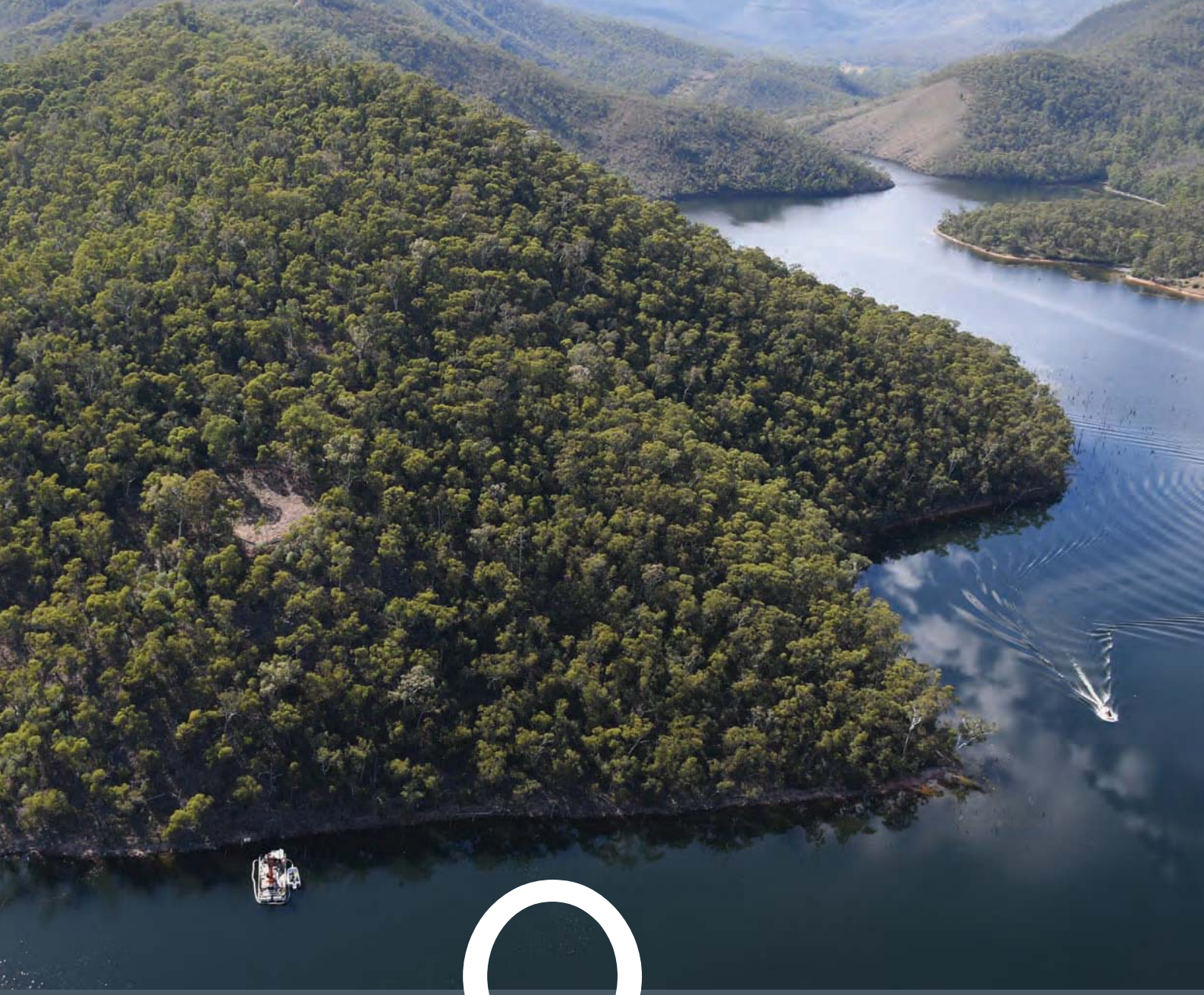

APPENDIX O

ABORIGINAL CULTURAL HERITAGE ASSESSMENT

New South Wales
ARCHAEOLOGY

Snowy 2.0
Exploratory Works
Aboriginal Cultural Heritage Assessment Report

Date: 20 July 2018
Author: Dr Julie Dibden
NSW Archaeology Pty Ltd
Proponent: Snowy Hydro Limited
Local Government Area: Snowy Valleys & Snowy Monaro Regional Councils

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PLATES

Frontispiece: The Yarrangobilly gorge at Lob Hole Ravine.
Source: Julie Dibden

EXECUTIVE SUMMARY

Introduction

The Snowy Mountains Hydro-electric Scheme (Snowy Scheme) was established by the Commonwealth in July 1949. The first power project within the scheme commenced operation in 1955 and the works were largely completed by 1974. The Snowy Scheme was and remains one of the largest engineering and construction projects in the world. The scheme consists of a network of reservoirs, tunnels, pipes and power stations in the Snowy Mountains of New South Wales (NSW).

In the original Snowy Scheme design, a tunnel between Tantangara and Talbingo was proposed. It was never built, and it is this link between the two existing reservoirs that Snowy Hydro Limited (Snowy Hydro) now plan to construct as Snowy 2.0.

Snowy 2.0 is a Pumped Hydro Energy Storage (PHES) project that will increase the generation capacity of the Snowy Scheme by up to 50 per cent, with an additional 2,000 megawatts of generation. Snowy 2.0 would comprise underground tunnels between the Tantangara and Talbingo reservoirs, an underground power station and associated infrastructure.

An Exploratory Works program is planned to better understand the underground conditions at the proposed power station cavern locations. The *Machine Hall* in which the power station would be housed is the largest of the underground caverns proposed. It would be excavated at a depth of about 850 metres below the surface and is one of the highest technical risks of the project. Detailed investigations of the rock conditions, ground temperature and stress conditions are required to confirm it as a viable site.

An Environmental Impact Statement (EIS) is being prepared to support an application seeking approval for Exploratory Works. This Aboriginal Cultural Heritage Assessment Report (ACHAR) has been prepared by New South Wales Archaeology Pty Ltd as a component of the EIS.

The area in which Exploratory Works would be undertaken is described as the Exploratory Works project area (project area) and is located at Lobs Hole and Talbingo Reservoir (Figures 1 & 2) in the Kosciuszko National Park (KNP).

Aboriginal Heritage

The Snowy Mountains is country to several groups and many Aboriginal people have cultural and spiritual associations that have long histories embodied in objects which can be seen on the ground and other intangible values related to the past and current

concerns and aspirations (NSW DEC 2006). The project area itself is located within the lands of the Wolgalu people (Boot 2000b).

The following excerpt from the KNP 2006 Plan of Management written by the members of the Kosciuszko Aboriginal Working Group (DEC 2006: xi) expresses the sentiments of Aboriginal people in regard to the Snowy Mountains:

> *Living by natural cycles, the land provides our people with life, ceremony, family lore/law, and resources, such as tools, plant medicine, plant food, waters, fish, animals and insects e.g. the Bogong moth, while the melting of the snow gives life to the many creeks and rivers that flow out of the mountains. There are places of spiritual and physical significance to our people, and we are committed to working in partnership with others to protect, maintain and manage these places.*

The National Parks and Wildlife Act 1974 (NPW Act) is the primary legislation for the protection of some aspects of Aboriginal cultural heritage in NSW. One of the objectives of the NPW Act is:

> … the conservation of objects, places or features (*including biological diversity) of cultural value within the landscape, including but not limited to: (i) places, objects and features of significance to Aboriginal people … (s.2A(1)(b))*.

Part 6 of the NPW Act is administered by the NSW Office of Environment and Heritage (NSW OEH) and provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. Harm is defined to mean destroying, defacing or damaging an Aboriginal object or declared Aboriginal place, or moving an object from the land. Anyone proposing to carry out an activity that may harm an Aboriginal object or declared Aboriginal place must investigate, assess and report on harm that may be caused by the activity they propose.

This report describes the assessment process, the Aboriginal objects, places and features of cultural value within the landscape and the proposed impacts and harm. It sets out a series of management and mitigation measures for the consideration of all stakeholders including the Aboriginal community, the NSW Department of Planning and Environment (DP&E), NSW OEH and Snowy Hydro.

Assessment Methodology

The assessment has been conducted in accordance with the NSW OEH (2011) *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (NSW DECCW 2010a).

A process of Aboriginal community consultation has been undertaken in accordance with the NSW OEH *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW DECCW 2010b). In addition, Snowy Hydro has consulted

independently with the relevant Local Aboriginal Land Councils and the Northern and Southern Kosciuszko National Park Aboriginal Community Memorandum of Understanding Groups. The consultation process is regular and on-going as the project is developed.

In addition to consultation, the heritage assessment has included a review of the relevant anthropological, historical and archaeological literature, a program of comprehensive field survey and extensive archaeological test excavations.

Assessment Results

Searches of the NSW OEH Aboriginal Heritage Information Management System (AHIMS) have been conducted (AHIMS #281524, #335512 & #335511). Eleven Aboriginal object locales recorded in 1992 are listed on AHIMS and occur in or near the project area.

At Lobs Hole[1], the field survey has been undertaken across a broad area, larger than, but inclusive of all areas in which direct impacts would occur. The field survey has sought to be as comprehensive as possible and was undertaken over six days. It is noted, however, that many places are vegetated with thick forest undergrowth and impenetrable blackberry thickets and this hampered access. Accordingly, the survey cannot claim to be complete and the management strategies proposed take this into consideration.

The project area has been divided into 27 Survey Units and their archaeological signature has been established during the assessment. A total of 44 Aboriginal object locales have been recorded in surface exposures across the project area. In addition, a program of test excavation has been conducted in seven Survey Units at Lobs Hole. A total of 2,306 lithic items were retrieved from 180 Test Squares (45 square metres). The average artefact density across the Survey Units tested is calculated to be 51 artefacts per square metre. It is evident based on these findings that the Lobs Hole valley was well used by Aboriginal people. The analysis has revealed a variable but widespread and relatively intensive use of the landscape.

Lithic material for implement manufacture at Lobs Hole was obtained almost exclusively from tuff and quartz cobbles sourced from the Yarrangobilly River. The lithic attributes suggest that pebbles were reduced by both hard hammer percussion and bipolar techniques to make sharp edge flakes and retouched tools for immediate usage. Numerous collections of items from individual knapping events have been identified which contain both the debitage - waste flakes - (sometimes including the core) and the retouched and or utilized items. Pebble tools including a grinding stone,

[1] In this report the contemporary spelling *Lobs Hole* is used except for when a specific older name is referred to, such as for example, *Lobbs Hole Copper Mine*, when the original spelling is used.

whetstone (for sharpening hatchets) and a hammerstone have been retrieved indicating the use of a broad suite of implements. Given the relative absence of foreign stone material, the evidence suggests that the Lobs Hole Ravine valley may have been used opportunistically as a refuge from the vagaries of the higher country weather. The valley would have provided protection from inclement weather, the resources of a fertile valley and an abundance of readily available lithic material.

The landforms within the project area have been found to be generally highly disturbed. All the project area has been subject to intensive levels of previous European impacts. Lobs Hole has been used since the early 1800s for prospecting, stock movement, grazing, mining, settlement, agriculture, recreation and so on. The Talbingo reservoir sites, including those near the Tumut 3 Power Station, are occupied by existing Snowy Scheme infrastructure, and in many places the original landforms have been entirely removed. Natural geomorphological processes including flooding and erosion, probably exacerbated by previous European activities, have been found to have contributed to disturbance. These prior impacts and processes have reduced the integrity of the archaeological values inherent within the landforms to varying degrees, but not entirely.

Conclusions and Recommendations

As a result of the assessment, the following conclusions and recommendations are made:

- The land in which impacts would occur is highly disturbed by previous land use and/or natural geomorphological processes. The archaeological resource is correspondingly disturbed.
- The Aboriginal artefact incidence in the project area does not surpass significance thresholds which would act to preclude the proposed impacts.
- Most of the artefact distribution is assessed to be representative of a very low or low density stone artefacts in their respective Survey Units. However, several Survey Units have been found to contain relatively high artefact densities. These are correspondingly of higher significance. Accordingly, management and mitigation of impacts comprises a tiered approach appropriate for each Survey Unit, and includes measures such as conservation, collection and/or salvage, and monitoring. In some Survey Units, no mitigation measures are required.
- Management and mitigation strategies are outlined and discussed in Section 9 of this report and should be given consideration by all stakeholders. These would form the basis for the development of an Aboriginal Cultural Heritage Management Plan.

  It is recommended that salvage excavations are conducted in five Survey Units in order to mitigate impacts to the archaeological resource in the project area.

Impact mitigation is not recommended for the remainder of Survey Units (N = 22).

- An Aboriginal Cultural Heritage Management Plan should be developed for guidance during construction in regard to the management of heritage, allowable impacts and mitigation.

Acknowledgments

Archaeological evidence confirms that Aboriginal people have had a long and continuous association with the region for thousands of years. We would like to acknowledge and pay our respects to the traditional owners of the country which is encompassed by the proposal.

Gratitude is extending to the following individuals for assistance during the preparation of this report:

Luke Penrith, Aboriginal Enterprise Development Program Binaal Billa Region Riverina - Murray and Western NSW,
Leanne Williams, Ramsey Freeman, Janice Williams, Steve Connolly, Lorraine Connolly, Lindsay Connolly, Julie Connolly, Lawrence Marlowe, Shirly Marlowe, Matt Marlowe and Ron Grosvenor, Northern MOU group, for field assistance,
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David Barnes,
Guy Fleming, Geological Survey of NSW,
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George Thomas, Wagga Wagga,
Tom Knight, Jo Dibden, Bec Parkes, Darren Rowsell, Ryan Desic, Kerryn Armstrong, for archaeological assistance in the field.

Unless otherwise acknowledged, all photographs in this report were taken by NSW Archaeology Pty Ltd personnel during fieldwork.

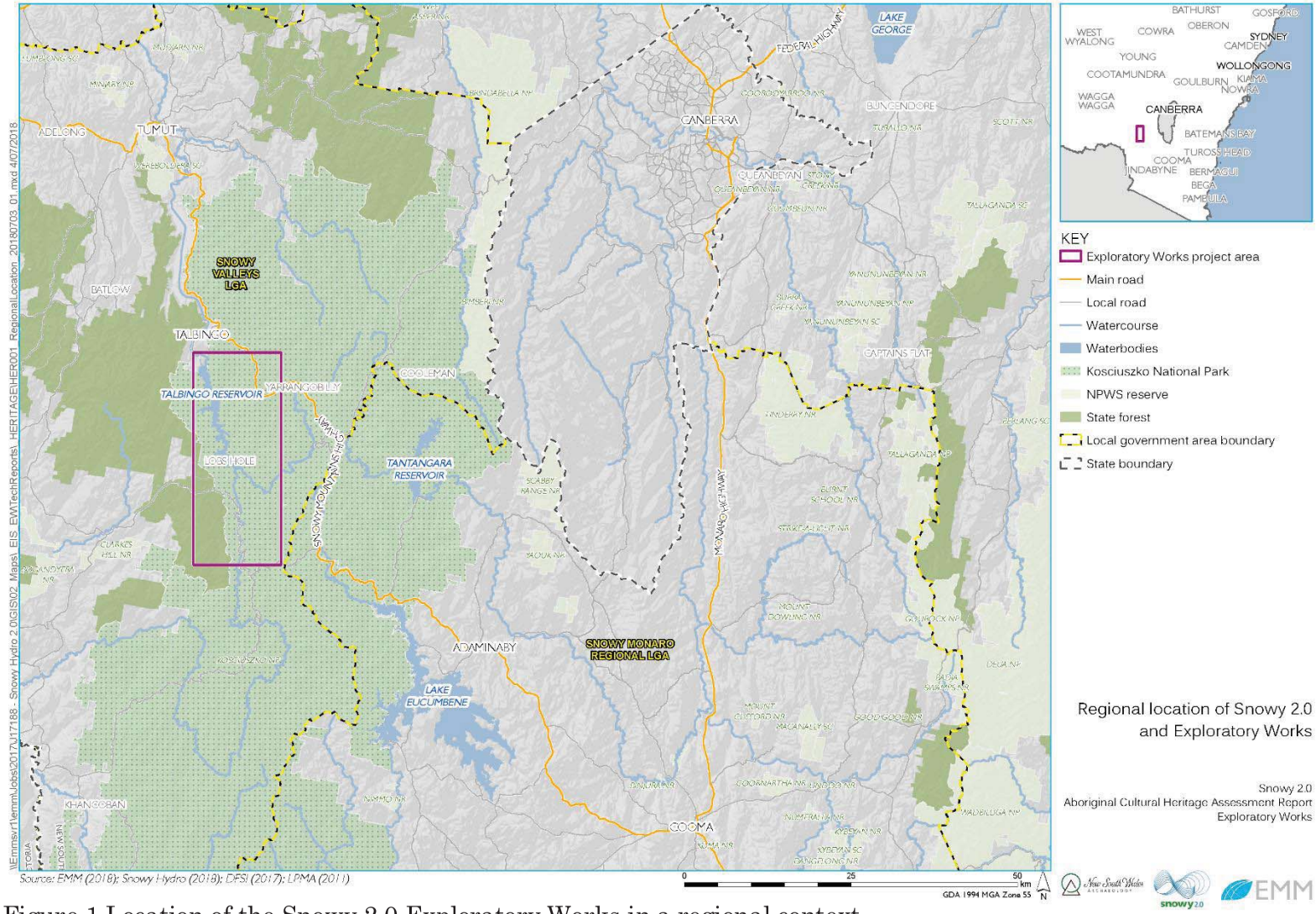


Figure 1 Location of the Snowy 2.0 Exploratory Works in a regional context.

Source: EMM (2018); Snowy Hydro (2018); SMEC (2018); Robert Bird (2018); DFSI (2017); LPMA (2011)

0 2.5 5 km
GDA 1994 MGA Zone 55
N

Exploratory Works project area

KEY

- Exploratory tunnel
- Access road upgrade
- Access road extension
- Communications cable
- Main road
- Local road
- Major watercourse
- On land rock management
- Subaqueous excavated rock placement
- Disturbance footprint
- Avoidance footprint

Snowy 2.0
Aboriginal Cultural Heritage Assessment Report
Exploratory Works

Figure 2 Exploratory works project area.

1. INTRODUCTION

1.1 THE PROJECT

Snowy Hydro Limited (Snowy Hydro) proposes to develop Snowy 2.0, a large scale pumped hydro-electric storage and generation project which would increase hydro-electric capacity within the existing Snowy Mountains Hydro-electric Scheme (Snowy Scheme). This would be achieved by establishing a new underground hydro-electric power station that would increase the generation capacity of the Snowy Scheme by almost 50%, providing an additional 2,000 megawatts (MW) generating capacity, and providing approximately 350,000 megawatt hours (MWh) of storage available to the National Electricity Market (NEM) at any one time, which is critical to ensuring system security as Australia transitions to a decarbonised NEM. Snowy 2.0 will link the existing Tantangara and Talbingo reservoirs within the Snowy Scheme through a series of underground tunnels and hydro-electric power station.

Snowy 2.0 has been declared to be State significant infrastructure and critical State significant infrastructure (CSSI) by the NSW Minister for Planning under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and is defined in Clause 9 of Schedule 5 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). Separate applications and environmental impact statements (EIS) for different phases of Snowy 2.0 are being submitted under Part 5, Division 5.2 of the EP&A Act. This technical assessment has been prepared to support an EIS for Exploratory Works to undertake investigative works to gather important technical and environmental information for the main Snowy 2.0 project. The main project will be subject of a separate application and EIS next year.

The purpose of Exploratory Works for Snowy 2.0 is primarily to gain a greater understanding of the conditions at the proposed location of the power station, approximately 850 metres (m) below ground level. Understanding factors such as rock conditions (such as stress conditions) and ground temperature is essential to inform decisions about the precise location of the power station cavern and confirm the cavern construction methods.

Exploratory Works comprises:

- an exploratory tunnel to the site of the underground power station for Snowy 2.0;
- horizontal and other test drilling, investigations and analysis in situ at the proposed cavern location and associated areas, and around the portal construction pad, access roads and excavated rock management areas all within the disturbance footprint;

- a portal construction pad for the exploratory tunnel;
- an accommodation camp for the Exploratory Works construction workforce;
- road works and upgrades providing access and haulage routes during Exploratory Works;
- barge access infrastructure, to enable access and transport by barge on Talbingo reservoir;
- excavated rock management, including subaqueous placement within Talbingo Reservoir;
- services infrastructure such as diesel-generated power, water and communications; and
- post-construction revegetation and rehabilitation, management and monitoring.

1.2 Purpose of this report

This Aboriginal Cultural Heritage Assessment Report (ACHAR) supports the EIS for Exploratory Works. It documents the heritage assessment methods and results, the initiatives built into the project design to avoid and minimise associated impacts, and the mitigation and management measures proposed to address any residual impacts not able to be avoided.

1.3 Location of Exploratory Works

Snowy 2.0 and Exploratory Works are within the Australian Alps, in southern NSW. The regional location of Exploratory Works is shown on Figure 1. Snowy 2.0 is within both the Snowy Valleys and Snowy Monaro Regional local government areas (LGAs), however Exploratory Works is entirely within the Snowy Valleys LGA. The majority of Snowy 2.0 and Exploratory Works are within Kosciuszko National Park (KNP). The area in which Exploratory Works will be undertaken is referred to herein as the project area and includes all of the surface and subsurface elements further discussed in Section 2.1.

Exploratory Works is predominantly in the Ravine region of the KNP. This region is between Talbingo Reservoir to the north-west and the Snowy Mountains Highway to the east, which connects Adaminaby and Cooma in the south-east to Talbingo and Tumut to the north-west of the KNP. Talbingo Reservoir is an existing reservoir that forms part of the Snowy Scheme. The reservoir, approximately 50 kilometres (km) north-west of Adaminaby and approximately 30 km east-north-east of Tumbarumba, is popular for recreational activities such as boating, fishing, water skiing and canoeing.

The nearest large towns to Exploratory Works are Cooma and Tumut. Cooma is approximately one hour and forty five minutes drive (95 km) south-east of Lobs Hole. Tumut is approximately half an hour (45 km) north of Talbingo. There are several communities and townships near the project area including Talbingo, Tumbarumba, Batlow, Cabramurra and Adaminaby. Talbingo and Cabramurra were built for the original Snowy Scheme workers and their families. Adaminaby was relocated to alongside the Snowy Mountains Highway from its original location (now known as Old Adaminaby) in 1957 due to the construction of Lake Eucumbene. Talbingo and Adaminaby provide a base for users of the Selwyn Snow Resort in winter. Cabramurra was modernised and rebuilt in the early 1970s and is owned and operated by Snowy Hydro. It is still used to accommodate Snowy Scheme employees and contractors. Properties within Talbingo are now predominantly privately owned. Snowy Hydro now only owns 21 properties within the town.

Other attractions and places of interest in the vicinity of the project area include Selwyn Snow Resort, the Yarrangobilly Caves complex and Kiandra. Kiandra has special significance as the first place in Australia where recreational skiing was undertaken and is also an old gold rush town.

The project area is shown on Figure 2 and comprises:

- Lobs Hole: Lobs Hole will accommodate the excavated rock emplacement areas, an accommodation camp as well as associated infrastructure, roads and laydown areas close to the portal of the exploratory tunnel and portal construction pad at a site east of the Yarrangobilly River;
- Talbingo Reservoir: installation of barge access infrastructure near the existing Talbingo Spillway, at the northern end of the Talbingo Reservoir, and also at Middle Bay, at the southern end of the reservoir, near the Lobs Hole facilities, and installation of a submarine cable from the Tumut 3 power station to Middle Bay, providing communications to the portal construction pad and accommodation camp. A program of subaqueous rock placement is also proposed;
- Mine Trail Road will be upgraded and extended to allow the transport of excavated rock from the exploratory tunnel to sites at Lobs Hole that will be used to manage excavated material, as well as for the transport of machinery and construction equipment and for the use of general construction traffic; and
- several sections of Lobs Hole Ravine Road will be upgraded in a manner that protects the identified environmental constraints present near the current alignment.

The project is described in more detail in Chapter 2.

1.4 Proponent

Snowy Hydro is the proponent for Exploratory Works. Snowy Hydro is an integrated energy business – generating energy, providing price risk management products for wholesale customers and delivering energy to homes and businesses. Snowy Hydro is the fourth largest energy retailer in the NEM and is Australia's leading provider of peak, renewable energy.

1.5 Assessment Guidelines and Requirements

This ACHAR has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for Exploratory Works, issued on 17 May 2018 (revised 20 June 2018), as well as relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies.

The SEARs must be addressed in the EIS. Table 1 lists the matters relevant to this assessment and where they are addressed.

Table 1 Relevant matters addressed in the SEARs.

Requirement	Section addressed
- an assessment of the Aboriginal and historic heritage (cultural and archaeological) impacts of the project; - archival and oral history recording for any items with significant heritage values likely to be disturbed or impacted by the project; and - adequate consultation with the local Aboriginal community and other relevant stakeholders, having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH, 2010)	This report and the Historic Cultural Heritage Assessment (Appendix P of the EIS)

The ACHAR addresses the SEARs. The content and format of the report is set out in accordance with the NSW OEH (2011) Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW document. The report aims to document:

- The Aboriginal objects and declared Aboriginal places (as relevant) located within the area of the proposed activity;
- The cultural heritage values, including the significance of the Aboriginal objects and declared Aboriginal places that exist across the whole area that will be affected by the proposed activity, and the significance of these values for the Aboriginal people who have a cultural association with the land, as relevant;
- How the requirements for consultation with Aboriginal people have been met (as specified in clause 80C of the NPW Regulation);

- The views of those Aboriginal people regarding the likely impact of the proposed activity on their cultural heritage (if relevant);
- The actual or likely harm posed to the Aboriginal objects or declared Aboriginal places from the proposed activity, with reference to the cultural heritage values identified;
- Any practical measures that may be taken to protect and conserve those Aboriginal objects or declared Aboriginal places (if relevant); and
- Any practical measures that may be taken to avoid or mitigate any actual or likely harm, alternatives to harm, or, if this is not possible, to manage (minimise) harm (if relevant).

The assessment and reporting has been conducted by Dr Julie Dibden (ANU: BA honours; PhD) and Andrew Pearce (UNE: Bachelor of Archaeology and Paleoanthropology), New South Wales Archaeology Pty Ltd. Field assistance has been provided by the people representing the Tumut Brungle Gundagai Area Aboriginal Community Memorandum of Understanding (TBGAAC MOU) group. Further field and technical assistance has been provided by archaeologists Tom Knight, Jo Dibden, Darren Rowsell, Bec Parkes, Kerryn Armstrong and Ryan Desic.

2. DESCRIPTION OF THE PROJECT – EXPLORATORY WORKS

The Snowy Mountains Scheme is the largest engineering project ever undertaken in Australia. It is also one of the largest and most complex hydro-electric schemes in the world. Its construction is seen by many as a defining point in Australia's history, and an important symbol of Australia's identity as an independent, multicultural and resourceful country (Commonwealth Government 2015).

The Snowy Mountains Scheme was designed to collect and store water, divert it through trans-mountain tunnels and power stations and then release it west of the Snowy Mountains into the catchments of the Murray and Murrumbidgee rivers. This long-term water regulation was designed to counteract the effects of severe drought sequences and increase agricultural productivity in the Murray Darling Basin (Snowy Hydro 2017).

The Snowy Mountains Scheme consists of:

- sixteen major dams with a total active storage capacity of 5,300 gigalitres (GL);
- nine power stations;
- one pumping station and one pump storage capability at Tumut 3 Power Station; and
- 145 km of tunnels and pipelines and 80 km of aqueducts.

The Snowy Mountains Scheme has 4,100 MW of existing hydro-electric generating capacity and produces 4,000 GWh on average each year for the National Electricity Market (NEM). The Snowy Scheme operates predominantly within the KNP under a lease from the NSW Minister for the Environment.

Snowy Hydro operates the Snowy Mountains Scheme under a water licence administered by the NSW Department of Industry - Water that allows for water collection, storage, diversion and release in order to generate electricity.

Snowy Hydro is the proponent for Snowy 2.0 and, as such, the proponent for the Exploratory Works. Snowy Hydro is an integrated energy business – generating energy, providing price risk management products for wholesale customers and delivering energy to homes and businesses. Snowy Hydro is the fourth largest energy retailer in the NEM and is Australia's leading provider of peak, renewable energy.

2.1 THE EXPLORATORY WORKS

Exploratory Works comprises construction associated with geotechnical exploration for the underground power station for Snowy 2.0. The Exploratory Works elements are shown on Figure 3 and involve:

- establishment of an exploratory tunnel to the site of the underground power station for Snowy 2.0;
- horizontal and other test drilling, investigations and analysis in situ at the proposed cavern location and associated areas, and around the portal construction pad, access roads and excavated rock management areas all within the disturbance footprint;
- establishment of a portal construction pad for the exploratory tunnel;
- establishment of an accommodation camp for the Exploratory Works construction workforce;
- road works and upgrades providing access and haulage routes during Exploratory Works;
- establishment of barge access infrastructure, to enable access and transport by barge on Talbingo reservoir;
- excavated rock management, including subaqueous placement within Talbingo Reservoir;
- establishment of services infrastructure such as diesel-generated power, water and communications; and
- post-construction revegetation and rehabilitation, management and monitoring.

2.2 Exploratory Tunnel

An exploratory tunnel of approximately 3.1 km is proposed to provide early access to the location of the largest cavern for the underground power station. This will enable exploratory drilling and help optimise the location of the cavern which, in turn, will optimise the design of Snowy 2.0.

The exploratory tunnel is proposed in the east of Lobs Hole and will extend in an east-west direction with the portal construction pad to be outside the western end of the tunnel at a site east of the Yarrangobilly River, as shown on Figure 4.

The location of the proposed exploratory tunnel and portal construction pad is shown in Figures 4 and 5. The exploratory tunnel will be excavated by drill and blast methods and have an 8 x 8 m D-Shaped cross section.

The drill and blast excavation process will be repeated cyclically throughout the tunnelling works, involving:

- marking up and drilling blast holes in a predetermined pattern in the working face of the tunnel;
- loading the blast holes with explosives, attaching detonators and connecting the holes into a blast sequence, and detonating the blast;

- ventilating the tunnel to remove blast fumes and dust;
- removing blasted rock;
- scaling and wash down of the tunnel roof and walls to remove loosened pieces of rock;
- geological mapping of the exposed rock faces and classification of the conditions to determine suitable ground support systems for installation;
- installing ground support; and
- advancing construction ventilation ducting and other utilities including power, water, compressed air and communications.

The exploratory tunnel will be shotcrete-lined with permanent anchor support and incorporate a groundwater management system. The exploratory tunnel shape and dimensions are designed to allow two-lane traffic for the removal of excavated material, along with additional space for ventilation and drainage of groundwater inflows. Groundwater intersected during tunnelling will be contained and transferred to the portal for treatment and management. Areas identified during forward probing with the potential for high groundwater flows may require management through a detailed grouting program or similar.

The tunnel portal will be established at the western end of the exploratory tunnel and provide access and utilities to the exploratory tunnel during construction. The portal will house power, communications, ventilation and water infrastructure. The portal will also provide a safe and stable entrance to the exploratory tunnel.

It is anticipated that the exploratory tunnel will be adapted for multiple functions during construction of the subsequent stages of the Snowy 2.0 project. The exploratory tunnel will also eventually be utilized to form the main access tunnel (MAT) to the underground power station during the operational phase of Snowy 2.0, should it proceed.

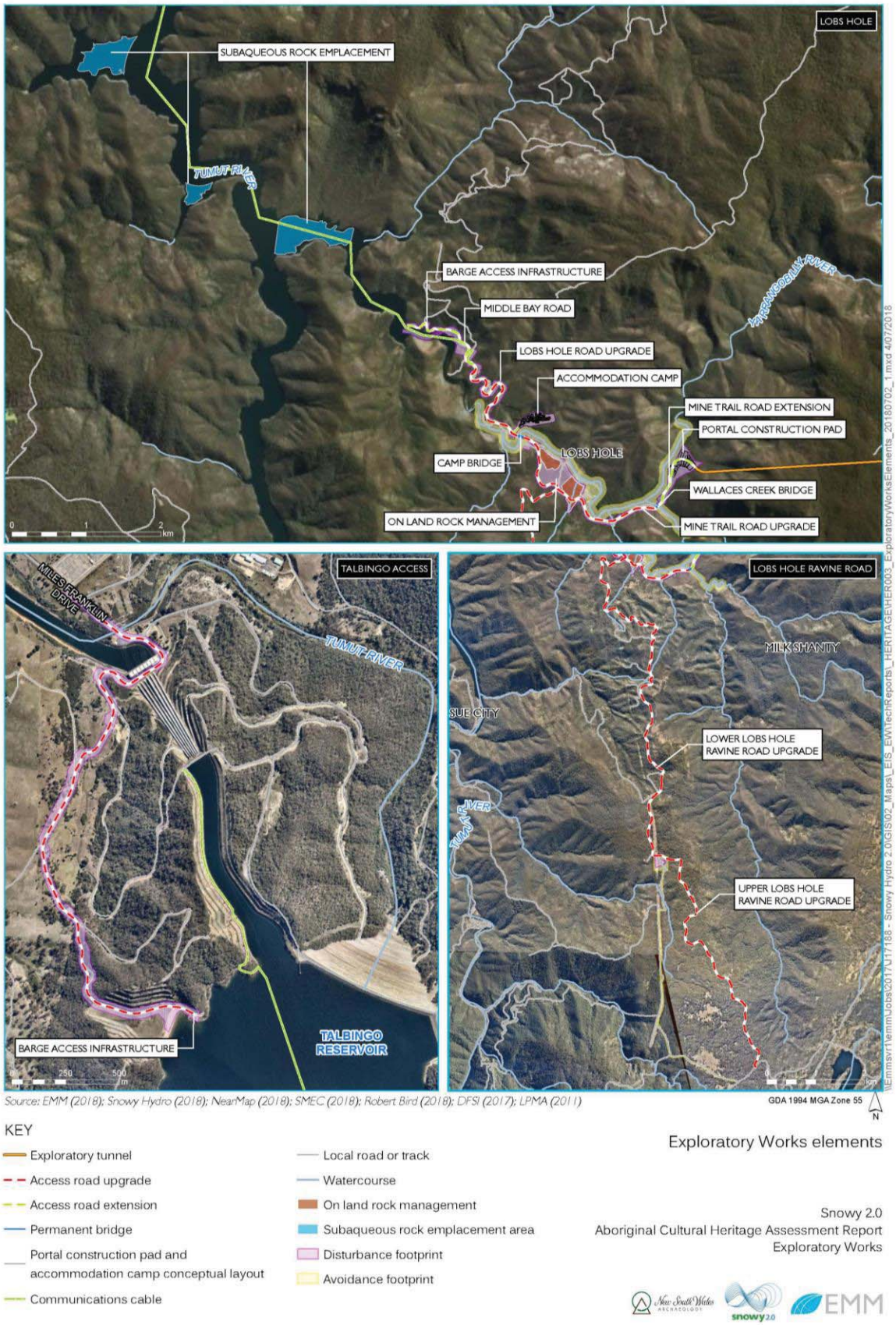


Figure 3 Exploratory Works elements.

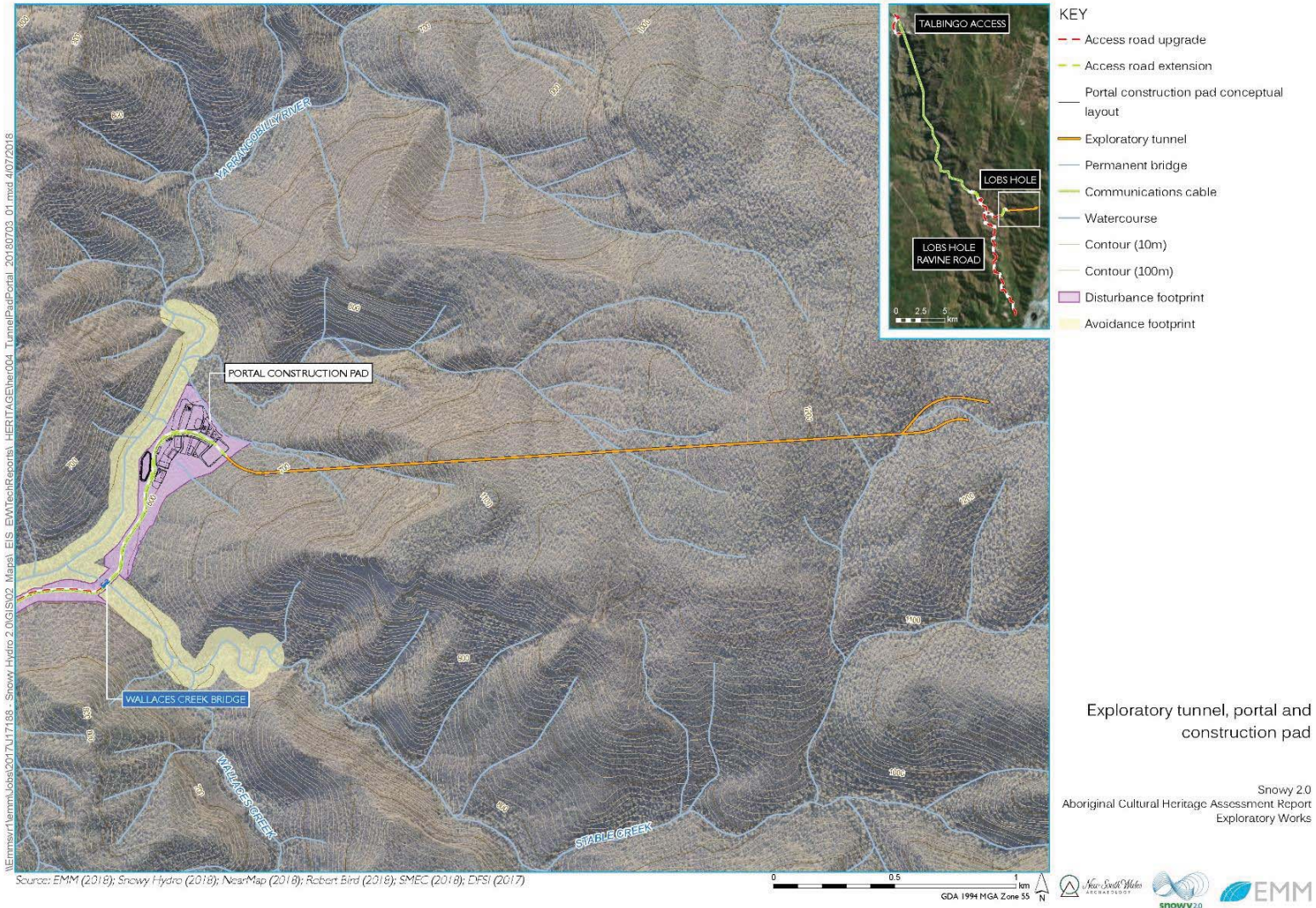
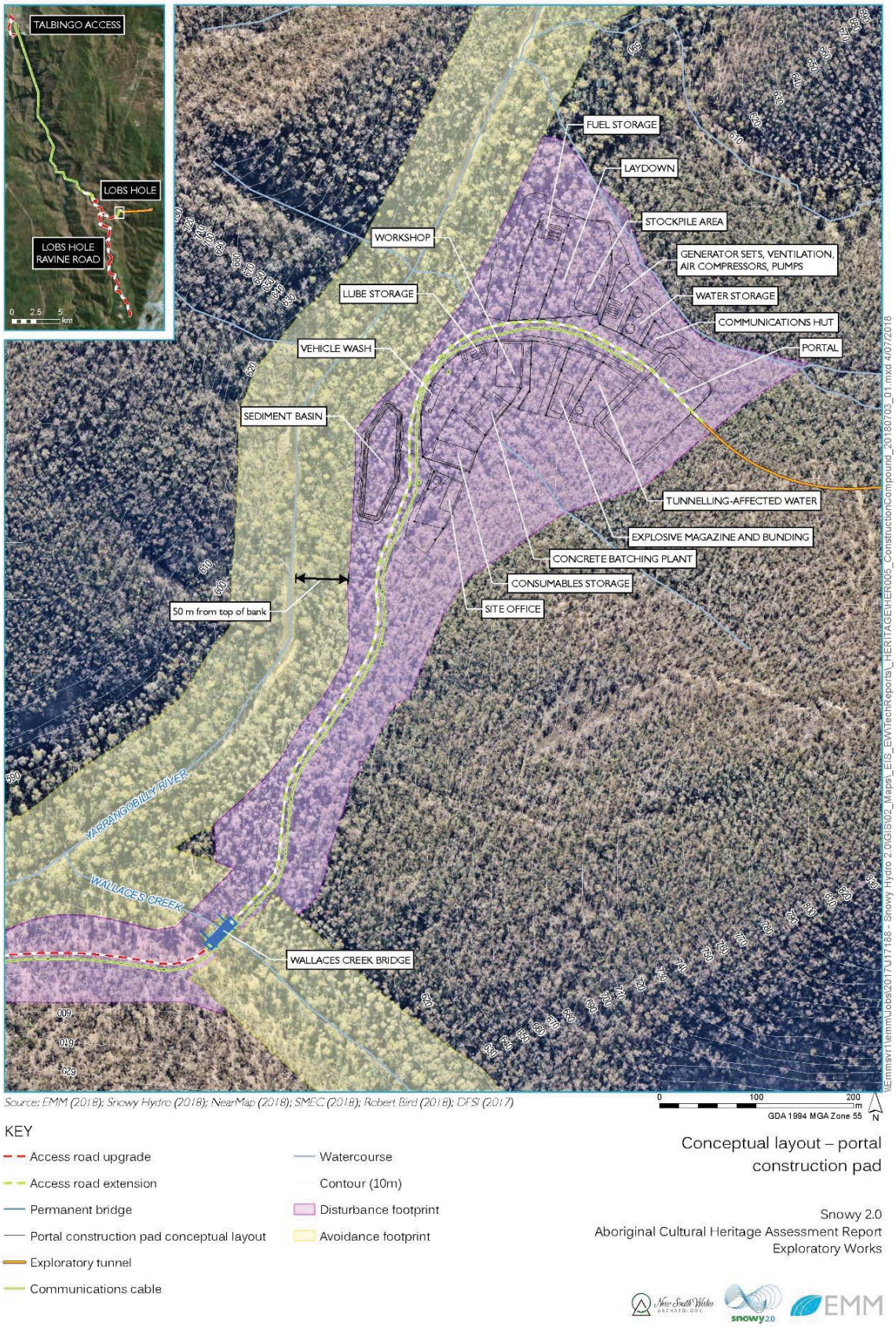


Figure 4 Exploratory tunnel location.



Source: EMM (2018); Snowy Hydro (2018); NearMap (2018); SMEC (2018); Robert Bird (2018); DFSI (2017)

KEY

- Access road upgrade
- Access road extension
- Permanent bridge
- Portal construction pad conceptual layout
- Exploratory tunnel
- Communications cable
- Watercourse
- Contour (10m)
- Disturbance footprint
- Avoidance footprint

Conceptual layout – portal construction pad

Snowy 2.0
Aboriginal Cultural Heritage Assessment Report
Exploratory Works

Figure 5 Conceptual layout – portal construction pad.

2.3 Portal Construction Compound

A portal construction pad for the exploratory tunnel will provide a secure area for construction activities. Infrastructure at the portal construction pad, shown in Figure 5, will primarily support tunnelling activities and include a concrete batching plant and associated stockpiles, site offices, maintenance workshops, construction support infrastructure, car parking and equipment laydown areas. Stockpile areas will allow for around two to three months supply of concrete aggregate and sand for the concrete batching plant to ensure that the construction schedule for the proposed access road works do not interfere with the exploratory tunnel excavation schedule. A temporary excavated rock stockpile area is also required to stockpile material excavated during tunnel construction prior to its transfer to the larger excavated material emplacement areas.

The portal construction pad will be at the western end of the exploratory tunnel. The portal construction pad will be excavated to provide a level construction area with a near vertical face for the construction of the portal and tunnelling. The area required for the portal construction pad is approximately 100,000 m^2.

2.4 Excavated Rock Management

It is estimated that approximately 750,000 m^3 of bulked materials will be excavated, mostly from the exploratory tunnel and portal construction pad with additional quantities from road upgrade works. Subject to geochemical testing of the rock material, excavated rock will be placed either on land or subaqueously within Talbingo Reservoir.

2.4.1 On Land Placement

Excavated materials will be placed in one of two rock emplacement areas at Lobs Hole as shown on Figure 6. The strategy for excavated rock management is for excavated material to be emplaced at two areas with the final placement of excavated material to be determined at a later date.

Consultation with NPWS throughout the design process has identified an opportunity for the eastern emplacement area to form a permanent landform that enables greater recreational use of Lobs Hole following the completion of Snowy 2.0's construction. It is envisaged that the excavated rock emplacement area will provide, in the long-term, a relatively flat final landform suitable for camping and basic recreational facilities to be confirmed in consultation with NPWS.

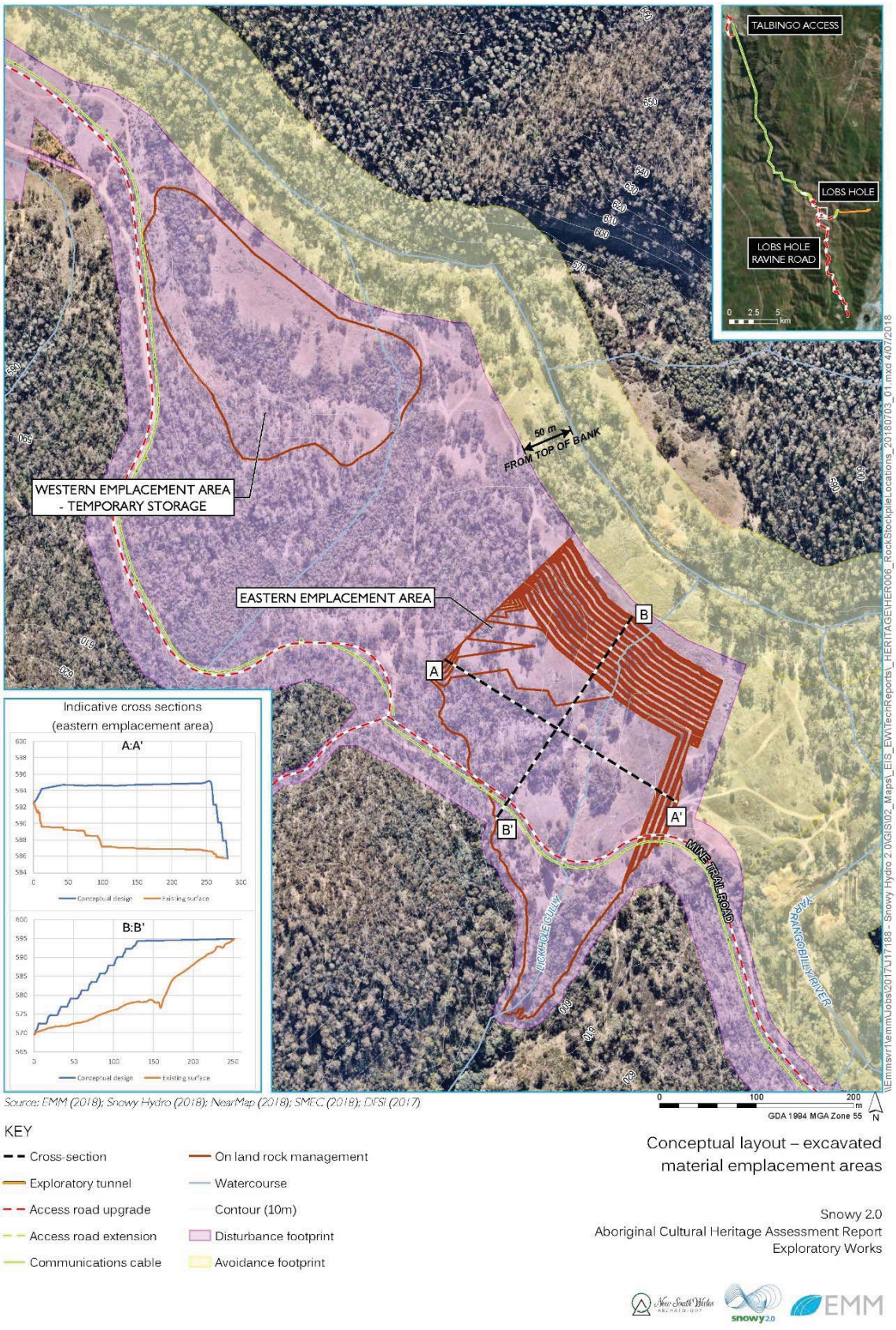


Figure 6 Conceptual layout – excavated rock emplacement areas.

The eastern emplacement area has a capacity of up to 600,000 m^3 of material. It will be approximately 25 m maximum depth and will be benched down to the northern edge of the emplacement which is setback 50 m from the Yarrangobilly River. The western emplacement area will be used to store excavated material should it not be able to be placed within the eastern emplacement area. It is envisaged this emplacement area will be used to store excavated materials suitable for re-use within the construction of Exploratory Works or for use by NPWS in KNP maintenance activities. All remaining material placed in this emplacement area will be removed following the completion of Exploratory Works.

The guiding principles for the design, construction method and management of emplacement areas undertaken for Exploratory Works have been as follows:

- reducing potential for acid rock drainage from the excavated rock emplacement area entering the Yarrangobilly River or forming groundwater recharge;
- avoid known environmental constraints; and
- manage existing surface water flows from Lick Hole Gully.

The design and management of the emplacement areas have not yet been finalised due to the need for further investigations to determine the likely geochemical characteristics of the excavated material. Following further investigation and prior to construction of Exploratory Works a management plan will be prepared and implemented.

2.4.2 Subaqueous Placement

An initial program for the placement of excavated rock within Talbingo Reservoir also forms part of Exploratory Works. The program will be implemented in an appropriate section of Talbingo Reservoir in accordance with a detailed management plan based on an engineering method informed through the materials' geochemistry and reservoir's characteristics. The purpose of the program is to confirm the suitability of the emplacement method for future excavated rock material from the construction of Snowy 2.0, should it proceed.

The rock for subaqueous placement will be taken from the excavated rock emplacement areas as described above. Testing of the rock would be conducted during excavation to assess geochemical properties. Any rock assessed as unsuitable for subaqueous placement based on the prior geochemical and leachability testing would be separately stockpiled and not used in the program. Suitable (ie non-reactive material) would be transported and loaded to barge, for placement at the deposition area. Suitable placement locations have been identified for Exploratory Works and are shown indicatively on Figure 7.

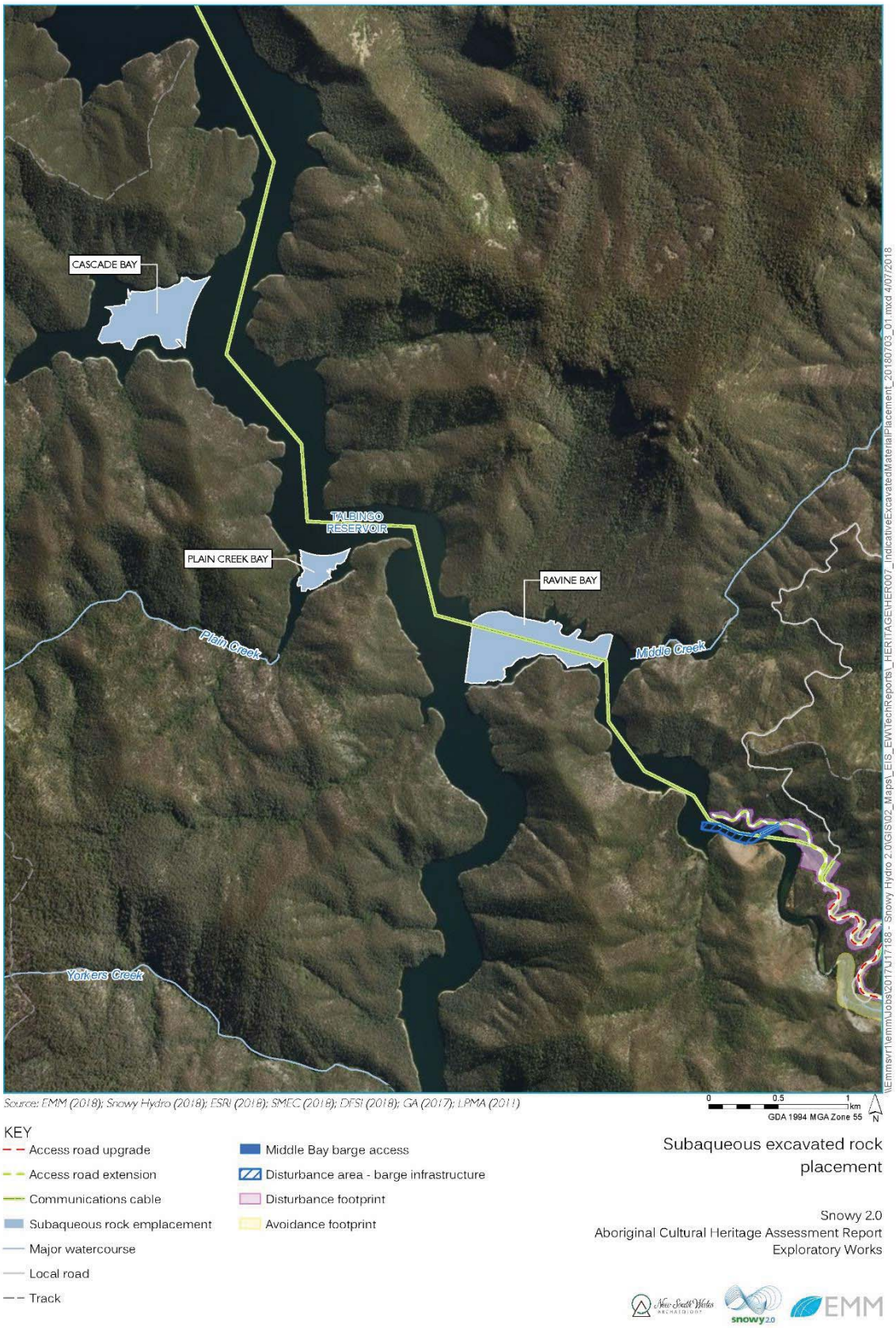


Figure 7 Indicative location of subaqueous rock placement in Talbingo reservoir.

All placement within the reservoir would occur within silt curtains and would be subject to a detailed monitoring regime including survey monitoring of pre-placement and post-placement bathymetry, water quality monitoring during placement, and monitoring of aquatic ecology and the recolonisation of benthic species and fish species to the placement area following the placement program. The management, mitigation and monitoring measures would be refined following the ongoing investigations.

2.5 ACCOMMODATION CAMP

An accommodation camp is proposed to provide accommodation and supporting services for workers in close proximity to the exploratory tunnel. The accommodation camp would include ensuite rooms surrounding central facilities including a kitchen, tavern, gym, admin office, laundry, maintenance building, sewage and water treatment plants and parking that will service the Exploratory Works workforce. The accommodation camp access road will connect to the north side of Lobs Hole Road at Lobs Hole. The conceptual layout of the accommodation camp is shown on Figure 8.

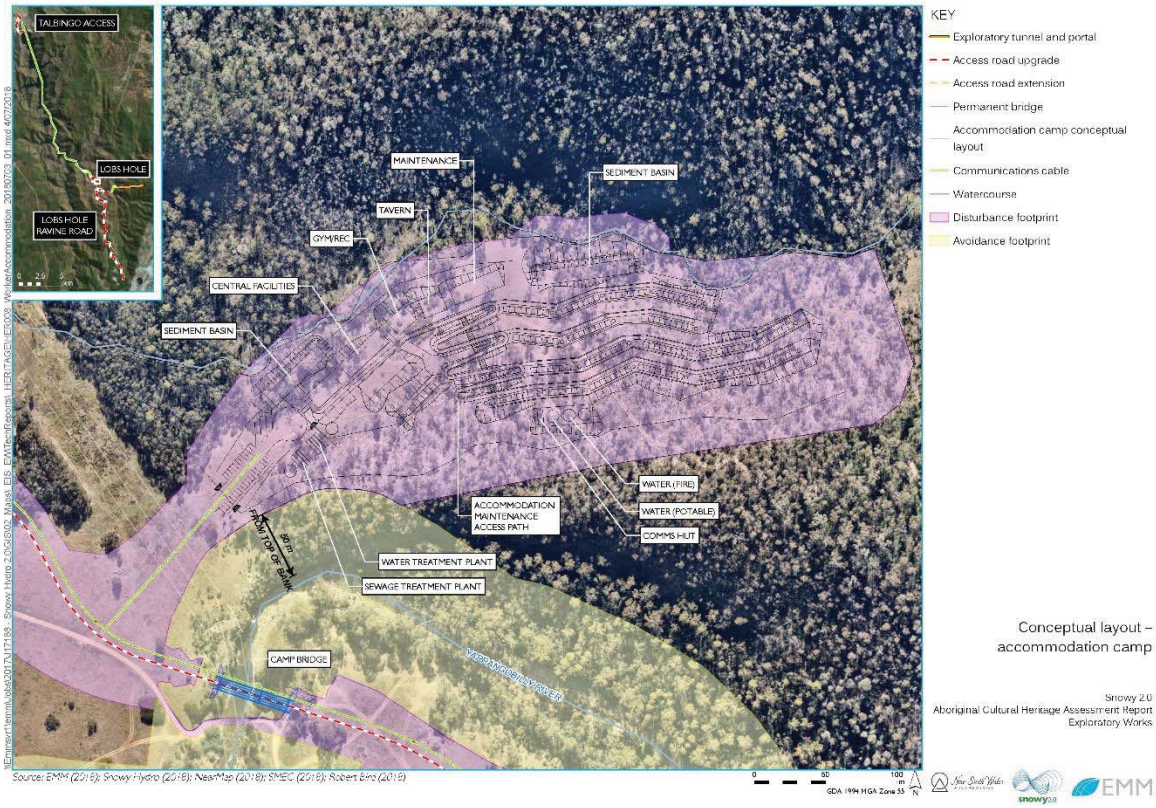


Figure 8 Conceptual layout – accommodation camp.

2.6 Road and Access Provisions

Existing road and access will need to be upgraded to a suitable standard to:

- provide for the transport of excavated rock material between the exploratory tunnel and the excavated rock emplacement areas;
- accommodate the transport of oversized loads as required; and
- facilitate the safe movement of plant, equipment, materials and construction staff to the portal construction pad.

Given the topographic constraints of the area, the standard of the existing roads and the environmental values associated with KNP, the option of barging larger and oversized loads to the site is available. This is discussed further below.

2.6.1 Access road Works

The access road upgrades will be designed based on access for a truck and dog trailer. The proposed road works are shown in Figure 9 and described in Table 2. It is expected that the majority of materials and equipment will travel along the Snowy Mountains Highway, Link Road and Lobs Hole Ravine Road, with some required to travel on Miles Franklin Drive via Talbingo to Talbingo Dam Wall and be transferred via a barge to site. The primary haul routes for construction material on site are provided in Figure 10. Where existing roads are replaced by new access roads or road upgrades, the existing roads will be removed and rehabilitated in line with the rehabilitation strategy for Exploratory Works.

Table 2 Access road works summary.

Roadwork area	Overview
Upper Lobs Hole Ravine Road upgrade	Minor upgrades to 7.5 km section of existing road. Only single lane access will be provided. No cut and fill earthworks or vegetation clearing will be undertaken.
Lower Lobs Hole Ravine Road upgrade	Upgrades to 6 km section of existing road involving cut and fill earthworks in some sections. Only single lane access will be provided.
Lobs Hole Road upgrade	Upgrade to 7.3 km section of existing road providing two-way access.
Mine Trail Road upgrade	Upgrade to 2.2 km section of existing track to two-way access.
Mine Trail Road extension	Establishment of a new two-way road providing access to the exploratory tunnel portal.
Middle Bay Road	Establishment of a new two-way road to the proposed Middle Bay barge ramp.
Spillway Road	Upgrade of a 3 km section of existing road to provide two-way access to the proposed Spillway barge ramp.

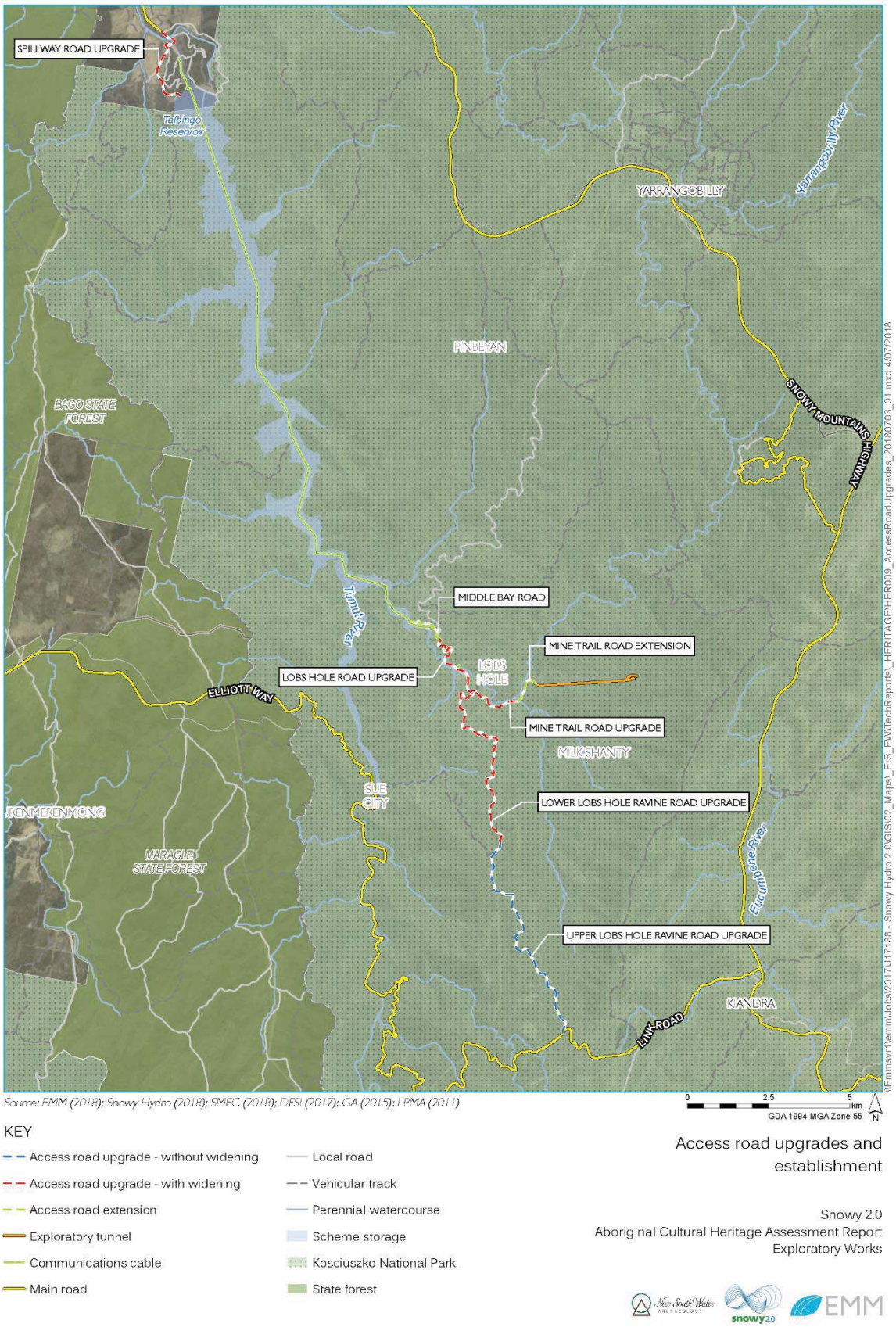


Figure 9 Access road upgrades and establishment.

While no cut and fill earthworks or vegetation clearing is proposed along Upper Lobs Hole Ravine Road, a laydown area is proposed within and adjacent to the existing transmission line easement. This area will be used to store materials required for the road works to the lower section of Lobs Hole Ravine Road.

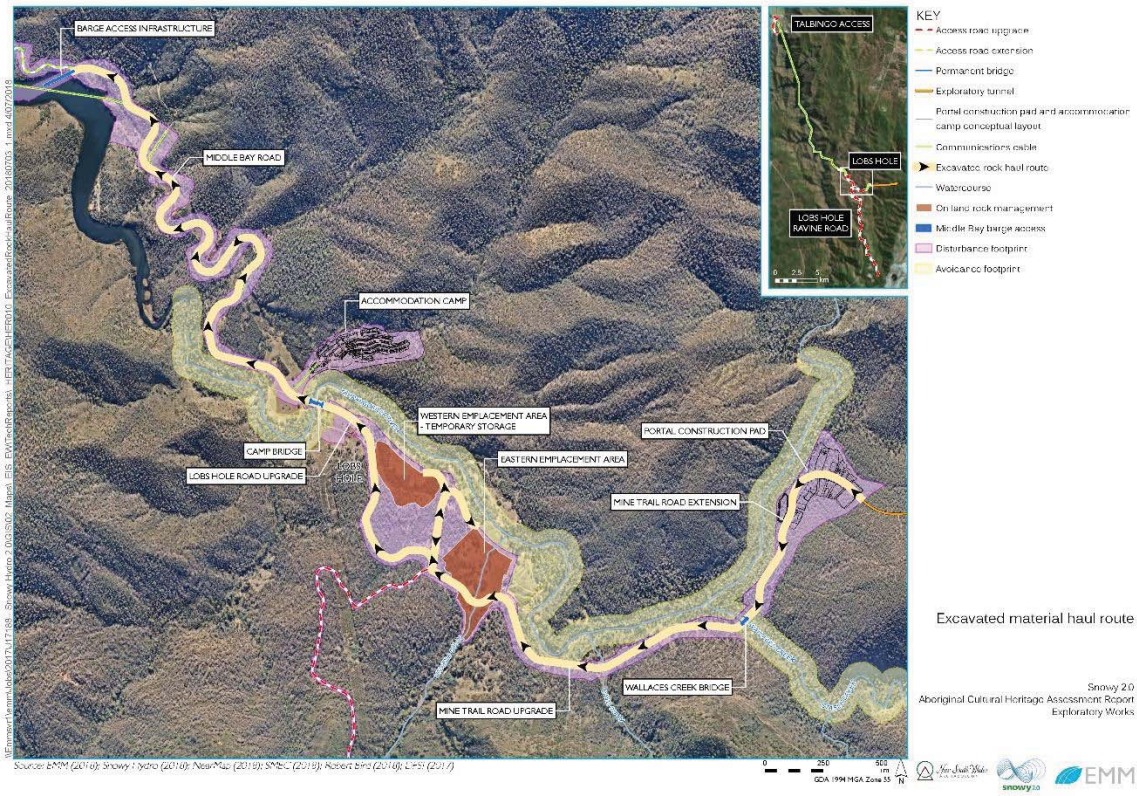


Figure 10 Excavated material haul route.

2.6.2 WATERCOURSE CROSSINGS

Bridge construction will be required at two locations as described in Table 3. The locations of these bridge works are shown in Figure 10.

The design for permanent bridges at both crossings will consist of steel girders with a composite deck. This is the most common type of permanent bridge constructed in and around the existing Snowy Scheme. Lightweight steel girders are easy to transport and will therefore allow for efficiencies in the construction schedule and permit the use of smaller-scale lifting equipment at the construction site.

Table 3 Watercourse crossing summary.

Bridge works area	Overview
Camp bridge	An existing crossing on Yarrangobilly River will be used as a temporary crossing while a new permanent bridge is built as part of Lobs Hole Road upgrade. The existing crossing will require the crossing level to be raised with rocks to facilitate vehicle passage. The rocks used to raise the crossing level will be removed and the crossing no longer used once the permanent bridge has been constructed. The new bridge (Camp Bridge) will be a permanent

Bridge works area	Overview
	crossing and used for both Exploratory Works and Snowy 2.0 main works, should it proceed.
Wallaces Creek bridge	Establishment of a new permanent bridge at Wallaces Creek as part of the Mine Trail Road extension. Establishment of this bridge will require an initial temporary pre-fabricated 'Bailey bridge' to be constructed, which will be removed before the end of Exploratory Works.

2.7 Barge Access infrastructure

To provide an alternative to road access, a barge option is proposed, not only for bulky and heavy equipment but for materials and in case of emergency. During Exploratory Works, barges will be loaded at the northern barge ramp (Talbingo barge ramp), travel about 18 km along Talbingo Reservoir and be unloaded at the southern barge ramp (Middle Bay barge ramp) before returning to the north. Some loads may also be transported in the reverse direction.

Barge access infrastructure will comprise two dedicated barge ramps at Middle Bay and Talbingo Spillway, with a slope of approximately 1 vertical to 10 horizontal (1V: 10H) at each location. A navigation channel is also required adjacent to the Middle Bay barge ramp. Construction will involve:

- geophysical and geotechnical investigation of the barge access area to inform detailed design;
- site establishment and excavation of barge access area;
- installation of precast concrete panels at the ramp location;
- installation of bollards for mooring lines;
- removal of trees and debris to establish a navigation channel allowing barge access; and
- minor dredging to allow barge access at the reservoir minimum operating level.

To facilitate construction, laydown areas are proposed adjacent to the Middle Bay barge ramp and adjacent to the water inlet pipeline. Laydown will also be used within the footprint of the Talbingo barge ramp. Dredged material will be placed as part of the subaqueous placement program or within one of the designated on land rock emplacement areas. The infrastructure proposed for the Talbingo Spillway barge ramp and Middle Bay barge ramp is provided in Figure 11.

Figure 11 Barge access locations.

2.8 SERVICES AND INFRASTRUCTURE

Exploratory Works will require additional power and communication infrastructure. Water services are also needed and include a water services pipeline and water and waste water (sewage) treatment facilities. A summary of services required is provided at Table 4.

Table 4 Summary of services and infrastructure.

Services infrastructure	Description
Power	Power will be provided at the portal construction pad and accommodation camp by diesel generators, with fuel storage provided at the portal construction pad.
Communication	Communication will be provided via fibre optic link. The fibre optic service has been designed to incorporate a submarine cable from Tumut 3 power station across Talbingo Reservoir to Middle Bay, and then via a buried conduit within the access roads to the accommodation camp and the portal construction pad.
Water and waste water (sewage)	A water services pipeline is proposed for the supply and discharge of water for Exploratory Works which will pump water between Talbingo Reservoir and the exploratory tunnel portal, portal construction pad and accommodation camp.
	A package water treatment plant is proposed at the accommodation camp to provide potable water to the accommodation camp and portal construction pad facilities and will be treated to a standard that complies with the Australian Drinking Water Guidelines. The accommodation camp water supply will be pumped via the water pipeline from Talbingo Reservoir at Middle Bay.
	A package waste water (sewage) treatment plant (STP) is proposed at the accommodation camp for the Exploratory Works waste water. The STP will produce effluent quality comparable to standard for inland treatment facilities in the region (eg Cabramurra). Following treatment waste water will be discharged to Talbingo reservoir via the water services pipeline connecting the accommodation camp to Talbingo Reservoir. Waste water from the exploratory tunnel and concrete batching plant will be either re-used on site or sent to the waste water treatment plant for treatment prior to discharge.

2.9 CONSTRUCTION AND SCHEDULE

2.9.1 GEOTECHNICAL INVESTIGATION

To assist the design development for the portal construction pad, accommodation camp, Middle Bay Road, Spillway Road, and Lobs Hole Ravine Road, further survey of ground conditions is required. A program of geotechnical investigations including geophysical survey, construction of test pits, and borehole drilling within the disturbance footprint, will be undertaken as part of construction activities. Excavation of test pits in areas where information on relatively shallow subsurface profiles is required, or where bulk sampling is required for laboratory testing. Borehole drilling is required to facilitate the detailed design of cuttings, bridge foundations, retaining wall foundations, and drainage structures.

2.9.2 CONSTRUCTION ACTIVITIES

A disturbance footprint has been identified for Exploratory Works. The extent of the footprint is shown on Figure 2 and shows the area required for construction, including the buildings and structures, portal construction pad, road widening and bridges, laydown areas, and rock emplacement areas. Typical construction activities that will occur within the footprint are summarised in Table 5.

Table 5 Construction activities.

Activity	Typical method
Geophysical and geotechnical investigation	Geophysical surveys will generally involve: o laying a geophone cable at the required location and establishing seismic holes; o in-reservoir geophysics surveys will use an air gun as the seismic source; and o blasting of explosives within seismic holes; Geotechnical surveys will generally involve: o establishing a drill pad including clearing and setup of environmental controls where required; o drilling a borehole to required depth using a tracked or truck mounted drill rig; and o installing piezometers where required for future monitoring program. Geophysical and geotechnical investigation within Talbingo Reservoir will be carried out using barges and subject to environmental controls.
Site establishment for portal construction pad, accommodation camp, rock placement areas and laydown areas	Site establishment will generally involve: o identifying and flagging areas that are to be avoided during the Exploratory Works period; o clearing of vegetation within the disturbance footprint, typically using chainsaws, bulldozers and excavators; o civil earthworks to create a stable and level area suitable for establishment. This will involve a cut and fill approach where required to minimise the requirement for imported material;

Activity	Typical method
	○ installing site drainage, soil erosion and other permanent environmental controls where required; ○ surface finishing, compacting only existing material where possible, or importing additional material. Where suitable, this material will be sourced locally (eg from upgrade works to Lobs Hole Ravine Road); and ○ set up and commissioning of supporting infrastructure, including survey marks.
Road works	Upgrades of existing tracks (no widening) will generally involve: ○ identifying and flagging areas that are to be avoided during the Exploratory Works period; and ○ removing high points, infilling scours, levelling of rutting, and compacting surfaces. Extension or widening of existing tracks will generally involve: ○ identifying and flagging areas that are to be avoided during the Exploratory Works period; ○ installing site drainage, soil erosion and other permanent environmental controls where required; ○ clearing and earthworks within the disturbance footprint; and ○ placing road pavement material on the roadway.
Bridge works	Establishment of permanent bridges will generally involve: ○ installing erosion and sedimentation controls around watercourses and installing scour protection as required; ○ establishing temporary diversions within the watercourse where required, including work to maintain fish passage; ○ establishing temporary bridges to facilitate permanent bridge construction; ○ constructing permanent bridges including piling, establishment of abutments and piers; and ○ removal and rehabilitation of temporary bridges and diversions.
Barge access works	Establishment of barge access infrastructure will generally involve: ○ installing sediment controls; ○ excavating and dredging of barge ramp area and navigation channel; ○ installing precast concrete planks and bollards; and ○ set up and commissioning of supporting infrastructure.

Activity	Typical method
Exploratory tunnel construction	The drill and blast excavation process will be repeated cyclically throughout the tunnelling works, involving: o marking up and drilling blast holes in a predetermined pattern in the working face of the tunnel; o loading the blast holes with explosives, attaching detonators and connecting the holes into a blast sequence, and detonating the blast; o ventilating the tunnel to remove blast fumes and dust; o removing blasted rock; o scaling and wash down of the tunnel roof and walls to remove loosened pieces of rock; o geological mapping of the exposed rock faces and classification of the conditions to determine suitable ground support systems for installation; o installing ground support; and o advancing construction ventilation ducting and other utilities including power, water, compressed air and communications.

2.9.3 Ancillary construction areas

Ancillary facilities and laydown areas have been identified within the conceptual layout for the portal construction pad and accommodation camp. A number of other indicative construction and laydown areas have also been identified to support Exploratory Works. A summary of these sites are:

- Upper Lobs Hole Ravine Road laydown area;
- rock emplacement area laydown, storage and ancillary uses;
- barge access infrastructure laydown areas at Talbingo and Middle Bay; and
- other minor laydown areas as needed during site establishment of watercourse crossings.

All laydown areas are within the disturbance footprint identified for Exploratory Works.

In addition, an area near Camp Bridge has been identified to be used for a plant nursery and organic stockpile area.

2.9.4 Construction Workforce Requirements

It is currently expected that workforce for Exploratory Works will be approximately 200 people in total at peak construction. Workers are anticipated to work a 'swing' shift, for example two weeks on and one week off. These workers will be accommodated within the accommodation camp at Lobs Hole when rostered on These workers will be accommodated within the accommodation camp at Lobs Hole when rostered on.

The majority of the workforce will work on a fly-in fly-out and drive-in drive-out basis. It is expected that the majority of workers will fly in and out of either Cooma Airport or Canberra Airport and then travel to site via bus.

During construction of the accommodation camp, workers will be accommodated at Cabramurra. Some workers may also be accommodated at Snowy Hydro existing accommodation units at Talbingo during construction of the Talbingo barge ramp. No accommodation will be required outside of Cabramurra, the construction accommodation camp or Talbingo for the Exploratory Works workforce.

It is expected that construction of the exploratory tunnel and haulage of rock material between the tunnel and excavated rock stockpile locations at Lobs Hole will be 24 hours a day, seven days a week for the duration of the tunnel drilling and blasting operation. Other construction activities, including the establishment works, road and infrastructure works, will normally work a 12 hour day, seven days a week.

The transport of materials along the haul route from Snowy Mountains Highway, Link Road and Upper Lobs Hole Ravine Road will only occur during day time hours (except during emergency), to avoid impacts to threatened species (Smoky Mouse). Transport by barge will be 24 hours a day, seven days a week.

2.9.5 Timing and Staging

Exploratory Works are expected to take about 34 months, with the exploratory tunnel expected to be completed by late 2021. It is expected that the construction works will be completed largely in parallel. However, road and access works are expected to be completed within the first six months from commencement. The proposed staging of construction activities are highlighted in Table 6.

Table 6 Indicative staging of construction.

All Exploratory Works align with components of the main works for Snowy 2.0. However, should Snowy 2.0 not be approved or not progress, the project area will

need to be rehabilitated, and project elements decommissioned in consultation with NPWS. Anticipated rehabilitation activities are summarised in Table 7.

Table 7 Planned Exploratory Works rehabilitation activities.

Exploratory Works element	Indicative rehabilitation activities
Exploratory tunnel	Tunnel to remain open and allowed to flood in lower portion provided groundwater impacts are negated.
Exploratory tunnel portal area	Permanent portal facade to be constructed, portal to be sealed from entry.
Portal construction pad and associated infrastructure	To be demobilised and all infrastructure removed. Site to be revegetated and returned to "original state".
Excavated rock emplacement areas	Emplaced excavated rock in the western emplacement area to be removed offsite and area to be revegetated and returned to "original state". The eastern emplacement area could remain in-situ and the landform rehabilitated as agreed with NPWS.
Accommodation camp	To be demobilised and all infrastructure removed. Site to be revegetated and returned to "original state".
Road access works	No remediation required as works are to be designed to be permanent.
Barge access infrastructure	No remediation works required as wharf and loading ramps are designed as permanent. Wharf can be removed if desired.
Services and infrastructure	To be demobilised and all infrastructure removed. Site to be revegetated and returned to "original state".

2.10 Decommissioning

Should Snowy 2.0 not proceed following the commencement or completion of Exploratory Works, elements constructed are able to be decommissioned and areas rehabilitated. Given works are within KNP, Snow Hydro will liaise closely with NPWS to determine the extent of decommissioning and types of rehabilitation to be undertaken. This approach will be taken to ensure that decommissioning allows for integration with future planned recreational use of these areas and to maintain the values of KNP.

2.11 Key aspects relevant to Aboriginal heritage

Potential Aboriginal heritage issues have been identified from reviewing the proposed Exploratory Works and associated activities. This identification process has considered the proposed project activities and the types of impacts to the historic heritage environment, and the following aspects are considered relevant to this assessment:

- Portal construction pad and other surface infrastructure - the substantial surface works that will be undertaken to facilitate tunnel construction have potential to affect Aboriginal heritage directly as a result of physical disturbance, primarily due to clearing of vegetation, stockpiling of materials and excavated rock, management of water and waste water;
- Excavated rock emplacement areas - disturbance associated with rock emplacement has potential to directly harm Aboriginal heritage as a result of physical disturbance primarily due to clearing of vegetation and excavations;
- Accommodation camp - disturbance associated with the construction of the accommodation camp has potential to directly harm Aboriginal heritage as a result of physical disturbance primarily due to clearing of vegetation and excavations;
- Barge access infrastructure - disturbance associated with the construction of barge access infrastructure has potential to directly harm Aboriginal heritage as a result of physical disturbance primarily due to clearing of vegetation and excavations;
- Services and infrastructure - disturbance associated with the installation of services infrastructure has potential to directly harm Aboriginal heritage as a result of physical disturbance primarily due to clearing of vegetation and excavations;
- Watercourse crossings - disturbance within the riparian zone has potential to directly harm Aboriginal heritage as a result of physical disturbance primarily due to clearing of vegetation and excavations; and
- Road upgrades and construction - has potential to affect Aboriginal heritage directly as a result of physical disturbance primarily due to clearing of vegetation and excavations.

In addition to direct physical impacts to Aboriginal heritage, potential indirect impacts include:

- Impacts from off-road activity including 4-wheel drive vehicles and motor bikes as a result of potential recreational activities by the Exploratory workforce at Lobs Hole;
- Impacts from inadvertent or deliberate damage to Aboriginal items, or the removal of Aboriginal items as a result of increased visitation by Exploratory workforce at Lobs Hole; and
- Impacts from increased recreational visitation to Lobs Hole after Exploratory Works activity due to upgraded access roads. Increased visitors have the potential to increase risks identified above relating to off-road activity and inadvertent damage/theft.

3. LEGISLATIVE CONTEXT

3.1 COMMONWEALTH LEGISLATION

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) aims to protect matters of national environmental significance (MNES) including:

- world heritage properties;
- national heritage places;
- Ramsar wetlands of international importance;
- nationally threatened species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

MNES relevant to Exploratory Works are nationally threatened species and ecological communities and national heritage places. Two national heritage places occur within the project area: Australian Alps National Parks and Reserves and The Snowy Mountains Scheme.

The project has been assessed according to the National Heritage values associated with the two National Heritage places against the significant impact criteria. The assessment has concluded that the action would not have a significant impact on either of the national heritage places.

3.2 NEW SOUTH WALES LEGISLATION

3.2.1 EP&A ACT AND ITS REGULATION

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) is the primary legislation regulating environmental planning and assessment in NSW. Part 5 of the EP&A Act establishes the assessment and approval regime for State Significant Infrastructure (SSI) and Critical State Significant Infrastructure (CSSI).

Snowy 2.0 has been declared CSSI by the NSW Minister for Planning under the provisions of the EP&A Act and is defined in Clause 9 of Schedule 5 of the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP).

3.2.2 NPW ACT 1974

The NPW Act provides statutory protection for all Aboriginal objects and Aboriginal Places.

An 'Aboriginal object' is defined as

> 'any deposit, object or material evidence (not being a handicraft for sale) relating to Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.

An Aboriginal place is an area declared by the Minister to be an Aboriginal place for the purposes of the Act (s84), being a place that in the opinion of the Minister *is or was of special significance with respect to Aboriginal culture*.

Part 6 of the National Parks and Wildlife Act 1974 (NPW Act) provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. Harm is defined to mean destroying, defacing, damaging or moving an object from the land. There are a number of defense's and exemptions to the offence of harming an Aboriginal object or place. One of the defense's is that the harm is carried out under an Aboriginal Heritage Impact Permit (AHIP).

However, under Section 5.23 of the Environmental Planning and Assessment Act 1979, the following authorisations are not required for approved State Significant Infrastructure (and accordingly the provisions of any Act that prohibit an activity without such an authority do not apply):

- an Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974.

A number of other aspects of the NPW Act are, however, relevant as set out below.

Under Section 89A Notification of sites of Aboriginal objects. A person who is aware of the location of an Aboriginal object that is the property of the Crown or, not being the property of the Crown, is real property, and does not, in the prescribed manner, notify the Director-General of OEH thereof within a reasonable time after the person first becomes aware of that location is guilty of an offence against this Act unless the person believes on reasonable grounds that the Director-General is aware of the location of that Aboriginal object. An Aboriginal Site Recording Form allows for primary site recording. Aboriginal Site Recording Forms are provided to the Aboriginal Heritage Information Management System (AHIMS) which is maintained by NSW OEH.

An Aboriginal Site Impact Recording Form has been developed to ensure that current information about the status of AHIMS sites is maintained and an accurate picture of the condition of all registered Aboriginal sites is always available. The form must be completed after authorised impacts to AHIMS sites occur. Once completed, the forms must be sent to the AHIMS Registrar. Authorised impacts are those:

- which occur as a result of test excavation carried out in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW;
- allowed by an AHIP issued by the NSW OEH;
- undertaken for the purpose of complying with Director-General Requirements issued by the Department of Planning and Infrastructure for State Significant Development (SSD – Part 4), State Significant Infrastructure (SSI – Part 5.1) or a Major Project (Part 3A – now repealed) under the Environmental Protection and Assessment Act 1979 – EP&A Act); or
- allowed by an SSD/SSI/Part 3A consent/approval under the EP&A Act.

Many Aboriginal communities wish to have care of Aboriginal objects which have been excavated, disturbed or moved by development activities, erosion or other processes. Under Section 85A of the NPW Act 1974, the transfer of Aboriginal objects from a site to an Aboriginal person or organisation for safe keeping is allowed. The person or organisation must enter into an agreement with the NSW OEH. A Care Agreement Application Form must be completed and sent to the relevant NSW OEH regional office.

4. DESCRIPTION OF THE AREA – BACKGROUND AND CONTEXT

In this section, background and relevant contextual information is compiled, analysed and synthesized. The purpose of presenting this material is to gain an initial understanding of the cultural landscape. The following topics are addressed (*cf*. NSW OEH 2011: 5):

- The physical setting or landscape;
- History of peoples living on that land; *and*
- Material evidence of Aboriginal land use.

4.1 THE PHYSICAL SETTING OR LANDSCAPE

Aboriginal people have occupied NSW for more than 42,000 years (Bowler *et al*. 2003). Evidence and cultural meanings relating to occupation are present throughout the landscape (NSW OEH 2011: iii).

A consideration of landscape is particularly valuable in archaeological modelling for the purposes of characterising and predicting the nature of Aboriginal occupation across the land. In Aboriginal society, landscape could be the embodiment of Ancestral Beings, and the basis of a social geography and economic and technological endeavour. The various features and elements of the landscape are/were physical places that are known and understood within the context of social and cultural practice. The reality of the physical world is such that human occupation, and certain cultural practices and behaviours, cannot be equivalent and always possible everywhere; '... environments constitute arenas of human action and being, they yield resources to be exploited, and they impose constraints and provide enabling conditions for practices' (Keen 2004: 3).

In Australia, a general model of subsistence organisation existed, a collector model, whereby people in groups formed home bases from which they made foraging forays, and returned, for the sharing and distribution of food (Keen 2004: 104). In this model people make few residential moves, and those made are often to locales valued as much for the presence of water or firewood, as they are for food (Keen 2004: 104). Geographical and environmental data is used in this study for anticipating where in the landscape people may have habitually resided in base camp scenarios, and how the patterns in their material objects, relate to those landforms.

Given that the natural resources that Aboriginal people harvested and utilised were not evenly distributed across landscapes, Aboriginal occupation and the archaeological manifestations of that occupation will not be uniform across space. Therefore, the examination of environmental context is valuable for predicting the type and nature of archaeological sites which might be expected to occur. Factors that typically inform the archaeological potential of landscape include the presence

or absence of water, animal and plant foods, stone and other resources, the nature of the terrain and the cultural meanings associated with a place.

Additionally, geomorphological and humanly activated processes need to be defined as these will influence the degree to which material evidence may be visible and/or conserved. Land which is heavily grassed and geomorphologically stable will prevent the detection of archaeological material, while places which have suffered disturbance may no longer retain artefacts or stratified deposits. A consideration of such factors is necessary in assessing site significance and formulating mitigation and management recommendations.

The project area is located primarily within the Kosciuszko National Park (KNP) which includes 673,542 hectares of the Snowy Mountains and surrounding slopes and lowlands (DEC 2006). KNP straddles the Great Dividing Range. Altitude varies from 213 m at the valley of the Snowy River to 2,229 m at the summit of Mount Kosciuszko. The park is of national and state conservation significance as it (NPWS 2000):

- protects significant water catchments;
- contains all of NSW's alpine areas and a large portion of its sub-alpine areas;
- protects a variety of habitats and threatened flora and fauna communities;
- contains a wide variety of significant topographical and geomorphological features, ranging from semi-arid to alpine environments;
- provides an educational and scientific resource of national and international importance;
- contains extensive archaeological resources, including Aboriginal campsites, stone arrangements, quarries, burial places and ceremonial grounds; and
- boasts a rich historic heritage relating to summer grazing, mining, skiing and the Snowy Mountains Scheme.

4.1.1 Geology and Terrain

The project area is in the Lachlan Orogeny (Fold Belt) in South-east NSW. The Lachlan Orogeny comprises Ordovician to Devonian aged sedimentary, igneous and metamorphic rocks that developed during several orogenic periods associated with extensive faulting to form major geotectonic structures (Snowy Hydro Limited 2017b).

The geology is dominated by extensive late Silurian to early Devonian S-type granitoid rocks. These intrude Ordovician turbidites (sandstones, siltstones and shales) and basaltic volcanics which constitute the oldest rocks in KNP and are now confined mostly to the west. A band of Ordovician rocks, dominated by basaltic

volcanics, outcrops along a metamorphic fold belt running approximately NNE – SSW on the western side of the Kosciuszko Main Range (Dibden 2004a).

Lobs Hole is on the Devonian Ravine Beds of shale, slate, siltstone, conglomerate. Siltstone and conglomerate rocks are ubiquitous across the valley on the bedrock crests and slopes. The southern end of Lobs Hole Ravine Road is on Devonian Byron Range Group siliciclastic deposits of siltstone, quartzite, shale, sandstone, conglomerate and nodular limestone. Further to the south, Tertiary basalt occurs (Snowy Hydro Limited 2017b).

The alpine region of KNP was uplifted during the last 40 million years in a series of steps which rise gradually from the east and plunge steeply to the west. This uplift was associated with basaltic up-welling and wide-scale faulting. The fault zones are in two sets; a major set running predominately southwest – northeast and a minor set aligned approximately east-west. They produce long, straight, parallel valleys that define the major drainage systems of the region including the Eucumbene, Snowy, Thredbo and Swampy Plain Rivers as well as Perisher and Pipers Creeks (Dibden 2004a).

During the last ice age, parts of the main range were glaciated, and ice action has creating a range of glacial formations including cirques, moraines and the deposition of erratics. The extent of glaciation was confined to the higher elevations around Mt Kosciuszko, Mt Townsend, Carruthers Peak, Mt Twynam and extended a short distance down the Snowy River and Perisher valleys. Much of the alpine and subalpine landscape is undulating, with open valleys and saddles, and has been subject to periglacial action that has produced features such as tors and blockstreams (Galloway 2004).

Granitoid rocks outcrop as tors on crests and steeper slopes. The tors present within the alpine and subalpine region have been considered significant Aboriginal site locational determinants given that they provided both food resources (as moth aestivation sites) and shelter from weather. Quartz veins occur within the bedrock and is present in gravels and soils. The land surfaces and soils within the alpine and subalpine areas are dated to the mid Holocene (7-5,000 years BP) (Costin *et al*. 1982: 23). This comparatively young age of landscapes is attributed to earlier landform processes during the terminal Pleistocene and early Holocene.

Eight Karst landscapes occur in KNP, developed in Silurian or Devonian limestones or their derivatives (Spate 2004). They are distinct from other NSW karst areas in that they occur near the crest of the eastern highlands and are in alpine, subalpine or montane environments. Cooleman and Yarrangobilly have outstanding aboveground karst features, particularly gorges and rising streams (Spate 2004). Lobs Hole has unusual Quaternary karst features which are tufa deposits (Spate 2004; NSW OEH 2012). These have formed small shelters in areas adjacent to the

project area, some of which have been found to have been used by Aboriginal people (Aplin *et al.* 2010; Ford & Aplin *n.d.*).

Lobs Hole is a valley through which the Yarrangobilly River flows and is surrounded by steep slopes and gorges (Plates 1 and 2). In the east, slopes fall from the escarpment of the Great Dividing Range, westward to the Yarrangobilly River and its tributaries. The escarpment trends north/south at an elevation of ~1500 m. The slopes fall to ~600 m at Lobs Hole. Gradients are typically steep and include cliff formations such as the Stable Walls near Milk Shanty Creek (Plate 3).

The tributaries of the Yarrangobilly River include Wallaces, Stable and Milk Shanty Creeks which join the river in the eastern part of the project area. Above Lobs Hole, these drainage depressions are frequently gorge features. Closer to Lobs Hole the third order streams Lick Hole Gully and Sheep Station Creeks flow easterly into the valley. The Yarrangobilly joins the Tumut River (Talbingo Reservoir) approximately four kilometres to the north of Lobs Hole.

Plate 1 The Yarrangobilly River gorge before it reaches Wallaces Creek behind the cliff formation in the photo. Looking north-northeast from Lobs Hole Ravine Road.

Plate 2 The Yarrangobilly River at Lobs Hole.

4.1.2 VEGETATION

Vegetation communities in KNP are related to variation in altitude and rainfall. Four physiographic elements present include alpine, subalpine, montane and tableland communities:

- The Alpine areas are situated above 1,850 m. This area is dominated by tall alpine herbfield and heathland communities, and includes sod tussock grassland, short alpine herbfield, feldmark, bog and fen (NPWS 2000).
- Subalpine areas occur between c. 1,400 m and 1,850 m. This community is dominated by Snow Gum woodland. Frost hollows occur in valley bottoms and are treeless. These include sod tussock grasslands and fen and bog communities (NPWS 2000).
- Montane areas are situated between 1,100 m and 1,400 m. These are dominated by forests and woodlands (NPWS 2000).
- The tableland areas occur below 1,100 m. These contain savannah woodland communities. Lobs Hole is in a tableland context (South West Slopes).

Plate 3 The Bridle Trail from Lobs Hole to Kiandra: Wallaces Creek near the confluence with the Yarrangobilly in ~1901; photo taken by Ernest Clayton Andrews, geological surveyor in the Geological Survey of NSW.
Source: Geological Survey of NSW.

The Lobs Hole area comprises areas of the Eucalypt flora community. Snow Gum - Mountain Gum shrubby open forest of montane areas occurs along the upper reaches of Lobs Hole Ravine Road, above 1,100 m. In this area, vegetation consists of tall forests dominated by Mountain Gum (*Eucalyptus dalrympleana*) and Snow Gum (*Eucalypotus pauciflora* subsp. *paucilfora*), with a moderate to dense shrubby midstorey dominated by shrubs from the plant family *Fabaceae* (with some *Epacridaceae* and *Mimosaceae*), and dense groundcover with abundant sub-shrubs.

At around 1,100 m, vegetation transitions to drier communities dominated by Peppermint (*Eucalyptus radiata* and *Eucalyptus dives*), Brittle Gum (*Eucalyptus mannifera*) and Candlebark (*Eucalyptus rubida*) with a moderate to sparse midstorey and grassy groundcover.

Much of the country around Lobs Hole was extensively cleared during the 1800s and early to mid-1900s, and used for cattle and sheep grazing, and horse breeding (for example, see Photo 3). The land around Lobs Hole, including valley slopes, was used for the cultivation of crops such as oats used to make chaff for horse and bullock feed (Barry Yan pers. comm.). Trees would have been harvested for firewood, fencing and

use in the Lobs Hole mines (Dibden 2018). The Lobs Hole valley is now cleared grassland with patchy regrowth woodland (Plate 4).

Plate 4 Typical vegetation in the Lobs Hole valley.

4.1.3 CLIMATE

Climate is a strong occupational determinant within the Snowy Mountains region. Snow cover and low temperatures during winter months are likely to have meant that Aboriginal land users would have avoided the higher altitude zones during this time.

Meteorological data from Talbingo is the most useful comparable material to describe the climate of Lobs Hole (Snowy Hydro Limited 2017c). At Talbingo, the mean monthly maximum temperature ranges from 12.5° in July to 30.3° in January. Mean monthly minimum temperature ranges from 3.0° in July to 15.3° in January. Given Lobs Hole is elevated at ~200 m higher, some minor variation to the Talbingo temperatures would prevail. Talbingo receives an annual precipitation of ~980mm with the wettest months typically late autumn to early spring. Snow falls at Talbingo and Lobs Hole are relatively rare.

4.1.4 The Aboriginal Environment

Until recently, the evidence for human activity above 1,000 m elevation in the Snowy Mountains did not extend back any further than 4,000 years (Aplin *et al.* 2010). However, recent archaeological research has confirmed an Aboriginal presence in the Snowy Mountains since the early Holocene, from around 9,000 years before present (BP) (Aplin *et al.* 2010, Theden-Ringl 2016).

The glaciation of the Snowy Mountains was over by 16,000 years ago. However, a return to cool conditions occurred during the Younger Dryas c. 13,000-11,500 years ago. During the early Holocene, beginning around 10,000 years ago and continuing until c, 6,000 years, warm conditions prevailed. The current tree line had attained its position at about 10,000 years ago. Peat was forming in moist sites at 1,000 m asl before the Younger Dryas; by the early Holocene it was forming in higher elevation sites (Aplin *et al.* 2010). Wet sclerophyll forest elements register in the palynological records from the early Holocene until c. 4,000 years ago and a rapid growth of mires occurs through the same period (Aplin *et al.* 2010).

Recent analysis of the mammal assemblage from excavations at Yarrangobilly suggest that the local environment in the early Holocene included significant areas of wet sclerophyll forest and was likely to be have been of higher overall productivity than modern communities (Aplin *et al.* 2010). The material indicates the presence of a mosaic understory structure and composition including moist, dense patches and more open communities each supporting different suites of animals (Aplin *et al.* 2010).

4.1.5 The Project Area

Lobs Hole

Lobs Hole and Lobs Hole Ravine Road are on the Ravine 8526-2N and Cabramurra 8526-2S 1:25,000 topographic maps (Figures 12 & 13). Lobs Hole is a locality in a valley of the Yarrangobilly River, on the western side of the Great Dividing Range. The valley is within a broader area of steep, mountainous terrain. Upstream of Lobs Hole, the Yarrangobilly River, Wallaces and Stable Creeks, become narrow, precipitous and gorge like. Lobs Hole is out-of-the-way, and being a valley of gentle topography and amenity, is a locally uncommon environment.

The valley is comprised of river flats, gentle gradient slopes and elevated crests. Situated at an elevation just below 600 m, the valley is likely to have provided respite throughout the year from the weather of the surrounding high country. It is difficult to recreate the pre-European environment of the valley with any great certainty. However, it is likely to have provided a relative abundance and diversity of flora and fauna, in addition to a reliable source of potable water and firewood. The Lobs Hole valley is likely to have been used regularly by Aboriginal people throughout the

annual cycle of movement through country. The material manifestation of that occupation is likely to be present as a relatively high density artefact distribution across the landscape.

Lobs Hole has been used since the early 1800s for the movement of stock, prospecting, grazing, settlement, refuge from the winters of Kiandra, gardening and agriculture, copper mining (from 1860s - ~1917) and recreation (Plates 5, 6 & 7). Accordingly, the landscape has suffered relatively high levels of prior disturbance from discrete impacts such as building construction, mining and so on, but also more broadly from agriculture, grazing and erosion. The Lobs Hole Ravine Road is locally disturbed by direct impacts associated with road construction and electricity easement clearing.

During the construction of the Snowy Scheme, Lobs Hole was used during surveying work. A major surveying camp was set up by Major Clews at Lobs Hole (believed to be at the junction of the Yarrangobilly and Tumut rivers and now under water, *but this is not confirmed*) and the Wallace Creek camp was apparently located near to the junction of Wallaces Creek and Yarrangobilly River (Rodwell 1999 - exact location unknown).

The 330kV transmission line from the Cabramurra switchyard traverses the Lobs Hole valley in a north/south alignment. During the construction of the Snowy Scheme, Lobs Hole was a recreational destination for workers. After the project was finished, these men met there for reunions when they enjoyed fishing, knife throwing competitions and the like. Lobs Hole continues to be used periodically for camping and fishing.

In summary, the environmental context is such that Lobs Hole is likely to have been used regularly and reasonably intensively by Aboriginal people. The material manifestation of that occupation is predicted to be moderate to high artefact densities in certain favorable landforms such as flats and gentle gradient crests. Artefact diversity and complexity may also be relatively high. However, given that previous European activities have caused high impacts to ground surfaces, artefact distributions are expected to be disturbed.

Plate 5 A cultivated flat (Lick Hole Creek near junction with Yarrangobilly River) at Lob Hole in ~1901; photo taken by Ernest Clayton Andrews.
Source: Geological Survey of NSW.

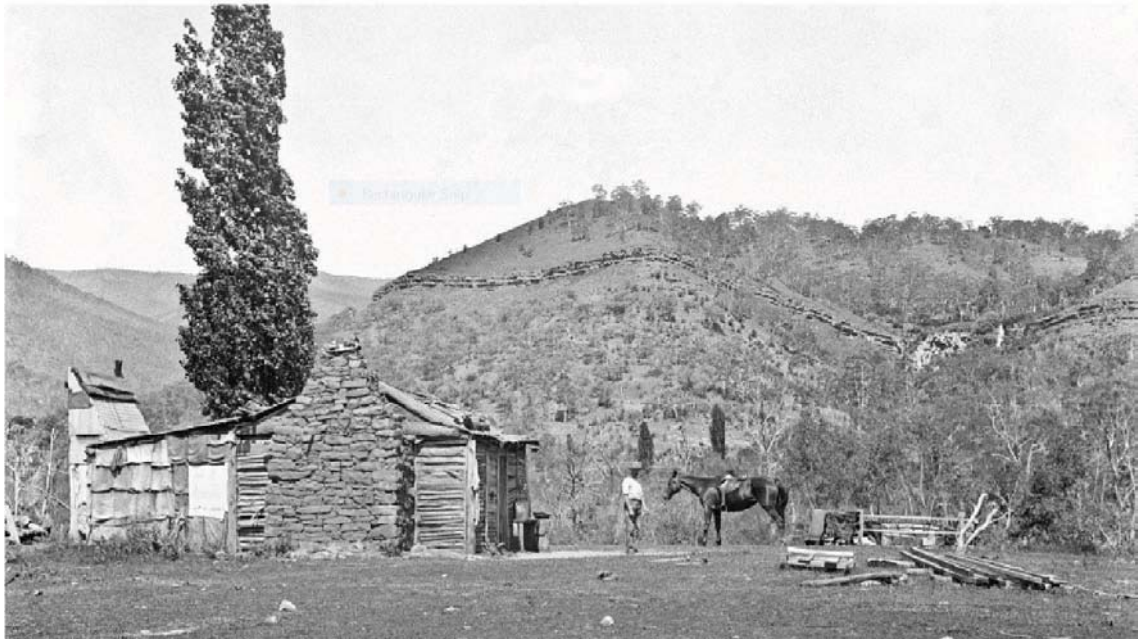


Plate 6 Man believed to be Adolf Reeckman at the Mine Managers office/house at Lobs Hole in ~1901; photo taken by Ernest Clayton Andrews. Note sparse vegetation cover on the hills in the background.
Source: Geological Survey of NSW.

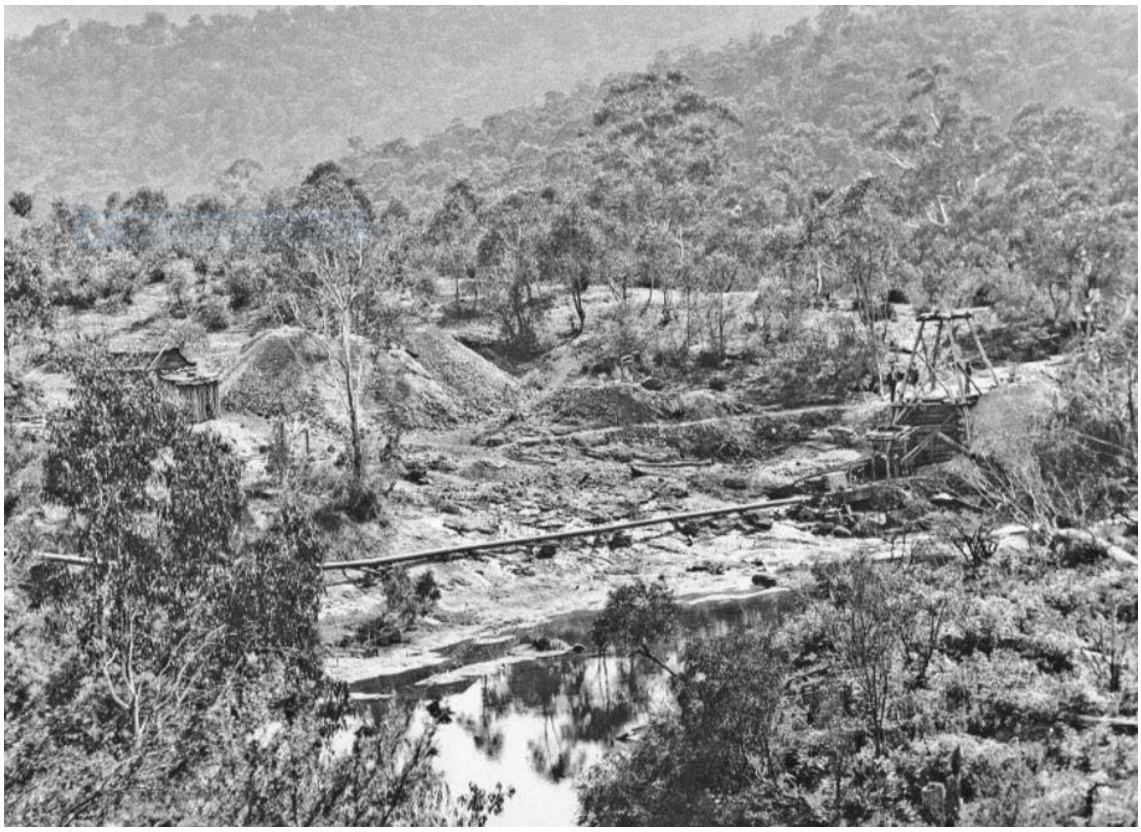


Plate 7 The *Lobbs Hole Copper Mine* in ~1901; photo taken by Ernest Clayton Andrews.
Source: Geological Survey of NSW.

Talbingo and Tumut 3 Power Station

The project areas near Talbingo Reservoir and the Tumut 3 power station are on the Yarrangobilly 8526-1S and Talbingo 8526-1N 1:25,000 topographic maps (Figure 14). The areas in which impact would occur are located within an original valley context of very steep, forested simple slopes. The majority of the impacts would occur in areas where the original landform has largely been removed for the Talbingo reservoir and road (Murray Jackson Drive) construction, such as a proposed wharf location at the east side of the dam in the spillway.

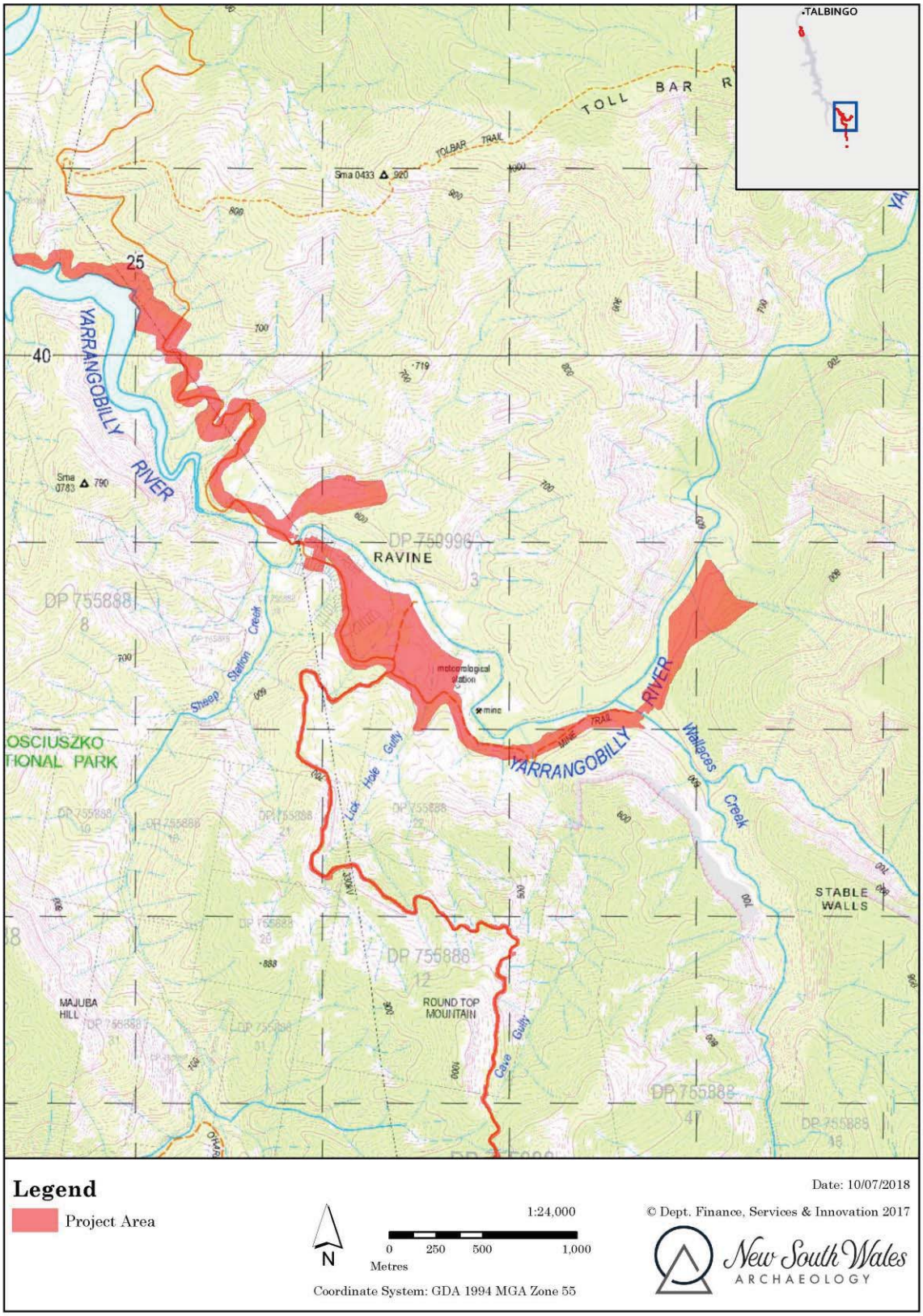


Figure 12 Location of Lobs Hole (Ravine) in a topographic context.

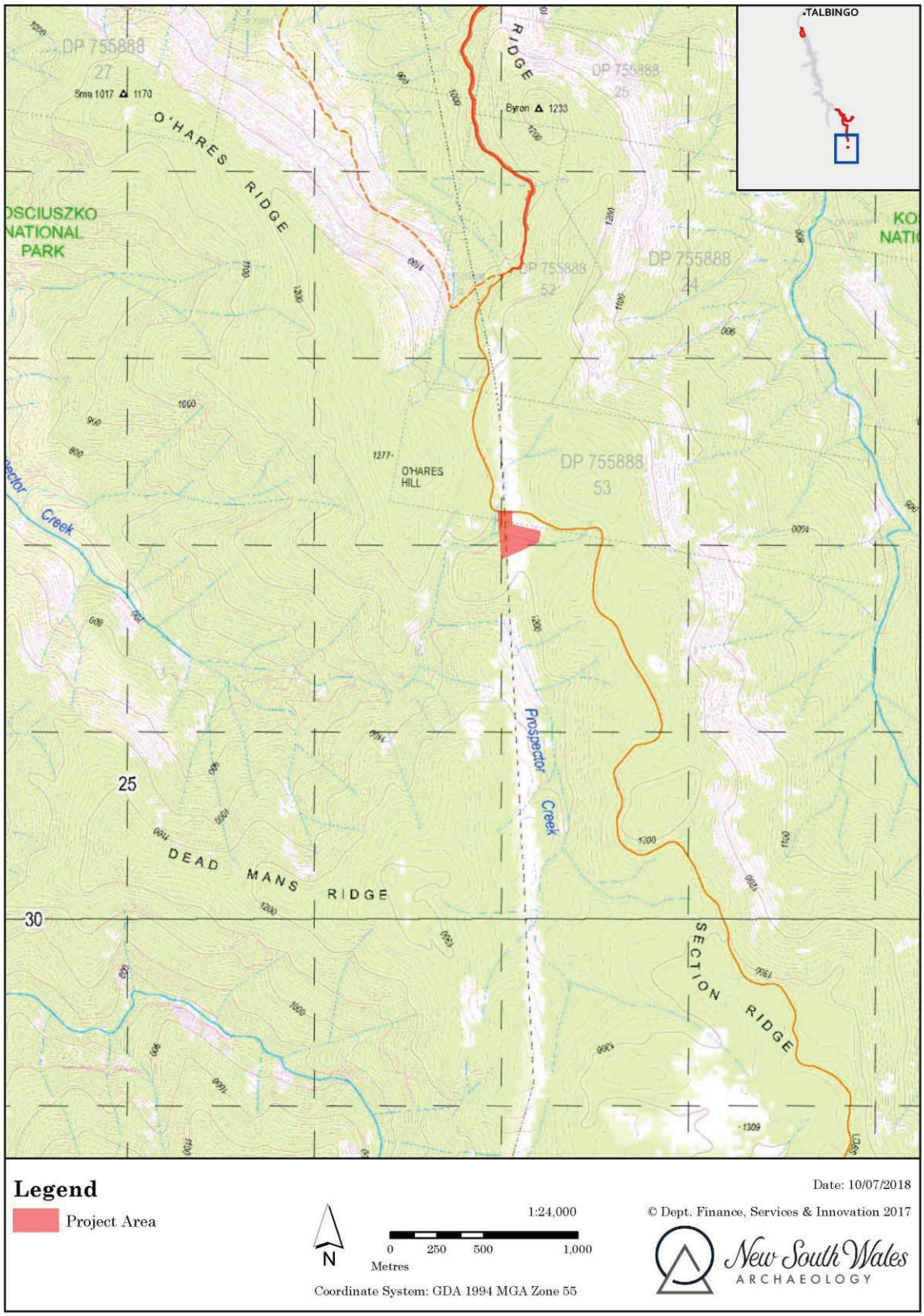


Figure 13 Location of Lobs Hole Ravine Road in a topographic context.

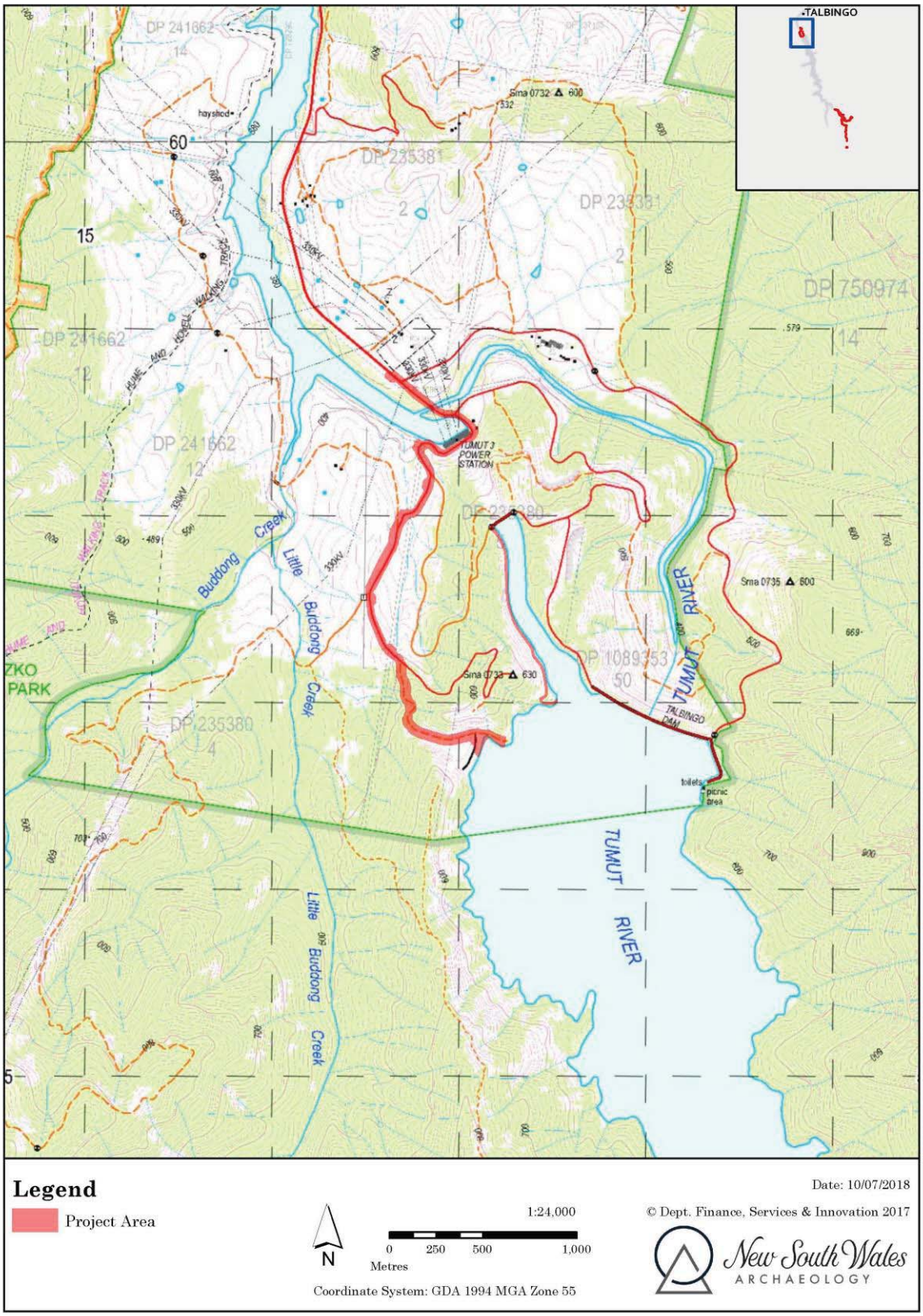


Figure 14 Location of the Tumut 3 Power Station area in a topographic context.

4.2 History of Peoples Living on the Land

Aboriginal people have occupied Australia for at least 40,000 years and possibly as long as 60,000 (Bowler *et al*. 2003; Mulvaney and Kamminga 1999: 2). By 35,000 years before present (BP), all major environmental zones in Australia were occupied, including the periglacial environments of Tasmania (Mulvaney and Kamminga 1999: 114). At the time of early occupation, Australia experienced moderate temperatures. However, between 25,000 and 12,000 years BP (the Last Glacial Maximum), dry and either intensely hot or cold temperatures prevailed across the continent (Mulvaney and Kamminga 1999: 114). At this time, the mean monthly temperatures on land were 6 - 10ºC lower; in southern Australia, coldness, drought and winds acted to change the vegetation structure from forests to grass and shrublands (Mulvaney and Kamminga 1999: 115-116).

During the Last Glacial Maximum at about 24 - 22,000 years ago, sea levels fell to about 130 metres below present and, accordingly, the continent was correspondingly larger. With the cessation of glacial conditions, temperatures rose with a concomitant rise in sea levels. By c. 6,000 BP, sea levels had stabilised to their current position. With the changes in climate during the Holocene, Aboriginal occupants had to deal not only with reduced landmass but changing hydrological systems and vegetation; forests again inhabited the grass and shrublands of the Late Glacial Maximum. As Mulvaney and Kamminga (1999: 120) have remarked:

> *When humans arrived on Sahul's[2] shores and dispersed across the continent, they faced a continual series of environmental challenges that persisted throughout the Pleistocene. The adaptability and endurance in colonising Sahul is one of humankinds' inspiring epics.*

In the late Pleistocene, much of the land in the region was covered in snow, with glaciers in the mountains and the lower plains being treeless. Over time, the Aboriginal people experienced and adapted to steady and considerable changes in conditions associated with gradual climatic warming, including the alteration of vegetation and variation in the distribution of wildlife (Young 2000).

4.2.1 Aboriginal Occupation of the Snowy Mountains

Human occupation of south-eastern NSW dates from at least 20,000 years ago as evidenced by dated occupation sites including the Burrill Lake rock shelter (Lampert 1971), Cloggs Cave (Flood 1980) and New Guinea 2 Cave (Ossa *et al*. 1995). The Bulee Brook 2 shelter in the south coast hinterland ranges, excavated by Boot (1994), provides evidence that occupation of this zone had occurred by at least 18,000 years ago. In the south-eastern highlands, excavation of the Birrigai rock-shelter has provided dates of occupation from 21,000±200 years BP (Flood *et al*. 1987: 16).

[2] *Sahul* is the name given to the single Pleistocene era continent which combined Australia with New Guinea and Tasmania.

Mulvaney (1992: 10) has argued that Pleistocene occupation of the alpine region may be presumed to have taken place in the mountains and '… particularly in the presently forested valleys'. While Pleistocene occupation of the Snowy Mountains has also been put forward as a theory by Kamminga (1992), this remains to be confirmed. The most current evidence does, however, indicate systematic usage of the high country since the early Holocene (Theden-Ringl 2016). Flood *et al.* (1987) argued that the Birrigai shelter on the northern fringes of the Alps provided evidence of Pleistocene occupation dating from about 21,000 years ago. The scarcity of artefacts in the Pleistocene levels was interpreted as showing seasonal occupation of the site. Flood *et al.* (1987) argued for an increase in occupation of the site from about 3,000 years BP and, on this basis, suggested that permanent exploitation of the alpine and sub-alpine regions of the Snowy Mountains began from about 5,000 years ago.

Flood (1973) conducted a survey at Thredbo which was probably the first alpine field survey. She surveyed a one kilometre transect north - south across the north side of Thredbo Valley. No sites were recorded which led her to conclude that the valley may only have been used as a minor transit route in summer.

Survey results from lower elevation valleys on the Snowy River and around Jindabyne led Flood (1980) to develop a regional site locational model. This model proposed that sites were mostly located 50 - 100 m from a river bank and well above flood levels, on well drained ground (sometimes of steep gradient) rather than on low lying poorly drained alluvial flats, to have a northerly or easterly aspect in which protection from prevailing westerly and southerly winds is possible, and clustered with larger sites situated around bends in rivers. Flood (1980) argued that these lowland sites were short term campsites used by Aboriginal people who occupied higher elevation locales during the summer months.

Flood (1980) drew heavily on the ethnographic literature regarding the summer Bogong moth exploitation to her regional model. She proposed that sites at higher elevations would have the following characteristics:

- Small sites and isolated finds could be found above the winter snowline (at c. 1,525 m asl). These sites would consist of pebble tools representative of moth exploitation;
- Small campsites would be located below the tree line and winter snowline (1,525 – 1,200 m asl). These sites would be representative of men's base camps related to the exploitation of the moth; and
- Larger campsites would be located below 1,200 m asl within montane valley contexts. These sites would be related to summer usage. However, Flood did concede that they may have been used at other times of the year.

Flood's (1973, 1980) work was the first regional framework of Aboriginal occupation of the Snowy Mountains. She presented a functional occupation model of seasonal usage (summer) of the highlands based on the exploitation of Bogong moths. Her model was heavily influenced by the ethnohistoric literature with a limited anchor in the archaeology. The moth, she argued, was important as an economic food source and that its exploitation may have been causal as the impetus for the initial usage of the highlands. As noted above, Flood (1973) argued that the occupation pattern which resulted from the exploitation of moths is one in which a series of camps extended from the lowest valleys below 300 m up to the alpine tree line zone at 1,830 m.

Since Flood's seminal work, further archaeological assessment has been undertaken within the region resulting in a revised understanding of Aboriginal occupation in the high country. A contrary viewpoint to Flood's (1973) model was put forward by Chapman (1977) who argued that there was no evidence which pointed to the moth as being a staple food source. She argued that, furthermore, there is no evidence that the moth was a reliable food source, and indeed, that it lacked nutritional value to act as a staple and, that the moth in any case, was primarily consumed by men. Chapman (1977) instead argued that the significance of moth exploitation was that it fostered social cohesion within the region.

Researchers such as Bowdler (1981), Cooke (1988), Gott (1982) and Kamminga *et al.* (1989) have drawn attention to a variety of vegetable and animal products available locally which are likely to have been utilized as food resources. Like Chapman (1977), Kamminga *et al.* (1989) also argued that the large inter-tribal gatherings which were associated with moth exploitation acted to mediate and foster political and social linkages between the different language and tribal groups which came together during these occasions.

While the Flood (1973, 1980) framework for understanding Aboriginal usage of the Snowy Mountains has clearly been found wanting, a model of seasonal usage of the continues to have currency within the literature. Mulvaney and Kamminga (1999: 298) argued that during winter small groups of Aboriginal people would have occupied the lower montane valleys and the adjacent tablelands and that the region would have opened up considerably in summer. It was during the summer months that people from other areas gathered in the north of the mountains to perform inter-tribal ceremonies (Mulvaney and Kamminga 1999: 299). Like Flood (1980) and others, Mulvaney and Kamminga (1999: 299) argue that above 1,200 m asl, only small lithic scatters occur.

Until recently there was almost no dated studies of habitation at high altitudes (*cf.* Theden-Ringl 2016). While numerous lower altitude sites have provided occupation dates from the terminal Pleistocene, one of which is Birrigai referred to previously,

only two high altitude sites have provided dates older than 3,000 years: Yarrangobilly Y258 (Aplin *et al*. 2010) and Nursey Swamp 2 (Rosenfeld *et al*. 1983).

Dates from six Namadgi rock shelters published recently by Theden-Ringl (2016) provide new information about the chronology of the Aboriginal presence in the Alps. The sites are all in a montane context in the Namadgi Ranges (c. 30 km east of Tantangara Reservoir), with altitudes ranging from 900 – 1,200 metres. Despite various constraints including taphonomic issues such as the suspected erosion of some cultural deposits, Theden-Ringl (2016) presents a broad occupation chronology of people in the Namadgi high country from almost 8,000 years ago. Importantly, the new dates establish the relative continuity of occupation from the Pleistocene-Holocene transition to the recent past. Theden-Ringl (2016) argues that the evidence fits a model of increased exploration and occupation, by generally low populations, in response to the opening up of ecological resources. These new dates do not clarify previous models of seasonal usage of the high country, nor the antiquity of moth feasting, but do contribute to an emerging continent-wide pattern of shifts in occupation through time.

Theden-Ringl (2017) has also produced a revised model of technological change for the high country based on her analysis of the lithic material from the Namadgi sites. She found no evidence to support Flood's (1973, 1980) regional model of a late Holocene technological transition from chert-dominated backed artefacts to a bipolar quartz industry. Nor did her evidence support cultural change associated with a blacked artefact proliferation at c. 4,500 to 3,500 BP (*cf*. Hiscock 2008). Instead, Theden-Ringl (2017) found technological shifts in morphometric decline, raw material diversity and the appearance of backed artefacts to occur in the last millennium.

4.2.2 Ethnographic and Historical Context

As far as possible, an ethnographic and historical review of Aboriginal life in the region will be outlined below. However, our understanding of Aboriginal people in this area, and the historical dimension of the colonial encounter has been reconstructed from scant records produced during a context of death and dispossession (Swain 1993: 115); it is sketchy and severely limited. Stanner (1977) has described the colonial and post-colonial past as a 'history of indifference', and this portrays both the substantive situation which prevailed and the general lack of regard for this history.

For a considerable period after Europeans arrived in Australia, no concerted ethnographic investigations were undertaken to learn about the society and culture of Aboriginal people. As a result, in trying to reconstruct the complex traditional cultures of Aboriginal groups, investigators of today are necessarily required to piece together, as best as possible, fragmentary information derived from the incidental

annotations of disparate early observers (*cf*. Young 2000). As elsewhere, this applies also to the Aboriginal peoples who occupied the Snowy Mountains. Knowledge and understanding of Aboriginal social life and organisation in south-eastern New South Wales at the time of European occupation is minimal. Fundamental details relating to kinship, clan, territorial and religious organisation is scant.

Aboriginal language groups including the Wolgalu, Djilamatung and Ngarigo occupied the Snowy Mountains prior to European settlement (Boot 2000, Flood 2010, Tindale 1974, Wesson 2000). White settlers began to move into the Snowy Mountains during the early 1800s. European settlement ultimately resulted in the alienation of Aboriginal people from their traditional lands and changes in their cultural and economic relationships with country.

The study area itself is within the country of the Wolgalu people (Tindale 1974, Boot 2000a). The Wolgalu inhabited parts of the South West Slopes including much of the eastern Tumbarumba district, the headwaters of the Murrumbidgee and Tumut Rivers, Kiandra, south to Tintaldra and north-east to near Queanbeyan (Knight 2010). This range may also have periodically included Mounts Kosciuszko, Cobberas and The Pilot (Boot 2000a, Howitt 1904; Tindale 1974). The Wolgalu shared borders with the Wiradjuri, Ngarigo, Ngunnawal and Djilimatang people. Tindale refers to some enmity between the Wiradjuri and Wolgalu, however, Cooke (1988) has emphasised the close cultural similarities that existed between them, citing intermarriage, shared social practices and regular trade.

Large-scale group interaction took place between these groups during highly formalised and carefully planned ceremonial events, typically incorporating ritual movement into the Wolgalu high country (Knight 2010). Occasions such as these were documented by Tom Wilkinson on the *Yallowin* run in the Tumut River valley in 1840 (Wilkinson 1970 cited in Knight 2010):

> The blacks used to come in from Yass, Wallaregang, Omeo and Mitta Mitta and hold corroborees at Yallowin. I have seen 300 there at one time … On a hill in front of Yallowin there still remains the mark of a ring made by a blackfellows' corroboree. The corroboree made men of the youths after they had attained a certain age.

The 'man-making' ceremonies at Yallowin involved a subsequent phase of movement to the Bogong Mountains where other known earth circle sites were incorporated into the ritual activity (Knight 2010). Knight (2010) suggests that Kiandra lies roughly mid-way between the significant places of the Bogong Mountains and Jagungal and may well have existed as an Aboriginal access route between them and other known ceremonial sites in and around Wolgalu country such as those near Yarrangobilly, Tantangara and the upper Goodradigbee River valley.

Howitt (1904) considered the Aboriginal people of the Kiandra area as *Bemeringal* or mountaineers:

> Those who live on the high mountains still further back are called the Bemeringal … from Bemering 'a mountain'. Perhaps strictly, the Bemering include the people living on the Manero tableland, and even those on the high country as far as Kiandra.

The relationships that existed between the regional groups is evidenced in the following (Pearse 1896 cited in Knight 2010):

> The blacks used to trade from tribe to tribe for stone tomahawks, boomerangs, and other weapons made from Boree wood, which would go to the blacks who lived more than one hundred miles away; they in exchange pipeclay, done up in roles. And stone knives were placed in these rolls of clay, these knives they call kiandra because they came from Kiandra in the mountains; the pipeclay came from Moneymoney (place unknown), it in booras (sic); fighting parties also used it.

There is very little historical information relating to the local Aboriginal people. Observations dating to the preceding 'traditional' phase of local Wolgalu life are limited to brief chance encounters in nearby country such as that between Henry Bingham and a small party of Aborigines at Yaouk Station in 1839 (Gillespie 1984: 31, cited in Knight 2010) and the campsites seen by the explorers Hume and Hovell in the Tumut River valley (Bland 1831: 22 in Flood 1980: 57). Shortly thereafter, it was noted in official census records that a Wolgalu group known as the 'Bolero band' with a 'King' from Kiandra was residing in the country between Kiandra and the Cooleman Plains (Cooke 1988; Knight 2010).

A review of the early historical literature relating to the pastoral industry and the movement of stock reveals that by the 1830s, Aboriginal people had forged close ties with white settlers and assisted in locating routes and the movement of stock though the mountains (for example *Murray of Yarralumla* as discussed in Wilson 1968). There is a reference in the literature to an Aboriginal man named Snowball in the 1870s, who hunted wild horses and broke them in to sell in auction (Australian Town & Country Journal 2 Mar 1872).

A perusal of the dairies of the early settlers suggests that in the early decades of the 1900s, Aboriginal people lived generally independently of the settler economy but worked on occasion when it suited them and on their own terms. Aboriginal men were highly regarded as extremely capable workers, and in and around the Snowy Mountains, relationships with the settlers appears to have been amiable.

4.3 Material Evidence

4.3.1 OEH Aboriginal Heritage Information management System

Three searches of the NSW OEH AHIMS have been undertaken for the project (Appendix 2 to 4). A total of eleven Aboriginal object sites are listed on AHIMS as being within or near the project area as shown on Figures 15, 16 & 17). Those relevant to this assessment are described below.

Lobs Hole

AHIMS Search #281524: Search date: 16/5/17. The search covered an area encompassed by Eastings: 621000 – 635000 and Northings: 6035000 – 6043000, with a buffer of 50 metres (Appendix 2). Nine Aboriginal object sites are listed on AHIMS for the Lobs Hole area, eight of which are in or near to the project area (Figure 15):

AHIMS site #56-6-0041 KNP 91-21 is located at the north end of Lobs Hole and west of the Washington Hotel ruins. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991). The site is described as stone artefacts on a track over 120m.

AHIMS site #56-6-0042 KNP 91-22 is located at the north end of Lobs Hole. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991). The site is described as stone artefacts on a track.

AHIMS site #56-6-0043 KNP 91-23 is located at Lobs Hole. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991). The site is described as stone artefacts on a track.

AHIMS site #56-6-0045 KNP 91-60 is located at the west end of Mine Trail. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991). No information is available regarding the nature of this site.

AHIMS site #56-6-0046 KNP 91-61 is located at the north end of Lobs Hole on the north side of the river. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991). The site is described as on a high point above the river.

AHIMS site #56-6-0047 KNP 91-62 is located at the north end of Lobs Hole near the ruins. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991).

AHIMS site #56-6-0048 KNP 91-63 is located at the north end of Lobs Hole. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991). The site is described as on a ridge top near the powerlines and is outside the project area.

AHIMS site #56-6-0009 Ravine Lob's Hole KNP 91-59 is located on Mine Trail, Lobs Hole. The site was recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991). The site is described as located in the picnic area which is not obviously now extant. Some 29 artefacts were recorded along a track over an area measuring 50 x 2 m. This recording superseded an earlier recording of a pebble chopper (*cf.* AHIMS site card).

Lobs Hole Ravine Road

AHIMS Search #335511: Search date: 24/3/18. The search covered an area encompassed by Eastings: 621000 – 635000 and Northings: 6026000 – 6036000, with a buffer of 50 metres (Appendix 3). Four Aboriginal object sites are listed on AHIMS for the area, three of which are in the project area on the Lobs Hole Ravine Road, as discussed below (Figure 16):

AHIMS site #56-6-0038 KNP 91-18 is a single artefact. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991).

AHIMS site #56-6-0039 KNP 91-19 is located on a surface erosion. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991).

AHIMS site #56-6-0040 KNP 91-20 is located on a track. The site is an artefact scatter recorded in 1991 during the Kosciuszko National Park Baseline Heritage Study (Johnson & Jones 1991). The site extends 7 m along a fire trail.

Talbingo: Tumut 3 Power Station

AHIMS Search #335512: Search date: 24/3/18. The search covered an area encompassed by Eastings: 615000 – 619000 and Northings: 6052000 – 6062000, with a buffer of 50 metres (Appendix 4). Some 16 Aboriginal object sites are listed on AHIMS for the area, none of which are in the project area at Talbingo (Figure 17).

It is noted that the AHIMS register only includes sites which have been reported to the NSW OEH. Generally, sites are only recorded during targeted surveys undertaken in either development or research contexts. Accordingly, this AHIMS search cannot be considered to be an actual or exhaustive inventory of Aboriginal objects situated within the local area or indeed within the project area. It is also noted that sites listed on AHIMS may be variable in their accuracy; it is not uncommon for grid references and/or the datum to be incorrect.

Searches have been conducted of the NSW State Heritage Inventory and the Australian Heritage Database. There are no Aboriginal heritage sites listed on these registers within the project area.

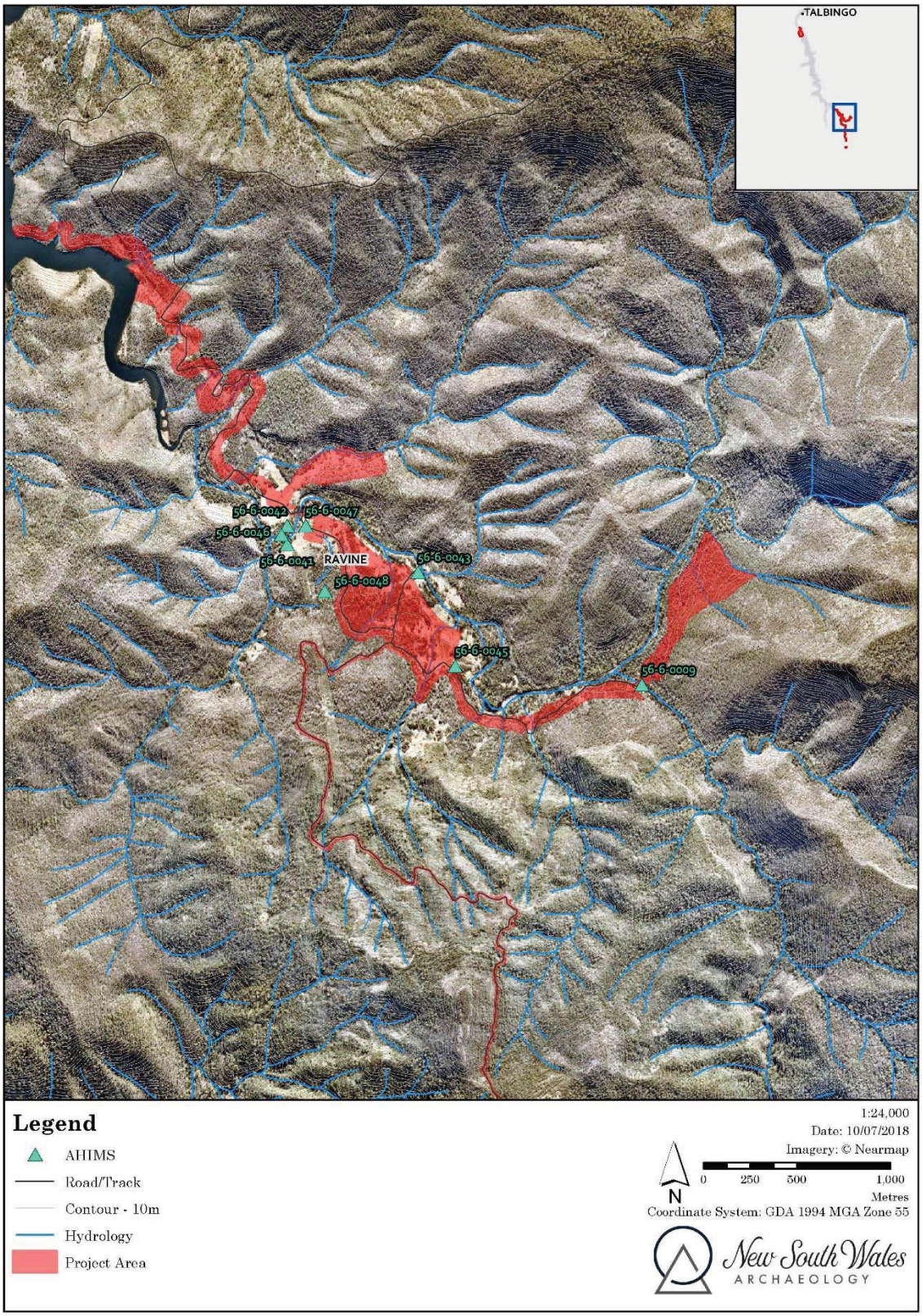


Figure 15 Location of AHIMS Aboriginal object sites at Lobs Hole.

Figure 16 Location of AHIMS Aboriginal object sites on or near Lobs Hole Ravine Road.

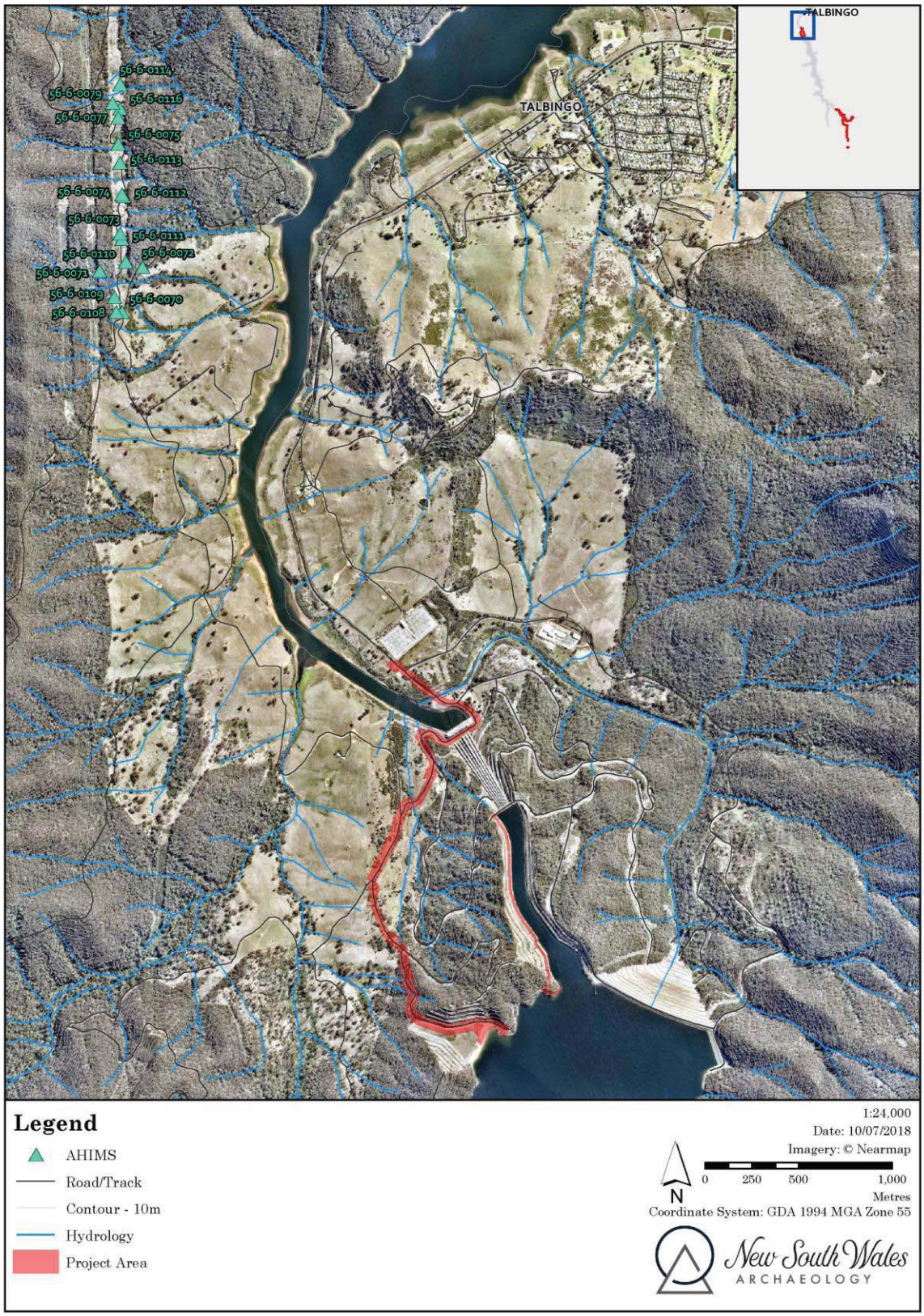


Figure 17 Location of AHIMS Aboriginal object sites at Talbingo.

4.3.2 Previous Archaeological Assessment in the Region

In this section, a summary of previous heritage studies conducted in Kosciuszko National Park is presented. The region has been the subject archaeological survey and assessment over many decades, however, only one study has been undertaken within the immediate area of the project (Johnson 1992), as discussed further below.

Flood (1973) included the local area in her regional prehistory of the highlands, as discussed above. She noted sites in the Kiandra, Boggy Plain and Mt Tantangara area. Flood also refers to the pass at Kiandra-Yarrangobilly as an Aboriginal travel route which, including Connors Hill and Adaminaby, contain 'traces' of Aboriginal usage. On the Bogong Mountains, Flood (1980: 176) recorded three sites in open flats, the location of which had been predicted from aerial photographs. Flood (1980: 176) described these as containing small numbers of artefacts. She compared them to a large site found at the Yarrangobilly River, with the inference that larger sites would be found in the main valleys. Additionally, Flood (1980: 176) indicates that Yarrangobilly is situated within a natural direct route situated between the lower Tumut Valley and the Monaro Tablelands as it passes between the Bogong Mountains to the east and the gorge country of the Upper Tumut River to the west.

Flood (1980) recorded several open artefact scatters further south along this natural direct route. One large site was recorded in the saddle at Connors Hill. The site is described as containing between 21 and 100 artefacts (her size class 3). Artefacts from this site were collected; they included backed blades and manuports and a backed scraper made of glass. In addition, she recorded a site at Kiandra and one on Tantangara Mountain. The Tantangara site was located on a saddle and consisted of a few small tools and one backed blade. These artefacts too, were collected from the site.

Flood (1980) described the *Rings* bunan site located on the Bogong Mountains. This earthen ceremonial site is situated in a natural frost-hollow clearing. Another earthen ring site is reported to exist on the Cooleman Plain, although Flood (1980: 146) reported that its location had not been determined.

Cooke (1988) conducted an archaeological investigation of the Cooleman Plain and found that while sites did occur at lower elevations in the open valley, primarily they were located between 1,200 m – 1,450 m elevations, within the tree line. These sites were interpreted to reflect longer-term occupation sites. Additionally, Cooke (1988) found that sites tended to be situated in the lee side of surrounding hills. Cooke's (1988) analysis of stone artefacts revealed that artefacts made on locally acquired stone were amorphous while those made on finer grained, potentially imported stone, were flaked more intensively and produced identifiable tool types such as backed blades. Cooke (1988) examined the deposition of human remains found in a

small cave at Blue Water Holes. Several stone quarries were recorded, including a basalt hatchet head quarry.

Navin (1989, 1990) conducted surveys of high altitude areas associated with radio communication tower developments within the Snowy Mountains. Four artefact scatters were recorded during these surveys. All sites were small in area and contained low artefact densities and numbers. Most raw materials were quartz and silcrete. All occurred on grassed, relatively flat, well drained ground, in generally sheltered contexts within or adjacent to Snow Gum woodlands. Sites were not found in exposed and/or heath dominated contexts.

Navin (1989) conducted a survey on the Mt Tantangara summit in response to a proposed mobile repeater and trunk microwave communications facility. No sites were found on the summit; however, one site and an isolated find were recorded on the mountain slopes. The artefact scatter is located on an extensive area of alpine grassland on a ridgeline saddle between Mt Tantangara and Sawyers Hill. The site was found to be associated with a small spring in a tea-tree thicket. Artefacts were distributed across an area of 800m². Raw materials recorded at the site included mudstone, silcrete and quartz.

Navin (1990) conducted a survey of Mt Gooandra. No sites were recorded, and the area was considered to be of low archaeological sensitivity.

Navin (1991) conducted a survey of two sections of existing transmission line easements, one extended from the Tooma River to Roaring Mag Mountain at Yellow Bog, and the other from Scammels Ridge to Dargals Fire Trail. The Tooma to Yellow Bog easement falls between two broad landscape elements: basal slopes of the upper catchment of Yellow Bog Creek and a ridge and spur complex which forms the western extension of Jagumba Mountain and the watershed between Yellow Bog Creek and Tooma River. One site consisting of four stone artefacts was found on a track on a basal hillslope. All artefacts were made of chert. The site was interpreted to be representative of a sparse scatter. The Scammels Ridge to Dargals Fire Trail easement consists of steep slopes and ridge and spur crests, in addition to a creek line.

Johnson (1992) documents the results of the Kosciuszko Baseline Study. This report lacks sufficient detail which might have made the results useful in a predictive modeling exercise. An area at the Tooma Reservoir situated around the Pearces Creek inflow was inspected. Visibility was 'excellent' and a basalt flake and a flaked pebble were found. The Manjar Fire Trail at Emu Plain was surveyed; however, no artefacts were found. A low density artefact scatter was found on Four Mile Hill Fire Trail (Johnson 1992). Numerous sites were recorded at Lobs Hole, now listed on AHIMS and as discussed previously. The Gulf Bend area situated 1-2 km downstream from Tantangara Dam wall was surveyed, at which time eight artefact

scatters were recorded, most of which were situated on ridgetops and knolls (Johnson 1992). Chert artefacts dominated the assemblages and a black chert flaking floor was recorded at one site (Johnson 1992: 130).

Saunders (1995) surveyed Four Mile Hill Fire Trail in response to a road upgrade proposal by NSW NPWS. Six low density artefact scatters, including a site previously recorded by Johnson and Jones (1991) and four isolated finds were recorded. The sites were distributed along ridge slopes and a ridge crest. The largest site with the highest number of artefacts was found in an upper slope context below the crest of the ridgeline. The assemblage was dominated by quartz and a material identified to be either tuff or siltstone.

Boot (1999) surveyed Quarry Road, west of the Tantangara Reservoir. Approximately 3.5 km of road was surveyed at which time nine artefact scatters and two isolated finds were recorded. Sites were found to be situated on flat spur crests or in locations adjacent to creeks. This was argued to be typical of the area (Boot 1999). Sites were located between 1,240 m and 1,260 m AHD elevations and Boot (1999) suggested that this pattern reflects an avoidance of cold air drainage in the valley floor.

Taylor (2000) conducted a further survey on Quarry Road to fully assess the sites as previously recorded by Boot (1999). Taylor relocated the sites, and in addition, recorded two more. Most were assessed to be low density artefact scatters, typical of the region. One site was, however, interpreted as a potential base camp given the large number of artefacts it contained and its location on a flat spur crest overlooking the Murrumbidgee valley (Taylor 2000).

Barber (2003) surveyed selected areas near Tantangara Reservoir and the Goodradigbee River. These areas are situated at between 1,000 m and 1,400 m AHD. No sites were recorded; however, prior disturbance was found to have been significant and, generally, the areas were assessed to be of low potential given the steep nature of the terrain.

Boot (2000b) conducted a survey at Denison on the northwest shore of Lake Eucumbene. Two previously recorded sites were located. These had been recorded during the Kosciuszko National Park Baseline Study (Johnson & Jones 1991). Four artefact scatters and three isolated finds were recorded by Boot (2000b). All sites were found to lie between the 1,200 m and 1,160 m AHD contours and to be situated on broad flat ridges and spur crests, and on alluvial flats near watercourses. Boot (2000b) found that this site distribution pattern suggested that cold air drainage seemed to be less of a constraint at Denison as it appeared to be elsewhere. The site contents were found to be consistent with other local areas (Boot 2000b). Sites were found to be small assemblages of dispersed artefacts dominated by chert, volcanic and quartz materials. The artefacts were predominantly flakes, flaked pieces and

cores. Two sites were noted to possess considerable amounts of pebble and quarry cortex on their artefacts. All quarry cortex artefacts were made of chert, suggesting to Boot (2000b) that a quarry exists in the area. Pebble cortex was found on quartzite and volcanic artefacts. These artefacts were probably sourced from the Eucumbene River (Boot 2000b).

Dibden (2003) surveyed a hillslope and crest at Mt Selwyn in response to a proposal to install an underground power cable. No sites were found; however, the area was assessed to have some potential. It was recommended that the site should be monitored during construction, at which time no Aboriginal objects were located.

Dibden (2004b) conducted a survey of several Snow Chain Bay locations proposed by the RTA on the Snowy Mountains Highway between Adaminaby and Kiandra. Despite high levels of prior disturbance associated with previous road works one artefact scatter was located on a basal hillslope near Connors Hill.

Dibden (2004c) conducted an assessment for Snowy Hydro of an area of land immediately adjacent to the Eucumbene Portal Electrical Substation, KNP, in relation to a proposed relocation of the existing substation access track. No Aboriginal objects or archaeologically sensitive landforms were recorded. The proposal area was assessed to be of negligible archaeological potential.

Knight (2004) carried out an archaeological assessment of the Yaouk and Scabby Range Nature Reserves. The survey included a series of transects across a range of inter-montane valley, ridgeline and range top locations between 1,100 m and 1,725 m AHD. Thirty nine Aboriginal sites were recorded including 24 artefact scatters, 14 isolated finds and one Aboriginal stone arrangement. In the Scabby Range, most sites were found in association with basal slope and spur features in valley contexts, with strong correlations evident between sites and low gradient surfaces overlooking or in direct proximity to permanent water sources such as creeks and swamps (Knight 2004: 28). In the more elevated terrain of Yaouk, strong correlations were evident between artefact scatters and low gradient crest and basal slope features slightly elevated above watercourses (Knight 2004: 29). In the case of the inter-montane valleys, a trend for artefact scatters to occur in association with the snow gum/grassland ecotone was also noted (Knight 2004: 33).

Dibden (2006) carried out an Aboriginal archaeological assessment of a proposed water pipeline between Three Mile Dam and the snowmaking pond at Selwyn Quarry. The survey route comprised a three kilometre long corridor that traversed a series of simple slope and ridge crest landform units associated with the major ridge feature dividing the Three Mile Creek and Bullocks Head Creek catchments. No Aboriginal objects were recorded during the survey. It was suggested that the lack of Aboriginal material was probably attributable to the local environment's low

biodiversity with no permanent water as well as with significant prior disturbance (Dibden 2006).

Feary and Vincent 2007 conducted a desktop assessment of Kiandra's Aboriginal heritage for the 2007 Precinct Plan. The potential for the Kiandra area to have attracted occupation was assessed as relatively low due to its perceived lack of resources and generally cold and 'barren landscape' (Feary & Vincent 2007). Limited Aboriginal economic activity was seen to have probably centred on the Eucumbene River and other local streams during the warmer months, with some camping taking place in the grassland/snow gum woodland ecotones (Feary & Vincent 2007: 11). It was hypothesised that the primary role of Kiandra in the cycle of Aboriginal landscape use was as a corridor of movement associated with the exploitation of bogong moths at the high peaks, associated ceremonial activity and as a possible source of stone for making 'knives' (Feary & Vincent 2007: 12). A predictive statement suggested the primary form of archaeological evidence likely to occur would be scatters of flaked or ground stone artefacts located on elevated and well drained land close to creeks (Feary & Vincent 2007: 30).

An archaeological survey of the Mt Selwyn Resort area was conducted by Knight in March 2009. In the course of this study it was predicted that the majority of the resort area was likely to exhibit low archaeological potential due to the combination of exposed, steep and rugged terrain and the high levels of disturbance (Knight 2009a: 5). However, some archaeological potential was seen to remain in certain zones including low gradient, sheltered points along the main ridge top (such as saddles), level, slightly elevated points overlooking the Bullock's Head and Clear Creek corridors (such as shoulders and spur toes) and local well-drained alluvial terraces or creek banks (Knight 2009: 5). The prediction was basically supported by the results of the survey. While no archaeological finds were made in the more elevated and steeper resort terrain, an isolated artefact was found in the upper reaches of Pig Gully. The artefact was found on an elevated shoulder overlooking the upper reaches of Bullocks Head Creek (Knight 2009a: 10). This location appeared to represent a comparatively intact portion of the landscape adjacent to an alluvial valley that had otherwise been heavily impacted by 19th and early 20th century gold mining (Knight 2009a: 6, 13-14). This result appeared to lend weight to the argument that lower elevation, lower gradient places overlooking creek valleys were attractive to Aboriginal land use.

Despite the previously negative findings in the Selwyn area, fieldwork undertaken by Sue Feary in May/June 2010 on the ski slopes at the resort resulted in the discovery of an open artefact scatter in part of the area previously surveyed by Knight (2009a). The scatter comprised 14 flakes of red silcrete adjacent to a soak in an upper slope context.

Knight (2010) conducted an assessment of the Kiandra precinct for NPWS. Seventeen Aboriginal sites were recorded including ten artefact scatters, six isolated artefacts and a significant Aboriginal cultural landscape feature. One site, a cultural stone alignment of indeterminate origin, was also recorded in the far west of the study area on Section Ridge.

The archaeology of the area was characterised by small, generally low-density sites (Knight 2010). However, due to issues of ground exposure and surface visibility it was determined that there was considerable potential some to be larger, including the Wallace's Creek Fire Trail sites and those around the flanks of Dunns Hill. The artefact assemblage was primarily debitage. Several types of stone had been utilised to produce the artefacts including quartz, grey volcanic, grey and brown tuff, black and grey chert, grey silcrete and grey porphyry. The highest level of site complexity in terms of raw material variation was apparent along the Wallace's Creek Fire Trail where most artefact scatters contain between two and four different types of raw material.

Site occurrence across the landscape showed a strong bias towards the elevated zone where 63% (n = 10) of sites were found. Of the remainder, 31% (n = 5) were found in the intermediate zone, with only one recording in the riverine valley. In terms of possible ecological influence, a trend for sites to occur at ecotones, specifically snow gum forest or woodland/open snow grass terrain was a notable feature. In contrast, very little was found in open snow grass plains such as that at Gibsons Plain and certain parts of the Three Mile catchment.

Knight (pers. comm. 2017) recorded a number of sites in the Yarrangobilly, Rules Point and Tantangara areas in the course of a field-based PhD research project. The sites were recorded in February 2007 and January 2008 and included artefact scatters and isolated finds. This research is described as follows:

- Sites recorded at Yarrangobilly were found along the eastern side of the Yarrangobilly River and in the elevated terrain east of the Yarrangobilly River Valley. In the river valley itself, two artefact scatters were recorded on a slightly elevated spur crest and an alluvial bank overlooking the river, on a walking track a short distance downstream from the Glory Hole Caves complex. Both sites contained five stone artefacts. To the east of the river valley, an isolated find was found at an elevation of 1,307 metres. The artefact occurred on a major ridge top next to a small drainage line.
- At Rules Point, two artefact scatters were found along the upper reaches of a creek draining from Long Plain into the Tumut River. The general location comprises a major pass connecting the river valley with the elevated, treeless plains of the Kiandra/Long Plain area. One scatter, on a low gradient spur crest on the eastern side of the creek, contained six artefacts including five flakes of grey and black chert, quartz, grey tuff and a dark grey volcanic and a single

grey chert core. A scatter containing 17 artefacts was recorded in a quarried area on the opposite side of the creek. It contained flakes and a flaked piece of quartz, grey volcanic, brown and grey chert, grey tuff and a banded metamorphic and a hammerstone/pestle manufactured from a dense, crystalline volcanic rock.

- Survey undertaken directly to the east of Tantangara Mountain and Boggy Plain resulted in the recording of a series of artefact scatters and isolated finds apparently associated with the Aboriginal occupation and use of Blackfellows Hill. Three artefact scatters and an isolated find were found on the hill flanks and flats at Wares Yards. The scatters were generally discrete occurrences containing between five to eight artefacts, including flakes, flaked pieces and cores of quartz and several varieties of silcrete, chert, tuff and volcanic stone. To the south, an extensive artefact scatter was recorded at the gap dividing the watersheds of the Eucumbene River and Tantangara Valley. The site was located at 1,423 m AHD and contained 27 artefacts including flakes, flaked pieces, cores and a scraper manufactured from quartz and varieties of silcrete, tuff and chert. On Blackfellows Hill itself, a small artefact scatter containing two black chert flakes was found at a ridge/spur junction at the hill's southern end and a single quartz flake was recorded further north near the base of the main peak.

4.4 Predictive Model of Aboriginal Site Distribution

4.4.1 Previous Archaeological Models

According to Johnson (1992), general trends in site location and assemblage attributes include:

- A modal elevation value of 1,300 metres with a noticeable 'peak' in site numbers in the 1,000 m - 1,400 m range typical of the elevated areas of low relief in the Park's north (Johnson 1992: 81);
- Highest levels of artefact scatter complexity were apparent in lower altitude, broad river valleys (Johnson 1992: 94);
- A strong tendency for sites to occur in areas of low gradient, generally in the 3-6 degree range (Johnson 1992: 84); and
- Artefact scatters displayed the highest level of raw material diversity in the north of the Park, with a notable range of cherts. Quartz remained ubiquitous throughout all assemblages and possible external sources of stone, including a Namadgi chert, were also apparent (Johnson 1992: 94).

Knight (2010) found that in the Kiandra Precinct study, the fact that most of the sites were located within snow grass/snow gum ecotones is potentially of considerable significance and appears to parallel archaeological findings in nearby and comparable montane and inter-montane zones such as Cooleman Plain (Cooke 1988) and the Yaouk/Scabby Range area (Knight 2004) and further supports Feary and Vincent's (2007) predictive statement for the precinct. However, Knight (2010) cautioned that the degree to which the current tree line and vegetation species distribution has been altered by historical activity remains unknown and this must be acknowledged. Site distribution according to study area zone also showed a strong bias toward the higher elevation areas. The evidence suggests that substantial activity in the study area's highest locations, such as the elevated ridges over the riverine valley, were preferred locations. Landscape positions such as prominent hilltops and flanks and elongated ridgelines exhibit the highest archaeological signatures. However, this is not universally reflected, and a substantial exception occurs in the apparent total lack of Aboriginal sites along the top of the Kings Cross ridge. Knight (2010) suggests possible explanations for the Kiandra site distribution may include the following:

- *Shelter* Camping locations at the tree line and in the lee of higher ridges and hills may have afforded shelter from wind, while avoiding cold air drainage and possible 'wind-tunnel' effects in the riverine valley and open grassy plains terrain.
- *Ecological diversity* Ecotone locations could have provided a wider range of available food resources and/or more easily accessible foods than the open grassland.
- *Strategic preference and travel* More elevated positions in the landscape provide open views of the surrounding terrain and in many cases comprise natural topographic travel routes, particularly between major watersheds. The ridgeline forming the route for the Wallace's Creek Fire Trail for example is a natural landscape 'pathway' connecting the steep creek and riverine zones of the west with the upper Three Mile Creek catchment and Gibsons Plain. The correspondingly high number of artefact scatters along the ridge top and the proximity of a significant natural cultural feature may reflect the importance of this natural landscape continuity and provide physical evidence of the Aboriginal 'pathway'.
- *Cultural factors* Restriction of certain activities to particular parts of the local terrain may reflect a purposeful, structured cultural division of the landscape that was intimately understood by those who utilised it. Given Kiandra's potential importance as a route of travel to and from ceremonies and as a meeting place associated with such ritual activity, there is scope for the local archaeology to reflect social convention including 'acceptable' and 'preferred' places for travel or activities undertaken by visitors or members of specific groups/gender.

- *Taphonomy* There is substantial potential for extensive site destruction to have occurred in the areas subject to mining activity in the historical period. Archaeological evidence of Aboriginal use of the riverine zones and other alluvial landforms in the study area may well be lacking simply because it has been obliterated by gold extraction methods such as sluicing, dredging and paddocking.

These models developed specifically for KNP are focused on higher elevations than those generally encountered in the project area. Lobs Hole and Talbingo are mostly below 600 m ASL and it is only the south end of the Lobs Hole Ravine Road that approaches elevation contexts considered by Johnson (1992) and Knight (2010). Therefore, the predictive statements set out below are based not only on a consideration of the above models but also the review of prior research conducted in the area and a recognition of the specific and rather unique landscape of Lobs Hole.

4.4.2 Predictive Model of Site distribution for the Project Area

While the predictive model of site type and location presented in this section considers a comprehensive range of Aboriginal sites, stone artefact distributions are likely to be the most common. Because of high levels of previous European impacts, other site types such as, for example, scarred trees, are less likely to have survived in the project area. Other types such as rock shelters are unlikely to be present simply because of the nature of the local geology in the project area.

Stone artefacts

Stone artefacts are found either on the ground surface and/or in subsurface contexts. Stone artefacts will be widely distributed across the landscape in a virtual continuum, with significant variations in density in relation to different environmental factors. Artefact density and site complexity is expected to be greater near reliable water and the confluence of a number of different resource zones.

Typically, stone artefacts recorded in open contexts are representative of debris which results from flaking stone and will include unmodified flakes, cores and flaked pieces. Actual stone tools such as deliberately formed artefacts (such as scrapers, backed blades or adzes) or pieces which possess evidence of use, generally occur in low frequencies. The detection of artefact scatters depends on ground surface factors and whether the potential archaeological bearing soil profile is visible. Prior ground disturbance, vegetation cover and sediment/gravel deposition can act to obscure artefact scatter presence.

Generally, stone artefact distributions represent a range of stages in what is termed a 'reduction sequence' – the reduction of stone by stages of flaking and/or grinding to make stone tools. The debitage (or debris) from tool making, including partly

fashioned implements and finished implements, were discarded or lost on the ground and subsequently incorporated into the archaeological record.

On the basis of a general ethnographic analogy from the Australian desert region, it is inferred that both men and women knapped stone to fashion and resharpen a range of both general tools and gender-specific tools. The flaking methods are freehand percussion, bipolar flaking, and 'chimbling' (application of direct pressure with a small stone presser) to make microblades and microliths. Hatchet heads and other ground stone tools were ground as well as flaked, and some were finished by pecking or lightly pounding the surface of the stone (such as 'Wiradjuri-style' hatchet heads).

In accordance with the OEH AHIMS searches, stone artefacts are known to be present in the project area at Lobs Hole and at the transmission line near Lobs Hole Ravine Road. However, their nature and distribution has not been reported in detail. Given the different environmental contexts present, stone artefacts are predicted to be present in variable densities ranging from very low to moderate or even high. The extensive prior disturbance from European and geomorphological impacts is certain to have impacted the artefact distribution but the extent of this is unknown.

Given the diverse and potentially resource rich environmental context of Lobs Hole, it is expected that a wide range of implement types will be present reflecting the range of behavioral activities likely to have been undertaken. It is questioned whether or not Aboriginal people used Lobs Hole in an interdependent relationship with the adjacent high country as was the case with the European occupants of Kiandra (Dibden 2018).

Grinding Grooves

Grinding grooves are always located on sandstone exposures and are the result of the manufacture and maintenance of ground edge tools. Such tools were generally made of stone; however, bone and shell were also ground to fine points. The location of sites with grinding grooves is dependent on the presence of a suitable rock surface, a fine grained homogeneous sandstone and a water source. Grinding groove sites may consist of a single groove, or a large number which are sometimes arranged in patterns. They commonly occur as an open site particularly in creek beds, however, are sometimes found in shelter contexts. Usually grinding grooves are located on horizontal sandstone exposures, but they can occasionally be found on vertical surfaces.

A broad temporal framework for the age of grinding groove sites can be inferred on the basis of the age of ground-edge hatchet heads found within archaeological deposits. Across Australia, there is significant variation in the timing of the introduction of ground-edge hatchet technology, and in the south-east, the earliest

hatchet heads date to the fourth millennium BP (Dibden 1996: 35; Attenbrow 2004: 241), and no earlier than 3,500 years ago (Hiscock 2008: 155). Grinding groove sites in the local area can be no older than 3,500 years. Given that hatchets were used at the time of European occupation, the use of some grinding groove sites may have spanned this temporal range.

Grinding hatchet heads on stone creates indelible marks on the rock surface and land. Grinding groove sites may have become significant and meaningful locales over time given their reference to an important item of material culture and their strong material presence in the landscape. Sites containing high groove counts are now visually significant marked locales. While the original motivation which led people to choose to grind hatchet heads at a specific place is now not well understood, it is possible that over time and as a place became increasingly embellished with grooves, the meaning and significance of that locale was changed correspondingly. Grinding groove sites may have provided a physical and conceptual reference to the ancestral past and activities of previous generations (Dibden 2011). Because of the enduring materiality of grinding grooves, they may have been meaningfully constituted expressions of place and mnemonic of past events and personal and group history (*cf*. Peterson 1972: 16).

Given the general absence of sandstone exposures in the activity areas (rough, blocky sandstone does however occur nearby), this site type is unlikely to be present. However, given the requirement to maintain ground edged implements, portable whetstones which satisfy this need may well be found (*cf*. Dibden 2005a).

Burials

Burial/interment sites have been recorded within the wider region. On the Monaro and in the Snowy Mountains, human remains have been found buried in excavated ground contexts (eg. Helms 1895: 404-406; Feary 1996), in limestone caves (eg. Spate 1997: 39) and deposited in standing hollow trees (eg. Helms 1895: 399; Flood 1980: 120).

No burials are known to be present in the proposed activity areas. Aboriginal burials are rarely encountered during field survey. They are not expected to be found in the project area, but the potential cannot be discounted.

Rock Shelter Sites

Rock shelter sites consist of any form of rock overhang that contains artefacts, archaeological deposit and/or art. Common archaeological features of rock shelter sites are: surface artefacts, archaeological deposit including stone artefacts, shell, bone and charcoal, rock drawings, paintings and stencils, engraved imagery and grinding grooves. No rock shelters are known in the project area. The tufa formations

located in the cliff lines south and east of Lobs Hole do form small caves and may have been used by Aboriginal people.

Scarred and Carved Trees

Scarred and carved trees result from the removal of bark from trees by Aboriginal people for either domestic or ceremonial purposes. These site types can occur anywhere that trees of sufficient age are present, however, in an Aboriginal land use context would most likely have been situated on flat or low gradient landforms in areas suitable for either habitation and/or ceremonial purposes. Bark removal by European people through the entire historic period and by natural processes such as fire blistering and branch fall, make the identification of scarring from a causal point of view very difficult. Accordingly, given the propensity for trees to bear scarring from natural causes their positive identification is impossible unless culturally specific variables such as stone hatchet cut marks or incised designs are evident and rigorous criteria in regard to tree species/age/size and it specific characteristics in regard to regrowth is adopted.

Nevertheless, the likelihood of trees bearing cultural scarring remaining extant and *in situ* in the study area is low given events such as land clearance and bushfires. Generally scarred trees will only survive if they have been carefully protected such as the trees associated with Yuranigh's grave at Molong where successive generations of European landholders have actively cared for them. The potential for scarred trees to be present in the project area is considered possible but unlikely.

Stone Quarry and Procurement Areas

A lithic quarry is the location of an exploited stone source (Hiscock & Mitchell 1993:32). Sites will only be located where exposures of a stone type suitable for use in artefact manufacture occur. These sites will commonly have evidence of exploitation including extraction and preliminary flaking preparation. The presence of these site types is dependent on the surface exposure of suitable stone. Quarries are a rare site type in this region, however, Comber (1988) recorded numerous quartz quarries on the Monaro. No quarries are known to be present in the activity areas. The potential for quarries to be present in the project area is considered possible but low. However, given the abundance of pebbles in the Yarrangobilly River, this may have been utilised as a stone procurement area.

Ceremonial Places and Sacred Geography

Burbung and ceremonial sites are places which were used for ritual and ceremonial purposes. Possibly the most significant ceremonial practices were those concerned with initiation and other rites of passage such as those associated with death. Sites associated with these ceremonies are burbung grounds and burial sites. Additionally, secret rituals were undertaken by individuals such as clever men. These rituals were commonly undertaken in 'natural' locations such as water holes.

In addition to site specific types and locales, Aboriginal people invested the landscape with meaning and significance; this is commonly referred to as a sacred geography. Natural features are those physical places which are intimately associated with spirits or the dwelling/activity places of certain mythical beings (*cf.* Knight 2001; Boot 2002). Boot (2002) refers to the sacred and secular meaning of landscape to Aboriginal people which has '… legitimated their occupation as the guardians of the places created by their spiritual ancestors'.

While many places in the high country are known in respect of their sacredness, none are reported for the project area.

Contact Sites

These sites are those which contain evidence of Aboriginal occupation during the period of early European occupation. Evidence of this period of 'contact' could potentially be Aboriginal flaked glass, burials with historic grave goods or markers, and debris from 'fringe camps' where Aborigines who were employed by, or traded with the white community, may have lived or camped. The most likely location for contact period occupation sites would be places adjacent to permanent water and located in relative proximity to centres of European occupation such as towns and homesteads. No contact sites are known to be present. The potential for contact sites to be present in the project area is considered possible but low.

5. ABORIGINAL CONSULTATION PROCESS

A formal process of Aboriginal community consultation has been conducted as a component of this assessment in accordance with the guidelines as set out in the NSW OEH's *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW DECCW 2010b).

The following additional consultation has been undertaken:

- Letters dated 16 June 2017 were sent to Wagonga and Brungle-Tumut Local Land Councils to provide preliminary advice about the project.
- Julie Dibden and Charlie Litchfield (Snowy Hydro) provided a preliminary presentation to the Northern and Southern MOU Kosciuszko Advisory Groups on 11 September 2017 and 16 September 2017, respectively.
- Charlie Litchfield provided a further presentation to the Northern MOU Kosciuszko Advisory Group on 9 April 2018 and the Southern MOU Kosciuszko Advisory Groups on 4 May 2018.
- NSW Archaeology Pty Ltd will present an overview of the Lobs Hole heritage assessment to the Northern MOU Kosciuszko Advisory Group on a date yet to be determined.

5.1 Consultation

In order to identify, notify and register Aboriginal people who may hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the area of the proposed project, the following procedure was implemented (see Appendix 5).

Correspondence dated 31 July 2017 was sent to:

- NSW OEH Queanbeyan office;
- Wagonga and Brungle-Tumut Local Aboriginal Land Councils;
- the Registrar, Aboriginal Land Rights Act 1983;
- the National Native Title Tribunal, requesting a list of registered native title claimants, native title holders and registered Indigenous Land Use Agreements;
- Native Title Services Corporation Limited (NTSCORP Limited);
- Snowy Monaro Regional Council and Snowy Valleys Council;
- Cooma Local Land Services.

In addition, advertisements were placed in the Monaro Post (2/8/17) and Tumut & Adelong Times (4/8/17).

Following information received from OEH, further letters of notification were sent to potential Aboriginal parties on 3/8/17. The Registered Aboriginal Parties (RAPS) for this project are:

- Iris White, on behalf of the Ngarigo people;
- Koomurri Ngunawal Aboriginal Corporation (since deregistered via email on 22/12/17);
- Corroboree Aboriginal Corporation;
- Bega Local Aboriginal Land Council;
- Lindsay Connolly, Steve Connolly and Ramsey Freeman.

A late registration of interest was received from the Brungle-Tumut Local Aboriginal Land Council in December 2017, Arnold Williams, on behalf of the Ngunnawal Elders Corporation, via email on 28 February 2018 and Ellen Mundy in June 2018.

In accordance with Section 4.2 and 4.3 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW DECCW 2010b) guidelines, information with regard to the project, proposed consultation process and assessment methodology was furnished to the RAPs for comment on 5/8/17.

One response was received from Iris White (see Appendix 5) at which time she raised a question regarding active involvement in the matter. Further to this email, Julie Dibden met with Iris to discuss the matter on 6/9/17. Iris advised that her group (KNP Southern) who have a MOU with KNP were having a meeting with NPWS in Jindabyne on the 16 September 2017. She advised that given it is not easy for some of her group to get to meetings and so on, it would be good for us to meet with them on that date. She suggested that Snowy Hydro address the meeting to provide the group with an overview of the project. A presentation was subsequently provided to the Southern MOU group (and also, the Northern MOU group), as discussed above.

An updated project consultation process and heritage assessment methodology was provided to RAPS on 14 January 2018. One response was received from Iris White (see Appendix 5) at which time she raised a question regarding traditional boundaries. Charlie Litchfield subsequently consulted with Iris via telephone and provided mapping as requested.

Updated information about the Exploratory Works project and the cultural heritage assessment was provided to RAPS on 15 April 2018.

Fieldwork

The project area is located entirely within the Northern MOU group area. In addition, it is within the recognized boundaries of the Wolgalu people, as discussed previously. Field assistance was provided Leanne Williams, Ramsey Freeman, Janice Williams, Steve Connolly, Lorraine Connolly, Lindsay Connolly, Julie Connolly, Lawrence Marlowe, Shirly Marlowe, Matt Marlowe and Ron Grosvenor, on behalf of the Northern MOU group.

A draft of this report has been provided to all RAPS for a review and consideration of the impacts and proposed management strategies (sent 21 April 2018). No responses have been received.

6. ARCHAEOLOGICAL FIELD ASSESSMENT AND RESULTS

6.1 OVERVIEW

The project area has been divided into 27 Survey Units and the archaeological signature of these has been established during the assessment. Survey Units are the framework for the development of significance values, and appropriate management and mitigation measures.

A total of 44 Aboriginal object locales have been recorded in surface exposures across the project area. It is likely that some of these encapsulate the original 1992 recordings as per the AHIMS sites. As noted previously, the exact nature and location of the AHIMS sites has been unable to be determined due to the limited available information.

In addition, a program of test excavation has been conducted in seven Survey Units at Lobs Hole. The test excavation has been conducted in Survey Units predicted to contain moderate or greater artefact densities. A total of 2,306 lithic items were retrieved from 180 Test Squares (45 square metres). The average artefact density across the Survey Units tested is calculated to be 51 artefacts per square metre. It is evident, based on these findings, that Lobs Hole was well used by Aboriginal people. The analysis has revealed a variable but widespread and relatively intensive use of the landscape.

6.2 FIELD SURVEY

6.2.1 SURVEY METHODOLOGY

The methodological approach adopted in this assessment attends particularly to location and relationality as a means of contextualising the material evidence of cultural practice across space. Given the nature of the geography and landscape, different places within the region are likely to have been utilised for different purposes, and also by different categories of people.

Landscape is more than a set of 'objective' topographic features. Landscapes are constructed out of cultural and social engagement; they are '... topographies of the social and cultural as much as they are physical contours' (David & Thomas 2008: 35). The conceptual approach to understanding landscape in this assessment is based on a concern with experience, occupation and practice (*cf.* Thomas 2008: 305). The location of material evidence in different environmental and topographic contexts across the project area has the potential to be informative of different activities and social contexts. Landform and environmental elements, as measurable empirical space, will be employed methodologically to explore land use, occupation and the nature of both recorded and unseen (i.e. subsurface) material evidence.

Given the area encompassed by the proposal, this methodology allows for the identification, at a fine level of spatial resolution, of elements representative of the patterns of Aboriginal social life and how these may vary over space.

The practical methodology for the field survey entailed a pedestrian traverse of the project area. The field survey was aimed at locating Aboriginal objects and predicting the nature of prior Aboriginal land use and the artefactual remains which might be expected to have resulted from such activity. An assessment was also made of land disturbance, survey coverage variables (ground exposure and archaeological visibility) and the potential archaeological sensitivity of the land. The assessment area covered by the Survey Units at Lobs Hole covers a much larger area than that in which direct impacts are proposed.

The approach to recording in the current study has been a 'nonsite' methodology (*cf.* Dunnell 1993; Shott 1995). The density and nature of the artefact distribution will vary across the landscape in accordance with a number of behavioural factors which resulted in artefact discard. While cultural factors will have informed the nature of land use, and the resultant artefact discard, environmental variables are those which can be utilised archaeologically in order to analyse the variability in artefact density and nature across the landscape. Accordingly, in this study, while the artefact is the elementary unit recorded, landform elements are utilised as a framework of recording, analysis (*cf.* Wandsnider and Camilli 1992) and ultimately, the formulation of recommendations. The project area has been divided into 27 Survey Units defined on the basis of landform morphological type, and these are described in Table 8.

Survey Unit Variables

Landscape variables utilised are conventional categories taken from the *Australian Soil and Land Survey Field Handbook* (McDonald *et al.* 1998). Landforms form the primary basis for defining Survey Unit boundaries.

The following variables were recorded for each Survey Unit:

Morphological type:

- Crest: - element that stands above all or almost all points in the adjacent terrain – smoothly convex upwards in downslope profile. The margin is at the limit of observed curvature.
- Simple slope: - element adjacent below crest or flat and adjacent above a flat or depression.
- Flat.

Slope class and value (ave.):

- Level: <1°.
- Very gentle: 1°.
- Gentle: 3°.
- Moderate: 10°
- Steep: 23°

Soil

Soil type and depth was recorded for each Survey Unit. This observation is based solely on the potential for soil to contain artefacts; it does not imply that artefacts will be present or absent.

Geomorphological processes

The following gradational category was recorded for each Survey Unit:

- eroded
- eroded and aggraded.

Survey Coverage Variables

Survey Coverage Variables are a measure of ground surveyed during the study and the type of archaeological visibility present within that surveyed area. Survey coverage variables provide a measure with which to assess the effectiveness of the survey so as to provide an informed basis for the formulation of management strategies. Specifically, an analysis of survey coverage is necessary in order to determine whether or not the opportunity to observe stone artefacts in or on the ground was achieved during the survey. In the event that it is determined that ground exposures provided a minimal opportunity to record stone artefacts, it may be necessary to undertake archaeological test excavation for determining whether or not stone artefacts are present. Conversely, if ground exposures encountered provided an ideal opportunity to record the presence of stone artefacts, the survey results may be considered to be adequate and, accordingly, no further archaeological work may be required.

Two variables were used to measure ground surface visibility during the study; the area of ground exposure encountered, and the quality and type of ground visibility (archaeological visibility) within those exposures. The survey coverage variables estimated during the survey are defined as follows:

- Ground Exposure (GE) – an estimate of the area of exposures of bare ground; *and*

- Archaeology Visibility (AV) – an estimate of the average levels of potential archaeological surface visibility within those exposures of bare ground. Archaeological visibility is generally less than ground exposure as it is dependent on adequate breaching of the bare ground surface which provides a view of the subsurface soil context. Based on subsurface test excavation results conducted in a range of different soil types across New South Wales it is understood that artefacts are primarily situated 10 - 30 cm below the ground; reasonable archaeological visibility therefore requires breaching of the ground surface to at least a depth of 10 cm (*cf*. Dibden 2005b).

Based on the two visibility variables as defined above, an estimate (Net Effective Exposure – NEE) of the archaeological potential of exposure area within a survey unit has been calculated. The Effective Survey Coverage (ESC) calculation is a percentage estimate of the proportion of the Survey Unit which provided the potential to view archaeological material.

Aboriginal Object Locales

For the purposes of defining the artefact distribution in space it has been labelled as a locale within its respective Survey Unit (eg. Survey Unit 1/Locale 1). It is not assumed that an artefact locale is a discrete 'site', but rather, a *visible* part of the artefact distribution expected to be present across the wider Survey Unit area.

The measurable area in which artefacts are observed has been noted. In addition, locale specific assessments of survey coverage variables have been made. The prior disturbance to the locale has been noted. Artefact numbers in each locale have been recorded and a prediction of artefact density stated, based on observed density taking into consideration Effective Survey Coverage and a consideration of environmental context.

The data collected forms the basis for the documentation of survey results outlined in the section below.

6.2.2 FIELD SURVEY - RESULTS

The field survey was conducted in a six day program on 17 and 18 October 2017 and 26 - 29 March 2018 and the project area was subject to a reasonably comprehensive field survey. However, in all Survey Units, vegetation frequently posed a constraint; visibility of ground surfaces was often absent. In forested areas at Lobs Hole and Lobs Hole Ravine Road, undergrowth was often thick and sometimes impenetrable, especially if blackberry was present. Also, at Lobs Hole, blackberry thickets cover relatively large areas along the Yarrangobilly River and Lick Hole Gully. The flats at Lobs Hole were covered in thick grass.

The project area was found to have undergone relatively high levels of prior disturbance associated with clearance, settlement, agriculture, mining, road building (and at Talbingo Dam and the Tumut 3 power station area, dam construction, stockpiling & quarrying), recreation and so on. Original land clearance and subsequent farming practices (cultivation, horticulture and gardening) have impacted the entire proposal area. The Lobs Hole copper mining ventures and associated settlement have causing significant localised ground disturbance and erosional contexts.

This prior activity has caused reasonably high levels of impact to ground surfaces and to any Aboriginal objects which may once have been present. On elevated crests and simple slopes, ground surfaces were found to be generally highly eroded and very rocky. Flats and open depression contexts do contain deeper soils, but these too are likely to be disturbed by natural geomorphological processes, agriculture and other. In Survey Units near the Talbingo Dam and Tumut 3 power station, entire landforms were found to have been removed or so altered by prior works that their archaeological potential was negligible.

The trees in the project area and its surrounds are predominately regrowth, estimated to be around 100 years old (or less). All trees were inspected during the survey and no evidence of Aboriginal scarring was found.

The Exploratory Works project area has been divided into 27 Survey Units; these are described in Table 8 and shown in Figures 18 - 23. The surveyed area measured approximately 310.1 hectares in area (Table 9). Ground exposures inspected are estimated to have measured 8.4 hectares. Of that ground exposure, archaeological visibility (the potential artefact bearing soil profile) is estimated to have been 5.6 hectares. Effective Survey Coverage is therefore calculated to have been 1.8% of the survey area.

Effective Survey Coverage encountered during the survey was generally limited due to the low incidence of ground exposures (or the complete removal of topsoil i.e. where roads and so on have been excavated). Accordingly, given that stone artefacts are present within soil profiles (*that is* - in a subsurface context) the ability to record Aboriginal objects during the survey was correspondingly low.

Nevertheless, a total of 44 Aboriginal object locales have been recorded in surface exposures across the project area (Figures 18, 19, 20, 21 & 22). It is possible that some of these encapsulate the original 1992 sites recordings on AHIMS. As noted previously, the exact nature and location of the AHIMS sites has been unable to be determined given the paucity of information on the site cards.

Given the environmental context of the Lobs Hole project area is predicted to have been highly favourable for Aboriginal occupation, stone artefact distributions of varying densities have been predicted to be present in a subsurface context in all Survey Units. That is, where ground exposures are absent, it is likely that artefacts would nevertheless be present in a generally continuous distribution below the vegetation cover and ground surface. The test excavation conducted at Lobs Hole, as discussed further below, clarifies this. In Table 8, a summary of Aboriginal object locales present in each Survey Unit is listed. Table 10 sets out a description of each locale recorded in surface exposures.

Table 8 A description of Survey Units including the AHIMS sites, Aboriginal object locales recorded during survey and test excavation (Test Transects).

ID	Start	Finish	Description	Disturbance	Predicted/Known Artefact Density	Aboriginal Objects
SU1	628044. 6037763	628223. 6039044	Lower simple slope landform. Dry sclerophyll forest with a thick shrubby understory. Shale bedrock; occasional cobbles and shatter. Erosional context.	Previous timber extraction for domestic and mining use. Natural erosional processes. Water race race/road.	Very low/ negligible	Nil recorded
SU2	627823. 6038005	628089. 6039134	Flat landform. Dry sclerophyll forest with a thick shrubby understory. Thickets of blackberry. Depositional context.	Previous timber extraction for domestic and mining use. Construction of water race/road.	Moderate	Nil recorded
SU3	626834. 6037907	628280. 6037746	Flat landform. Dry sclerophyll forest with occasional grassy glades. Depositional context.	Previous timber extraction for domestic and mining use. Historic gardens. Construction of water race and road. Recreational use.	Low/Moderate	AHIMS 56-6-0009 SU3/L1 SU3/L2 SU3/L3 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4
SU4	626834. 6037911	626705. 6038354	Crest/knoll landform. Cleared with some regrowth saplings. Scattered shrubs and blackberry. Shale bedrock. Negligible topsoil. Highly eroded with no or limited soil.	Previous clearance, original homestead site. Mining.	Low	AHIMS 56-6-0045 SU4/L1 SU4/L2

ID	Start	Finish	Description	Disturbance	Predicted/Known Artefact Density	Aboriginal Objects
SU5	626765. 6038102	626577. 6038570	Flat landform. Patches of regenerating dry sclerophyll forest and open grassland. Depositional context.	Previous clearance, cultivation and gardening. Mining. Recreation.	Moderate	SU5/L1 SU5/L2 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4 Test Transect 5
SU6	626563. 6038141	626520. 6038637	Crest landform. Regenerating dry sclerophyll forest and open grassland. Shale bedrock. Generally negligible topsoil. Highly eroded to bedrock.	Previous clearance, historic occupation. Mining. Recreation	Moderate/high	SU6/L1 SU6/L2 SU6/L3 SU6/L4 Test Transect 1 Test Transect 2
SU7	625939. 6038408	626381. 6038621	Crest landform. Regenerating dry sclerophyll forest. Shale bedrock. Erosional context	Previous clearance, historic occupation including 1920 school.	Moderate	Nil recorded
SU8	626550. 6038617	626173. 6038961	Flat landform. Patches of regenerating dry sclerophyll forest and open grassland. Depositional context.	Previous clearance, cultivation and gardening. Mining. Recreation.	Low	AHIMS 56-6-0043 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4
SU9	626223. 6038599	626124. 6038885	Steep simple slope. Patches of regenerating dry sclerophyll forest. Erosional context.	Previous timber extraction for domestic and mining use.	Negligible	Nil recorded
SU10	626142. 6038654	626025. 6039021	Crest landform. Regenerating native shrubs; mostly grassland. Shale bedrock. Erosional context	Previous clearance, historic occupation including police station.	Moderate/high	SU10/L1 SU10/L2 SU10/L3 Test Transect 1 Test Transect 2

ID	Start	Finish	Description	Disturbance	Predicted/Known Artefact Density	Aboriginal Objects
SU11	625700. 6038734	626110. 6039080	Flat landform. Patches of regenerating dry sclerophyll forest and open grassland. Depositional context.	Previous clearance, historic occupation including Washington Hotel, cultivation and gardening. Recreation.	Low	AHIMS 56-6-0041 AHIMS 56-6-0047 SU11/L1 SU11/L2 SU11/L3 Test Transect 1 Test Transect 2 Test Transect 3
SU12	625700. 6038734	626110. 6039080	Flat landform. Patches of regenerating dry sclerophyll forest and open grassland. Depositional context.	Previous clearance, cultivation and gardening. Recreation.	Moderate/high	AHIMS 56-6-0042 AHIMS 56-6-0046 SU12/L1 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4 Test Transect 5 Test Transect 6 Test Transect 7 Test Transect 8
SU13	625526. 6039474	625463. 6039162	Crest landform. Regenerating dry sclerophyll forest and open grassland. Shale bedrock. Erosional context	Previous clearance, timber extraction for domestic and mining use.	Low	SU13/L1 SU13/L2
SU14	625680. 6039417	626438. 6039390	Steep simple slope. Regenerating dry sclerophyll forest. Erosional context.	Previous timber extraction for domestic and mining use.	Negligible	Nil recorded
SU15	625934. 6039145	626558. 6039131	Crest landform. Regenerating dry sclerophyll forest. Shale bedrock. Erosional context	Previous clearance, timber extraction for domestic and mining use.	Low	Nil recorded

ID	Start	Finish	Description	Disturbance	Predicted/Known Artefact Density	Aboriginal Objects
SU16	625871. 6039011	626571. 6039160	Gentle simple slope. Regenerating dry sclerophyll forest. Erosional context.	Previous timber extraction for domestic and mining use.	Low	SU16/L1 SU16/L2 SU16/L3 SU16/L4
SU17	626658. 6038178	626644. 6037763	Crest landform. Regenerating dry sclerophyll forest. Shale bedrock. Erosional context	Previous clearance, timber extraction for domestic and mining use. Dwellings etc of 'Struggle Street'.	Low	SU17/L1
SU18	626255. 6037617	627342. 6037529	Gentle simple slope. Regenerating dry sclerophyll forest with some grassland. Thickets of blackberry. Erosional context.	Previous timber extraction for domestic and mining use.	Low	SU18/L1
SU19	628321. 6037830	628289. 6039033	Steep simple slope. Dry sclerophyll forest. Erosional context.	Previous timber extraction for domestic and mining use.	Negligible	Nil recorded
SU20	628712. 6027495	627141. 6031868	Generally, gently undulating crest landform. Dry sclerophyll forest. Erosional context.	Previous timber extraction.	Low	SU20/L1 SU20/L2 SU20/L3 SU20/L4 SU20/L5 SU20/L6 SU20/L7 SU20/L8 SU20/L9 SU20/L10 SU20/L12 SU20/L12

ID	Start	Finish	Description	Disturbance	Predicted/Known Artefact Density	Aboriginal Objects
SU21	629075. 6027804	626360. 6038292	Gently undulating crest landform at south end, becoming steep to north. Dry sclerophyll forest. Erosional context.	Previous timber extraction.	Low	Nil recorded
SU22	625213. 6039987	624901. 6039838	Crest landform. Regenerating dry sclerophyll forest. Shale bedrock. Erosional context	Previous clearance, timber extraction for domestic and mining use.	Low	SU22/L1 SU22/L2 SU22/L3
SU23	625132. 6040059	624350. 6040552	Gentle simple slope. Regenerating dry sclerophyll forest. Thickets of blackberry. Erosional context.	Previous timber extraction for domestic and mining use.	Low	SU23/L1 SU23/L2 SU23/L3
SU24	625535. 6039474	625163. 6040069	Gently undulating crest landform at south end, becoming steep to north. Dry sclerophyll forest. Erosional context.	Previous timber extraction.	Low	SU24/L1
SU25	627154. 6031875	627038. 6032150	Gently undulating crest landform. Dry sclerophyll forest. Erosional context.	Cleared electricity easement.	Low	AHIMS 56-6-0038 AHIMS 56-6-0039 AHIMS 56-6-0040
SU26	617274. 6056791	616718. 6059014	Generally steep simple slopes.	SMA infrastructure.	Negligible	Nil recorded
SU27	618303. 6056461	616989. 6058557	Generally steep simple slopes.	SMA infrastructure.	Negligible	Nil recorded

Table 9 Effective Survey Coverage.

ID	Area sq. m.	GE %	GE sq. m.	AV %	NEC sq. m.	ESC %
SU1	208234	3	6247.02	30	1874.11	0.9
SU2	156582	5	7829.1	50	3914.55	2.5
SU3	143857	1	1438.57	60	863.142	0.6
SU4	52228	30	15668.4	80	12534.7	24
SU5	59984	1	599.84	40	239.936	0.4
SU6	106427	2	2128.54	70	1489.98	1.4
SU7	54633	0	0	0	0	0
SU8	73494	1	734.94	40	293.976	0.4
SU9	16008	1	160.08	70	112.056	0.7
SU10	34738	2	694.76	80	555.808	1.6
SU11	59137	1	591.37	40	236.548	0.4
SU12	127688	4	5107.52	60	3064.51	2.4
SU13	61185	1	611.85	70	428.295	0.7
SU14	40915	1	409.15	60	245.49	0.6
SU15	30647	5	1532.35	80	1225.88	4
SU16	109303	5	5465.15	80	4372.12	4
SU17	54034	3	1621.02	80	1296.82	2.4
SU18	315001	2	6300.02	80	5040.02	1.6
SU19	297082	5	14854.1	80	11883.3	4
SU20	180000	1	1800	60	1080	0.6
SU21	420000	1	4200	60	2520	0.6
SU22	53736	1	537.36	60	322.416	0.6
SU23	78415	1	784.15	60	470.49	0.6
SU24	39106	2	782.12	80	625.696	1.6
SU25	84029	2	1680.58	80	1344.46	1.6
SU26	107026	1	1070.26	10	107.026	0.1
SU27	137893	1	1378.93	10	137.893	0.1
Total	3,101,382		84,227		56,279	1.8

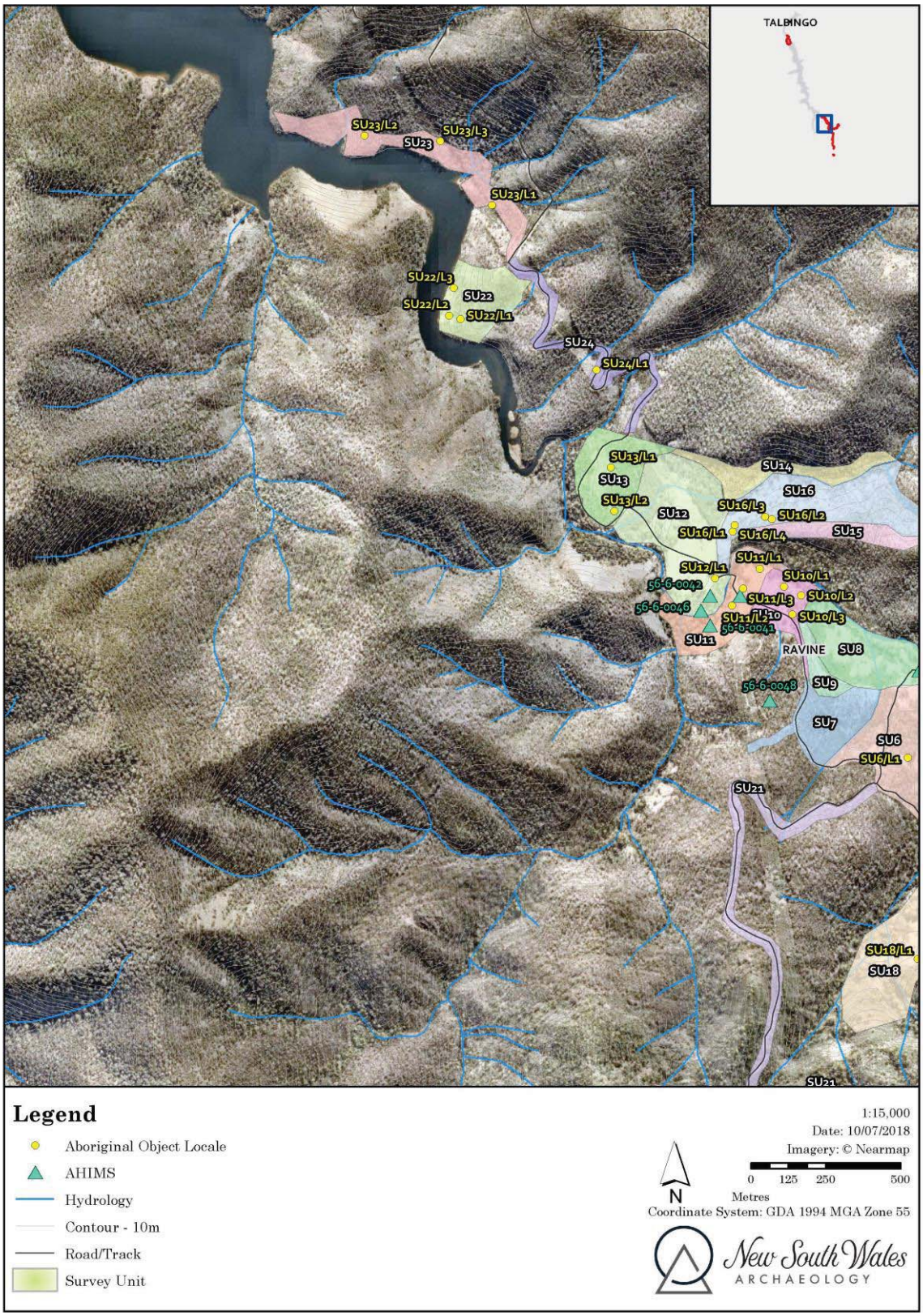


Figure 18 Survey Units and Aboriginal object locales: Lobs Hole west.

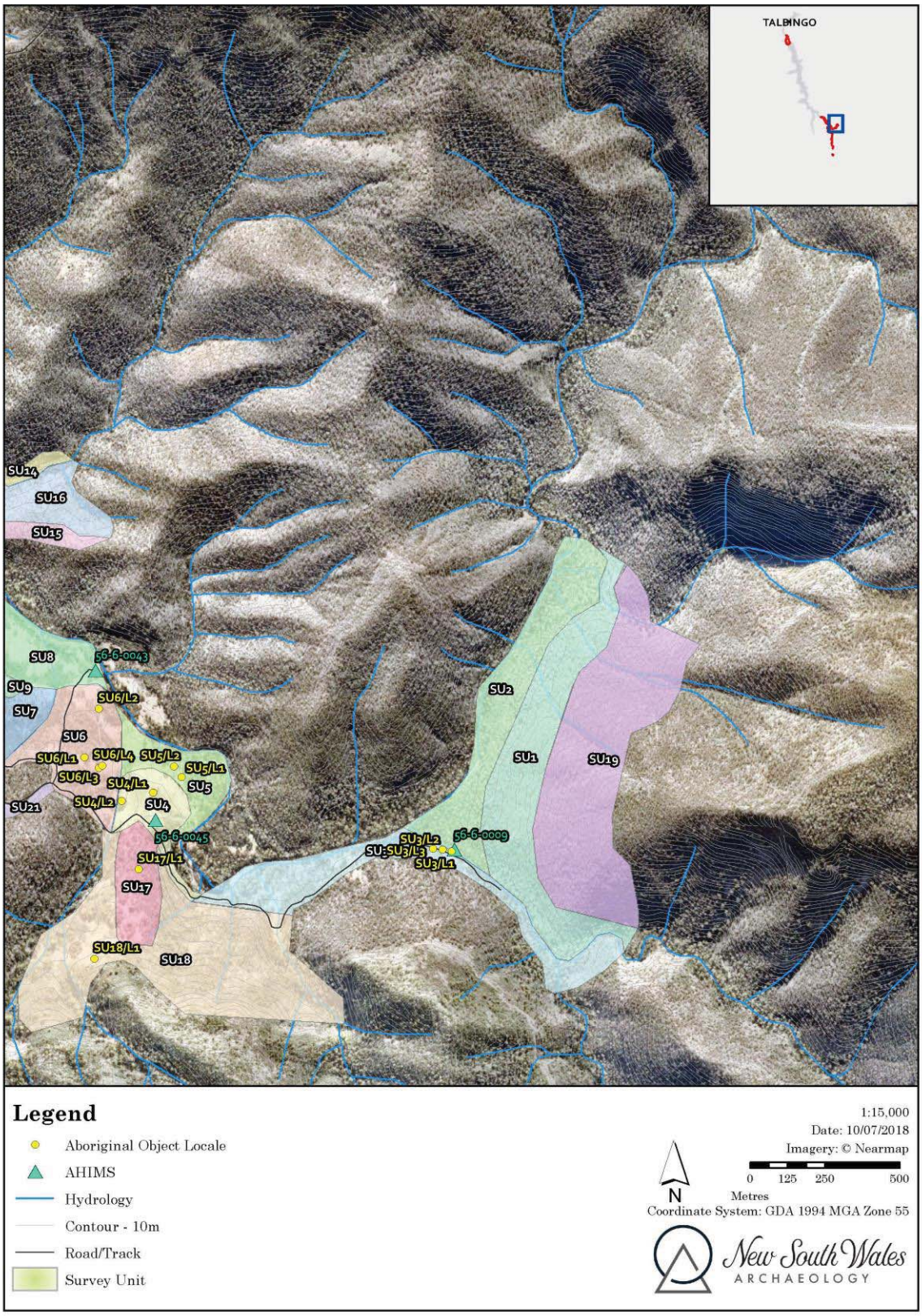


Figure 19 Survey Units and Aboriginal object locales: Lobs Hole east.

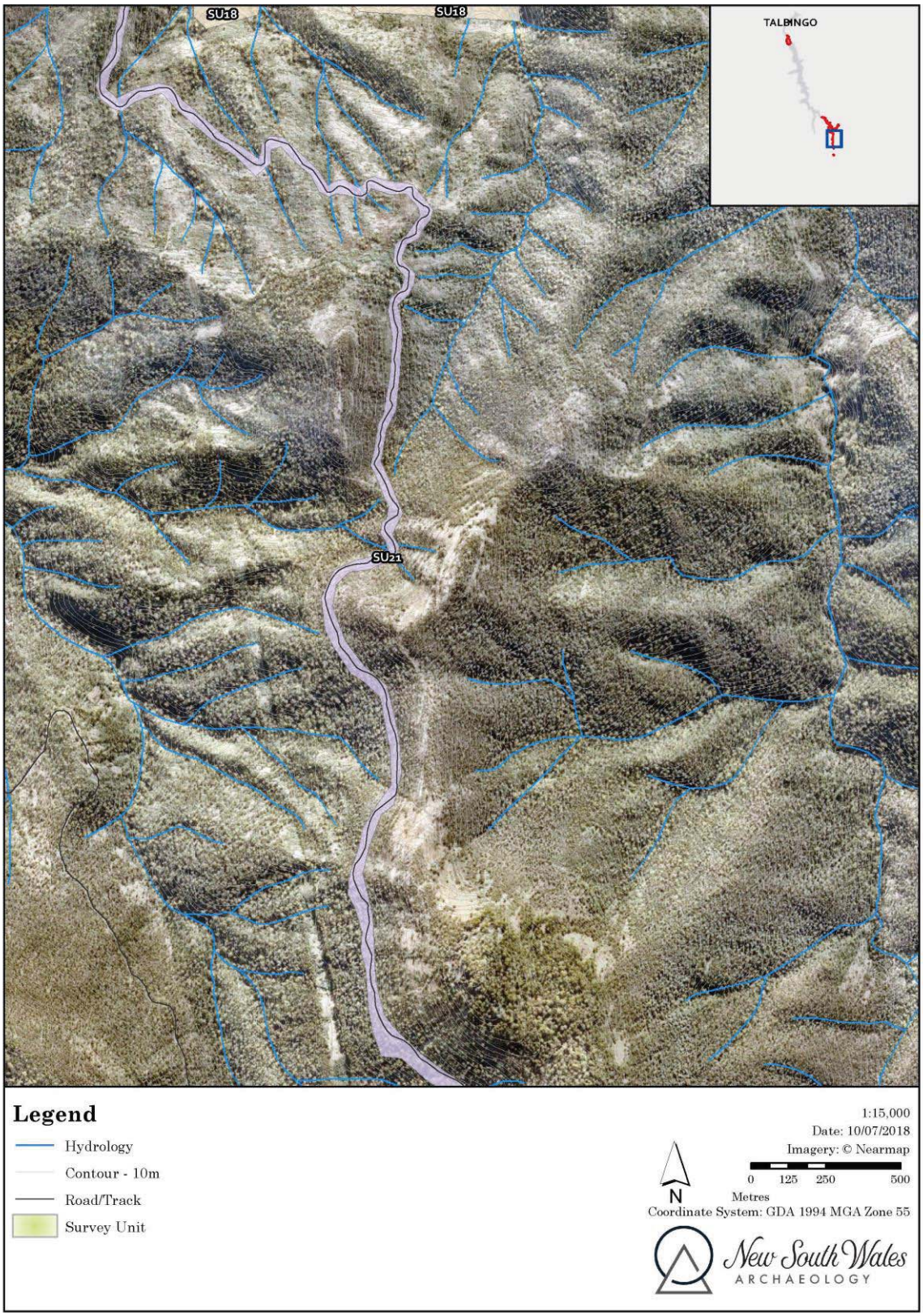


Figure 20 Survey Units: Lobs Hole Ravine Road north.

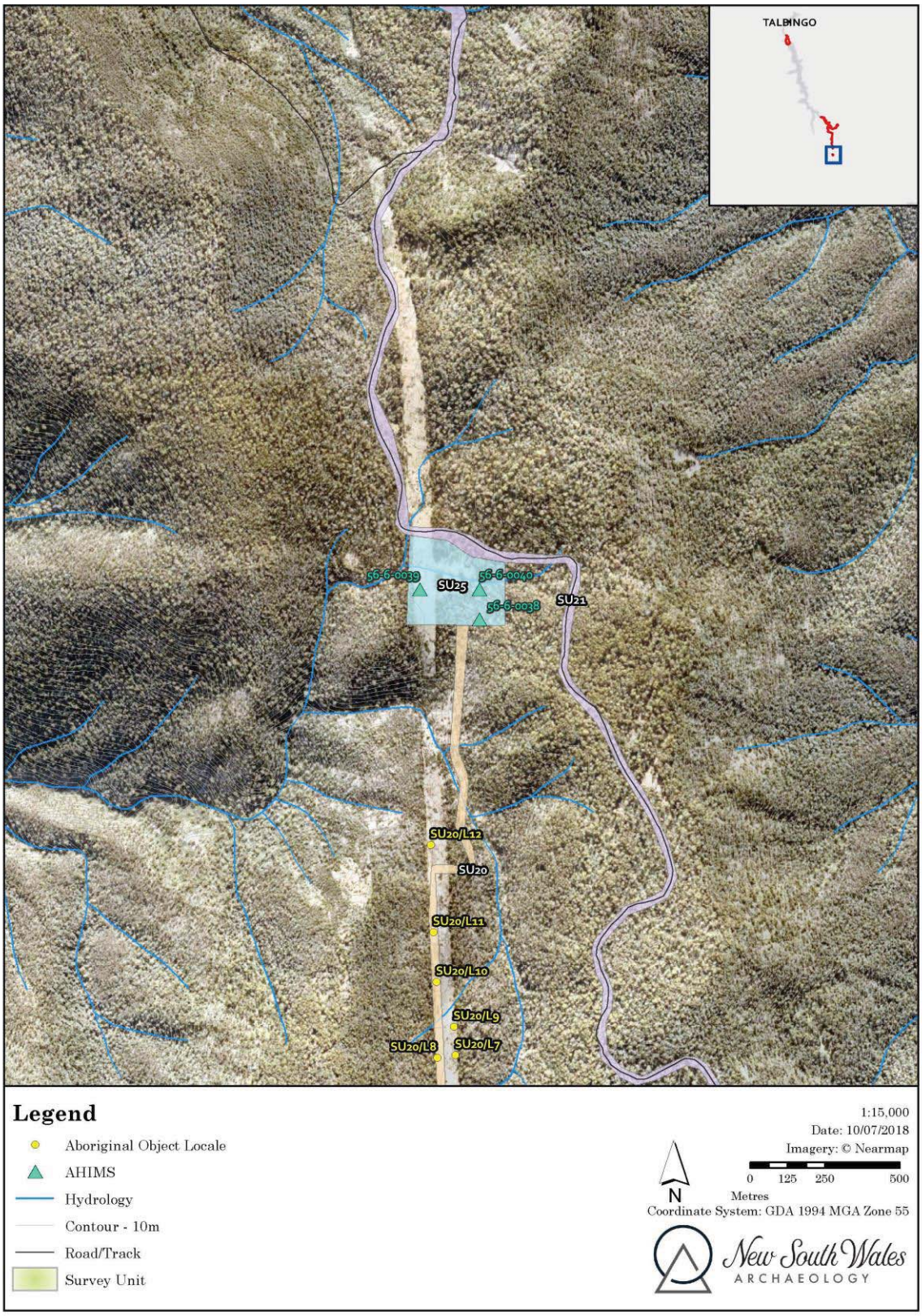


Figure 21 Survey Units and Aboriginal object locales: Lobs Hole Ravine Road mid area.

Figure 22 Survey Units and Aboriginal object locales: Lobs Hole Ravine Road south.

Figure 23 Survey Units: Tumut 3 Power Station, Talbingo.

Table 10 Aboriginal object descriptions.

SU	ID	Easting	Northing	Description	Artefact
SU3	SU3/L1	627704	6038078	Two stone artefacts recorded on a vehicle track on the flat encompassed by SU3. The artefacts were 3m apart. The area is highly disturbed by historic and modern recreational use (Plate 8).	Tuff flake: 27x16x3mm; Tuff core: 40x30x27mm.
SU3	SU3/L2	627673	6038084	Two stone artefacts recorded on a deeply eroded vehicle track on the flat encompassed by SU3. The artefacts were 6m apart. The area is highly disturbed by historic and modern recreational use (Plate 9).	Qtz flake: 18x16x3mm; Tuff core: 43x34x8mm.
SU3	SU3/L3	627641	6038087	One stone artefact recorded on a deeply eroded vehicle track on the flat encompassed by SU3. The area is highly disturbed by historic and modern recreational use (Plate 10).	Tuff proximal flake: 43x34x8mm.
SU4	SU4/L1 incl. of AHIMS 56-6-0045	626704	6038275	A low density distribution of stone artefacts (<1 per sq. m) across the entire knoll landform (all SU4): visible in almost any areas of ground exposure. The landform is highly disturbed and significantly eroded; shale bedrock is frequently exposed. There is little to no topsoil and hence no subsurface archaeological potential. Stone artefacts are mixed with historical debris/artefacts, such as glass, ceramics, porcelain and metal. The site contains *in situ* pebbles and cobbles. Note, grid reference is a nominal point location and denotes centre of knoll (Plate 11).	Tuff and quartz flaked artefacts.
SU4	SU4/L2	626599	6038247	One stone artefact on the spoil of an old ?mine pit. The artefact is highly disturbed and has no associated subsurface potential (Plate 12).	Tuff flake: 63x45x18mm.
SU5	SU5/L1	626799	6038327	Two stone artefacts recorded on a vehicle track on the flat encompassed by SU5. The artefacts were 5m apart. The	Tuff flake: 48x35x16mm; Tuff flake: 37x35x7mm.

SU	ID	Easting	Northing	Description	Artefact
				area is highly disturbed by historic and modern recreational use (Plate 12).	
SU5	SU5/L2	626774	6038362	Nine stone artefacts recorded on a vehicle track on the flat encompassed by SU5. The artefacts were 25m apart. The area is highly disturbed by historic and modern recreational use. The adjacent areas in the landform are predicted to contain moderate/high artefact density but possibly highly disturbed (Plate 14).	Qtz flake:20x10x3mm Tuff bifacial core with peb cortex: 25x40x20m; Qtz flake:20x10x3mm Tuff flake frag: 20x13x6mm Chert flake frag with possible retouch: 20x18x6mm. Silcrete flake: 23x46x8mm; Tuff flake: 27x35x10mm; Chert flake frag: 21x10x7mm; Chert flake: 32x29x5mm; Tuff flake piece: 38x22x19mm.
SU6	SU6/L1	626474	6038393	Stone artefact recorded on a road exposure on the southeast side of SU6. There is sparse good quality quartz, some of which may be artefactual but is crushed from vehicle traffic. Also, numerous pieces of buried tuff likely to be artefactual. The area is highly disturbed and generally eroded to bedrock with high levels of shatter (Plate 15).	Tuff flake: 20x20x5mm.
SU6	SU6/L2	626522	6038555	Stone artefact recorded on a road exposure on the southeast side of SU6. There is sparse good quality quartz, some of which may be artefactual. The area is highly disturbed and generally eroded to bedrock and high levels of shale shatter (Plate 16).	Tuff flake frag: 27x18x10mm with pebble cortex.

SU	ID	Easting	Northing	Description	Artefact
SU6	SU6/L3	626522	6038358	One stone artefact in large (10 x 2m) bare earth patch on east side of SU6. The site is facing 120° with a gentle gradient. It is highly disturbed and eroded. It has no subsurface archaeological potential (Plate 17).	Chert flake: appears to have retouch from ventral on 1 margin, 35x20x5mm.
SU6	SU6/L4	626534	6038365	Three stone artefacts in large (5 x 10m) bare earth patch on east side of SU6. The site is facing 120° with a gentle gradient. It is highly disturbed and eroded. It has no subsurface archaeological potential (Plate 18).	Tuff flake: 28x12x3mm Qtz flake frag.: 12x10x2mm; Tuff lake: 17x28x10mm.
SU10	SU10/L1	626059	6038964	Stone artefacts recorded on road exposures on the northwest side of SU10. The area is highly disturbed and eroded to bedrock and high levels of shatter and *in situ* cobbles. The area encompassed by the visible artefacts measured c. 30 x 10m. Artefacts listed are a representative sample (Plate 19).	Tuff multidirectional core: 70x60x40mm; Tuff flake: 31x25x5mm; Tuff flake: 35x26x11mm; Tuff flake frag: 30x24x8mm; Tuff scraper: 50x40x15mm; Flaked pebble: each opposing end unifacially flaked, 150x105x30mm; Flaked pebble: each opposing end and margins unifacially flaked, 173x109x30mm.
SU10	SU10/L2	626117	6038935	Two artefacts on a vehicle track on northeast end of SU10. The area is highly disturbed and eroded to bedrock and high levels of shatter and *in situ* cobbles. The area encompassed by the visible artefacts measured c. 9 x 2m (Plate 20).	Tuff proximal flake: 31x15x5mm; Tuff flake: 54x47x10mm
SU10	SU10/L3	626087	6038871	Two stone artefacts on a vehicle track on SU10. The area is highly disturbed and eroded to bedrock and high levels of shatter and *in situ* cobbles. The area encompassed by the visible artefacts measured c. 40 x 2m. Artefacts listed are a	Tuff distal: pos. steep retouch and use wear, 40x35x12mm; Tuff bifacial core: 45x37x30mm.

SU	ID	Easting	Northing	Description	Artefact
				representative sample; at least another 20 artefacts at road junction (Plate 21).	
SU11	SU11/L1	625886	6038900	Stone artefact on a track. The area is disturbed (Plate 22).	Tuff flake: 70x45x20mm. pebble cortex
SU11	SU11/L2	625923	6038957	Stone artefacts in fabric and eroding out of the pisé walls of the Washington Hotel (Plate 23).	Tuff and quartz flaked artefacts
SU12	SU12/L1	625829	6038992	>100 artefacts on erosional exposures and a vehicle track on in SU12. The area is highly disturbed and eroded to bedrock and high levels of shatter and *in situ* cobbles. The area encompassed by the visible artefacts measured c. 20 x 10m (Plate 24).	
SU13	SU13/L1	625481	6039362	One stone artefact found in a bare earth patch in SU13. The scald measured 30 x 30 m on the crest proper. Ground exposure was estimated to be 30% with archaeological visibility in that exposure 30%. *In situ* pebbles occur locally (Plate 25).	Tuff flake: 40x42x10mm, pebble cortex.
SU13	SU13/L2	625492	6039216	One stone artefact found in a bare earth patch at the south end in SU13 at the edge of the crest. The landform has a gentle gradient and aspect to SE. The scald measured 4 x 3 m on the crest proper. Ground exposure was estimated to be 60% with archaeological visibility in that exposure 80%. The site is highly eroded to bedrock and shale shatter.	Tuff flake: 22x30x8mm.
SU16	SU16/L1	625888	6039148	Two stone artefacts found in a small bare earth patch in SU16. The landform has a gentle gradient and aspect to the northwest. Ground exposure was estimated to be 80% with archaeological visibility in that exposure 70%. The site is eroded to bedrock (Plate 26).	Tuff flake: 38x14x9mm; Tuff blade flake: 29x16x5mm.
SU16	SU16/L2	626019	6039190	One stone artefact found in an animal track in SU16 on an upper slope. The landform has a moderate gradient and	Tuff distal flake: 57x52x15 mm.

SU	ID	Easting	Northing	Description	Artefact
				aspect to NW. Ground exposure was estimated to be 80% with archaeological visibility in that exposure 80%. The site is highly eroded to bedrock and shale shatter and has no subsurface archaeological potential (Plate 27).	
SU16	SU16/L3	625996	6039198	Three stone artefacts found in an erosional scald in SU16 on a mid-slope. The exposure measured c. 3 x 3m. The landform has a moderate gradient and aspect to NW. Ground exposure was estimated to be 50% with archaeological visibility in that exposure 20%. The site is highly eroded to bedrock and shale shatter and has no subsurface archaeological potential (Plate 28).	Tuff flake: 30x20x10 mm; Tuff flaked piece: 40x30x5 mm; Tuff distal flake: 50x47x25 mm with pebble cortex.
SU16	SU16/L4	625894	6039170	Four stone artefacts found in an erosional scald in SU16 on a gentle gradient simple slope. The exposure measures c. 5 x 2m. The landform has a moderate gradient and aspect to NW. Ground exposure was estimated to be 40% with archaeological visibility in that exposure 80%. The site is highly eroded to bedrock and shale shatter and has no subsurface archaeological potential (Plate 29).	Tuff flake: 24x18x7 mm; Tuff flake: 38x19x11 mm; Qtz proximal flake: 28x20x8mm; Tuff flake: 41x23x15 mm Tuff flake frag: 14x26x6 mm with pebble cortex.
SU17	SU17/L1	626656	6038018	Four stone artefacts found in a bare rocky area in SU17 on a flat crest. The exposure measures c. 10 x 5m. The site is highly eroded to bedrock and has no subsurface archaeological potential (Plate 30).	Tuff flake: 18x15x2mm; Tuff flake: 16x12x3mm; Tuff flaked piece: 43x39x16 mm; Tuff flake: 27x14x3mm.
SU18	SU18/L1	626507	6037719	One stone artefact found in a bare earth exposure in SU18 on a moderate gradient simple slope. The exposure measures c. 10 x 5m. Ground exposure was estimated to be 70% with archaeological visibility in that exposure 60%. The site is highly disturbed and eroded. It has no subsurface archaeological potential (Plate 31).	Chert flake: 36x26x5mm.

SU	ID	Easting	Northing	Description	Artefact
SU20	SU20/L1	628110	6027769	One stone artefact found on a vehicle track in SU20 on a broad amorphous crest. The exposure measures c. > 10 x 2m. Ground exposure was estimated to be 40% with archaeological visibility in that exposure 90%. The site is disturbed. Artefact density is predicted to be low (Plate 32).	Qtz flake: 15x10x2mm, bipolar.
SU20	SU20/L2	627218	6028452	Two stone artefacts (10m apart) found on a vehicle track in SU20 on a slope adjacent to a minor drainage line. The exposure measures c. > 10 x 2m. Ground exposure was estimated to be 60% with archaeological visibility in that exposure 90%. The site is disturbed. Artefact density is predicted to be low (Plate 33).	Chert retouched geometric artefact: 23x18x6mm; Volcanic (coarse) flake: 39x26x9mm.
SU20	SU20/L3	627121	6028561	Eight stone artefacts found on a vehicle track in SU20 on a broad amorphous crest. The exposure measures c. > 20 x 2m. Ground exposure was estimated to be 60% with archaeological visibility in that exposure 90%. The site is disturbed. Artefact density is predicted to be low (Plate 34).	Chert flake: 20x19x4mm; Qtz flake frag (possible): 20x14x9mm; Uncertain material, retouched artefact (distal): 20x13x5mm; Fine grained volcanic flake frag: 30x127mm; Uncertain material, flake frag: 17x7x2mm; Qtz flake frag: 24x13x11mm; Chert flake frag: 17x15x3mm; Qtz flake frag: 24x13x4mm.
SU20	SU20/L4	627097	6030124	Six stone artefacts found in an erosional scald in SU20 on a broad crest in the electricity easement. The exposure measures c. 8 x 2m. Ground exposure was estimated to be 90% with archaeological visibility in that exposure 70%. The	Tuff flake: 34x28x9mm; Chert flake: 20x18x6mm; Chert flake frag: 28x9x7mm; Tuff flake: 20x17x6mm; Chert flake frag: 17x8x2mm;

SU	ID	Easting	Northing	Description	Artefact
				site is disturbed. Artefact density is predicted to be low (Plate 35).	Tuff flake: 22x16x7mm.
SU20	SU20/L5	627149	6030256	One stone artefact found in an erosional scald in SU20 on a lower simple slope in the electricity easement. The exposure measures c. 3 x 1m. The gradient is gentle and the aspect is to the east. Ground exposure was estimated to be 90% with archaeological visibility in that exposure 70%. The site is disturbed. Artefact density is predicted to be low (Plate 36).	Porphyry flake: 28x18x7mm.
SU20	SU20/L6	627086	6030289	One stone artefact found on a track in SU20 on a broad crest in the electricity easement. The exposure measures c. >3 x 2m. Ground exposure was estimated to be 40% with archaeological visibility in that exposure 70%. The site is disturbed. Artefact density is predicted to be low (Plate 37).	Porphyry flake: 29x20x12 mm.
SU20	SU20/L7	627132	6030426	Two stone artefacts found in an erosional scald in SU20 on a lower simple slope in the electricity easement. The gradient is gentle and the aspect is to the east. The exposure measures c. 4 x 3m. Ground exposure was estimated to be 70% with archaeological visibility in that exposure 70%. The site is disturbed. Artefact density is predicted to be low (Plate 38).	Silcrete distal flake: 14x22x4mm; Qtz flake: 14x16x5mm.
SU20	SU20/L8	627070	6030417	One stone artefact found on a track in SU20 on a broad crest in the electricity easement. The exposure measures c. >3 x 3m. Ground exposure was estimated to be 70% with archaeological visibility in that exposure 70%. The site is disturbed. Artefact density is predicted to be low (Plate 39).	Silcrete flake: 42x28x11mm.

SU	ID	Easting	Northing	Description	Artefact
SU20	SU20/L9	627126	6030521	Three stone artefacts found in an erosional scald in SU20 on a lower simple slope in the electricity easement. The gradient is gentle, and the aspect is to the east. The exposure measures c. 10 x 1m. Ground exposure was estimated to be 80% with archaeological visibility in that exposure 70%. The site is disturbed. Artefact density is predicted to be low (Plate 40).	Tuff flake: 12x22x3mm; Silcrete core: 35x33x24mm; Silcrete flake: 12x12x2mm.
SU20	SU20/L10	627068	6030671	One stone artefact found on a track in SU20 on a broad crest in the electricity easement. The gradient is gentle, and the aspect is to the east. The exposure measures c. >3 x 3m. Ground exposure was estimated to be 70% with archaeological visibility in that exposure 70%. The site is disturbed. Artefact density is predicted to be low (Plate 41).	Tuff bidirectional core, pebble cortex.
SU20	SU20/L11	627058	6030837	One stone artefact found on a track in SU20 on a broad crest in the electricity easement. The gradient is gentle, and the aspect is to the east. The exposure measures c. >3 x 3m. Ground exposure was estimated to be 70% with archaeological visibility in that exposure 70%. The site is disturbed. Artefact density is predicted to be low (Plate 42).	Tuff proximal flake: 23x15x4mm.
SU20	SU20/L12	627049	6031129	One stone artefact found on a track in SU20 on a broad crest in the electricity easement. The gradient is gentle, and the aspect is to the east. The exposure measures c. >3 x 3m. Ground exposure was estimated to be 70% with archaeological visibility in that exposure 70%. The site is disturbed. Artefact density is predicted to be low (Plate 43).	Quartzite flake: 47x36x13 mm.

SU	ID	Easting	Northing	Description	Artefact
SU22	SU22/L1	624978	6039859	One stone artefact found on a track in SU22. The landform is a moderate/steep gradient simple slope and the aspect is to the west. The exposure measures c. >3 x 3m. Ground exposure was estimated to be 90% with archaeological visibility in that exposure 80%. The site is disturbed, and the landform is highly eroded. Artefact density is predicted to be very low (Plate 44).	Tuff flake: 29x23x9mm.
SU22	SU22/L2	624940	6039871	One stone artefact found on a track in SU22. The landform is a moderate gradient simple slope and the aspect is to the west. The exposure measures c. 10 x 10m. Ground exposure was estimated to be 90% with archaeological visibility in that exposure 80%. The site is disturbed, and the landform is highly eroded. Artefact density is predicted to be very low (Plate 45).	Tuff flake: 40x27x10mm.
SU22	SU22/L3	624955	6039963	One stone artefact found on a track in SU22. The landform is a moderate gradient simple slope and the aspect is to the west. The exposure measures c. 20 x 10m. Ground exposure was estimated to be 90% with archaeological visibility in that exposure 80%. The site is disturbed, and the landform is highly eroded. Artefact density is predicted to be very low (Plate 46).	Tuff flake: 38x40x10mm. Also, possible qtz flake 10m to north.
SU23	SU23/L1	625083	6040240	One stone artefact found in an erosional scald in SU23 on a lower simple slope. The gradient is gentle, and the aspect is to the WNW. The exposure measures c. 2 x 1m. Ground exposure was estimated to be 50% with archaeological visibility in that exposure 20%. The site is disturbed. Artefact density is predicted to be low (Plate 47).	Tuff flake: 55x35x18mm.

SU	ID	Easting	Northing	Description	Artefact
SU23	SU23/L2	624656	6040472	One stone artefact found in an erosional scald in SU23 on a crest. The gradient is gentle, and the aspect is to the SW. The exposure measures c. 2 x 1m. Ground exposure was estimated to be 5% with archaeological visibility in that exposure 5%. The site is disturbed. Artefact density is predicted to be low (Plate 48).	Tuff compression flake: 55x35x18mm.
SU23	SU23/L3	624911	6040455	One stone artefact found in an area of pig rooting in SU23 on a simple slope. The gradient is gentle, and the aspect is to the SW. The exposure measures c. 10 x 4m. Ground exposure was estimated to be 70% with archaeological visibility in that exposure 50%. The site is highly disturbed. Artefact density is predicted to be very low (Plate 49).	Tuff flake: 38x35x10mm.
SU24	SU24/L1	625432	6039689	Seven stone artefacts found on and adjacent to the Powerline Road. The landform is a crest measuring c. 20m wide. The exposure measures c. 40 x 15m. Ground exposure was estimated to be 70% with archaeological visibility in that exposure 50%. The site is highly disturbed by clearance and road grading. Artefact density is assessed to be very low (Plate 50).	Tuff flake: 25x19x7mm; Tuff flake: 23x21x6mm; Qtz flaked piece with pebble cortex: 25x18x13mm; Tuff bidirectional core: 72x61x47mm; Tuff flake: 50x65x24mm; Qtz flake frag.: 19x11x3mm; Chert micro-blade core: 32x18x15mm.

Plate 8 Aboriginal object locale SU3/L1; looking east.

Plate 9 Aboriginal object locale SU3/L2 on Mine Trail; looking east.

Plate 10 Aboriginal object locale SU3/L3; looking east.

Plate 11 Aboriginal object locale SU4/L1; looking east across the knoll. This landform is highly disturbed by historical mining.

Plate 12 Aboriginal object locale SU4/L2 in drainage depression; looking east to artefact on mullock of what is believed to be a mine shaft (Historic site R114).

Plate 13 Aboriginal object locale SU5/L1; looking 330°.

Plate 14 Aboriginal object locale SU5/L2; looking 130°. This landform is assumed to have been the focus of intensive European activity associated with mining and agriculture.

Plate 15 Aboriginal object locale SU6/L1; looking 300°.

Plate 16 Aboriginal object locale SU6/L2; looking 310°.

Plate 17 Aboriginal object locale SU6/L3; looking 120°. This area is adjacent to Lick Hole Creek in which extensive mining and other activity occurred. It is highly eroded.

Plate 18 Aboriginal object locale SU6/L4; looking 90°.

Plate 19 Aboriginal object locale SU10/L1; looking 250°. Note Washington Hotel ruin in background.

Plate 20 Aboriginal object locale SU10/L2; looking 140°. This crest landform was occupied by the Ravine police station (~1910) and associated activity and is highly eroded.

Plate 21 Aboriginal object locale SU10/L3; looking 210°.

Plate 22 Aboriginal object locale SU11/L1; looking 200°.

Plate 23 Aboriginal object locale SU11/L2; looking 210°. Stone artefacts are in the Washington Hotel's earthen walls and eroding from them.

Plate 24 Aboriginal object locale SU12/L1; looking 10° during test excavation.

Plate 25 Aboriginal object locale SU13/L1; looking 210°.

Plate 26 Aboriginal object locale SU16/L1; looking ESE.

Plate 27 Aboriginal object locale SU16/L2; looking west.

Plate 28 Aboriginal object locale SU16/L3; looking east.

Plate 29 Aboriginal object locale SU16/L4; looking 230°.

Plate 30 Aboriginal object locale SU17/L1; looking 200°.

Plate 31 Aboriginal object locale SU18/L1; looking 60°.

Plate 32 Aboriginal object locale SU20/L1; looking 300°.

Plate 33 Aboriginal object locale SU20/L2; looking 120°.

Plate 34 Aboriginal object locale SU20/L3; looking 330°.

Plate 35 Aboriginal object locale SU20/L4; looking 160°.

Plate 36 Aboriginal object locale SU20/L5; looking north.

Plate 37 Aboriginal object locale SU20/L6; looking 150°.

Plate 38 Aboriginal object locale SU20/L7; looking east.

Plate 39 Aboriginal object locale SU20/L8; looking 340°.

Plate 40 Aboriginal object locale SU20/L9; looking south.

Plate 41 Aboriginal object locale SU20/L10; looking 340°.

Plate 42 Aboriginal object locale SU20/L11; looking 340°.

Plate 43 Aboriginal object locale SU20/L12; looking southwest.

Plate 44 Aboriginal object locale SU22/L1; looking 40°.

Plate 45 Aboriginal object locale SU22/L2; looking 310°.

Plate 46 Aboriginal object locale SU22/L3; looking south.

Plate 47 Aboriginal object locale SU23/L1; looking 320°.

Plate 48 Aboriginal object locale SU23/L2; looking west.

Plate 49 Aboriginal object locale SU23/L3; looking 150°.

Plate 50 Aboriginal object locale SU24/L1; looking southwest.

6.3 Archaeological Test Excavation

Rationale

During the field survey, the Effective Survey Coverage achieved was generally very low because of thick vegetation cover on the ground (i.e. grasses, shrubs, blackberry and so on). Accordingly, the surface survey was not fully adequate for the task of determining the archaeological status of the project area.

A program of subsurface test excavation has therefore been undertaken for the purposes of clarifying the nature and significance of the archaeological resource present. The purpose of the test excavation is to provide a better-informed framework for which to develop appropriate management and mitigation strategies in regard to the Aboriginal objects within the context of the proposed impacts.

6.3.1 Test Excavation Methodology

The test excavation has been conducted in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales: Requirement 16 – page 26. A methodology for the program was developed by NSW Archaeology Pty Ltd and submitted to the NSW OEH on 7 February 2018. It was endorsed by OEH on 23 February 2018.

The test excavation was conducted in Survey Units predicted to possess moderate to high stone artefact density. Seven survey units were subject to the test excavation program: SU3, SU5, SU6, SU8, SU10, SU11 and SU12. Test excavation was originally proposed for Survey Unit 2, however, thick undergrowth and blackberry precluded access[3].

Test Transects were positioned within Survey Units in accordance with a number of selection criteria: location in a central and representative area within the survey unit; in areas devoid of obvious previous disturbance; and in accessible locations (Figures 24 & 25). Test Transects measured up to 25 metres in length (Plate 51).

Plate 51 The excavation at Test Transect 1 in Survey Unit 10; looking 200°.

A total of 180 Test Squares, each measuring 0.5 x 0.5 metres, were excavated by hand utilising spades, mattocks, crowbars and hand trowels. Test Squares were excavated at five metre intervals along Test Transects. Occasionally Test Squares were enlarged. This was done in order to retrieve more artefacts if an abundance was encountered to assist in providing a robust count for analysis or to clarify geomorphological issues.

Each Test Square was excavated in successive 10 cm spits, apart from the first spit in each Survey Unit which was excavated in 5 cm layers. The excavation was concluded when an environment of low archaeological potential was reached. All excavated sediment was transferred into colour-coded and labelled buckets. The

[3] Given that the nature of the artefact distribution in Survey Unit 2 has not been determined, this will be taken into consideration during the development of management strategies for the project.

majority of Test Squares were excavated to ~40 cm. However, some were excavated to greater depths, usually for purposes of clarifying geomorphological problems.

All deposit recovered was dry sieved through 5 mm sieves. All stone material recovered from sieves was hand sorted in the field on a sorting table by a qualified archaeologist. The stone material was rinsed prior to sorting to clean it to facilitate artefact identification and retrieval. Given the abundance of background stone (pebbles, shatter and gravels), extreme care was taken so as to retrieve all artefacts or stone suspected of being artefactual, including very small artefacts.

All stone determined or suspected to be humanly modified was bagged according to individual Survey Unit/Test Transect/Square/Spit. A representative sample of background stone has been retained for comparative purposes. All bagged stone was subsequently inspected under magnification at which time any non-artefactual material was discarded.

Test Square stratigraphy was recorded using standard sedimentological descriptive terms and criteria (McDonald *et al*. 1998). Colour was described using a Munsell Soil Colour Chart (Munsell 1992) and pH was recorded. A stratigraphic description of soil texture, coarse fragments and structure was made. Sediment descriptions noted trends down the profile. A section and base of each Test Square was photographed, and a drawing of a representative section was made for each Test Transect. Each Test Square was backfilled with spoil collected on tarpaulins during sieving (Plate 52).

Plate 52 The excavation at Test Transect 3 in Survey Unit 8; looking 200°.

Lithic Analysis

Stone artefacts excavated from the project area have been identified and analysed by Julie Dibden. The analysis has entailed inspection under low powered stereoscopic magnification, measuring and description according to technological attributes. Details of the stone artefact collection recovered during the test excavation are listed in a table in Appendix 6 of this report.

Analysis of the data resulting from this identification and recording process has been conducted to address the following issues:

- Technological and behavioural activities represented by the lithic material;
- Artefact density;
- Artefact distribution and variability across the landscape; and
- The organisation and use of stone resources in the area.

To undertake an investigation of these questions, a basic profile of the artefact assemblage has been developed from the recorded data. Assemblage content was determined by recording and/or measuring a number of variables as outlined in Appendix 6.

Details of each artefact were entered into an Excel spreadsheet. Each artefact was designated an individual number which ranges from 1 to 2,306.

6.3.2 Test Excavation - Results

The test excavation was conducted at Lobs Hole Ravine during a 20 day program between 26 February 2018 to 23 March 2018.

A summary description of Test Transects is listed in Table 11. Test Transect locations are shown in Figures 24 & 25.

Table 11 Summary of Test Transect locational data.

SU ID	Test Transect ID	Grid references	Summary
3	1	East end 627700. 6038077 West end 627677. 6038089	Seven squares excavated.
3	2	West end 627742. 6038047 East end 627756. 6038036	Eight squares excavated.
3	3	East end 627740. 6038042 West end 627737. 6038041	Four squares excavated.
3	4	NW end 627598. 6038117 SE end 627608. 6038099	Six squares excavated.
5	1	NE end 626782. 6038369 SW end 626763. 6038353	Nine squares excavated.
5	2	NE end 626777. 6038378	Four squares excavated.

SU ID	Test Transect ID	Grid references	Summary
		SW end 626756. 6038362	
5	3	NW end 626776. 6038359 SE end 626790. 6038337	Six squares excavated.
5	4	NW end 626783. 6038368 SE end 626799. 6038343	Ten squares excavated.
5	5	NW end 626798. 6038338 SE end 626810. 6038312	Seven squares excavated.
6	1	SE end 626496. 6038509 NW end 626499. 6038550	Seven squares excavated.
6	2	SW end 626500. 6038535 NE end 626519. 6038552	Six squares excavated.
8	1	NE end 626266. 6038842 SW end 626246. 6038826	Nine squares excavated.
8	2	NE end 626243. 6038817 SW end 626226. 6038793	Six squares excavated.
8	3	NE end 626307. 6038754 SW end 626292. 6038738	Eight squares excavated.
8	4	NE end 626318. 6038734 SW end 626313. 6038729	Four squares excavated.
10	1	N end 626103. 6038937 S end 626083. 6038920	Six squares excavated.
10	2	N end 626104. 6038923 S end 626083. 6038906	Six squares excavated.
11	1	N end 625882. 6038884 S end 625898. 6038880	Five squares excavated.
11	2	N end 625868. 6038878 S end. 625887. 6038860	Six squares excavated.
11	3	S end 625968. 6039025 N end 625972. 6039050	Six squares excavated.
12	1	SW end 625735. 6039009 NE end 625754. 6039024	Nine squares excavated.
12	2	NE end 625747. 6038941 SW end 625771. 6038984	Six squares excavated.
12	3	West end 625690. 6038986 East end 625712. 6038996	Six squares excavated.
12	4	West end 625690. 6038987 East end 625712. 6038995	Six squares excavated.
12	5	West end 625672. 6039016 East end 625702. 6039021	Six squares excavated.
12	6	NW end 625677. 6039108 SE end 625704. 6039101	Six squares excavated.
12	7	S end 625817. 6038973 N end 625834. 6038999	Six squares excavated.
12	8	SE end 625827. 6039026 NW end625832. 6039011	Five squares excavated.

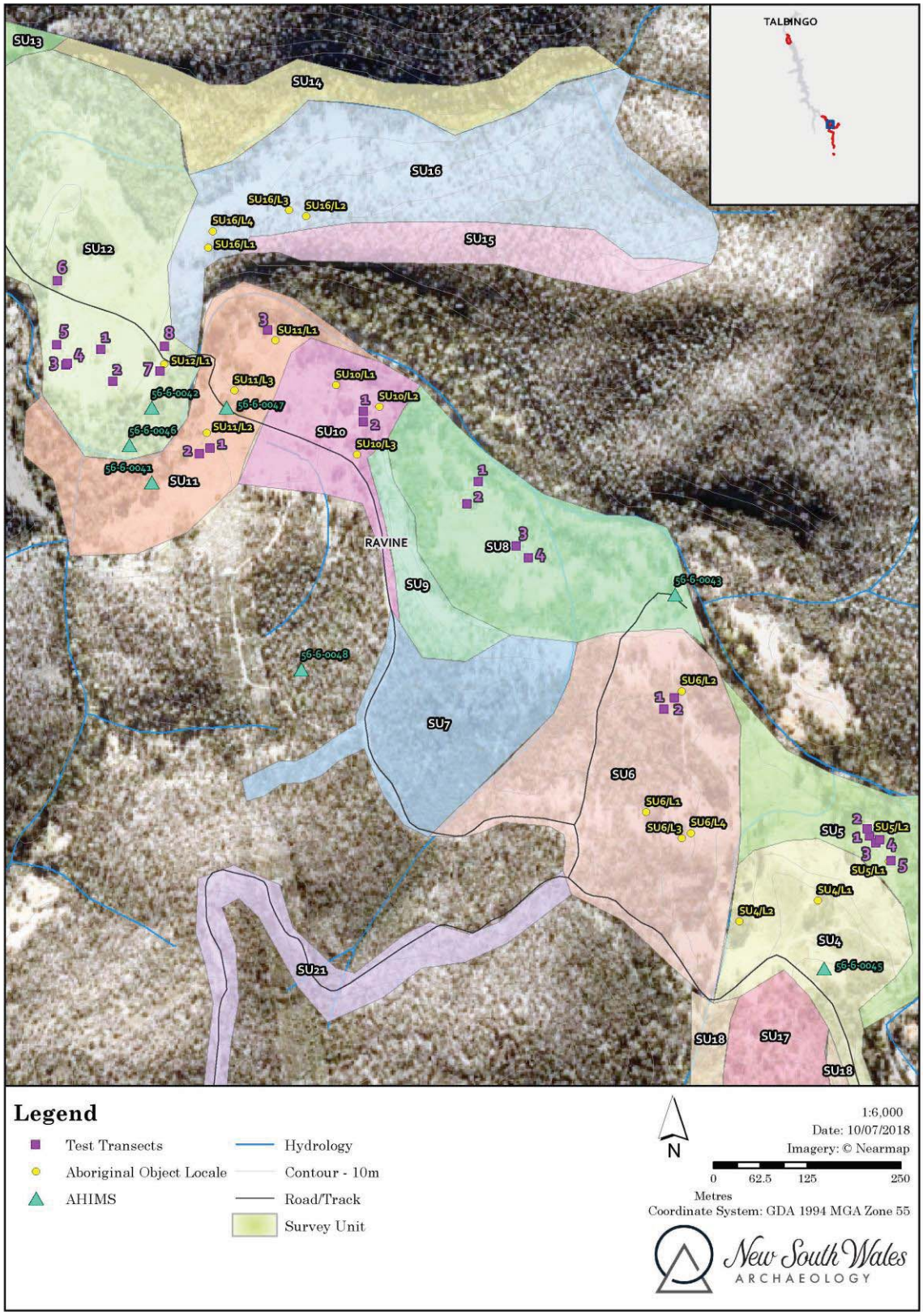


Figure 24 Location of Test Transects in respect of Survey Units: Lobs Hole west.

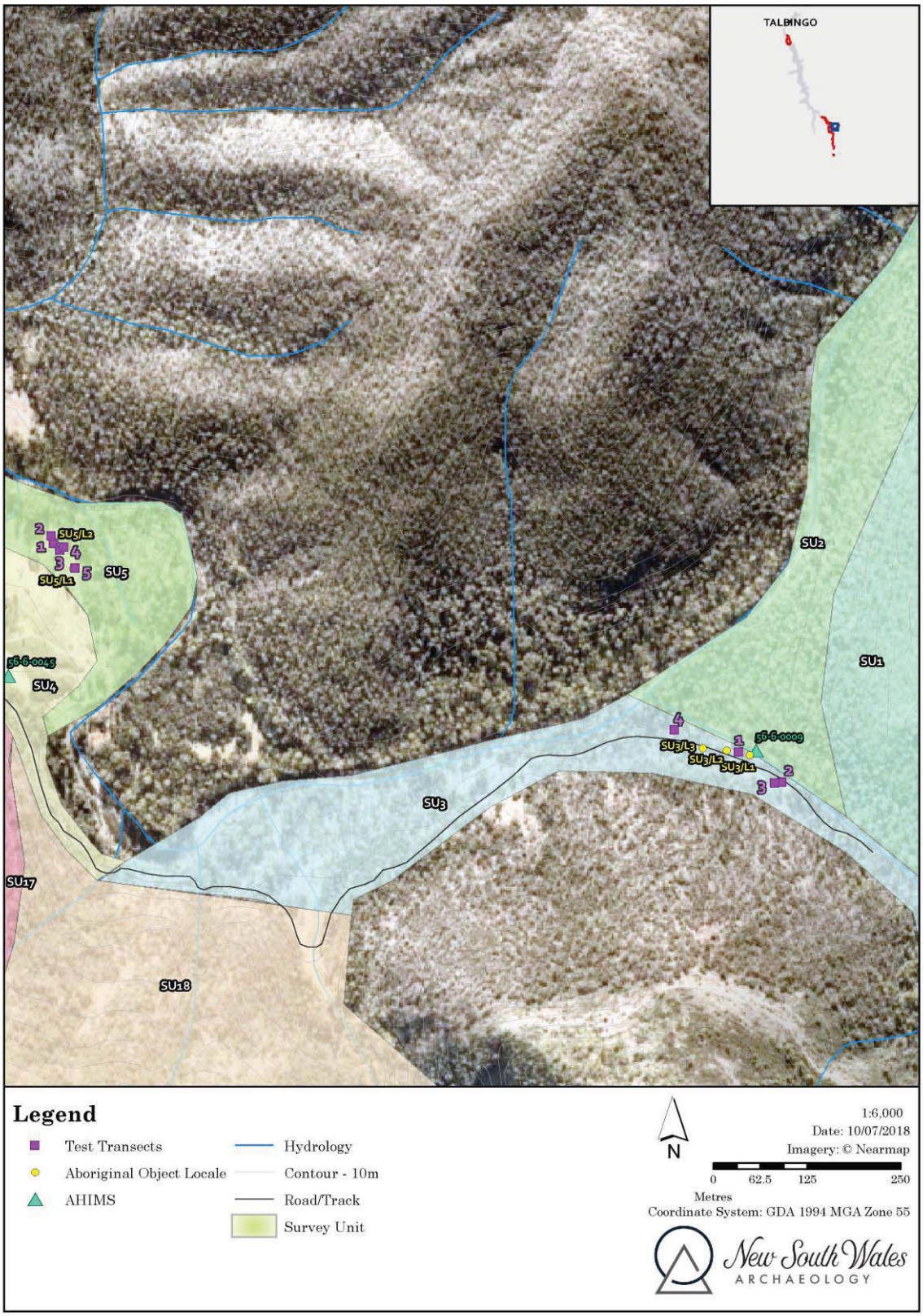


Figure 25 Location of Test Transects in respect of Survey Units: Lobs Hole east.

The number of Test Transects, Test Squares and area excavated in each Survey Unit is listed in Table 12.

Table 12 Summary of excavation data per Survey Unit.

SU ID	Test Transect #	Test Squares #	Area excavated
3	4	25	6.25 square meters
5	5	36	9 square meters
6	2	13	3.25 square meters
8	4	27	6.75 square meters
10	2	12	3 square meters
11	3	17	4.25 square meters
12	8	50	12.5 square meters
Total	28	180	45 square metres

Excavation and Field Observations

Detailed records of the excavated soil profiles were made in the field. Recording comprised examination of sections and section drawing. The logs and descriptions of the Test Squares provide an archival record of the stratigraphy observed. The pH across the valley has been found to be consistently 5½, being acidic.

Each of the 50 x 50 cm Test Squares were excavated by removing 10 cm thick spits (except for the 1st Sq in each SU, which was excavated in 5cm spits). The depth of each Test Square was dependent upon the nature of the sediments. Excavation was terminated when decomposing bedrock or an archaeologically sterile unit was reached. Soils were found to be variable across the site. Typically, flats were found to have deep soil profiles while crests have shallow and rocky soils.

Survey Units 3, 5, 8, 11 and 12 are river flats. It is assumed that the flats at Lobs Hole have been used for intensive cultivation over many decades from the mid/late 1800s until the mid-1900s when the last people (the Yan family) left the valley. In addition, the flats would have been used for general occupation and the movement of wagons, carts and animals, and the handling and haulage of copper. There are numerous water races and other site-specific disturbances such as house platforms that are still visible (see Dibden 2018). More recent human impacts relate to contemporary recreation and camping. The flats are favoured camp sites and are littered with fire pits, toilets excavations and other. Rabbit activity and their deep burrowing has disturbed the flats since about 1912 (George Thomas pers. comm. April 2018). The Test Transects were positioned so as to avoid obvious areas of disturbance and any historic features.

Geomorphological processes are likely to have caused a series of erosional and depositional events over time, and these may have been exacerbated following European occupation and land clearance. The Yarrangobilly River is known as a system of highly dynamic water flow. While the flats were found to possess deep silty

soils, lens of gravels and or river cobbles were frequently encountered in the soil profile during excavation, attesting to successive depositional events from fluvial processes. It is likely that erosional events have also occurred where topsoil has been removed during floods. However, identifying these during the excavation was not possible. Within Test Transects, it was common for Test Squares to exhibit considerable variability in whether not they contained gravels or cobbles suggesting finely braided geomorphological processes, presumably associated with water (for example, see Plate 53 & 54).

Plate 53 SU12; TT1; Square 1; note relative absence of cobbles.

Plate 54 SU12; TT1; Square 5; note extensive cobbles.

A typical soil profile encountered on flats is described as follows:

- 0-10 cm: medium yellow brown slightly gravelly fine sandy silt;
- 10-20 cm: medium yellow brown slightly gravely to gravelly fine sandy silt with very occasional waterworn small-medium pebbles;
- 20-30 cm: medium yellow brown gravely/pebbly fine sandy silt, waterworn pebbles becoming common. Highly compacted mottled gravelly yellow brown fine sandy silt.
- 40-40 cm: highly compacted light-yellow brown slightly gravelly sandy silt. Slight increase in gravel size with depth.

Survey Units 6 and 10 are crest landforms and have likely suffered the same or similar impacts from Europeans, as described above for flats. Given their naturally shallower soil profiles, the effects of European disturbance and other geomorphological processes has resulted in shallow and very rocky soil profiles. Water worn cobbles occur on crests indicating an ancient fluvial origin. Crest landforms are generally sloping with gentle gradients and, accordingly, it is presumed that fine particles have eroded down slope leaving behind lag deposit of cobbles, shatter and gravels.

In Plate 51, the rocky nature of the crest landforms is clearly demonstrated in the track exposure. The excavation of Survey Units 6 and10 revealed a shallow rocky bedrock profile giving way to a deeper deposit with water worn cobbles (see Plates 5 & 56).

Plate 55 SU10; TT1; Square 1.

Plate 56 SU10; TT2; Square 6.

Artefact Recovery and Distribution

A total of 2,306 stone artefacts were recovered from 27 of the 28 Test Transects. This result indicates that artefacts are widely distributed in a subsurface context across the test area. However, an analysis of the results reveals that there is considerable variability in artefact density between individual Survey Units. Artefact densities across the project area range from very low to high.

The majority of artefacts retrieved are pieces of flaked stone representing debitage (waste) from stone knapping. The collection is mostly flakes, flake fragments and flaked pieces (flaking debitage - waste). A small number of cores and retouched artefacts are also present. The collection is dominated by locally sourced tuff and quartz material, much of which retains pebble cortex. The tuff has a highly weathered chalky, brown patina. Where it possesses fresh fractures, a dark grey, fine grained siliceous interior is revealed. Tuff and quartz are locally available from the Yarrangobilly River. Foreign stone is a negligible component of the collection.

Given the small number of artefacts retrieved and the small excavation area, making inferences in regard to behavioural activities is somewhat limited. However, given the evidence of artefact discard over the majority of the Test Excavation area it is possible to infer widespread usage of the land. The variability in artefact density that is evident between different Survey Units suggests differential patterns of land use which relate at least in part to environmental parameters.

Three Survey Units (SU6, 10 and 12) have been found to possess moderate to high artefact density. This result suggests that these landforms were utilised for relatively high intensity levels of occupation (long term or repeated occupation areas such as 'base camps'). Several Survey Units possess low/moderate artefact densities and were also focal areas of activity. Survey Units 3, 8 and 11, all flat landforms, surprisingly, have been found to possess relatively low density.

The artefactual material itself reflects generalised stone flaking with some evidence of the manufacture of retouched microliths. Numerous probable knapping events have been identified some of which possess microliths and evidence of use wear. As

such, it can be inferred that stone knapping and implement manufacture and use occurred contemporaneously.

The presence of *in situ* knapping events provides evidence that post-depositional factors, including European land use, has had a limited impact on the spatial integrity of at least some of the archaeological evidence.

A summary of results is listed below:

- A total area of 45 conflated square metres has been excavated.
- A total of 2,306 artefacts have been retrieved.
- The stone artefacts primarily represent flaking debitage and include flakes, flake fragments, flaked pieces and cores made from a limited range of raw materials dominated by locally acquired tuff and quartz. A small percentage of artefacts are formed by retouch (Bondi Points and geometric microliths); several retouched and unretouched artefacts possess evidence of use such as microscopic edge damage and rounding.
- Artefacts from probable individual flaking events (knapping which is undertaken at a single point time and discarded in a spatially discrete area) have been identified in numerous Test Squares. Some of the individual flaking events include the core and associated retouched and/or utilised artefacts.
- The retrieval of artefacts which are representative of single flaking events within single Test Squares is confirmation that generally, the subsurface archaeological material possesses a certain spatial integrity.
- Individual flaking events are generally found to be distributed through more than one spit in a Test Pit indicating post-depositional vertical movement of artefacts throughout the soil profile. This is a common result and is suggestive that the vertical integrity of the subsurface archaeological context appears to be low.
- Artefacts were recovered from 27 of 28 Test Transects indicating a widespread distribution of artefacts across the landscape.
- The average artefact density across the test excavation area, calculated by dividing the total number of artefacts by the total area excavated, is 51 artefacts per square metre;
- Artefact density in individual Survey Units range from as low as 11 artefacts per square metre to 82 artefacts per square metre.
- Artefact density in individual Test Squares ranges from as low as 4 artefacts square metre to 616 artefacts per square metre.

- Given an average artefact density of 51/m² and that the Survey Units in the test excavation program measures approximately 60.5 hectares it is estimated that 30,871,575 artefacts may be present in that area (calculated by multiplying 60.5 hectares [605325 square meters] by 51).

In the following section, the analyses are presented.

Artefact Distribution Analysis

The approach to recording in the current study has been a 'nonsite' methodology: the elementary unit recorded is an artefact rather than a site (*cf.* Dunnell 1993; Shott 1995). Given that the test excavation framework is to excavate a sample of a Survey Unit area, the process of identifying site boundaries (if they exist at all) is clearly not possible. However, it can be expected that artefacts will be distributed across the project area, and within Survey Units, in a virtual continuum. This phenomenon is not anomalous; subsurface work conducted elsewhere in southeast Australia confirms this pattern (see for example Dibden 2005d). Therefore, in respect of stone artefact distribution, the notion of site is itself a meaningless concept and cannot encompass or reflect the actual distribution of artefacts across the landscape. Given that artefacts are continuous in distribution and not discrete 'site' occurrences artefact distribution is better conceptualised in relational terms.

The density and nature of the artefact distribution will vary across the landscape in accordance with a number of behavioural factors which resulted in artefact discard. While cultural factors will have informed the nature of land use, and the resultant artefact discard, environmental variables are those which can be utilised archaeologically in order to analyse the variability in artefact density and nature across the landscape. Accordingly, in this study, while the artefact is the elementary unit recorded, it is the Survey Unit which is utilised as a framework of recording and analysis (Wandsnider and Camilli 1992).

The rationale for employing this definition relates to its utility in regard to predicting the archaeological potential of and between landforms. The archaeological evidence which has been located within individual Survey Units during the current study is assumed to be generally representative of the archaeological resource located within the entire Survey Unit.

Given this theoretical assumption, it is predicted that the archaeological material recovered from the individual Test Transect/s excavated in each Survey Unit is likely to be representative of that which is distributed across the entire Survey Unit. Furthermore, results obtained from one Survey Unit may be extrapolated (albeit with caution) to other similar survey units.

In this section the spatial distribution of lithic material across the proposal area is examined. The aim is to determine whether there is an even spread of artefacts or a

variable distribution. The relative artefact density between Survey Units will be examined.

A total of 2,306 stone artefacts were retrieved during the test excavation. Artefact numbers retrieved from each excavated Survey Unit are listed in Table 6. Artefacts were retrieved from 27 of 28 Test Transects indicating that artefacts are widely distributed across the landscape. The average artefact density across the test excavation area, calculated by dividing the total number of artefacts by the total area excavated, is 51 artefacts per square metre. Artefact density in individual Survey Units ranges from as low as 11 artefacts per square metre to as high as 82 artefacts square metre (Table 13). On a finer scale, artefact numbers in individual Test Squares ranges from 1 (4 artefacts square metre) to 154 (616 artefacts per square metre) (Table 14).

Table 13 Summary of excavation data per Survey Unit

SU	Number of Test Transects	Number of Test Squares	Area Excavated	Number of Artefacts	Artefact density per sq. m.
3	4	25	6.25 sq. m	151	23
12	8	50	12.5 sq. m	1,020	81
11	3	17	4.25 sq. m	72	17
10	2	12	3 sq. m	235	78
8	4	27	6.75 sq. m	77	11
6	2	13	3.25 sq. m	267	82
5	5	36	9 sq. m	484	54
Total	28	180	45 sq. m	2,306	51

Artefacts were recovered from most of the excavated Test Squares. This result indicates that artefact distribution is generally widespread. However, there is significant variation artefact abundance between Test Squares (Table 14).

Table 14 Number of artefacts recovered from each Test Square.

Sq.	1	1b	1c	1d	2	2a	2b	2c	2d	3	3b	3c	3d	3e	3f	4	4c	4d	5	6
SU10																				
1	1				5					15						33			63	42
2	18				4					7						12			19	16
SU11																				
1	16				8					15						14				
2	3									3						5			1	1
3					1					1						3			1	
SU12																				
1	32	5	2	6	2					8						1				3
2	1									1						4			8	9
3	8				54					33						17			4	7
4	16				41					33						3			3	
5	3				22					2						11			1	1
6					33					4						13			2	1
7	10				9											12			131	154
8	29				85		66			108						22				
SU3																				
1					1					5	5					11			2	2
2	4				31		14	6	12	15						11			8	
3	1					1	2													
4					10		3			3						4				
SU5																				
1	26	11	14	20	22					16						4			5	1
2					8					25						5				3
3	18				21					2									1	2
4	27									7	8	32	15	21	11	10			6	17
5	39	26			20					18						5			11	7
SU6																				
1	45				27					31	39					15			8	13
2	32	24								9	8					11			5	
SU8																				
1																	2	1		
3	6				2		1			37	23					2				
4	2									1										

Artefact analysis

The artefact analysis has been structured to address the following issues:

- Technological and behavioural activities represented by the lithic material; and
- The organisation and use of stone resources in the Lobs Hole area.

The nature of the assemblage is examined through basic descriptive statistics on artefact type, raw material type, presence and type of cortex, initiation, platform and

termination attributes, size and shape and relevant relationships between these variables.

Although the excavated material is described as a total unit it should be recognized that the collection is a compilation of material which may have accumulated as a result of numerous unrelated occupational events spread over an indeterminate period of time. However, as noted previously, many artefacts are likely to be parts of related knapping events and this allows for a detailed examination of the technological and behavioural aspects relating to lithic manufacture and use.

Of the 2,306 artefacts, the majority are pieces of flaked stone. However, a small number of pebble artefacts have also been identified including a fragment of whetstone, grinding stone and a hamper stone. Flaked artefact classes identified in the collection include flakes, flake fragments, flaked pieces, cores and retouched artefacts.

A summary of the numbers of each artefact class made from the range of raw materials present in the collection is presented in Table 15. Flakes and flake portions are the most frequently occurring type with a total of 2,167 (93%) found in the area excavated. Twenty nine cores and core fragments were recorded representing 1% of the collection. Twenty five retouched artefacts, 15 unmodified flakes with use wear and four pebble artefacts were identified.

Table 15 Crosstabulation of artefact classes by raw material for all artefacts (abbreviations are defined in Appendix 6).

Type	ch	chal	fgv	q	qu	s	t	unc	vol	Total
Flake	55	1	10	146	8	3	526	1		750
Flake fragment	73	2	10	321	9	1	660	1		1,077
Flaked piece	8	1		33	1		41			84
Proximal	10		2	14	1	1	74			102
Medial	4			8		1	12			25
Distal	14		3	27	2		83			129
Core	2		1	4			12			19
Core fragment	1			1			8			10
Grinding stone					1			1		2
Hammer								1		1
Possible	9		1	12	6	1	23	9	4	65
Retouched artefact	8			1			16			25
Flaked peb							1			1
Unmodified with use	1						14			15

Type	ch	chal	fgv	q	qu	s	t	unc	vol	Total
Whetstone								1		1
Total	185	4	27	567	28	7	1,470	14	4	2,306

A range of raw material types were utilised to produce the artefacts, however tuff (N=1,470; 63.7%) and quartz (N=567; 24.6%) are the most abundant. Both are available as cobbles from the Yarrangobilly River. Chert is represented by 185 artefacts (8%). Small amounts of other materials including silcrete (N=7), chalcedony (N=4), quartzite (N=28) and volcanics (N=31) were identified (Table 15). The paucity of these latter materials is most likely to be related to the distance of Lobs Hole from their source.

Table 16 Crosstabulation of cortex type and lithic material.

Cortex type	ch	chal	fgv	q	qu	s	t	unc	vol	Total
pebble	10		5	59	13		325	6		418
terrestrial	1									1
Total	11	0	5	59	13	0	325	6	0	419

Cortex was identified on 419 (18%) lithic items, all of which was water worn pebble except for one. The high percentage of cortex on tuff and quartz lithics is notable. The incidence of high levels of cortex retention indicates relatively low levels of reduction and suggests that water worn cobbles were close to the study area, which indeed they are (Table 16).

The data supports the conclusion that a limited range of raw material sources were utilised to manufacture the artefacts and that tuff and quartz was the dominant material utilised at Lobs Hole. The dominance of these, and the high incidence of pebble cortex suggests that this material was acquired locally. The location of this source is almost certainly the Yarrangobilly River.

Initiation, platform and termination attributes

Several attributes present on artefacts produced by flaking can be used to positively distinguish between naturally fractured stone and artefacts. These features are well defined and the presence of two or more is usually required before an artefact can be conclusively identified. Full descriptions of these fracture features are available in numerous publications (*cf.* Andrefsky 1998:17-19). The three attributes identified in this analysis were: initiation type, platform type and termination type. Positive identification of flaked stone artefacts is dependent upon the presence of these features which described in Appendix 6. The recognition of one or more of these features on the lithic items used in this analysis demonstrates the validity of these identifications.

These attributes can also be used to examine basic technological features of a collection. In this study these fracture characteristics are examined to determine if

any patterns in the reduction strategies used to produce the artefacts are evident. Four initiation types were recorded in this analysis: bending, bipolar, Hertzian (conchoidal) and wedging. Hertzian initiations as a result of hard hammer percussion are the most common type for the flakes with intact platforms. This result is not uncommon and indicates that the collection is representative of very general flaking technology. Conchoidal fractures are typically the most frequent initiation type in Australian artefact assemblages.

The dominant mode of reduction evident at Lobs Hole entailed the fracturing of large pebble cobbles (for example, see Plates 57 and 58). Test Squares commonly possessed a wide range of artefact sizes with large conchoidal flakes, often with cortex, diminishing to very small pieces measuring less than one millimeter.

Plate 57 Related tuff artefacts retrieved from SU12, TT 8, Sq. 3, Sp 1.

Plate 58 Related tuff artefacts retrieved from SU12, TT 7, Sq. 6, Sp 2.

Bipolar flakes also account for a relatively high proportion of initiations. The presence of bipolar cores confirms bipolar technology as a common method of flaking quartz cobbles. The relatively high incidence of quartz corresponds to these patterns. Raw material morphology can exert a strong influence on core reduction strategies. In particular quartz can present difficulties for hand held percussion (conchoidal initiation) techniques due to the hard, brittle nature of the stone and the small size of quartz nodules and pebbles. Bipolar reduction, where the core is rested on an anvil, is frequently employed to produce quartz flakes. As a result, bipolar flakes often show signs of impact on opposing ends and have compression rings moving in two directions towards each other (Andrefsky 1998: Glossary xxi).

For all raw materials, including quartz, conchoidal initiations were the dominant fracture type for flakes with a platform. However, a clear association between bipolar reduction and quartz is demonstrated and is the only raw material where this reduction strategy is employed. Naturally occurring quartz cobbles is readily available within the Yarrangobilly, so it is unlikely that bipolar reduction was used as a material conservation strategy. It is however, likely that hand held percussion techniques would be difficult for flaking small nodules.

A number of aspects of artefact reduction technology are indicated by a range of platform traits. Hiscock (1986:44) has demonstrated a number of technological changes in assemblages by measuring attributes which reflected the various combinations of platform preparation and force application. Hiscock (1986:43) lists a range of measures to examine application of force precision and platform preparation. The percentage of focalised platforms was used as an indicator of the precision of the blow. Hiscock found that changes in the relative proportions of these indicators were associated with technological changes through time. Although the current study does not investigate any temporal aspects of artefact production, it is possible to examine platform preparation aspects as a general indicator of reduction technology. Focused platforms, where the point of force application (PFA) covers more than half of the platform is common in the collection, indicating careful flaking. Likewise, platform preparation was frequently observed, further demonstrating careful preparation. Flakes are often very thin.

Knapping events

The presence of a number of apparent reduction events supports the contention of that despite disturbance, the archaeological resource exhibits reasonable spatial integrity. Examples of these are listed below:

- SU3/Test Transect 4/Sq. 2 (including adjoining Sq. 2b): – a total of 10 possible related tuff artefacts including the core, flakes, flake fragments and a broken piece of a retouched artefact. Distributed in Spits 1-2.
- SU3/Test Transect 2/Sq. 2 (including adjoining Sq. 2b, 2c, 2d): – a total of 56 possible related tuff artefacts including flakes and flake fragments. Distributed in Spits 2-4.
- SU3/Test Transect 2/Sq. 4: – a total of 9 possible related tuff artefacts including flakes and flake fragments.
- SU8/Test Transect 3/Sq. 3 (including adjoining Sq. 3b): – a total of 25 related chert artefacts including the core and six retouched artefacts (Plate 59). Located in Spit 5. It is noted that the chert used in this event is a distinctive, very beautiful (like porcelain) pale cream material and not found elsewhere in the collection.
- SU12/Test Transect 1/Sq. 1 (including adjoining Sq. 1b, 1c, 1d): – a total of 43 possible related tuff artefacts including the core, flakes, flake fragments and a broken piece of a retouched artefact. Distributed in Spits 1-2.
- SU12/Test Transect 3/Sq. 1: – a total of 51 possible related tuff artefacts including flakes and flake fragments. In Spit 2.
- SU12/Test Transect 4/Sq. 2: – a total of 26 possible related tuff artefacts including a very small Bondi point. In Spit 1.

- SU12/Test Transect 4/Sq. 3: – a total of 12 possible related quartz artefacts. In Spit 2.
- SU12/Test Transect 5/Sq. 2: – a total of 19 possible related tuff artefacts including a pebble core. In Spit 2.
- SU12/Test Transect 6/Sq. 2: – a total of 26 possible related tuff artefacts including a core fragment. In Spit 2.
- SU12/Test Transect 7/Sq. 5: – a total of 67 possible related tuff artefacts including two cores. Distributed in Spits 1-2.
- SU12/Test Transect 7/Sq. 5: – a total of 55 possible related quartz artefacts many exhibiting bipolar features. In Spits 2-4.
- SU12/Test Transect 7/Sq. 6: – a total of 100 possible related tuff artefacts including an unmodified piece with use wear and two retouched artefacts. Distributed in Spits 1- 2.
- SU12/Test Transect 7/Sq 3: a total of 95 possible related tuff artefacts including an unmodified piece with use wear and two retouched artefacts. Distributed in Spits - 3 (Plate 57).
- SU12/Test Transect 8/Sq 3: a total of 85 possible related tuff artefacts. Distributed in Spits 1- 2 (Plate 58).

Plate 59 Related chert artefacts retrieved from SU8, TT 8, Sq. 3 (on left) and Sq3b (on right), Sp 5.

These numerous knapping events possess a number of features of interest. Several possess retouched artefacts including some with use wear (also unretouched flakes with use wear) which suggests that tools were fashioned *and used* within a single event or period of time. The other notable feature is that often a single event is distributed throughout the soil profile. This phenomenon is probably related to various factors including natural bioturbation processes as well as European activities including ploughing.

Retouched artefacts

A total of 25 retouched artefacts were identified (Table 17). Retouched artefacts are backed artefacts including Bondi Point and geometric microlith types. The function of retouched microliths, including Bondi Points and geometric microliths, is debated in the literature (*cf.* Fullagar *et al.* 1994; Mulvaney and Kamminga 1999). Generally, they are believed to have been utilised in armatures of spears (Mulvaney and Kamminga 1999), although the function of Bondi Points as cutting implements has been proposed (Sokoloff 1977). Fullagar *et al.* (1994) have examined residues on Bondi Points and argue that their function is multipurpose. Kamminga (1980) has argued that most specimens in museum collections have no evidence of having been used at all. However, detailed use-wear analysis and residue studies on backed artefacts from three Upper Mangrove Creek shelters indicated that they were a general purpose and multiple use implement (Robertson *et al.* 2009: 296).

Several retouched artefacts present in this collection have been recorded as components of individual knapping events indicating that they may be produced and discarded immediately without use (*at least* that which is observable under low powered magnification), *or*, may be produced, utilised and discarded within a single event. This latter observation suggests alternative usage other than as a component of spear armature.

Table 17 Retouched artefacts.

SU	TT	Sq.	Sp	Material	Size	Comments
SU12	1	1	1	T	2	Proximal portion of a retouched artefact
SU3	1	4	4	T	4	Broken. Unweathered grey interior is visible. Orientation uncertain. Steeply retouched from ventral
SU12	4	2	1	T	2	Very small Bondi point 15 x 6 x 4mm
SU12	5	4	2	ch	2	Proximal, thin, retouch on 1 margin, 17 x 8 x 2mm
SU12	7	5	1	T	3	Flake, distally retouched
SU12	7	6	3	T	2	Bondi point, retouched from ventral, 16 x 6 x 2mm

SU	TT	Sq.	Sp	Material	Size	Comments
SU12	7	6	3	T	2	Distally retouched from the ventral, 16 x 6 x 3mm
SU12	8	2	1	T	2	Proximal, probably Bondi point, steep backing retouch from ventral, edge damage on opposing margin from ventral consistent with use
SU12	8	2b	1	T	2	Geometric, flake, parallel arises, retouched distally from ventral. 17 x 9 x 3mm
SU6	1	3B	2	T	3	Broken; probably distal; bifacial retouch backing
SU6	1	3B	2	T	2	Proximal portion; retouch along part of one margin
SU6	1	6	1	Q	2	Broken Bondi point
SU6	2	3B	1	T	3	Broken in two; tip missing; Bondi point
SU8	3	3	5	ch	3	Flake fragment; 1 ridge; retouched both ends and one margin; chord has some possible damage consistent with use
SU8	3	3	5	ch	3	Flake with crushed platform; 1 ridge; retouched on one margin from ventral and only on the distal portion
SU8	3	3	5	ch	3	Flake; 2 ridges; distally retouched on one margin from the ventral; edge damage with use on the chord
SU8	3	3	5	ch	2	Flake fragment; triangular in plan view; retouched from ventral on one margin
SU8	3	3B	5	T	2	Flake fragment; retouch from ventral along one concave shaped margin
SU8	3	3B	5	ch	3	Flake; 1 ridge; distally backed from the ventral; possible use wear on the chord
SU8	3	3B	5	ch	2	Triangular in plan view
SU10	1	4	1	ch	2	Fine grained; distally retouched from ventral
SU10	1	6	1	T	3	Distally retouched only from the ventral
SU10	1	6	1	T	2	Bondi point shape; missing tip; retouched from ventral at both ends; all of the tuff artefacts in square 6 spit 1 probably all related
SU5	4	6	1	T	2	Bondi point 12 x 5 x 3mm
SU5	5	1	T	t	3	Bondi point, 2 pieces

Retouched artefacts are represented in three raw material categories including quartz (N=1), chert (N=8) and tuff (N=16). The dominance of tuff corresponds to relative abundance of this material across the entire collection. The relative abundance of chert backed artefacts is notable. However, six of these come for a single knapping event (of a highly distinctive and rare chert), which is of itself unusual.

Discussion

The subsurface test excavation has found stone artefacts to be present across all the Survey Units tested indicating a widespread spatial distribution. The average artefact density across the test excavation area, calculated by dividing the total number of artefacts by the total area excavated, is 51 artefacts per square metre.

Artefacts are however distributed in variable density between individual Survey Units. Most have been found to possess artefacts in relatively low but not insignificant density. However, several Survey Units possess relatively higher artefact densities which range from low/moderate to moderate/high. This result suggests a relatively higher level of occupation in these locales and that they were focal areas of activity. It is concluded that Lobs Hole was utilised for relatively intensive Aboriginal occupation.

Lithic material for implement manufacture was obtained almost exclusively from tuff and quartz cobbles sourced from the local river. The lithic attributes suggest that pebbles were reduced by both hard hammer percussion and bipolar techniques to make sharp edge flakes and retouched tools for immediate usage. Numerous collections of items from individual knapping events have been identified which contain both the debitage (sometimes including the core) and the retouched and or utilized items. Pebble tools including a grinding stone, whetstone (for sharpening hatchets) and a hammerstone have been retrieved, indicating the use of a broad suite of implements.

An estimate of the likely abundance of subsurface artefacts in the landscape can be problematic when the results demonstrate a variable distribution. While the use of widely spaced transects and small pits situated five metres apart is appropriate for an investigation to determine the archaeological sensitivity of an area, this strategy is, however, not well suited to determining precise estimates of artefact abundance when the results show variability in their distribution. Nevertheless, extrapolations of the average artefact density of 51/m^2 over the Survey Units tested (60.5 hectares) indicate that 30,871,575 artefacts may be present. This is of course a hypothetical scenario but does highlight the potential for considerable numbers of additional artefacts to exist between the excavated squares. Such a large artefact number should not be considered excessive or unusual, especially for the environmental and

geographical context in question. It is also noted that artefacts would be unequally distributed throughout the study area.

In the Australian model of subsistence organisation discussed in Section 4.1, residential moves are as much to do with access to firewood and water, as for food. In the Snowy Mountains, occupation of the higher elevation environments posed a considerable risk to people becoming stranded quickly due to rapidly changed weather circumstances and, in particular, to snow events. This peril prevailed over the majority of the annual cycle as snow can fall at almost any time of the year. Occupational contexts in this environment are therefore likely to refer to these risks.

We know that Europeans moved on a seasonal basis between Kiandra and Lobs Hole (Dibden 2018) and, given the relative proximity of Lobs Hole to places such as Kiandra and Mt Gooandra, Aboriginal people are also likely to have sought shelter there when the weather turned. In this regard, it's worth noting that Lobs Hole was a unique environment in an otherwise steep and dramatic landscape. The Lobs Hole valley would have provided protection from dangerous or unfavourable weather, an abundance of firewood, reliable potable water, the resources of a fertile valley and an abundance of readily available lithic material. The relative absence of foreign stone material in the excavated lithic collection suggests that people had occupied the valley without planning or provisioning. This lends weight to the idea that people may have moved there quickly for shelter.

The occupation models discussed in Section 4.4.1 such as those of Johnson (1992) and Knight (2010) are focused on the distribution of discrete 'sites'. The excavations at Lobs Hole present a rather different picture of artefact distribution in the landscape. Artefacts have been found to be continuous distributions rather than individual site locales. This result is comparable to the excavations conducted in the Thredbo Valley by Kamminga *et al* (1989). Kamminga (1992) proposed that the Thredbo Valley could be regarded as a '… continuous archaeological 'site' comprising innumerable prehistoric activity areas'. The artefactual evidence at Lobs Hole is similarly distributed.

The excavations do, however, reveal considerable differences in artefact densities between landforms. The highest densities were found on the elevated crest landforms of Survey Units 6 and 10, with only one flat possessing comparable densities (SU12). Kamminga *et al.* (1989) found a similar pattern in landform preference in the Thredbo Valley where the most favoured localities were landforms elevated 15 - 20 m above the valley floor. At Lobs Hole, the lower artefact densities in flats other than Survey Unit 12 may be due to these having been boggy environments prior to European land clearance and so on. Barry Yan (pers comm) recalls his father who farmed at Lobs Hole, referring to the boggy nature of the flats and that they required preparation to be suitable for cultivation.

7. HERITAGE VALUES AND STATEMENT OF SIGNIFICANCE

The information provided in this report and the assessment of significance of Aboriginal objects provides the basis for the proponent to make informed decisions regarding management and mitigation which should be undertaken in respect of proposed impacts.

7.1 SIGNIFICANCE ASSESSMENT CRITERIA

The NPWS (1997) defines significance as relating to the meaning of sites: 'meaning is to do with the values people put on things, places, sites, land'. The following significance assessment criteria are derived from the relevant aspects of ICOMOS Burra Charter and NSW Department of Urban Affairs and Planning's 'State Heritage Inventory Evaluation Criteria and Management Guidelines'.

Aboriginal archaeological sites are assessed under the following categories of significance:

- cultural value to contemporary Aboriginal people,
- archaeological value,
- aesthetic value,
- representativeness, and
- educational value.

Aboriginal cultural significance

The Aboriginal community will value a place in accordance with a variety of factors including contemporary associations and beliefs, and historical relationships. Most heritage evidence is valued highly by Aboriginal people given its symbolic embodiment and physical relationship with their ancestral past.

Archaeological value

The assessment of archaeological value involves determining the potential of a place to provide information which is of value in scientific analysis and the resolution of potential archaeological research questions. Relevant research topics may be defined and addressed within the academy, the context of cultural heritage management or Aboriginal communities. Increasingly, research issues are being constructed with reference to the broader landscape rather than focusing specifically on individual site locales. In order to assess scientific value, sites are evaluated in terms of nature of the evidence, whether or not they contain undisturbed artefactual material, occur within a context which enables the testing of certain propositions, are very old or contain significant time depth, contain large artefactual assemblages or material diversity, have unusual characteristics, are of good preservation, or are a part of a

larger site complex. Increasingly, a range of site types, including low density artefact distributions, are regarded to be just as important as high density sites for providing research opportunities.

In order to assess the criteria of archaeological significance further, and also to consider the criteria of rarity, consideration can be given to the distribution of stone artefacts across the continent. There are two published estimates of the quantity of accumulated stone artefacts in Australia, both of which are almost certainly understated (Wright 1983:118; Kamminga 1991:14; 2002). Wright estimated an average of 500,000 débitage items and 24,000 finished tools per square kilometre, which equates to a total of about 180 billion finished stone tools and four trillion stone débitage items in Australia. Kamminga's estimates, which were determined from a different set of variables, provide a conservative estimate of 200 billion stone tools and 40 million tonnes of flaking débitage (see Kamminga 1991:14; 2002). These two estimates are similar and suggest that the actual number of stone tools and items of flaking débitage in Australia is in the trillions. The stone artefacts distributed in the proposed activity area cannot, therefore, be considered to be rare.

The vast majority of stone artefacts found in Australia comprise flaking debris (termed débitage) from stone tool making. While it can be reasonably inferred from a range of ethnographic and archaeological evidence that discarded stone artefacts and flaking debris was not valued by the maker, in certain circumstances these objects may to varying degrees have archaeological research potential and/or Aboriginal social value. However, only in very exceptional circumstances is archaeological research potential high for particular sites (Kamminga, J. pers. comm. June 2009).

Representativeness

Representative value is the degree to which a 'class of sites are conserved and whether the particular site being assessed should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole' (NPWS 1997). Factors defined by NPWS (1997) for assessing sites in terms of representativeness include defining variability, knowing what is already conserved and considering the connectivity of sites.

Educational value

The educational value of cultural heritage is dependent on the potential for interpretation to a general visitor audience, compatible Aboriginal values, a resistant site fabric, and feasible site access and management resources.

Aesthetic value

Aesthetic value relates to aspects of sensory perception. This value is culturally contingent.

7.2 Significance of the Aboriginal Object Sites in the project Area

The significance assessment is conducted within an analytical framework based on Survey Units.

Most of the Survey Units in the project area are assessed to be of relatively low archaeological heritage value primarily because of their low artefact density and high degree of previous impacts and disturbance. However, several Survey Units are assessed to be of moderate to high significance (Table 18).

It is noted that Aboriginal heritage sites often have high cultural value to the local Aboriginal community given that they provide direct physical and symbolic linkages to their ancestral past and to the landscape. The cultural values of the heritage will almost certainly differ to the archaeological significance values.

Table 18 Cultural heritage significance assessment of Survey Units and Aboriginal object locales.

ID	Predicted/Known Artefact Density	Aboriginal Objects	Significance	Criteria
SU1	Very low/ negligible	Nil recorded	-	-
SU2	Moderate	Nil recorded	Potentially moderate local significance	Common site type Low educational value Low aesthetic value Potentially moderate research potential: predicted moderate/high artefact density.
SU3	Low/Moderate	AHIMS 56-6-0009 SU3/L1 SU3/L2 SU3/L3 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4	Low/moderate local significance	Common site type Low educational value Low aesthetic value Low/moderate research potential: low moderate artefact density, but generally disturbed.
SU4	Low	AHIMS 56-6-0045 SU4/L1 SU4/L2	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and highly disturbed.

ID	Predicted/Known Artefact Density	Aboriginal Objects	Significance	Criteria
SU5	Moderate	SU5/L1 SU5/L2 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4 Test Transect 5	Moderate local significance	Common site type Low educational value Low aesthetic value Moderate artefact density, but generally disturbed.
SU6	Moderate/high	SU6/L1 SU6/L2 SU6/L3 SU6/L4 Test Transect 1 Test Transect 2	Moderate local significance	Common site type Low educational value Low aesthetic value Moderate research potential: moderate/high artefact density but generally disturbed.
SU7	Moderate or possibly moderate/high	Nil recorded	Potentially moderate local significance	Common site type Low educational value Low aesthetic value Potentially moderate research potential: predicted moderate or moderate/high artefact density.
SU8	Low	AHIMS 56-6-0043 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and highly disturbed. However, certain areas may have higher values.

ID	Predicted/Known Artefact Density	Aboriginal Objects	Significance	Criteria
SU9	Negligible	Nil recorded	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: negligible artefact density and highly disturbed.
SU10	Moderate/high	SU10/L1 SU10/L2 SU10/L3 Test Transect 1 Test Transect 2	Moderate local significance	Common site type Low educational value Low aesthetic value Moderate research potential: moderate/high artefact density.
SU11	Low	AHIMS 56-6-0041 AHIMS 56-6-0047 SU11/L1 SU11/L2 SU11/L3 Test Transect 1 Test Transect 2 Test Transect 3	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and highly disturbed.

ID	Predicted/Known Artefact Density	Aboriginal Objects	Significance	Criteria
SU12	Moderate/high	AHIMS 56-6-0042 AHIMS 56-6-0046 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4 Test Transect 5 Test Transect 6 Test Transect 7 Test Transect 8	Moderate local significance	Common site type Low educational value Low aesthetic value Moderate research potential: moderate/high artefact density.
SU13	Low	SU13/L1 SU13/L2	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and disturbed.
SU14	Negligible	Nil recorded	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: negligible artefact density and highly disturbed.
SU15	Low	Nil recorded	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and disturbed.

ID	Predicted/Known Artefact Density	Aboriginal Objects	Significance	Criteria
SU16	Low	SU16/L1 SU16/L2 SU16/L3 SU16/L4	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and disturbed.
SU17	Low	SU17/L1	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and disturbed.
SU18	Low	SU18/L1	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and disturbed.
SU19	Negligible	Nil recorded	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: negligible artefact density.

ID	Predicted/Known Artefact Density	Aboriginal Objects	Significance	Criteria
SU20	Low	SU20/L1 SU20/L2 SU20/L3 SU20/L4 SU20/L5 SU20/L6 SU20/L7 SU20/L8 SU20/L9 SU20/L10 SU20/L12 SU20/L12	Low local significance	Common site type Low educational value Low aesthetic value Low/moderate research potential: low artefact density and disturbed.
SU21	Low	Nil recorded	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: negligible artefact density.
SU22	Low	SU22/L1 SU22/L2 SU22/L3	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and disturbed.
SU23	Low	SU23/L1 SU23/L2 SU23/L3	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and disturbed.

ID	Predicted/Known Artefact Density	Aboriginal Objects	Significance	Criteria
SU24	Low	SU24/L1	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: low artefact density and disturbed.
SU25	Low	AHIMS 56-6-0038 AHIMS 56-6-0039 AHIMS 56-6-0040	Low local significance	Common site type Low educational value Low aesthetic value Low/moderate research potential: low artefact density and disturbed.
SU26	Negligible	Nil recorded	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: negligible artefact density and disturbed.
SU27	Negligible	Nil recorded	Low local significance	Common site type Low educational value Low aesthetic value Low research potential: negligible artefact density and disturbed.

8. IMPACT ASSESSMENT

In this section, the nature and extent of the proposed activity and any potential harm to Aboriginal object locales is identified. The assessment takes into consideration the extent to which the development or activity will change the surrounding landscape (NSW OEH 2011).

Direct harm would occur as a result of an activity which disturbs the ground such as road works, excavations for construction and rock emplacement, as listed previously in Section 2. Indirect harm may occur to places situated adjacent and beyond areas in which direct impacts happen, for example, via exacerbated erosional processes.

When assessing harm, a consideration of Ecologically Sustainable Development (ESD) is required. ESD is defined in the Protection of the Environment Administration Act 1991. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

(a) the precautionary principle,

(b) inter-generational equity,

(c) conservation of biological diversity and ecological integrity,

(d) improved valuation, pricing and incentive mechanisms.

The principles of ecological sustainable development and the matter of cumulative harm have been considered for this project. Given the low levels of prior, existing and potential future impacts in the local and regional context in which the proposed activity area is situated (the area is a national park with a conservation charter), most of cultural values, including archaeological, which attach to the local area and the broader landscape would remain largely intact. The consideration of ESD has concluded that avoidance of impacts is not warranted.

However, the proposed activities at Lobs Hole will take place across a large proportion of the valley although not all areas would be impacted. The archaeological values vary across Lobs Hole and the impacts would occur within landforms of varying significance and value.

Most Aboriginal object locales have suffered considerable prior disturbance and impacts will not be new. The Aboriginal object locales are not in any case considered to be of sufficient significance as to warrant avoidance measures. However, a number of management strategies are possible, and these are each given consideration in Section 9.

The assessment of harm is conducted within an analytical framework based on Survey Units (Table 19 & 20). The location of impacts in respect of Survey Units and Aboriginal object locales in shown in Figures 26, 27, 28 & 29. An impact assessment is outlined in the table below. It is noted that not all areas within Survey Units would be impacted during the activity, and accordingly impacts will be partial rather than comprehensive. It is noted that in particular, a riparian exclusion zone of 50m in width adjacent to the Yarrangobilly River, will result in a conservation outcome of any Aboriginal object incidence within that zone.

Table 19 List of Survey Units and specific Aboriginal object locales which would be impacted as a result of the activity.

SU ID	ID	Impact
SU3	SU3/L2	Mine Trail Road Upgrade
SU3	SU3/L3	Mine Trail Road Upgrade
SU4	56-6-0045	Mine Trail Road Upgrade
SU4	SU4/L2	Excavated Material Stockpile
SU4	SU4/L1	Excavated Material Stockpile
SU6	SU6/L3	Excavated Material Stockpile
SU6	SU6/L4	Excavated Material Stockpile
SU6	SU6/L1	Excavated Material Stockpile
SU6	SU6/L2	Other - Between Stockpiles
SU10	SU10/L3	Lower Lobs Hole Ravine Road Upgrade
SU10	SU10/L2	Lower Lobs Hole Ravine Road Upgrade
SU10	SU10/L1	Lower Lobs Hole Ravine Road Upgrade
SU16	SU16/L1	Accommodation Camp
SU16	SU16/L4	Accommodation Camp
SU16	SU16/L2	Accommodation Camp
SU16	SU16/L3	Accommodation Camp
SU13	SU13/L2	Lower Lobs Hole Ravine Road Upgrade
SU24	SU24/L1	Lower Lobs Hole Ravine Road Upgrade
SU23	SU23/L1	Middle Bay Wharf Access
SU23	SU23/L3	Middle Bay Wharf Access
SU25	56-6-0039	Upper Lobs Hole Ravine Road

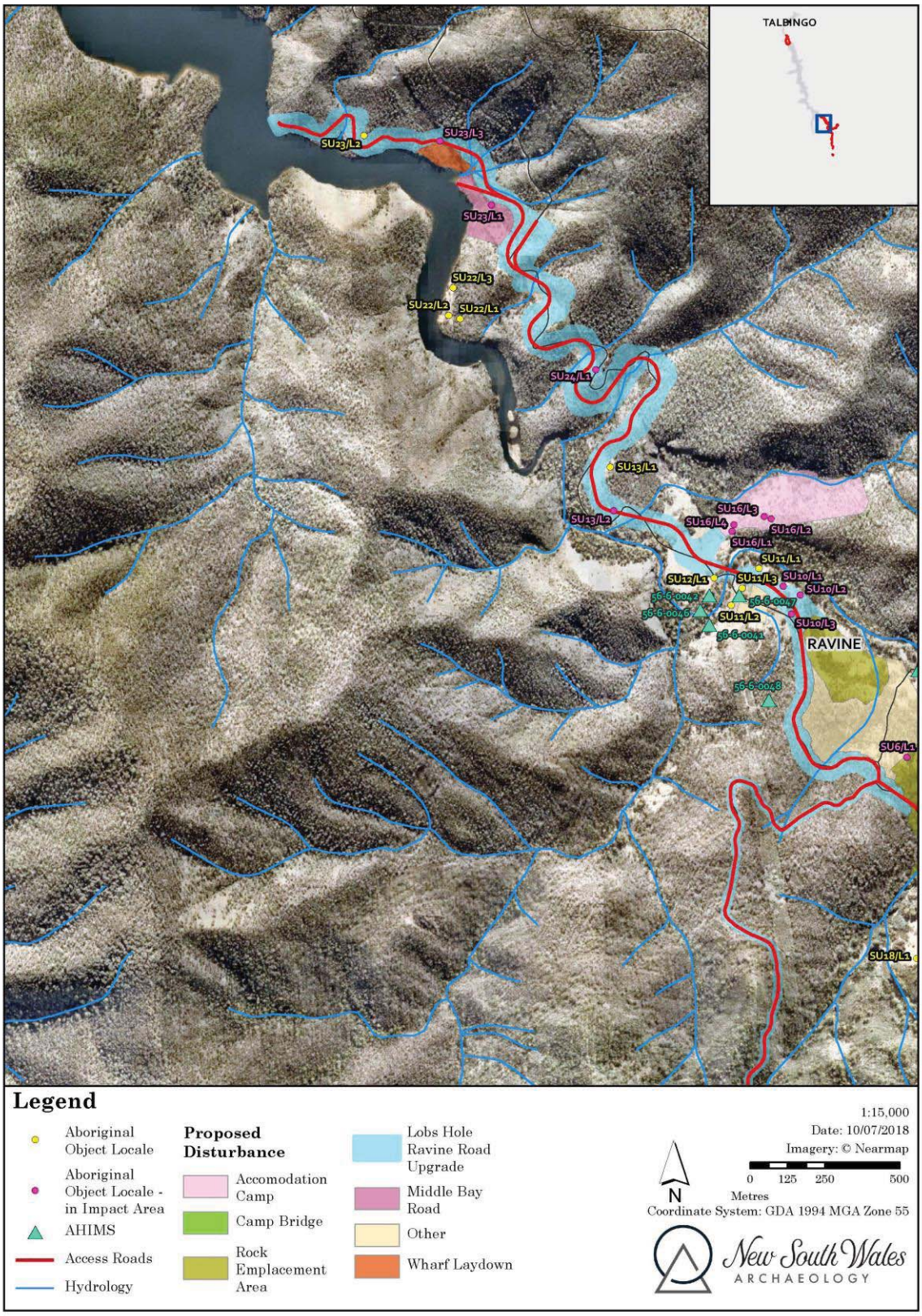


Figure 26 The location of proposed impacts in respect of Survey Units and Aboriginal object locales: Lobs Hole west.

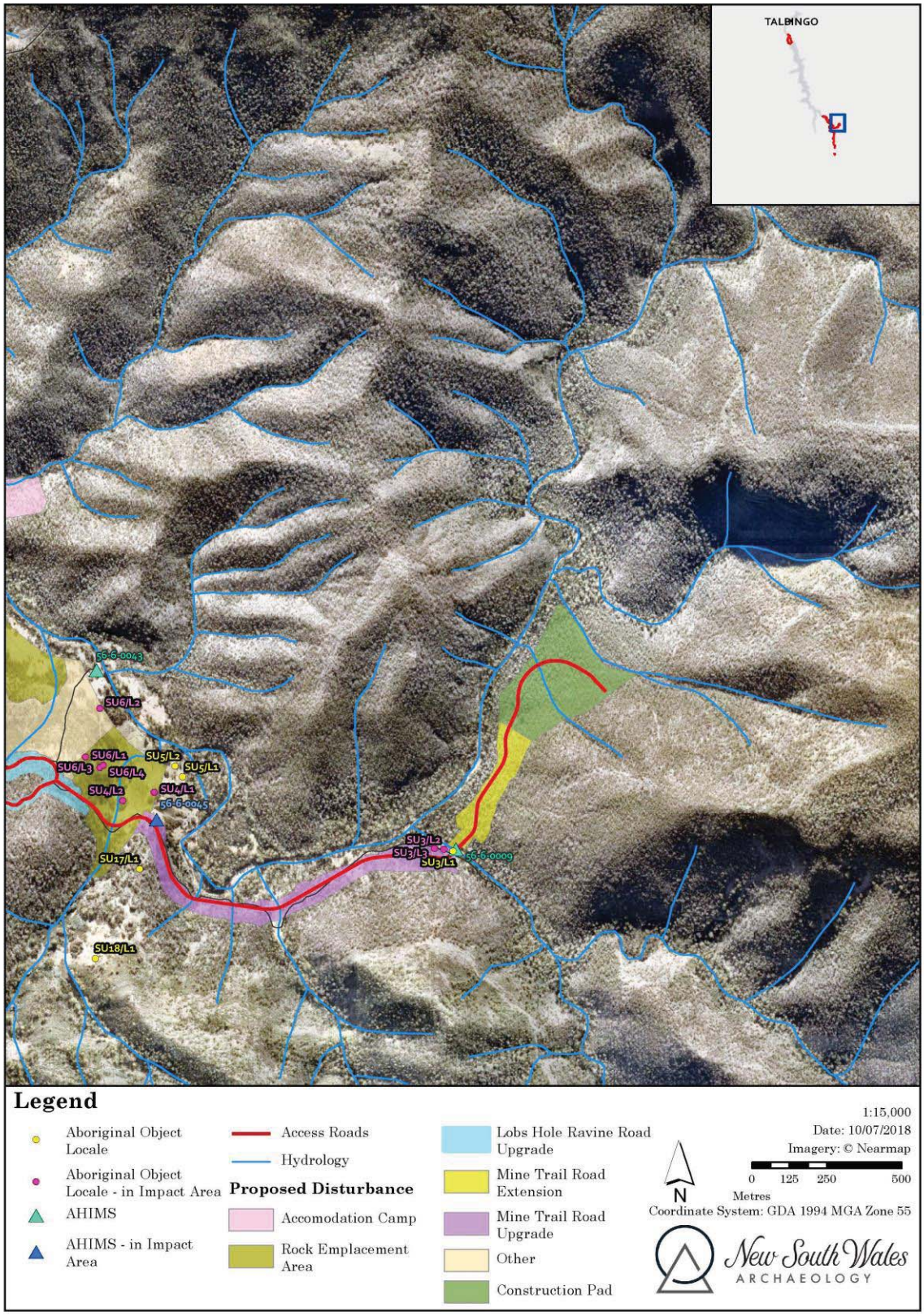


Figure 27 The location of proposed impacts in respect of Survey Units and Aboriginal object locales: Lobs Hole east.

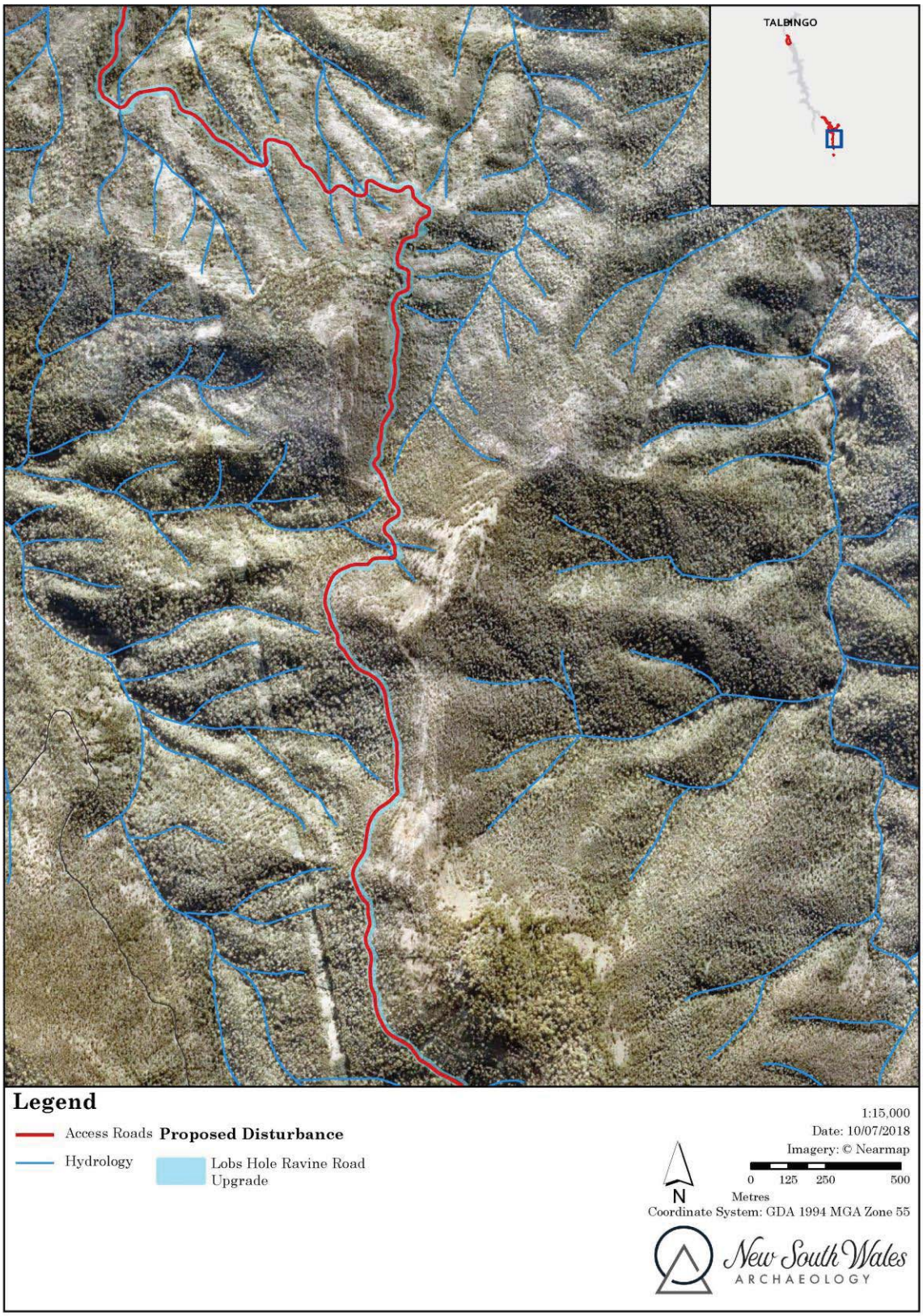


Figure 28 The location of proposed impacts in respect of Survey Units and Aboriginal object locales: Lobs Hole Ravine Road.

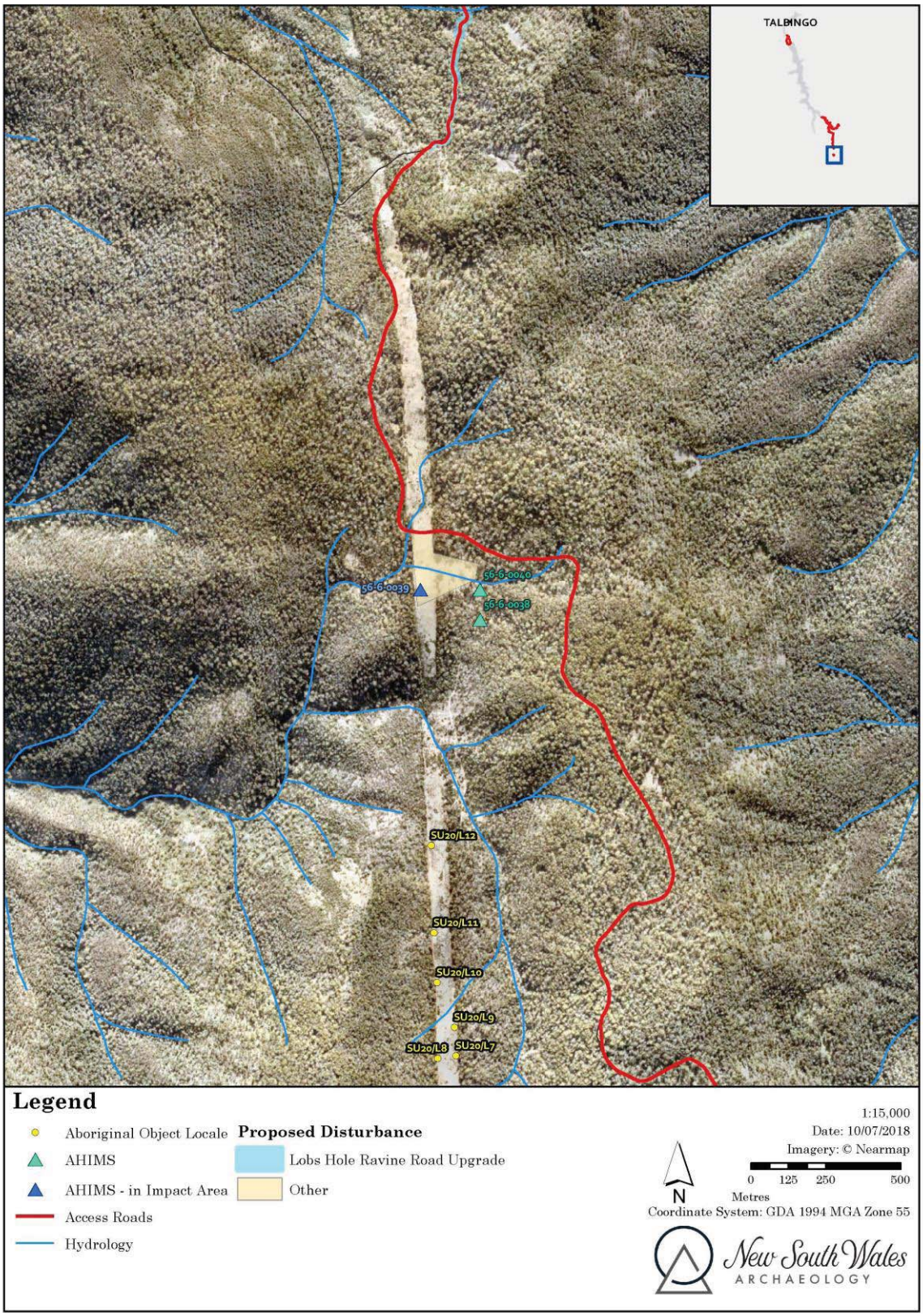


Figure 29 The location of proposed impacts in respect of Survey Units and Aboriginal object locales: Lobs Hole Ravine Road – mid area.

Table 20 Impact assessment of Survey Units and Aboriginal object locales within the proposal area.

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Consequence of harm
SU1	Nil recorded	-	Direct Construction Pad Mine Trail Road Extension	Partial *Not all of SU would be impacted*	Partial loss of value
SU2	Nil recorded	Potentially moderate local significance	Direct Construction Pad Mine Trail Road Extension	Partial *Not all of SU would be impacted*	Partial loss of value
SU3	AHIMS 56-6-0009 SU3/L1 SU3/L2 SU3/L3 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4	Low/moderate local significance	Direct Mine Trail Road Upgrade	Partial *Not all of SU would be impacted*	Partial loss of value
SU4	AHIMS 56-6-0045 SU4/L1 SU4/L2	Low local significance	Direct Mine Trail Road Upgrade Excavated material stockpile	Partial *Not all of SU would be impacted*	Partial loss of value
SU5	SU5/L1 SU5/L2 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4	Moderate local significance	Direct Excavated material stockpile	Partial *Not all of SU would be impacted*	Partial loss of value

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Consequence of harm
	Test Transect 5				
SU6	SU6/L1 SU6/L2 SU6/L3 SU6/L4 Test Transect 1 Test Transect 2	Moderate local significance	Direct Excavated material stockpile	Partial *Not all of SU would be impacted*	Partial loss of value
SU7	Nil recorded	Potentially moderate local significance	Direct Excavated material stockpile Other	Partial *Not all of SU would be impacted*	Partial loss of value
SU8	AHIMS 56-6-0043 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4	Low local significance	Direct Excavated material stockpile	Partial *Not all of SU would be impacted*	Partial loss of value
SU9	Nil recorded	Low local significance	Direct Excavated material stockpile	Partial *Not all of SU would be impacted*	Partial loss of value
SU10	SU10/L1 SU10/L2 SU10/L3 Test Transect 1 Test Transect 2	Moderate local significance	Direct Lobs Hole Ravine Road Upgrade Other	Partial *Not all of SU would be impacted*	Partial loss of value

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Consequence of harm
SU11	AHIMS 56-6-0041 AHIMS 56-6-0047 SU11/L1 SU11/L2 SU11/L3 Test Transect 1 Test Transect 2 Test Transect 3	Low local significance	Direct Lobs Hole Ravine Road Upgrade Other	Partial *Not all of SU would be impacted*	Partial loss of value
SU12	AHIMS 56-6-0042 AHIMS 56-6-0046 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4 Test Transect 5 Test Transect 6 Test Transect 7 Test Transect 8	Moderate local significance	Direct Lobs Hole Ravine Road Upgrade	Partial *Not all of SU would be impacted*	Partial loss of value
SU13	SU13/L1 SU13/L2	Low local significance	Direct Lower Lobs Hole Ravine Road Upgrade	Partial *Not all of SU would be impacted*	Partial loss of value
SU14	Nil recorded	Low local significance	Nil	Nil	N/A
SU15	Nil recorded	Low local significance	Direct Accommodation camp	Partial *Not all of SU would be impacted*	Partial loss of value

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Consequence of harm
SU16	SU16/L1 SU16/L2 SU16/L3 SU16/L4	Low local significance	Direct Accommodation camp	Partial *Not all of SU would be impacted*	Partial loss of value
SU17	SU17/L1	Low local significance	nil	*nil*	N/A
SU18	SU18/L1	Low local significance	Direct Mine Trail Road Upgrade Rock emplacement Area	Partial *Not all of SU would be impacted*	Partial loss of value
SU19	Nil recorded	Low local significance	Direct Construction Pad	Partial *Not all of SU would be impacted*	Partial loss of value
SU20	SU20/L1 SU20/L2 SU20/L3 SU20/L4 SU20/L5 SU20/L6 SU20/L7 SU20/L8 SU20/L9 SU20/L10 SU20/L12 SU20/L12	Low local significance	Nil	Nil	N/A
SU21	Nil recorded	Low local significance	Direct Lobs Hole Ravine Road upgrade	Partial *Not all of SU would be impacted*	Partial loss of value

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Consequence of harm
SU22	SU22/L1 SU22/L2 SU22/L3	Low local significance	Direct Lower Lobs Hole Ravine Road Upgrade	Partial *Not all of SU would be impacted*	Partial loss of value
SU23	SU23/L1 SU23/L2 SU23/L3	Low local significance	Direct Middle Bay Wharf Access Wharf laydown	Partial *Not all of SU would be impacted*	Partial loss of value
SU24	SU24/L1	Low local significance	Direct Lower Lobs Hole Ravine Road Upgrade	Partial *Not all of SU would be impacted*	Partial loss of value
SU25	AHIMS 56-6-0038 AHIMS 56-6-0039 AHIMS 56-6-0040	Low local significance	Direct Lobs Hole Ravine Road Upgrade Laydown	Partial *Not all of SU would be impacted*	Partial loss of value
SU26	Nil recorded	Low local significance	Direct Talbingo access	Partial *Not all of SU would be impacted*	Partial loss of value
SU27	Nil recorded	Low local significance	nil	nil	N/A

9. MANAGEMENT AND MITIGATION

9.1 Management and Mitigation Strategies

Further Investigation

Depending on the scale of impacts in certain Survey Units (SUs 2, 6 & 7), some further field inspection may be required after vegetation clearance in order to get access and conduct some investigative works which were not able to be satisfactorily undertaken at this time due to thick undergrowth, blackberry thickets etc.

These further investigations would be developed during the construction of a Cultural Heritage Management Plan.

Conservation

Avoidance of impacts (conservation) is a suitable management option in any situation, however, it is not always feasible to achieve. Such a strategy is generally adopted in relation to sites which are assessed to be of high cultural and scientific significance but can be adopted in relation to any site type.

In the case at hand, the development of a conservation strategy is not relevant or warranted in respect of the Aboriginal object locales. However, impacts to ground surfaces should be kept to an absolute minimum.

As noted previously, a riparian exclusion zone adjacent to the Yarrangobilly River measuring 50 m wide will result in a conservation outcome in these areas.

Mitigated Impacts

Mitigated impact usually takes the form of partial impacts only (i.e. conservation of part of an Aboriginal site or Survey Unit) and/or salvage in the form of further research and archaeological analysis prior to impacts. Such a management strategy is generally appropriate when Aboriginal objects are assessed to be of moderate or high significance to the scientific and/or Aboriginal community and when avoidance of impacts and hence full conservation is not feasible. Salvage can include the surface collection or subsurface excavation of Aboriginal objects and subsequent research and analysis.

In the case at hand, mitigated impact in the form of salvage excavations is considered warranted in respect of some Survey Units which are assessed to be of higher significance values (see Table 21).

A program of salvage excavation is proposed in landforms of higher archaeological value where impacts are proposed. The scale and nature of the salvage program

would be determined in consultation with the proponent, Aboriginal community and OEH during the development of the Cultural Heritage Management Plan.

Unmitigated Impacts

Unmitigated impact (harm without salvage) to Aboriginal objects can be given consideration when they are assessed to be of low archaeological and cultural significance and otherwise in situations where conservation or limiting the extent of impacts is simply not feasible.

Most Aboriginal object sites identified in the subject area have been assessed to be of low or low/moderate archaeological significance. Given the nature of these, and the proposed impacts, unmitigated impacts would be appropriate. However, see above (Conservation).

Monitoring

Monitoring during construction for the purposes of identifying cultural material that may be uncovered during earth disturbance can be implemented as a management strategy. However, monitoring is a reactive rather than proactive strategy, and as such, is not an ideal management tool in cultural heritage management. Monitoring for artefacts is not a widely accepted method of management because sites of significance can be destroyed as monitoring is taking place and because it can result in lengthy and costly delays to development works if significant cultural material is uncovered. In the case at hand, the development of a monitoring strategy may be warranted for some areas which have been unable to be adequately assessed at this time due to thick vegetation prohibiting access to certain areas. A program for these works would be addressed within the Cultural Heritage Management Plan and would need to be undertaken well is advance of the constructions.

In the Table 21, management and mitigation measures are discussed in respect of each Survey Unit.

Table 21 Recommended management and mitigation strategies.

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Management and mitigation
SU1	Nil recorded	-	Direct Construction Pad Mine Trail Road Extension	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU2	Nil recorded	Potentially moderate local significance	Direct Construction Pad Mine Trail Road Extension	Partial *Not all of SU would be impacted*	Monitoring after vegetation clearance and salvage excavation
SU3	AHIMS 56-6-0009 SU3/L1 SU3/L2 SU3/L3 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4	Low/moderate local significance	Direct Mine Trail Road Upgrade	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU4	AHIMS 56-6-0045 SU4/L1 SU4/L2	Low local significance	Direct Mine Trail Road Upgrade Excavated material stockpile	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU5	SU5/L1 SU5/L2 Test Transect 1 Test Transect 2 Test Transect 3	Moderate local significance	Direct Excavated material stockpile	Partial *Not all of SU would be impacted*	Nil required; Impacts minimal

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Management and mitigation
	Test Transect 4 Test Transect 5				
SU6	SU6/L1 SU6/L2 SU6/L3 SU6/L4 Test Transect 1 Test Transect 2	Moderate local significance	Direct Excavated material stockpile	Partial *Not all of SU would be impacted*	Monitoring after vegetation clearance and salvage excavation
SU7	Nil recorded	Potentially moderate local significance	Direct Excavated material stockpile Other	Partial *Not all of SU would be impacted*	Monitoring after vegetation clearance and salvage excavation
SU8	AHIMS 56-6-0043 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4	Low local significance	Direct Excavated material stockpile	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU9	Nil recorded	Low local significance	Direct Excavated material stockpile	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU10	SU10/L1 SU10/L2 SU10/L3 Test Transect 1 Test Transect 2	Moderate local significance	Direct Lobs Hole Ravine Road Upgrade Other	Partial *Not all of SU would be impacted*	Salvage excavation

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Management and mitigation
SU11	AHIMS 56-6-0041 AHIMS 56-6-0047 SU11/L1 SU11/L2 SU11/L3 Test Transect 1 Test Transect 2 Test Transect 3	Low local significance	Direct Lobs Hole Ravine Road Upgrade Other	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU12	AHIMS 56-6-0042 AHIMS 56-6-0046 Test Transect 1 Test Transect 2 Test Transect 3 Test Transect 4 Test Transect 5 Test Transect 6 Test Transect 7 Test Transect 8	Moderate local significance	Direct Lobs Hole Ravine Road Upgrade	Partial *Not all of SU would be impacted*	Depending on the extent of impacts, salvage excavations may be appropriate
SU13	SU13/L1 SU13/L2	Low local significance	Direct Lower Lobs Hole Ravine Road Upgrade	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU14	Nil recorded	Low local significance	Nil	Nil	N/A
SU15	Nil recorded	Low local significance	Direct Accommodation camp	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Management and mitigation
SU16	SU16/L1 SU16/L2 SU16/L3 SU16/L4	Low local significance	Direct Accommodation camp	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU17	SU17/L1	Low local significance	nil	nil	N/A
SU18	SU18/L1	Low local significance	Direct Mine Trail Road Upgrade Rock emplacement Area	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU19	Nil recorded	Low local significance	Direct Construction Pad	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU20	SU20/L1 SU20/L2 SU20/L3 SU20/L4 SU20/L5 SU20/L6 SU20/L7 SU20/L8 SU20/L9 SU20/L10 SU20/L12 SU20/L12	Low local significance	Nil	Nil	N/A

ID	Aboriginal Objects	Significance	Type of harm	Degree of harm	Management and mitigation
SU21	Nil recorded	Low local significance	Direct Lobs Hole Ravine Road upgrade	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU22	SU22/L1 SU22/L2 SU22/L3	Low local significance	Direct Lower Lobs Hole Ravine Road Upgrade	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU23	SU23/L1 SU23/L2 SU23/L3	Low local significance	Direct Middle Bay Wharf Access Wharf laydown	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU24	SU24/L1	Low local significance	Direct Lower Lobs Hole Ravine Road Upgrade	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU25	AHIMS 56-6-0038 AHIMS 56-6-0039 AHIMS 56-6-0040	Low local significance	Direct Lobs Hole Ravine Road Upgrade Laydown	Partial *Not all of SU would be impacted*	Salvage excavation
SU26	Nil recorded	Low local significance	Direct Talbingo access	Partial *Not all of SU would be impacted*	Unmitigated impact: Avoidance or salvage not required
SU27	Nil recorded	Low local significance	nil	nil	N/A

10. CONCLUSIONS AND RECOMMENDATIONS

The recommendations are made on the basis of:

- A consideration of the relevant legislation (see Section 8 Statutory Information).
- The results of the investigation as documented in this report.
- Consideration of the type and scale of impacts proposed.

The following conclusions and recommendations are made:

- The land in which impacts would occur is highly disturbed by previous land use and/or natural geomorphological processes.
- The Aboriginal artefact distribution in the project area does not surpass significance thresholds which would act to preclude the proposed impacts.
- Most of the artefact distribution is assessed to be representative of a very low or low density stone artefacts in their respective Survey Units. However, several Survey Units have been found to contain relatively high densities. These are correspondingly of higher significance and value. Accordingly, management and mitigation of impacts comprises a tiered approach appropriate for each Survey Unit and includes measures such as conservation and salvage. In the majority of Survey Units, no mitigation measures are required.
- Management and mitigation strategies are outlined and discussed in Section 9 of this report and should be given consideration by all stakeholders. These would form the basis for the development of an Aboriginal Cultural Heritage Management Plan.

  It is recommended that salvage excavations are conducted in five Survey Units in order to mitigate impacts to the archaeological resource in the project area. Impact mitigation is not recommended for the remainder of Survey Units (N = 22).
- The proponent should develop a Cultural Heritage Management Plan (CHMP) for the appropriate management and mitigation of development impacts during any further planning and project construction for Exploratory Works. The development of an CHMP should be undertaken in consultation with the project archaeologist, the Registered Aboriginal Parties and the NSW Office of Environment and Heritage.

  The CHMP would be prepared to guide the process for management and mitigation of impacts to Aboriginal cultural heritage and to set out procedures relating to the conduct of additional archaeological assessment, if required, and

the management of any further Aboriginal cultural heritage values which may be identified.

A summary of the heritage management and mitigation measures for Exploratory Works is provided in Table 22.

Table 22 Summary of mitigation measures.

Impacts/risks	Reference #	Measures
Impact to known and unknown heritage sites and items	HER01	A Cultural Heritage Management Plan (CHMP) will be prepared and implemented to guide the process for management and mitigation of impacts to Aboriginal cultural and historic heritage. The CHMP will: o be prepared in consultation with RAPs and OEH; o include procedures relating to the conduct of additional archaeological assessment including monitoring after clearance, if required; o set out guidelines for the management of movable heritage located anywhere in or near the project areas, to ensure that it is not inadvertently impacted or removed; and o include an unexpected finds protocol for Aboriginal and European objects and sites, including reference to the management of the unknown locations of unmarked graves at Lobs Hole.
Loss of Aboriginal cultural heritage	HER02	Specific management and mitigation measures are listed for each individual heritage item in Table 21 of this report and will be included in the CHMP. Aboriginal cultural heritage management measures to be included in the CHMP are: o impacts to ground surfaces should be kept to an absolute minimum; o for Survey Units which are assessed to be of higher significance values mitigated impacts in the form of partial impacts only (ie conservation of part of an Aboriginal site or Survey Unit) and/or salvage in the form of further research and archaeological analysis prior to impacts; o salvage excavations in five Survey Units in order to mitigate impacts to the archaeological resource in the project area; and o the CHMP is to include management measures of any further Aboriginal cultural heritage values which may be identified during construction.

Impacts/risks	Reference #	Measures
*Loss of historic heritage	HER03	Salvage and/or archival recording of potential and known heritage items to be removed in the Lobs Hole Ravine area.
	HER04	Specific management and mitigation measures are listed for each individual heritage item in Table 19 of Appendix P and will be included in the CHMP. A series of management recommendations are presented. In some instances, no impact mitigation is required. For others a range of measures are recommended ranging from salvage of movable heritage to salvage excavation. In particular and where possible, further avoidance is recommended for the Ravine cemetery.
	HER05	A comprehensive research project on the history and heritage of the area will be undertaken to fill in the gaps in the existing history of settlement and mining and the archival recording of heritage items in the Lobs Hole Ravine area.

*Note – Mitigation measures for loss of historic heritage (HER03, HER04 and HER05) are detailed further in the Historic Cultural Heritage Assessment Report (Appendix P of the EIS).

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APPENDIX 1 GLOSSARY

Aboriginal object - A statutory term, meaning: '… any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains' (s.5 NPW Act).

Declared Aboriginal place - A statutory term, meaning any place declared to be an Aboriginal place (under s.84 of the NPW Act) by the Minister administering the NPW Act, by order published in the NSW Government Gazette, because the Minister is of the opinion that the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal objects.

Project area - Area proposed to be impacted as part of a specified activity or development proposal.

Harm - A statutory term meaning '… any act or omission that destroys, defaces, damages an object or place or, in relation to an object – moves the object from the land on which it had been situated' (s.5 NPW Act).

Place - An area of cultural value to Aboriginal people in the area (whether or not it is an Aboriginal place declared under s.84 of the Act).

Proponent - A person proposing an activity that may harm Aboriginal objects or declared Aboriginal places and who may apply for an AHIP under the NPW Act.

Proposed activity - The activity or works being proposed. In this instance the proposed activity is the Exploratory Works program.

APPENDIX 2 AHIMS SITE SEARCH #281524

Office of Environment & Heritage
NSW GOVERNMENT

AHIMS Web Services (AWS)
Extensive search - Site list report

Your Ref/PO Number : SH 2.0 16-05-17
Client Service ID : 281524

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
56-6-0041	KNP91-21;Ravine;	AGD	55	625700	6038650	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	L Brass					Permits		
56-6-0042	KNP91-22;Ravine;	AGD	55	625700	6038750	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	L Brass					Permits		
56-6-0043	KNP91-23;Ravine;	AGD	55	626400	6038500	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	L Brass					Permits		
56-6-0045	KNP91-60;	AGD	55	626600	6038000	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	N Baczocha,J Johnson					Permits		
56-6-0046	KNP91-61;	AGD	55	625670	6038700	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	Trish Thams					Permits		
56-6-0048	KNP91-63;	AGD	55	625900	6038400	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	N Baczocha					Permits		
57-6-0323	Kiandra Plain;	AGD	55	634600	6039000	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Mr.S.J Reilly					Permits		
56-6-0009	Ravine;Lob's Hole;KNP91-59;	AGD	55	627600	6037900	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	M Collins,A Waghorn,T Campbell					Permits		
56-6-0047	KNP91-62;	AGD	55	625800	6038750	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	N Baczocha					Permits		

Report generated by AHIMS Web Service on 16/05/2017 for Julie Dibden for the following area at Datum :GDA, Zone : 55, Eastings : 621000 - 635000, Northings : 6035000 - 6043000 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 9

APPENDIX 3 AHIMS SITE SEARCH #335511

Office of Environment & Heritage NSW

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Ravine Road Sth
Client Service ID : 335511

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
56-6-0039	KNP91-19;Ravine;	AGD	55	626900	6031800	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	L Brass					Permits		
56-6-0040	KNP91-20;Ravine;	AGD	55	627100	6031800	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	L Brass					Permits		
56-6-0130	MS-ST-1	AGD	55	631360	6027240	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	Recorders	Central West Archaeological and Heritage Services Pty Ltd					Permits		
56-6-0038	KNP91-18;Ravine;	AGD	55	627100	6031700	Open site	Valid	Artefact : -	Open Camp Site	1962
	Contact	Recorders	L Brass					Permits		

Report generated by AHIMS Web Service on 24/03/2018 for Julie Dibden for the following area at Datum :GDA, Zone : 55, Eastings : 621000 - 635000, Northings : 6026000 - 6036000 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 4

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 omission made on the information and consequences of such acts or omission.

Page 1 of 1

APPENDIX 4 AHIMS SITE SEARCH #335512

Office of Environment & Heritage NSW

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Talbingo
Client Service ID : 335512

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
56-6-0110	JP-OS-2/A	AGD	55	615090	6060720	Open site	Valid	Artefact : -		97490
Contact	Recorders	Mr.Terry Howard						Permits		
56-6-0111	JP-OS-3/A	AGD	55	615070	6060840	Open site	Valid	Artefact : -		97490
Contact	Recorders	Mr.Terry Howard						Permits		
56-6-0112	JP-OS-4/A	AGD	55	615080	6061070	Open site	Valid	Artefact : -		97490
Contact	Recorders	Mr.Terry Howard						Permits		
56-6-0113	JP-OS-5/A	AGD	55	615060	6061250	Open site	Valid	Artefact : -		97490
Contact	Recorders	Mr.Terry Howard						Permits		
56-6-0114	JP-OS-7/A	AGD	55	615060	6061670	Open site	Valid	Artefact : -		97490
Contact	Recorders	Mr.Terry Howard						Permits		
56-6-0116	JP-OS-6/A	AGD	55	615060	6061540	Open site	Valid	Artefact : -		97490
Contact	Recorders	Mr.Terry Howard						Permits		
56-6-0070	JP- IF-1	AGD	55	615070	6060450	Open site	Destroyed	Artefact : -		97490
Contact	Recorders	Mrs.Robynne Mills						Permits	1293,1480	
56-6-0071	JP-0S-1	AGD	55	614950	6060670	Open site	Destroyed	Artefact : -		97490
Contact	Recorders	Mrs.Robynne Mills						Permits	1293,1480	
56-6-0072	JP-OS-2	AGD	55	615180	6060690	Open site	Destroyed	Artefact : -		97490
Contact	Recorders	Mrs.Robynne Mills						Permits	1293,1480	
56-6-0073	JP-OS-3	AGD	55	615060	6060870	Open site	Destroyed	Artefact : -		97490
Contact	Recorders	Mrs.Robynne Mills						Permits	1293,1480	
56-6-0074	JP-OS-4	AGD	55	615070	6061080	Open site	Destroyed	Artefact : -		97490
Contact	Recorders	Mrs.Robynne Mills						Permits	1293,1480	
56-6-0075	JP-OS-5	AGD	55	615050	6061350	Open site	Destroyed	Artefact : -		97490
Contact	Recorders	Mrs.Robynne Mills						Permits	1293,1480	
56-6-0077	JP-OS-6	AGD	55	615050	6061490	Open site	Destroyed	Artefact : -		97490
Contact	Recorders	Mrs.Robynne Mills						Permits	1293,1480	
56-6-0079	JP-SO-7	AGD	55	615020	6061570	Open site	Destroyed	Artefact : -		97490
Contact	Recorders	Mrs.Robynne Mills						Permits	1293,1480	
56-6-0108	JP-IF-1/A	AGD	55	615040	6060450	Open site	Valid	Artefact : 1		97490
Contact	Recorders	Mr.Terry Howard						Permits		
56-6-0109	JP-OS-1/A	AGD	55	615030	6060530	Open site	Valid	Artefact : -		97490
Contact	Recorders	Mr.Terry Howard						Permits		

Report generated by AHIMS Web Service on 24/03/2018 for Julie Dibden for the following area at Datum :GDA, Zone : 55, Eastings : 615000 - 619000, Northings : 6052000 - 6062000 with a Buffer of 50 meters. Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 16

APPENDIX 5 CONSULTATION DOCUMENTS

First letter of Agency/Group notification

New South Wales Archaeology Pty Limited ABN 53106044366

PO Box 2135
Central Tilba NSW 2546
Ph 02 44737947
www.nswarchaeology.com.au

31 July 2017

Jackie Taylor
Team Leader Aboriginal Heritage - South East
Regional Operations Group (South Branch)
Office of Environment and Heritage
PO Box 733
Queanbeyan NSW 2620

Dear Jackie

Re Snowy Hydro 2.0

Snowy Hydro Limited proposes the potential expansion of the Snowy Scheme's pumped hydro storage capability in Kosciuszko National Park. The Snowy Hydro 2.0 project would entail investigations and the construction of an underground tunnel and power station between Tantangara and Talbingo Dams. In relation to this proposal, NSW Archaeology Pty Ltd would undertake consultation with Aboriginal people on behalf of the proponent. This would be conducted in accordance with the requirements stipulated in the former NSW DECCW *Aboriginal cultural heritage consultation requirements for proponents, 2010***.** The purpose of Aboriginal community consultation is to assist the proponent in understanding Aboriginal peoples views and concerns about the project, and to understand cultural values present in the area, and to assist the NSW Office of Environment and Heritage (OEH) in a determination of an AHIP application, if required, or otherwise, general terms of approval.

We are seeking to identify Aboriginal persons who hold cultural knowledge relevant to this project area and who may wish to register an interest. Those who choose to register will have the opportunity to provide culturally appropriate information and to comment on the cultural heritage significance of Aboriginal objects and the area. If you are aware of Aboriginal people or groups who you

believe may wish to register an interest please provide contact details to NSW Archaeology Pty Ltd on behalf of the proponent before the 14 August 2017.

Yours faithfully

Dr Julie Dibden
New South Wales Archaeology Pty Limited

Second letter of notification

New South Wales Archaeology Pty Limited ABN 53106044366

PO Box 2135
Central Tilba NSW 2546
Ph 02 44737947
Mob. 0427074901
www.nswarchaeology.com.au

3 August 2017
Alice Williams
3 Goonda St
Cooma NSW 2630

Dear Alice

Re Snowy Hydro 2.0

Snowy Hydro Limited (Charlie Litchfield C/- Snowy Hydro Limited - PO Box 332 Cooma NSW 2630) proposes the potential expansion of the Snowy Scheme's pumped hydro storage capability in Kosciuszko National Park. The Snowy Hydro 2.0 project would entail investigations and the construction of an underground tunnel and power station between Tantangara and Talbingo Dams. In relation to this proposal, NSW Archaeology Pty Ltd is undertaking consultation with Aboriginal people on behalf of the proponent according to the requirements stipulated in the former NSW DECCW Aboriginal cultural heritage consultation requirements for proponents, 2010. The purpose of Aboriginal community consultation is to assist the proponent in understanding Aboriginal peoples views and concerns about the project, to understand cultural values present in the area, and to assist the NSW Office of Environment and Heritage (OEH) in the determination of an AHIP application, if required, or otherwise, general terms of approval.

Aboriginal people with cultural knowledge relevant to determining the significance of Aboriginal objects and/or places in the area are invited to register an interest in the process of community consultation. OEH provided your details to us and indicated that you may have an interest in the area. If you wish to register in a process of community consultation with the proponent please notify**:** Julie Dibden, NSW Archaeology PL, PO Box 2135 Central Tilba NSW 2546, before 17 August 2017. Please note that if you do register an interest your details will be forwarded to the OEH and the relevant Local Aboriginal Land Councils unless you specify that you do not want your details released.

Yours faithfully

Dr Julie Dibden
New South Wales Archaeology Pty Limited

Paper Advertisements

Monaro Post

Please send your application to:
Attention: Peter Gordon, Independent Chair
Granite Hills Wind Farm CCC - Expression of Interest
at peter.gordon@charterpoint.com.au or
PO Box 5519
Kingston ACT 2604

Expressions of interest close on 26th of August 2017.

Please note:
- *Membership of the CCC is on a voluntary basis*
- *Membership of the CCC will be approved by the NSW Department of Planning & Environment*
- *Application forms can be found on the project's website: www.granite-hillswindfarm.com.au*

Snowy Hydro Limited proposes the potential expansion of the Snowy Scheme's pumped hydro storage capability in Kosciuszko National Park. The Snowy Hydro 2.0 project would entail investigations and the construction of an underground tunnel and power station between Tantangara and Talbingo Dams. An Aboriginal Heritage Impact Permit or other approvals may be required in respect of Aboriginal objects. Aboriginal people with cultural knowledge relevant to determining the significance of Aboriginal objects and/or places in the area are invited to register an interest in the process of community consultation. The purpose of consultation is to assist the applicant in the preparation of an application for an AHIP and to assist the Director General of NSW OEH or the NSW Department of Planning and Environment in its consideration and determination. Please register in writing to: Julie Dibden, NSW Archaeology PL, PO Box 2135 Central Tilba NSW 2546, before 18 August 2017.

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At MAX, we value diversity - in the backgrounds, ideas, work styles and perspectives of our team. We are an equal Opportunity Employer and strongly encourage people with a disability, Aboriginal & Torres Strait Islander people, mature aged workers and people from culturally diverse backgrounds to apply.
Next steps
If you require an adjustment to the recruitment process for reasons of equal opportunity, please call a member of our Recruitment Team on 07 3727 1306 or email your application to:
max.recruit@maxsolutions.com.au with Cooma in the subject heading.

FUNERAL AND DEATH NOTICES, RETURN THANKS AND IN MEMORIAMS

If you wish to publish a Funeral, Death, Return Thank you or Memoriam notice, Please contact The Monaro Post on 6452 0313, email sales@monaropost.com.au or through our website contact page. Notices will be published in the weekly paper, on Facebook and our website. www.monaropost.com.au

RICHTER, Myrna Fay

Passed away peacefully on Sunday, July 30th 2017 at Her residence, formerly of Station St, Cann River. Aged 72 years.

The relatives and friends of the late MYRNA FAY RICHTER are invited to attend her funeral service to be held in the St John's Evangelist Church, Cann River, on Saturday August 5th 2017 commencing at 11:00 am. At the conclusion of the service, the cortege will proceed to Cann River Cemetery.

Allans Funerals Cooma
Alan Dodd Director
Family Owned & Operated
FDA 02-64522094

THORP, Stephen Alexander

Passed away on Saturday, 22nd of July 2017 at Residence, formerly of Florance St, Berridale. Aged 45 years.

Dearly loved father of EMMA, JAMES, CONNOR AND ERIN. Dearly Loved Son Of Iarline and Philip And Brother to Andrew

The relatives and friends of the late STEPHEN ALEXANDER THORP are invited to attend his funeral service to be held in the Trinity Lutheran Church, Cooma, on Thursday August 3rd 2017 commencing at 11:00 am. At the conclusion of the service, the cortege will proceed to Adaminaby General Cemetery.

Allans Funerals Cooma
Alan Dodd Director
Family Owned & Operated
FDA 02-64522094

DAVEY, John Charles

Passed away peacefully on Saturday, July 29th 2017 at Sir William Hudson Memorial Centre, Cooma, formerly of Sir William Hudson St, Cooma. Aged 79 years.

Dearly loved husband of Monica, father of Tony, Sue, Jacqui and Greg. Father-in-law to Cate, Guy, Avi and Felicity. Adored Pa to his grandchildren

The relatives and friends of the late JOHN CHARLES DAVEY are invited to attend his funeral service to be held in the St Patrick's Catholic Church, Cooma, on Friday August 4th 2017 commencing at 11:00 am. At the conclusion of the service, the cortege will proceed to Cooma Lawn Cemetery.

Allans Funerals Cooma
Alan Dodd Director
Family Owned & Operated
FDA 02-64522094

Wednesday August 2, 2017

Tumut and Adelong Times

FRIDAY, AUGUST 4, 2017
TUMUT & ADELONG TIMES 17

Position Vacant

cvgt australia

RETAIL ASSISTANT

Our client has a position available for a Retail Assistant in the hardware industry based in Tumut. The position is full time 38 hours per week but may include some Saturdays if and when required.

We are seeking applications for people with previous Retail experience, good customer service skills, able to work as part of a team and have the ability to work unsupervised after a period of time.

A current drivers' is essential.

Forklift ticket would be an advantage.

To apply please forward a hand written application to:
Fran Davey at CVGT Recruitment
37 Wynyard Street, Tumut, NSW, 2720
by COB Monday, August 7, 2017,
along with your resume with names and contact details for two work related referees.

Public Notices

South West PEST Control
(Est. 1977)
SCOTT PLATT
Personally servicing the Tumut region for over 15 years
Phone 0412 050 573
PO Box 779, Tumut 2720

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Public Notices

ROOFING
SJ Moore Plumbing & Roofing
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Phone Sam 0412 925 563

Seeking information on my Great Grandfather
MICHAEL EGAN
Born 01.12.1863 – Died 07.07.1936
His children
William, Julie, Ann, Mary,
Pauline, Margaret, Aileen
If you have any information please contact
Michael Livsey,
PO Box 3227, Wareemba, NSW, 2046
or email mikelivsey29@gmail.com

TUMUT RSL SUB-BRANCH
V.P. AND VIETNAM VETERANS DAY
Saturday, August 12
at 11am
at the Cenotaph
(Richmond Park)
Wreath-Laying and Commemoration Service

PUBLIC NOTICE

Snowy Hydro Limited proposes the potential expansion of the Snowy Scheme's pumped hydro storage capability in Kosciuszko National Park.

The Snowy Hydro 2.0 project would entail investigations and the construction of an underground tunnel and power station between Tantangara and Talbingo Dams.

An Aboriginal Heritage Impact Permit or other approvals may be required in respect of Aboriginal objects. Aboriginal people with cultural knowledge relevant to determining the significance of Aboriginal objects and/or places in the area are invited to register an interest in the process of community consultation.

The purpose of consultation is to assist the applicant in the preparation of an application for an AHIP and to assist the Director General of NSW OEH or the NSW Department of Planning and Environment in its consideration and determination.

Please register in writing to:
Julie Dibden,
NSW Archaeology PL,
PO Box 2135 Central Tiba NSW 2546,
before Friday, August 18, 2017.

Government cuts red tape for funding program

COMMUNITY organisations in the Wagga Wagga electorate will have more opportunities to apply for funding of local projects as part of changes to the NSW Government's Infrastructure Grants, Member for Wagga Wagga, Daryl Maguire MP said.

Mr Maguire said the changes will make it easier to apply for a wide range of Infrastructure Grants across arts and culture, emergency preparedness and sport and recreation.

"The NSW Government is giving more communities the opportunity to access the funding more often," Mr Maguire said.

"The new funding guidelines will mean the NSW Government can fund a wider range of projects. A simpler application process will cut red tape and allow for faster assessment.

"I encourage our local community organisations to learn more about the new guidelines and consider applying for grants, with the first new funding round opening on August 1."

Instead of one round of funding each year for grants up to $1 million, there will now be four rounds. New funding ranges are $50,000 to $200,000 for arts and culture, $10,000 to $200,000 for emergency preparedness and $100,000 to $300,000 for sport and recreation.

Mr Maguire said the Infrastructure Grants program has supported some great projects across NSW including local sports ground facilities, public swimming pools, children's play areas, museums, art galleries, back-up power generators and accommodation for volunteers and the community.

Minister for Racing Paul Toole said Infrastructure Grants can make a real difference to communities, bringing together people to enjoy new or improved sports, recreation, arts and cultural facilities, or help improve community safety in times of emergency.

"During this term of government, $50 million from the program is being provided to communities across NSW," Mr Toole said.

Public Notices

Tumut Property Management
Louise McAlister
Property Management Specialist
Licenced Real Estate Agent
M: 0436 382 817
E: louise@tumutpm.com.au
W: tumutpropertymanagement.com.au
PO Box 588 Tumut NSW 2720
Licence: 20148896 :: ABN: 217 570 33 145

Snowy Valleys Council
NOMINATIONS NOW OPEN
The Snowy Valleys Council election will be held on Saturday 9 September 2017.
Nominations for Councillors are now open.
Nominations and Registrations close 12 noon, Wednesday 9 August 2017.
For info visit www.votensw.info/forcandidates

Real estate industry wants action on tribunal

A DECISION that could leave tenants and landlords with no remedy to disputes must be rectified immediately, according to the Real Estate Institute of New South Wales.

The legal loophole emerged after the Court of Appeal declared in February that the NSW Administrative and Civil Tribunal (NCAT), which handles disputes between tenants and landlords, has no jurisdiction if one party lives in another state.

REINSW President John Cunningham said the residential rental property market is crucial to our society and involves significant investment by a broad investor base.

"Inevitably there are disputes between parties which requires resolution. These disputes must have an efficient

Proposed project and consultation process document

PROJECT DESCRIPTION AND PROPOSED CULTURAL HERITAGE ASSESSMENT AND CONSULTATION PROCESS

THE PROPOSED ACTIVITY

NSW Archaeology Pty Ltd has been commissioned by Snowy Hydro Limited to conduct a formal process of Aboriginal Consultation in relation to the Snowy Hydro 2.0 project (the Project). The project area is within the Wagonga and Brungle-Tumut Local Aboriginal Land Council boundaries.

The Project would be an expansion of pumped hydro-electric storage in the existing Snowy Mountains Scheme. A feasibility study is currently being undertaken and once this is complete, the Board of Directors of Snowy Hydro will assess the outcomes of the study, including the technical and economic aspects, and decide on next steps.

If it goes ahead, the Project would entail the construction of an underground tunnel and underground power station between Tantangara and Talbingo Dams in Kosciusko National Park. No new dams would be built. The location of the project area is shown on the map included with this document.

Snowy 2.0 would make up to 2000 megawatts of renewable hydro energy available to the electricity market. To find out more, you can visit: http://www.snowyhydro.com.au/our-scheme/snowy20/.

Although the project is still within a preliminary planning phase, Snowy Hydro nevertheless wishes to commence a formal process of consultation with Aboriginal people in accordance with the requirements of the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (NSW DECCW).

As the Project develops more detailed information regarding the Project, the proposed impacts and impact locations will be made available to Registered Aboriginal Parties (RAPs).

Please review the following information which sets out the proposed cultural heritage and assessment process for your review, consideration and input.

PROPOSED CULTURAL HERITAGE ASSESSMENT PROCESS

This document is being provided to Registered Aboriginal Parties (RAPs) for the purposes of agreeing on outcomes relating to the assessment process.
The cultural heritage assessment process for this project would be conducted in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (NSW DECCW). The NSW Office of Environment and Heritage -

OEH (formally DECCW) manages Aboriginal cultural heritage in NSW in accordance with the National Parks and Wildlife Act 1974. Part 6 of the Act provides specific protection for Aboriginal objects and Aboriginal places by administering offences for harming them without authorisation. When an activity is likely to impact Aboriginal objects or declared Aboriginal Places, approval of the OEH is required, issued in the form of an Aboriginal Heritage Impact Permit (AHIP) or where relevant, General Terms of Approval.

NSW OEH requires effective consultation with Aboriginal people because it recognises that:

- Aboriginal people should have the right to maintain culture, language, knowledge and identity;
- Aboriginal people should have the right to directly participate in matters that may affect their heritage; and
- Aboriginal people are the primary determinants of the cultural significance of their heritage.

The purpose of the NSW OEH Aboriginal Cultural Heritage Consultation Requirements for Proponents document (NSW DECCW 2010) is to facilitate positive Aboriginal cultural heritage outcomes by:

- affording an opportunity for Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) in the proposed project area to be involved in consultation so that information about cultural significance can be provided to NSW OEH to inform decisions regarding applications for an AHIP or General Terms of Approval; and
- providing Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) in the proposed project area with the opportunity to participate in decision-making regarding the management of their cultural heritage by providing proponents with information regarding cultural significance and inputting into management options (NSW DECCW 2010).

The ACHCRP requirements outline four main consultation stages to be implemented during consultation undertaken with Aboriginal people (these are outlined below). In summary, the consultation process involves getting the views of, and information from, Aboriginal people and reporting these.

To fulfil the consultation requirements, NSW Archaeology Pty Ltd, on behalf of the proponent, proposes to implement the following procedure:

Stage 1 Notification of project proposal and registration of interest.

This stage is already underway, and the aim is 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 proposal area.

- NSW Archaeology, on behalf of the proponent, has sought to identify the names of Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places. An advertisement has been placed in the local paper and letters have been written to various agencies.

- As we receive registrations of interest, NSW Archaeology is making a record of the names of each Aboriginal person or group who has registered an interest. Unless it is specified by a registered Aboriginal party that they do not want their names released, the list of names will be provided to OEH and the Local Aboriginal Land Councils.

- Where an Aboriginal organization representing Aboriginal people who hold cultural knowledge has registered an interest, a contact person for that organization must be nominated. We rely on that organization to make these arrangements. Where Aboriginal cultural knowledge holders have appointed a representative to act on their behalf, this information must be provided in writing to NSW Archaeology Pty Ltd.

Stage 2 Presentation of information about the proposed project
The aim of this stage is to provide registered Aboriginal parties with information about the scope of the proposed project and the proposed cultural heritage assessment process. This will entail:

- The proponent has engaged NSW Archaeology Pty Ltd to conduct the consultation process. It is therefore the role of Julie Dibden, NSW Archaeology Pty Ltd, to co-ordinate the assessment process. Aboriginal parties are invited to define their role, function and responsibility in this process.
- All registered Aboriginal parties are invited to identify, raise and discuss any cultural concerns, perspectives and assessment requirements (if any). In this regard registered Aboriginal parties should contact Julie Dibden, and this may be done in writing or by telephone.
- Provision of project information and the proposed cultural heritage process is provided to registered Aboriginal parties as per this document and the accompanying *Methodology* document.
- If further information is required regarding the proposal this will be provided to Aboriginal parties upon request. If necessary, additional information about the project may entail a project site visit.
- A record will be made that the proposed project information has been submitted. A record of any agreed outcomes and any contentious issues that

may require further discussion to establish mutual resolution (if applicable) will be kept and a record will be provided to registered Aboriginal parties.
- All comments and feedback regarding the Consultation Process and Project Methodology should be provided to NSW Archaeology within 28 days.

Stage 3 Gathering information about cultural significance
The aim of stage 3 is to facilitate a process whereby Aboriginal parties can contribute to culturally appropriate information gathering and the project methodology, provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposal area to be determined, and to have input into the development of cultural heritage management options.

- A proposed methodology for the cultural heritage assessment will be provided to registered Aboriginal parties for review. Any comments regarding the methodology should be provided to Julie Dibden, NSW Archaeology Pty Ltd, within 28 days. Any protocols that registered Aboriginal parties wish to be adopted into the information gathering process and assessment methodology, and any other matters, should be provided in writing or may be sought by the consultant.
- As a part of consultation, NSW Archaeology Pty Ltd, on behalf of the proponent, seeks cultural information from registered Aboriginal parties to identify whether there are any Aboriginal objects or places of cultural value to Aboriginal people in the proposal area and if so, to uncover knowledge about their context to reveal their meaning and significance. Registered Aboriginal parties who wish to contribute to this process should contact Julie Dibden (within 28 days) so that appropriate arrangements regarding collecting cultural knowledge can be made.
- If any information obtained is sensitive, appropriate protocols will be developed and implemented for sourcing and holding sensitive information.
- Registered Aboriginal parties are invited to identify, raise and discuss any cultural concerns, perspectives and assessment requirements by telephone or in writing to Julie Dibden, NSW Archaeology, within 28 days.
- All feedback received from registered Aboriginal parties will be documented in the Aboriginal cultural heritage assessment report as appropriate.

Stage 4 Review of Draft Cultural Heritage Assessment Report
The aim of this stage is to prepare and finalise an Aboriginal cultural heritage assessment report with input from registered Aboriginal parties.

- A draft report will be compiled.
- The draft report will be provided to registered Aboriginal parties for review and comment.
- Any comments regarding the report should be provided to Julie Dibden, NSW, within 28 days.

After considering comments the report will be finalised and copies will be provided to registered Aboriginal parties. The final report will include copies of any submissions made and the proponents response to any submissions.

Proposed methodology document

PROPOSED METHODOLOGY FOR THE INDIGENOUS HERITAGE (CULTURAL AND ARCHAEOLOGICAL) ASSESSMENT

NSW Archaeology Pty Ltd has been commissioned by Snowy Hydro Limited to conduct a formal process of Aboriginal Consultation in relation to the Snowy Hydro 2.0 project **(**the Project).

NSW Archaeology Pty Ltd is undertaking consultation with Aboriginal people on behalf of the proponent according to the requirements stipulated in the former NSW DECCW Aboriginal cultural heritage consultation requirements for proponents, 2010**.**

NSW Archaeology Pty Ltd is a consultancy specialising in Indigenous cultural heritage management and aims to prepare assessments of a high standard to satisfy all stakeholders including the local Aboriginal community and the NSW Office of Environment and Heritage – OEH.

The project will be conducted in accordance with the requirements of the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* and the *DECCW 2010 Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. In addition, the study is being undertaken following the requirements for *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP) (NSW DECCW 2010).

In accordance with the process as outlined in *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP) (NSW DECCW 2010), this methodology is being provided to all Aboriginal groups/individuals who have registered an interest in this process of consultation. The purpose of providing registered stakeholders with this methodology is for stakeholders to review and provide feedback to the consultant, including identification of issues/areas of cultural significance that might affect the methodology. Stakeholders are invited to make a written response to this proposed methodology within 28 days.

The methodology which is proposed to be implemented during this project is set out below.

It is proposed that the assessment of cultural heritage values of the project area will entail the following aspects as defined in the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*:
<u>*Review of background information*</u>: Definition and mapping of the physical landscape; reviewing historic values via recourse to written and oral histories and existing heritage data bases; and define the material evidence of Aboriginal land

use via review of previous research, development of predictive model and a field inspection and survey (the latter to be documented in a survey report). Any information received from registered Aboriginal parties will be used in this process. Registered Aboriginal parties are invited to inform Julie Dibden regarding areas, objects and places of cultural value in the proposed activity area.

Initiate ongoing consultation in accordance with the OEH's Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010. Information is sought from registered Aboriginal parties on whether there are any Aboriginal areas, objects or places of cultural value to Aboriginal people in the proposed activity area.

Identify and assess the cultural heritage values: Upon receipt of information that would enable the cultural significance of Aboriginal areas, objects and/or places in the proposed activity area to be determined, the range of social, historical, scientific and aesthetic values present across the study area would be identified, mapped, and assessed as to why they are important.

Assess harm of the proposed activity: Identification of the nature of the proposed activity and any potential harm to Aboriginal areas, objects and/or places. This would take into consideration the principles of ecologically sustainable development (ESD) if relevant.

Develop harm avoidance and/or minimisation strategies: Registered stakeholders would be invited to have input into the development of cultural heritage management options. The development of avoidance and/or minimisation strategies if required would commence in the field, and be developed further within an Aboriginal cultural heritage assessment report.

Documentation of Findings: An Aboriginal cultural heritage assessment report would be prepared. The report would be prepared in accordance with the report outline as set out in OEH's *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*.

A draft copy of the report will be provided to all Aboriginal groups or individuals who register an interest in this project for review and comment.

Upon review of this proposed methodology, registered stakeholders are invited to make submissions relating to the information gathering and assessment methodology, and any matters such as issues/areas of cultural significance that might affect, inform or refine the assessment methodology, to Julie Dibden within 28 days. All feedback received will be documented in the cultural heritage assessment report, which will include copies of submissions received and the proponent's response to issues raised.

Consultation correspondence

From: *Iris White [mailto:irisj.white@gmail.com]*
Sent: *Saturday, 5 August 2017 8:46 AM*
To: *Julie Dibden <julie@nswarchaeology.com.au>*
Subject: *Re: Snowy Hydro 2*

Hello Julie
The Ngarigo people insist we are actively involved in investigations in relation to this matter. We do not wish to simply be advised or consulted via electronic media.
Please contact me in the first instance by phone to discuss facilitation of meeting with our traditional owner group, as many people who have registered interest on Ngarigo country do not have traditional custodial rights to speak on our cultural heritage.
My phone number is 0499716999.
Kind regards
Iris

Sun 15/04/2018 11:27 AM

Hello Julie and thank you for your advice.

I am however compelled on behalf of the Sovereign Ngarigo People and with the greatest respect, could you please explain how you determined and identified our respective traditional boundaries without engaging with us?

Could you please provide that information to us at or before the Southern Kosciuszko MOU Committee meeting scheduled for 3-4 May along with a map clearly showing the those boundaries and where those cultural Assessments have been done and is being carried out.

Thank you.
Kindest regards
Iris White

APPENDIX 6 LITHIC DATABASE

The following attributes have been recorded:

Provenance - Each artefact is categorized according to its retrieval location as follows:

Survey Unit #: The excavation was conducted in Survey Units 3, 5, 6, 8, 10, 11 & 12.

Transect #: Each Test Transect is given an individual number; numbers are sequential and range from 1 to 28.

Square #: Each Test Square situated within an individual transect is given an individual number; numbers are sequential and range from 1 to 9. Where squares have been enlarged they have been named Sq. 1b, 1c and so on.

Spit #: Each Spit located within a Pit is given an individual number; numbers are sequential and range from 1 to 9. Spit 1 is closest to the ground surface; Spit 2 is below Spit 1 and so on.

Class - Classification of artefacts has been based on technical criteria. The following classes have been identified in the assemblage:

Flake: A sharp edged piece of stone detached from a core by the application of force. Flakes are characterised (and identified) by a number of features which may include a platform, bulb of percussion, a bulbar scar, ripple marks and fissures on the ventral surface and negative flake scars on the dorsal surface.

Flaked piece: A flaked piece is an artefact that exhibits features such as negative flake scars but does not have any other features that would allow differentiation between a flake, a retouched flake or core.

Flake Fragment: Pieces which are almost certainly flake portions, but which cannot be oriented in respect of its detachment from a core or location within a flake framework.

Core: Cores are pieces of rock from which flakes have been detached. Cores are characterised by negative flake scars where flakes have been detached.

Retouched artefact: An artefact which has had flakes removed subsequent to its original manufacture.

Pebble artefacts: Pebbles humanly modified by either flaking, pounding, pitting or grinding.

Raw material – The following raw materials were identified to be present in the assemblage:

Tuff: Tuff is an material that forms from the products of an explosive volcanic eruption, compaction and cementation into a rock.

Chert: A cryptocrystalline siliceous rock of organic or inorganic origin. Chert is isotropic and brittle. It is accordingly a highly favoured rock for artefact manufacture (Holdaway and Stern 2004).

Quartz: The mineral quartz is crystalline silica with a hardness value of 7 (Mohs's hardness scale). Given this property quartz flakes possess highly durable sharp edges (Holdaway and Stern 2004). However, given quartz possesses internal flaws and cleavage planes it typically flakes in an unpredictable manner.

Silcrete: This rock is formed by the impregnation of a sedimentary layer with silica; it consists of quartz grains in a matrix of either amorphous or fine-grained silica. The flaking qualities of silcrete are dependent of the size of the quartz grains (Holdaway and Stern 2004).

Quartzite**:** Quartzite is formed by the cementing together of siliceous grains through pressure or chemical processes.

Volcanic**:** Of igneous origin.

Chalcedony**:** A compact form of silica formed of quartz crystallites.

Portion

The following types of broken artefacts have been recorded:

Proximal: Broken flake which possesses a platform, PFA, bulb of percussion or bulbar scar.

Medial: Broken flake with identifiable ventral or dorsal surfaces but devoid of proximal or distal ends.

Distal: Broken flake which possesses a termination.

Cortex type

One cortex type was identified in the assemblage:

Pebble: A water worn surface indicative of an fluvial origin.

Artefact dimensions

Artefacts have been ascribed into size classes:
1 = 0-10mm; 2 = 11-20, and so on.

Artefact attributes

The following attributes were identified:

Initiation type – The type of primary fracture initiation including the following:

Hertzian: (conchoidal fracture) Formed when stone is struck by a hammer forming a ring crack; the ring crack forms a cone that bends backward towards the surface of the core (Holdaway and Stern 2004).

Bending: Formed when the angle between the platform and surface of the core is acute. Flakes do not possess clear ring cracks or well defined bulbs of percussion.

Bipolar**:** A bipolar flake is formed as a result of compression forces. Bipolar flakes often show signs of impact on opposing ends and have compression rings moving in two directions towards each other (Andrefsky 1998).

Wedging**:** Common in bipolar flaking.

Platform type

Two platform types are recorded as follows:

Broad: Platform measures more than twice the area of the ring crack.

Focal: Platform measures less than twice the area of ring crack.

Overhang removal

Small scars on the dorsal surface of a flake situated below the platform indicate the removal of a lip left from previous flake removals. This variable may indicate that precise control of flake removal was sought.

Termination type

Feather: Exhibits minimal thickness at the distal end and acute angle between ventral and dorsal surface.

Hinge: Forms when the fracture meets the surface of the core at c. 90º to the longitudinal axis of the flake.

Step: Forms when flake terminates abruptly in a right angle break.

Outrépassé (plunge): Forms when the fracture plane curves away from the face of the core removing the base of the core.

The following core types have been recorded:

Unidirectional core (single platform): cores with scars originating from a single platform.

Bifacial core: cores with single platform but with flakes detached from two faces.

Bidirectional: cores with two platforms one opposing ends.

Multiplatform: cores with more than three or more platforms.

Comments

Comments are made in regard to the following:

- specific descriptions of various attributes and features, and
- associations/relatedness between artefacts.

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU3	4	2	1	1	c	q	90		amorphous core, broken pebble, 3 scars from 1 face, 89 x 65 x 44mm
SU3	4	2	1	2	ff	t	4		arts #2 - #7 possibly related
SU3	4	2	1	3	ff	t	2		bending initiation, rotation vis on dorsal
SU3	4	2	1	4	fp	t	3		
SU3	4	2	1	5	f	t	2		
SU3	4	2	1	6	ff	t	3		
SU3	4	2	1	7	ff	t	2		
SU3	4	2	2	8	f	unc	6	p	focal plat, bending init. Pebble cortex
SU3	4	2	2	9	ff	t	5		
SU3	4	2	2	10	f	t	3		Art #8-10 possibly related to those above
SU3	4	2b	1	11	ff	q	2		grey trans quartz with bipolar features
SU3	4	2b	1	12	f	t	2		Hertzian feather
SU3	4	2b	1	13	ff	t	2		
SU3	4	3	4	14	f	s	2		
SU3	4	3	4	15	f	t	2		Hertzian
SU3	4	3	4	16	pos	unc	2		
SU3	4	4	1	17	fp	q	3		milky
SU3	4	4	2	18	f	t	4		Hertzian feather
SU3	4	4	2	19	ff	q	1		milky
SU3	4	4	4	20	f	t	2		very weathered
SU12	1	1	1	1	p	t	3		parallel arises, blade flake
SU12	1	1	1	2	fp	t	3		arts #1 - #26 related
SU12	1	1	1	3	f	t	3	p	Hertzian, rough cortex
SU12	1	1	1	4	ff	t	3		
SU12	1	1	1	5	f	t	3		parallel arises, blade flake
SU12	1	1	1	6	ff	t	3		
SU12	1	1	1	7	f	t	2		Hertzian, feather, focal
SU12	1	1	1	8	ff	t	2		
SU12	1	1	1	9	ff	t	3		
SU12	1	1	1	10	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	1	1	1	11	m	t	2		medial blade flake
SU12	1	1	1	12	f	t	2		narrow blade flake Hertzian, rotation: perp scars on dorsal
SU12	1	1	1	13	ff	t	2		
SU12	1	1	1	14	ff	t	2		
SU12	1	1	1	15	ff	t	3		
SU12	1	1	1	16	d	t	2		
SU12	1	1	1	17	ra	t	2		proximal portion of a retouched artefact
SU12	1	1	1	18	ff	t	2		
SU12	1	1	1	19	ff	t	2		
SU12	1	1	1	20	ff	t	1		
SU12	1	1	1	21	p	t	2		focal plat, bending init.
SU12	1	1	1	22	d	t	2		
SU12	1	1	1	23	p	t	2		Hertzian
SU12	1	1	1	24	f	t	2		hertz, focal, feather, very thin flake
SU12	1	1	1	25	ff	t	1		very thin
SU12	1	1	1	26	ff	t	1		
SU12	1	1	2	27	p	t	2		focal, Hertzian
SU12	1	1	2	28	p	t	2		Focal, Hertzian
SU12	1	1	2	29	ff	t	2		
SU12	1	1	2	30	ff	t	2		Arts#27-30 almost certainly related to event above.
SU12	1	1	2	31	pos	unc	210	p	river cobble with one very smooth face, possible whetstone, but no depression. One flake removal from margin
SU12	1	1b	1	32	c	t	90		amorphous core pebble cortex; split pebble, one margin. Flake scars on one face (cortex) from one end, 85x54x34
SU12	1	1b	1	33	f	t	5	p	focal, Hertzian, outrépassé, peb cortex on distal and right half of dorsal
SU12	1	1b	1	34	ff	t	3		
SU12	1	1b	1	35	ff	t	4		
SU12	1	1b	1	36	d	t	1		
SU12	1	1c	3	37	ff	t	2		evidence of core rotation
SU12	1	1c	3	38	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	1	1d	1	39	f	t	4	p	broad plat, bending init, step term, peb cort.
SU12	1	1d	1	40	ff	t	3		
SU12	1	1d	1	41	ff	t	2		
SU12	1	1d	1	42	ff	t	3		
SU12	1	1d	1	43	f	t	2		broad plat, Hertzian, feather
SU12	1	2	1	44	f	t	3	p	focal plat, bending, feather, pebble cortex
SU12	1	2	1	45	ff	t	2		
SU12	1	3	2	46	f	t	3		focal plat, Hertzian, hinge
SU12	1	3	2	47	f	t	3		broad plat, Hertzian, step
SU12	1	3	2	48	f	t	3		broad plat, Hertzian, hinge
SU12	1	3	2	49	f	t	2		focal plat, bending, hinge
SU12	1	3	2	50	ff	t	2		
SU12	1	3	2	51	ff	t	2		
SU12	1	3	2	52	ff	t	2		focal, Hertzian, step
SU12	1	3	2	53	ff	t	2		
SU12	1	4	1	54	f	t	3		broad, bending, feather
SU12	1	6	2	55	f	q	7	p	bipolar compression flake, pebble cortex
SU12	1	6	2	56	ff	q	4		
SU12	1	6	2	57	f	q	2		
SU12	1	1	4	58	ff	q	2		recorded out of sequence
SU12	1	1d	4	59	c	t	16		155x119x79mm. Pebble unifacially flaked. 4 scars modern damage
SU3	1	2	4	1	h	unc	14	p	114x68x54mm. Pebble with crushing on opposing ends consistent with hammer use. Each end has a large flake scar. Sparse bruising on margins and faces consistent with anvil or hammer use
SU3	1	3	3	2	p	t	3		focal, Hertzian, overhang removal, 1 ridge
SU3	1	3	3	3	f	t	3		bending init, feather, 3 ridges, overhang removal
SU3	1	3	3	4	f	t	3		longitudinally broken
SU3	1	3	4	5	cf	t	4		amorphous core
SU3	1	3	4	6	f	q	6		compression flake, bipolar features
SU3	1	3b	3	7	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU3	1	3b	4	8	ff	q	3		
SU3	1	3b	4	9	ff	t	2		
SU3	1	3b	4	10	f	t	3		longitudinally broken
SU3	1	3b	4	11	ff	t	2		
SU3	1	4	3	12	ff	q	2		
SU3	1	4	3	13	f	t	3		Hertzian, bending, 1 ridge
SU3	1	4	3	14	ff	t	4		
SU3	1	4	3	15	p	t	3		Hertzian, broad, 2 ridges, parallel arises
SU3	1	4	3	16	d	t	3		bending termination
SU3	1	4	3	17	ff	t	2		
SU3	1	4	3	18	p	t	2		focal, bending
SU3	1	4	3	19	m	q	2		
SU3	1	4	4	20	ra	t	4		Broken. Unweathered grey interior is visible. Orientation uncertain. Steeply retouched from ventral
SU3	1	4	4	21	p	t	3		focal, Hertzian
SU3	1	4	4	22	ff	t	2		
SU3	1	5	4	23	pos	vol	3		broad, Hertzian, overhang removal, 1 ridge
SU3	1	5	4	24	pos	vol	5		piece conjoins with #23, pebble cortex
SU3	1	6	3	25	f	t	5		broad, Hertzian, bending, 3 ridges
SU3	1	6	3	26	pos	vol	2		pebble cortex
SU3	2	1	2	1	ff	q	2		
SU3	2	1	3	2	ff	t	3		very fine lines in the material
SU3	2	1	4	3	f	q	1		bipolar flake longitudinally broken
SU3	2	1	4	4	d	t	2		
SU3	2	2	2	5	f	q	2		bipolar
SU3	2	2	2	6	ff	t	2		focal, Hertzian
SU3	2	2	3	7	f	t	5		broad, Hertzian, hinge, 2 ridges
SU3	2	2	3	8	ff	t	6	p	rough cortex
SU3	2	2	3	9	f	t	5		broad, Hertzian, feather, numerous ridges and overhang removal
SU3	2	2	3	10	ff	t	5	p	rough pebble cortex

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU3	2	2	3	11	f	t	4		broad, Hertzian, feather, longitudinally broken
SU3	2	2	3	12	ff	t	2		
SU3	2	2	3	13	ff	t	3		
SU3	2	2	3	14	f	t	3		Hertzian, feather
SU3	2	2	3	15	ff	t	4		very rough texture
SU3	2	2	3	16	ff	t	4		
SU3	2	2	3	17	f	t	3		focal, Hertzian, feather
SU3	2	2	3	18	f	t	3	p	broad, bending, feather, pebble cortex
SU3	2	2	3	19	f	t	3		focal, Hertzian, bending, previous scar behind PFA
SU3	2	2	3	20	f	t	2		focal, Hertzian, feather, numerous ridges
SU3	2	2	3	21	ff	t	3		
SU3	2	2	3	22	ff	t	2		
SU3	2	2	3	23	ff	t	2		
SU3	2	2	3	24	ff	t	2		
SU3	2	2	3	25	ff	t	2		
SU3	2	2	3	26	ff	t	2		
SU3	2	2	3	27	ff	t	2		
SU3	2	2	3	28	ff	t	1		
SU3	2	2	3	29	ff	t	2		
SU3	2	2	3	30	f	t	2		focal, Hertzian, feather, numerous ridges
SU3	2	2	3	31	ff	t	2		
SU3	2	2	3	32	f	t	2		focal, Hertzian, feather
SU3	2	2	3	33	pos	t	1		
SU3	2	2	4	34	ff	t	2		
SU3	2	2	4	35	ff	t	2		artefacts #6 - #35 almost certainly related, adjoining squares likewise
SU3	2	2b	2	36	ff	t	4	p	rough pebble cortex
SU3	2	2b	2	37	ff	t	3		
SU3	2	2b	2	38	ff	t	2		
SU3	2	2b	2	39	f	t	2		broad, Hertzian
SU3	2	2b	2	40	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU3	2	2b	3	41	ff	t	5		
SU3	2	2b	3	42	f	t	3		focal, Hertzian, feather, overhang removal, 1 ridge
SU3	2	2b	3	43	f	t	3		broad, bending, feather, overhang removal, core rotation
SU3	2	2b	3	44	ff	t	2		
SU3	2	2b	3	45	ff	t	3		
SU3	2	2b	3	46	m	t	1		
SU3	2	2b	3	47	ff	q	3		
SU3	2	2b	3	48	f	q	3		broad, Hertzian, feather
SU3	2	2b	3	49	d	q	2		feather
SU3	2	2c	2	50	ff	q	2		
SU3	2	2c	3	51	f	t	5	p	broad, Hertzian, feather, overhang removal, pebble cortex, numerous ridges
SU3	2	2c	3	52	pos	t	3	p	pebble cortex
SU3	2	2c	3	53	f	t	2		focal, Hertzian, feather, 2 ridges
SU3	2	2c	3	54	f	t	2		focal, Hertzian, feather
SU3	2	2c	3	55	ff	t	1		
SU3	2	2d	2	56	f	t	4		broad, Hertzian, feather, overhang removal, 3 scars, poss. Use wear on margins (but could just be damage)
SU3	2	2d	2	57	ff	t	4		
SU3	2	2d	2	58	ff	t	2		
SU3	2	2d	2	59	ff	t	2		
SU3	2	2d	2	60	f	t	2		broad, bending, hinge
SU3	2	2d	2	61	ff	q	2		
SU3	2	2d	3	62	ff	t	2		
SU3	2	2d	3	63	f	t	2		Hertzian, feather
SU3	2	2d	3	64	ff	t	2		
SU3	2	2d	3	65	ff	t	2		
SU3	2	2d	3	66	f	t	2		focal, Hertzian, feather
SU3	2	2d	3	67	ff	t	2		
SU3	2	3	2	68	ff	q	2		
SU3	2	3	2	69	fp	q	1		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU3	2	3	2	70	ff	ch	1		
SU3	2	3	3	71	f	t	5	p	focal, Hertzian, feather, pebble cortex
SU3	2	3	3	72	ff	t	3		
SU3	2	3	3	73	ff	q	2		
SU3	2	3	4	74	f	t	4	p	focal, Hertzian, feather, pebble cortex
SU3	2	3	4	75	ff	t	4		
SU3	2	3	4	76	p	t	2		broad, Hertzian, 1 ridge
SU3	2	3	4	77	ff	t	3		
SU3	2	3	4	78	ff	t	3		
SU3	2	3	4	79	f	t	2		bending, step
SU3	2	3	4	80	ff	t	2		
SU3	2	3	4	81	ff	t	3		
SU3	2	3	4	82	ff	t	2		
SU3	2	4	3	83	f	t	4		broad, Hertzian, hinge, 1 ridge
SU3	2	4	3	84	ff	q	2		
SU3	2	4	4	85	f	t	3		broad, Hertzian, feather, overhang removal, numerous ridges
SU3	2	4	4	86	f	t	3		broad, Hertzian, feather, 1 ridge
SU3	2	4	4	87	ff	t	2		
SU3	2	4	4	88	ff	t	3		
SU3	2	4	4	89	ff	t	2		
SU3	2	4	4	90	ff	t	2		
SU3	2	4	4	91	f	t	2		broad, Hertzian, feather, 2 ridges
SU3	2	4	4	92	f	t	2		focal, Hertzian, step, overhang removal, 1 ridge
SU3	2	4	4	93	f	t	2		broad, bending feather. Artefacts #85 - 93 almost certainly related
SU3	2	5	4	94	fp	t	5	p	rough pebble cortex
SU3	2	5	4	95	f	t	4		broad, Hertzian, feather, 3 ridges
SU3	2	5	4	96	ff	t	2	p	pebble cortex
SU3	2	5	4	97	ff	t	2		
SU3	2	5	4	98	ff	t	2		
SU3	2	5	4	99	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU3	2	5	4	100	ff	t	2		
SU3	2	5	4	101	ff	t	1		
SU3	3	1	1	1	pos	t	2		
SU3	3	2a	4	2	ff	t	3		
SU3	3	2b	4	3	f	t	4		focal, Hertzian, feather, 1 ridge
SU3	3	2b	4	4	ff	t	6		probable modern break
SU12	2	1	2	1	f	t	6	p	broad, bending, outrépassé, 51x52x29mm. Rough cortex, 4 flake removals from ventral on 1 margin. Weathered.
SU12	2	3	2	2	f	q	4		bipolar compression flake
SU12	2	4	2	3	f	t	4		broad, Hertzian, step
SU12	2	4	2	4	ff	t	3		
SU12	2	4	3	5	ff	q	2		
SU12	2	4	4	6	pos	unc	6	p	56x50x42 river pebble with minor crushing on 1 end. Uncertain if it is an artefact
SU12	2	5	1	7	ff	q	1		
SU12	2	5	2	8	c	q	6		single platform core
SU12	2	5	2	9	ff	q	2		
SU12	2	5	2	10	ff	q	2		
SU12	2	5	3	11	ff	q	2		
SU12	2	5	3	12	ff	q	2		
SU12	2	5	3	13	ff	q	2		
SU12	2	5	3	14	ff	q	2		
SU12	2	6	1	15	p	qu	5		broad, Hertzian
SU12	2	6	1	16	f	q	3		crushed, Hertzian, feather
SU12	2	6	1	17	ff	t	3		
SU12	2	6	1	18	ff	t	3		
SU12	2	6	2	19	f	q	4	p	compression flake, longitudinally broken with minimally worn pebble cortex
SU12	2	6	2	20	ff	q	3		
SU12	2	6	2	21	ff	q	2		
SU12	2	6	2	22	ff	q	2		
SU12	2	6	2	23	ff	q	1		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	3	1	1	1	f	t	4	p	crushed, Hertzian, bending, pebble cortex, overhang removal, 2 scars
SU12	3	1	1	2	ff	t	3		
SU12	3	1	1	3	uu	t	3		focal, Hertzian, feather, use wear scarring from ventral on distal including a notch 7.5mm wide
SU12	3	1	1	4	f	t	2		uncertain initiation, feather, overhang removal
SU12	3	1	1	5	f	t	2		broad, bending feather, previous flake removal immediately behind PFA
SU12	3	1	1	6	ff	t	2		
SU12	3	1	2	7	ff	t	2		
SU12	3	1	2	8	ff	t	1		Artefacts #9-44 in this spit almost certainly related, as well as artefacts in Spit 1
SU12	3	2	2	9	f	t	5	p	focal, Hertzian, feather, 100% pebble cortex
SU12	3	2	2	10	ff	t	4		
SU12	3	2	2	11	ff	t	4		
SU12	3	2	2	12	d	t	4		feather
SU12	3	2	2	13	f	t	4		overhang removal, broad, bending, feather
SU12	3	2	2	14	ff	t	4		
SU12	3	2	2	15	ff	t	3		
SU12	3	2	2	16	ff	t	3		
SU12	3	2	2	17	f	t	3		broad, Hertzian, feather, previous flake removal behind PFA, 3 ridges
SU12	3	2	2	18	ff	t	3		
SU12	3	2	2	19	ff	t	2		
SU12	3	2	2	20	ff	t	2		
SU12	3	2	2	21	ff	t	3		
SU12	3	2	2	22	p	t	3		broad, crushed, previous flake removal behind PFA
SU12	3	2	2	23	ff	t	2		
SU12	3	2	2	24	ff	t	3	p	pebble cortex
SU12	3	2	2	25	ff	t	2		
SU12	3	2	2	26	f	t	2		focal, Hertzian, feather
SU12	3	2	2	27	ff	t	3		
SU12	3	2	2	28	fp	t	2	p	pebble cortex
SU12	3	2	2	29	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	3	2	2	30	ff	t	2		
SU12	3	2	2	31	f	t	2		focal, Hertzian, outrépassé
SU12	3	2	2	32	ff	t	2		
SU12	3	2	2	33	f	t	2		focal, Hertzian, step, previous flake scar behind PFA
SU12	3	2	2	34	fp	t	2		
SU12	3	2	2	35	ff	t	2		
SU12	3	2	2	36	ff	t	2		
SU12	3	2	2	37	fp	t	1		
SU12	3	2	2	38	ff	t	2		
SU12	3	2	2	39	f	t	2		focal, Hertzian, feather
SU12	3	2	2	40	ff	t	2		
SU12	3	2	2	41	f	t	1		Hertzian, bending, focal
SU12	3	2	2	42	ff	t	1		
SU12	3	2	2	43	ff	t	1		
SU12	3	2	2	44	ff	q	2		
SU12	3	2	1	45	g	unc	9	p	82x58x40mm, broken piece of probably grindstone. Originally a smooth river cobble
SU12	3	2	1	46	f	t	4		longitudinally broken. Note that tuff artefacts in this spit and below are almost certainly related
SU12	3	2	1	47	f	t	4		broad, Hertzian, feather, previous flake removal behind PFA
SU12	3	2	1	48	ff	t	3	p	pebble cortex
SU12	3	2	1	49	f	t	2		broad, bending, hinge
SU12	3	2	1	50	f	t	2		focal, Hertzian, step, previous flake scar behind PFA
SU12	3	2	1	51	ff	t	2		
SU12	3	2	1	52	ff	t	2	p	pebble cortex
SU12	3	2	1	53	f	t	2		longitudinally broken
SU12	3	2	1	54	ff	t	2		
SU12	3	2	1	55	f	t	2		focal, Hertzian, feather
SU12	3	2	1	56	f	t	2		broad, bending, feather
SU12	3	2	1	57	ff	t	2		
SU12	3	2	1	58	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	3	2	1	59	ff	t	2		
SU12	3	2	1	60	ff	t	2		
SU12	3	2	1	61	ff	unc	1		
SU12	3	2	1	62	ff	q	1		
SU12	3	3	1	63	f	t	8	p	100% pebble cortex, uncertain initiation, feather termination
SU12	3	3	1	64	f	t	5	p	broad, Hertzian, feather, pebble cortex on platform and 1/2 dorsal
SU12	3	3	1	65	ff	t	8	p	pebble cortex
SU12	3	3	1	66	f	t	5	p	broad, Hertzian, feather, platform and 1 margin pebble cortex
SU12	3	3	1	67	ff	t	5		
SU12	3	3	1	68	ff	t	2		
SU12	3	3	1	69	ff	t	3		
SU12	3	3	1	70	fp	t	2		
SU12	3	3	1	71	pos	t	2		looks like a flake but edges are all rounded
SU12	3	3	1	72	f	t	2		focal, Hertzian, feather
SU12	3	3	1	73	ff	t	2		
SU12	3	3	1	74	ff	t	2		
SU12	3	3	1	75	f	t	2	p	focal, Hertzian, feather with pebble cortex
SU12	3	3	1	76	f	t	2		focal, Hertzian, bending
SU12	3	3	1	77	ff	t	1		
SU12	3	3	1	78	fp	t	1		
SU12	3	3	1	79	ff	t	2		
SU12	3	3	1	80	ff	t	2		
SU12	3	3	2	81	f	t	3		broad, Hertzian, outrépassé
SU12	3	3	2	82	uu	t	3		focal, Hertzian, feather, core rotation, damage on distal from use
SU12	3	3	2	83	ff	t	2		
SU12	3	3	2	84	ff	t	2		
SU12	3	3	2	85	ff	t	2		
SU12	3	3	2	86	ff	t	2		
SU12	3	3	2	87	ff	t	2		
SU12	3	3	2	88	fp	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	3	3	2	89	ff	t	2		
SU12	3	3	2	90	f	t	2		broad, Hertzian, feather
SU12	3	3	2	91	f	t	1		broad, bending, feather
SU12	3	3	2	92	ff	t	2		
SU12	3	3	2	93	ff	t	1		
SU12	3	3	2	94	ff	t	1		
SU12	3	3	2	95	ff	t	2		
SU12	3	4	1	96	ff	t	5		
SU12	3	4	1	97	p	t	4		broad, Hertzian, 1 ridge
SU12	3	4	1	98	ff	t	3		
SU12	3	4	1	99	f	t	3		broad, Hertzian, hinge, previous scar immediately behind PFA
SU12	3	4	1	100	fp	t	2		
SU12	3	4	1	101	ff	t	3		
SU12	3	4	1	102	d	t	2		
SU12	3	4	1	103	ff	t	2		
SU12	3	4	1	104	f	t	2		crushed, Hertzian, step, previous scar immediately behind PFA
SU12	3	4	1	105	f	t	1		focal, Hertzian, feather
SU12	3	4	2	106	f	t	5		broad, feather
SU12	3	4	2	107	f	t	2		focal, Hertzian, hinge, longitudinally broken
SU12	3	4	2	108	ff	t	3		
SU12	3	4	2	109	ff	t	2		
SU12	3	4	2	110	ff	t	1		
SU12	3	4	2	111	pos	vol	3		
SU12	3	4	4	112	ff	t	4		
SU12	3	5	1	113	ff	t	2		
SU12	3	5	1	114	ff	t	2		
SU12	3	5	1	115	d	t	2		feather
SU12	3	5	2	116	ff	t	4	p	100% pebble cortex
SU12	3	6	1	117	pos	unc	6		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	3	6	2	118	uu	t	6	p	focal, Hertzian, feather, pebble cortex, numerous ridges, microscopic use wear scarring from ventral
SU12	3	6	2	119	uu	t	6		crushed, Hertzian, feather, use wear edge rounding and scarring on both margins
SU12	3	6	2	120	ff	t	2		
SU12	3	6	2	121	ff	t	2	p	pebble cortex
SU12	3	6	2	122	ff	t	2		
SU12	3	6	2	123	ff	t	1		
SU12	4	1	1	1	m	t	4		
SU12	4	1	1	2	f	t	3		focal, Hertzian, feather
SU12	4	1	1	3	ff	t	2		
SU12	4	1	1	4	ff	t	2	p	
SU12	4	1	1	5	p	t	2		focal, Hertzian
SU12	4	1	1	6	ff	t	2		
SU12	4	1	1	7	p	t	2		broad, Hertzian
SU12	4	1	1	8	ff	q	2		
SU12	4	1	1	9	f	ch	3		focal, Hertzian, feather
SU12	4	1	1	10	ff	ch	2		
SU12	4	1	1	11	d	fgv	2		feather
SU12	4	1	1	12	f	fgv	2		
SU12	4	1	1	13	ff	fgv	2		
SU12	4	1	2	14	ff	ch	2	t	
SU12	4	1	2	15	f	ch	4	p	broad, Hertzian, feather
SU12	4	1	3	16	f	fgv	5	p	focal, Hertzian, feather
SU12	4	2	1	17	f	t	5	p	broad, Hertzian, feather, 2 ridges
SU12	4	2	1	18	f	t	4	p	focal, outrépassé
SU12	4	2	1	19	ff	t	3	P	
SU12	4	2	1	20	ff	t	3		
SU12	4	2	1	21	ff	t	2		
SU12	4	2	1	22	ff	t	3	p	
SU12	4	2	1	23	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	4	2	1	24	ff	t	2		
SU12	4	2	1	25	ff	t	2	p	
SU12	4	2	1	26	ff	t	2		
SU12	4	2	1	27	ff	t	2		
SU12	4	2	1	28	f	t	2		longitudinally split
SU12	4	2	1	29	ff	t	2		
SU12	4	2	1	30	f	t	2		longitudinally split
SU12	4	2	1	31	ff	t	2		
SU12	4	2	1	32	d	t	2	p	
SU12	4	2	1	33	ff	t	2		
SU12	4	2	1	34	ff	t	2		
SU12	4	2	1	35	ff	t	2		
SU12	4	2	1	36	ff	t	2		
SU12	4	2	1	37	d	t	2		
SU12	4	2	1	38	ff	t	2		
SU12	4	2	1	39	ff	t	1		
SU12	4	2	1	40	f	t	1		longitudinally split
SU12	4	2	1	41	ff	t	2		
SU12	4	2	1	42	ra	t	2		very small Bondi point 15 x 6 x 4, tuff artefacts #17 - #42 almost certainly related
SU12	4	2	1	43	ff	fgv	2	p	
SU12	4	2	1	44	f	fgv	3		focal, Hertzian, feather
SU12	4	2	1	45	ff	fgv	2	p	
SU12	4	2	1	46	ff	q	2		
SU12	4	2	1	47	ff	q	2		
SU12	4	2	1	48	ff	q	3		
SU12	4	2	2	49	d	t	2		feather
SU12	4	2	2	50	f	t	2		broad, Hertzian, hinge
SU12	4	2	2	51	ff	t	2	p	
SU12	4	2	2	52	ff	t	3		
SU12	4	2	2	53	f	t	2		focal, feather

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	4	2	2	54	ff	t	1		
SU12	4	2	2	55	f	t	1		focal, feather
SU12	4	2	2	56	d	t	2		feather
SU12	4	2	2	57	ff	t	2		artefacts #49 - #57 almost certainly related
SU12	4	3	1	58	p	t	5	p	crushed platform
SU12	4	3	1	59	ff	t	4	p	
SU12	4	3	1	60	ff	t	3	p	
SU12	4	3	1	61	f	t	3		focal, feather
SU12	4	3	1	62	ff	t	2	p	
SU12	4	3	1	63	ff	t	2	p	
SU12	4	3	1	64	f	t	2		focal, feather, 1 previous ridge
SU12	4	3	1	65	ff	qu	2	p	
SU12	4	3	1	66	ff	q	2		
SU12	4	3	1	67	ff	q	2		
SU12	4	3	2	68	f	t	4	p	broad, Hertzian, feather
SU12	4	3	2	69	ff	t	2	p	
SU12	4	3	2	70	ff	t	2	p	
SU12	4	3	2	71	ff	t	2	p	
SU12	4	3	2	72	ff	t	2		
SU12	4	3	2	73	ff	t	2		
SU12	4	3	2	74	p	t	2		focal
SU12	4	3	2	75	f	q	3		bipolar
SU12	4	3	2	76	f	q	2		broad, Hertzian, feather
SU12	4	3	2	77	f	q	2		bipolar
SU12	4	3	2	78	fp	q	2		
SU12	4	3	2	79	fp	q	2		
SU12	4	3	2	80	ff	q	2		
SU12	4	3	2	81	ff	q	2		
SU12	4	3	2	82	ff	q	2		
SU12	4	3	2	83	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	4	3	2	84	d	q	1		feather
SU12	4	3	2	85	ff	q	1		
SU12	4	3	2	86	d	q	1		feather; quartz artefacts in this spit are likely to be related
SU12	4	3	3	87	ff	t	4		
SU12	4	3	3	88	ff	q	2		
SU12	4	3	2	89	pos	t	5	p	
SU12	4	3	2	90	fp	t	2		
SU12	4	4	2	91	p	t	2		broad, Hertzian
SU12	4	4	2	92	ff	t	2		
SU12	4	4	3	93	uu	t	3	p	flake fragment with edge rounding and scarring on margins, consistent with use
SU12	4	5	1	94	uu	t	3	p	flake fragment with edge rounding and scarring on margins, consistent with use
SU12	4	5	2	95	ff	t	5	p	
SU12	4	5	3	96	ff	t	5		
SU12	5	1	1	1	f	t	5	p	bending, feather
SU12	5	1	1	2	ff	t	3		
SU12	5	1	1	3	ff	q	2		
SU12	5	2	1	4	ff	t	2		
SU12	5	2	1	5	f	ch	2		bending, feather, focal
SU12	5	2	1	6	pos	t	1		
SU12	5	2	2	7	c	t	14	p	broken cobble with 2 definite negative scars
SU12	5	2	2	8	f	t	6	p	broad, Hertzian, outrépassé, 3 ridges
SU12	5	2	2	9	f	t	7		focal, Hertzian, outrépassé
SU12	5	2	2	10	ff	t	5	p	
SU12	5	2	2	11	d	t	4	p	feather
SU12	5	2	2	12	ff	t	3	p	
SU12	5	2	2	13	ff	t	3		
SU12	5	2	2	14	f	t	3		longitudinally split
SU12	5	2	2	15	f	t	3	p	focal, bending, feather
SU12	5	2	2	16	f	t	3	p	broad, bending, feather
SU12	5	2	2	17	d	t	3		feather

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	5	2	2	18	ff	t	3		
SU12	5	2	2	19	f	t	3		focal, Hertzian, feather
SU12	5	2	2	20	ff	t	3	p	
SU12	5	2	2	21	f	t	2		focal, Hertzian, feather, 1 ridge
SU12	5	2	2	22	ff	t	2	p	
SU12	5	2	2	23	f	t	2		focal, Hertzian, hinge, 1 ridge
SU12	5	2	2	24	ff	t	2		
SU12	5	2	2	25	f	t	1		broad, Hertzian, feather, 1 ridge
SU12	5	3	1	26	f	t	3		Hertzian, crushed, feather, 1 ridge
SU12	5	3	2	27	ff	q	2		
SU12	5	4	1	28	ff	t	2		
SU12	5	4	2	29	ff	t	3	p	
SU12	5	4	2	30	ff	t	2	p	
SU12	5	4	2	31	ff	t	1		
SU12	5	4	2	32	d	fgv	2		feather
SU12	5	4	2	33	ff	fgv	3		
SU12	5	4	2	34	ra	ch	2		proximal, thin, retouch on 1 margin, 17 x 8 x 2
SU12	5	4	2	35	d	ch	2		hinge
SU12	5	4	2	36	f	ch	2		overhang removal
SU12	5	5	1	37	ff	qu	7		
SU12	5	6	2	38	f	t	7	p	focal, feather
SU12	5	4	2	39	f	t	3		Hertzian, feather
SU12	5	4	2	40	f	t	3		broad, Hertzian, hinge
SU12	6	2	1	1	f	t	4		Hertzian, broad, outrépassé
SU12	6	2	1	2	f	t	2	p	focal, feather
SU12	6	2	2	3	f	t	5	p	broad, Hertzian, feather
SU12	6	2	2	4	f	t	7	p	broad, Hertzian, feather, 2 ridges
SU12	6	2	2	5	cf	t	4		
SU12	6	2	2	6	f	t	4		1 ridge, core rotation, broad, Hertzian, outrépassé
SU12	6	2	2	7	f	t	3		longitudinally split

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	6	2	2	8	f	t	3		focal, Hertzian, hinge
SU12	6	2	2	9	d	t	2		feather
SU12	6	2	2	10	d	t	3		feather
SU12	6	2	2	11	ff	t	2		
SU12	6	2	2	12	ff	t	2		
SU12	6	2	2	13	p	t	2		crushed platform, 2 ridges
SU12	6	2	2	14	ff	t	2	p	
SU12	6	2	2	15	f	t	2		Hertzian, broad, step
SU12	6	2	2	16	ff	t	2		
SU12	6	2	2	17	f	t	2		focal, Hertzian, outrépassé
SU12	6	2	2	18	p	t	2		focal, bending
SU12	6	2	2	19	d	t	2		feather
SU12	6	2	2	20	f	t	2		longitudinally split
SU12	6	2	2	21	ff	t	2		
SU12	6	2	2	22	ff	t	2		
SU12	6	2	2	23	f	t	2		focal, feather
SU12	6	2	2	24	f	t	2		longitudinally split
SU12	6	2	2	25	f	t	2		focal, feather
SU12	6	2	2	26	m	t	1		
SU12	6	2	2	27	p	t	1		Hertzian, focal. Tuff artefacts in this spit are almost certainly related
SU12	6	2	2	28	ff	qu	2		
SU12	6	2	2	29	ff	qu	3		
SU12	6	2	2	30	pos	unc	3		
SU12	6	2	3	31	ff	t	2		
SU12	6	2	4	32	pos	unc	4		
SU12	6	2	4	33	pos	unc	2		
SU12	6	3	1	34	ff	t	2		
SU12	6	3	1	35	p	t	1		focal, bending
SU12	6	3	1	36	pos	t	1		
SU12	6	3	2	37	uu	t	3		flake with edge rounding and scarring from ventral, consistent with use

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	6	4	1	38	pos	unc	4		
SU12	6	4	1	39	ff	ch	2		
SU12	6	4	1	40	ff	t	1		
SU12	6	4	2	41	f	ch	2		focal, Hertzian, outrépassé. Almost certainly related to chert above
SU12	6	4	2	42	f	t	3		broad, Hertzian, hinge
SU12	6	4	2	43	f	t	3		focal, Hertzian, feather, 4 ridges
SU12	6	4	2	44	f	t	2		broad, Hertzian, feather
SU12	6	4	2	45	f	t	2		broad, Hertzian, feather
SU12	6	4	2	46	f	t	2		focal, Hertzian, feather
SU12	6	4	2	47	ff	t	2		
SU12	6	4	2	48	d	t	2		hinge, parallel arises
SU12	6	4	3	49	ff	t	3	p	
SU12	6	4	3	50	fp	chal	2		
SU12	6	5	2	51	ff	t	2		
SU12	6	5	2	52	m	t	2		
SU12	6	6	3	53	fp	t	6	p	
SU12	7	1	1	1	ff	t	3		1 ridge
SU12	7	1	1	2	ff	t	2		
SU12	7	1	1	3	ff	t	2		
SU12	7	1	1	4	ff	q	2		
SU12	7	1	2	5	ff	t	3		
SU12	7	1	2	6	ff	t	3		
SU12	7	1	2	7	ff	t	3		
SU12	7	1	2	8	pos	unc	2		
SU12	7	1	2	9	ff	q	2		
SU12	7	1	2	10	ff	q	1		
SU12	7	2	1	11	f	t	5	p	Hertzian, focal, hinge
SU12	7	2	1	12	ff	t	5	p	
SU12	7	2	1	13	f	t	2		focal, bending, hinge, 1 ridge
SU12	7	2	1	14	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	2	1	15	ff	t	2		
SU12	7	2	1	16	f	q	3	p	broad, Hertzian, feather
SU12	7	2	1	17	ff	q	2		
SU12	7	2	1	18	ff	q	1		
SU12	7	2	1	19	f	q	1		focal, feather, parallel arises
SU12	7	4	1	20	f	t	4	p	broad, bending, feather
SU12	7	4	1	21	ff	t	3		
SU12	7	4	1	22	f	t	1		focal, Hertzian, feather, parallel arises
SU12	7	4	1	23	f	t	1		focal, Hertzian, feather, 2 ridges
SU12	7	4	1	24	ff	q	3		
SU12	7	4	1	25	f	q	2		broad, Hertzian, feather
SU12	7	4	1	26	d	q	2		feather
SU12	7	4	1	27	ff	q	1		
SU12	7	4	1	28	ff	q	2		black quartz
SU12	7	4	2	29	f	t	2	p	crushed, Hertzian, feather
SU12	7	4	2	30	ff	ch	3		black chert
SU12	7	4	2	31	ff	q	2		
SU12	7	5	1	32	ff	t	2		
SU12	7	5	1	33	c	t	5	p	amorphous core, 1 platform, 3 negative scars
SU12	7	5	1	34	c	t	4	p	amorphous core, 2 rotations
SU12	7	5	1	35	f	t	6		focal, Hertzian, feather
SU12	7	5	1	36	f	t	5		longitudinally split, Hertzian, focal, hinge
SU12	7	5	1	37	f	t	7	p	focal, Hertzian, feather
SU12	7	5	1	38	fp	t	5	p	
SU12	7	5	1	39	ff	t	5	p	
SU12	7	5	1	40	f	t	5	p	broad, Hertzian, feather
SU12	7	5	1	41	f	t	4	p	crushed, Hertzian, step
SU12	7	5	1	42	f	t	4		broad, Hertzian, hinge, 1 ridge
SU12	7	5	1	43	f	t	4		focal, Hertzian, step, 1 ridge
SU12	7	5	1	44	ff	t	3	p	

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	5	1	45	ff	t	3	p	
SU12	7	5	1	46	fp	t	3	p	
SU12	7	5	1	47	ra	t	3		flake, distally retouched
SU12	7	5	1	48	fp	t	3	p	
SU12	7	5	1	49	ff	t	3		
SU12	7	5	1	50	ff	t	3		
SU12	7	5	1	51	ff	t	2		
SU12	7	5	1	52	p	t	2		broad, Hertzian, 1 ridge
SU12	7	5	1	53	ff	t	2		
SU12	7	5	1	54	f	t	2	p	focal, feather
SU12	7	5	1	55	ff	t	2		
SU12	7	5	1	56	ff	t	2	p	
SU12	7	5	1	57	f	t	2		focal, feather
SU12	7	5	1	58	f	t	2		focal, Hertzian, step
SU12	7	5	1	59	ff	t	2		
SU12	7	5	1	60	ff	t	2	p	
SU12	7	5	1	61	ff	t	2		
SU12	7	5	1	62	p	t	2		focal, Hertzian
SU12	7	5	1	63	ff	t	2		
SU12	7	5	1	64	ff	t	2		
SU12	7	5	1	65	ff	t	2		
SU12	7	5	1	66	ff	t	1		
SU12	7	5	1	67	d	t	1		feather, parallel arises
SU12	7	5	1	68	ff	t	2		
SU12	7	5	1	69	f	t	1		focal, step
SU12	7	5	1	70	f	t	1		focal, step. Most tuff artefacts in this spit are almost certainly related
SU12	7	5	1	71	ff	ch	2		brown
SU12	7	5	1	72	ff	fgv	1		
SU12	7	5	1	73	p	ch	1		focal, grey, very fine grained
SU12	7	5	1	74	pos	qu	5	p	

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	5	1	75	pos	qu	5	p	
SU12	7	5	1	76	pos	fgv	4	p	
SU12	7	5	1	77	ff	q	3		
SU12	7	5	1	78	ff	q	3		
SU12	7	5	1	79	pos	q	4		? compression flake
SU12	7	5	1	80	ff	q	2		
SU12	7	5	1	81	ff	q	2		
SU12	7	5	1	82	ff	q	1	p	
SU12	7	5	2	83	ff	t	3		
SU12	7	5	2	84	d	t	3		
SU12	7	5	2	85	f	t	3		focal, Hertzian, feather, 1 ridge
SU12	7	5	2	86	f	t	3	p	focal, Hertzian, outrépassé, 3 ridges
SU12	7	5	2	87	p	t	2		bending
SU12	7	5	2	88	f	t	3		focal, Hertzian, hinge, 3 ridges
SU12	7	5	2	89	ff	t	2		
SU12	7	5	2	90	ff	t	2	p	
SU12	7	5	2	91	f	t	2	p	broad, Hertzian, hinge, 2 ridges
SU12	7	5	2	92	ff	t	2	p	
SU12	7	5	2	93	ff	t	2		
SU12	7	5	2	94	ff	t	2		
SU12	7	5	2	95	p	t	2		focal, bending
SU12	7	5	2	96	f	t	2		broad, bending, overhang removal, axial termination
SU12	7	5	2	97	f	t	2		focal, bending, feather
SU12	7	5	2	98	ff	t	2		
SU12	7	5	2	99	ff	t	2		
SU12	7	5	2	100	ff	t	1		
SU12	7	5	2	101	ff	t	1		
SU12	7	5	2	102	ff	t	1		
SU12	7	5	2	103	ff	t	1		
SU12	7	5	2	104	f	t	1		broad, bending, feather

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	5	2	105	f	t	2		longitudinally split
SU12	7	5	2	106	f	t	2		broad, Hertzian, hinge
SU12	7	5	2	107	f	t	2		focal, Hertzian, feather, 1 ridge
SU12	7	5	2	108	ff	t	2		
SU12	7	5	2	109	fp	t	3		
SU12	7	5	2	110	ff	t	3		
SU12	7	5	2	111	pos	q	4	p	
SU12	7	5	2	112	m	q	3		
SU12	7	5	2	113	m	q	3		
SU12	7	5	2	114	ff	q	2		
SU12	7	5	2	115	m	q	2		
SU12	7	5	2	116	ff	q	2	p	
SU12	7	5	2	117	ff	q	2		
SU12	7	5	2	118	ff	q	2	p	
SU12	7	5	2	119	ff	q	2		
SU12	7	5	2	120	ff	q	2		
SU12	7	5	2	121	f	q	2		bipolar
SU12	7	5	2	122	ff	q	2		
SU12	7	5	2	123	f	q	2		broad, Hertzian, crushed
SU12	7	5	2	124	ff	q	2		
SU12	7	5	2	125	ff	q	2		
SU12	7	5	2	126	d	q	2		feather
SU12	7	5	2	127	ff	q	2		
SU12	7	5	2	128	ff	q	2		
SU12	7	5	2	129	ff	q	2		
SU12	7	5	2	130	ff	q	1		
SU12	7	5	2	131	ff	q	1		
SU12	7	5	2	132	ff	q	1		
SU12	7	5	2	133	ff	q	1		quartz artefacts in this spit are almost certainly related. Quartz is uniformly poor quality

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	5	3	134	f	t	5		bending, hinge, 1 scar
SU12	7	5	3	135	ff	t	3		
SU12	7	5	3	136	p	t	2		broad, Hertzian
SU12	7	5	3	137	ff	t	2		
SU12	7	5	3	138	ff	t	2		
SU12	7	5	3	139	ff	t	2		
SU12	7	5	3	140	d	q	2		quartz is almost certainly related to the quartz above
SU12	7	5	3	141	f	q	3	p	compression flake
SU12	7	5	3	142	ff	q	3		
SU12	7	5	3	143	ff	q	3		
SU12	7	5	3	144	ff	q	3		
SU12	7	5	3	145	f	q	3		focal, Hertzian, hinge
SU12	7	5	3	146	ff	q	2		
SU12	7	5	3	147	f	q	2		compression flake
SU12	7	5	3	148	d	q	2		feather
SU12	7	5	3	149	p	q	2		focal, Hertzian
SU12	7	5	3	150	ff	q	2		
SU12	7	5	3	151	ff	q	2		
SU12	7	5	3	152	ff	q	1		
SU12	7	5	3	153	ff	q	1		
SU12	7	5	3	154	ff	q	1		
SU12	7	5	4	155	w	unc	10	p	broken pebble with part of a depression on 1 face consistent with whetstone or grinding use
SU12	7	5	4	156	ff	q	2		
SU12	7	5	4	157	ff	q	2		
SU12	7	5	4	158	ff	q	2		
SU12	7	5	4	159	ff	q	2		
SU12	7	5	4	160	f	q	2		bipolar
SU12	7	5	4	161	ff	q	1		
SU12	7	5	4	162	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	6	2	163	f	t	6	p	broad, Hertzian, feather
SU12	7	6	2	164	ff	t	5	p	
SU12	7	6	2	165	f	t	4	p	focal, Hertzian, outrépassé
SU12	7	6	2	166	fp	t	5	p	
SU12	7	6	2	167	f	t	5		broad, bending, outrépassé
SU12	7	6	2	168	ff	t	5	p	
SU12	7	6	2	169	ff	t	5	p	
SU12	7	6	2	170	ff	t	4		
SU12	7	6	2	171	ff	t	4		
SU12	7	6	2	172	d	t	4	p	outrépassé
SU12	7	6	2	173	ff	t	4		
SU12	7	6	2	174	f	t	3	p	axial termination
SU12	7	6	2	175	ff	t	4		
SU12	7	6	2	176	ff	t	4	p	
SU12	7	6	2	177	f	t	3		broad, Hertzian, hinge
SU12	7	6	2	178	f	t	3		broad, Hertzian, outrépassé, 4 ridges
SU12	7	6	2	179	ff	t	3	p	
SU12	7	6	2	180	fp	t	3	p	
SU12	7	6	2	181	f	t	4		focal, Hertzian, feather, 2 ridges
SU12	7	6	2	182	f	t	3	p	focal, Hertzian, feather
SU12	7	6	2	183	d	t	4	p	feather
SU12	7	6	2	184	f	t	3		focal, step, core rotation, 2 ridges
SU12	7	6	2	185	ff	t	3		
SU12	7	6	2	186	fp	t	3		
SU12	7	6	2	187	f	t	3		focal, Hertzian, feather
SU12	7	6	2	188	ff	t	3		
SU12	7	6	2	189	d	t	3		feather
SU12	7	6	2	190	ff	t	3	p	
SU12	7	6	2	191	fp	t	2	p	
SU12	7	6	2	192	f	t	2		focal, Hertzian, outrépassé

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	6	2	193	f	t	2		focal, Hertzian, feather
SU12	7	6	2	194	d	t	2		feather
SU12	7	6	2	195	ff	t	2		
SU12	7	6	2	196	f	t	3		focal, bending, feather
SU12	7	6	2	197	m	t	3		parallel arises
SU12	7	6	2	198	f	t	3		broad, Hertzian, step, longitudinally broken
SU12	7	6	2	199	fp	t	3	p	
SU12	7	6	2	200	f	t	2		focal, Hertzian, bending, overhang removal, 1 ridge
SU12	7	6	2	201	f	t	2		focal, Hertzian, feather
SU12	7	6	2	202	f	t	2		focal, Hertzian, step
SU12	7	6	2	203	f	t	2		broad, Hertzian, feather
SU12	7	6	2	204	fp	t	2		
SU12	7	6	2	205	f	t	2		broad, Hertzian, feather, core rotation, 2 ridges
SU12	7	6	2	206	ff	t	2	p	
SU12	7	6	2	207	ff	t	2	p	
SU12	7	6	2	208	f	t	2		broad, Hertzian, step, overhang removal, 1 ridge
SU12	7	6	2	209	d	t	2		hinge
SU12	7	6	2	210	fp	t	3	p	
SU12	7	6	2	211	d	t	2		feather
SU12	7	6	2	212	ff	t	2	p	
SU12	7	6	2	213	f	t	2		focal, Hertzian, step, 2 ridges
SU12	7	6	2	214	ff	t	2	p	
SU12	7	6	2	215	d	t	2		feather
SU12	7	6	2	216	p	t	2		bending, broad, step, overhang removal, parallel arises
SU12	7	6	2	217	ff	t	2		
SU12	7	6	2	218	ff	t	2		
SU12	7	6	2	219	ff	t	2		
SU12	7	6	2	220	f	t	2		broad, Hertzian, step, 2 ridges
SU12	7	6	2	221	pos	t	1	p	
SU12	7	6	2	222	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	6	2	223	ff	t	2		
SU12	7	6	2	224	f	t	2		focal, Hertzian, step, 2 ridges
SU12	7	6	2	225	f	t	2		longitudinally split, Hertzian, broad, outrépassé
SU12	7	6	2	226	ff	t	2		
SU12	7	6	2	227	ff	t	2		
SU12	7	6	2	228	d	t	1		feather
SU12	7	6	2	229	ff	t	2		
SU12	7	6	2	230	ff	t	1		
SU12	7	6	2	231	m	t	1		
SU12	7	6	2	232	d	t	2		feather
SU12	7	6	2	233	d	t	1		feather
SU12	7	6	2	234	ff	t	1		
SU12	7	6	2	235	ff	t	1		tuff artefacts in this spit are likely to be part of a related knapping event
SU12	7	6	2	236	fp	ch	3		
SU12	7	6	2	237	ff	ch	3		
SU12	7	6	2	238	fp	ch	2		
SU12	7	6	2	239	ff	ch	2		
SU12	7	6	2	240	ff	ch	2		
SU12	7	6	2	241	p	ch	2		focal, Hertzian, 2 ridges
SU12	7	6	2	242	ff	ch	2		
SU12	7	6	2	243	ff	ch	2		
SU12	7	6	2	244	ff	ch	2		
SU12	7	6	2	245	ff	ch	2		
SU12	7	6	2	246	m	ch	1		
SU12	7	6	2	247	p	ch	1		crushed platform, Hertzian
SU12	7	6	2	248	ff	ch	2		chert all a light grey colour, very poor quality generally, with the occasional high quality fragment - all likely to be related
SU12	7	6	2	249	f	q	3	p	compression flake
SU12	7	6	2	250	f	q	3	p	bipolar
SU12	7	6	2	251	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	6	2	252	m	q	2		
SU12	7	6	2	253	ff	q	2		
SU12	7	6	2	254	ff	q	2		
SU12	7	6	2	255	ff	q	2		
SU12	7	6	2	256	ff	q	2		
SU12	7	6	2	257	ff	q	2		
SU12	7	6	2	258	ff	q	2		
SU12	7	6	2	259	ff	q	1		
SU12	7	6	2	260	ff	q	1		
SU12	7	6	2	261	ff	q	2		
SU12	7	6	2	262	ff	q	2		
SU12	7	6	2	263	ff	q	1		
SU12	7	6	2	264	ff	q	1		
SU12	7	6	2	265	fp	q	1		
SU12	7	6	2	266	fp	q	1		
SU12	7	6	2	267	ff	ch	2		related to the others in this spit
SU12	7	6	2	268	ff	t	2		related to the others in this spit
SU12	7	6	2	269	ff	q	2		
SU12	7	6	2	270	g	qu	13	p	pebble, broken, smooth depression consistent with grinding wear. Small area of pitting (30 x 20mm) consistent with anvil use
SU12	7	6	3	271	uu	t	7	p	broad, Hertzian, feather, edge damage on margins consistent with use. 3 ridges
SU12	7	6	3	272	ff	t	6	p	
SU12	7	6	3	273	f	t	5	p	broad, Hertzian, feather
SU12	7	6	3	274	f	t	4		broad, bending, feather
SU12	7	6	3	275	d	t	5	p	feather
SU12	7	6	3	276	f	t	4	p	crushed, Hertzian, feather
SU12	7	6	3	277	f	t	4	p	crushed, feather. 2 ridges
SU12	7	6	3	278	ff	t	4	p	
SU12	7	6	3	279	ff	t	4	p	
SU12	7	6	3	280	ff	t	4		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	6	3	281	d	t	2		feather
SU12	7	6	3	282	ff	t	2		
SU12	7	6	3	283	f	t	3		focal, Hertzian, axial, parallel arises, 2 ridges
SU12	7	6	3	284	d	t	2		feather
SU12	7	6	3	285	f	t	3		focal, Hertzian, feather, 3 ridges
SU12	7	6	3	286	d	t	2		feather
SU12	7	6	3	287	d	t	2		feather
SU12	7	6	3	288	ra	t	2		Bondi point, retouched from ventral, 16 x 6 x 2 mm
SU12	7	6	3	289	ff	t	2		
SU12	7	6	3	290	f	t	2		focal, Hertzian, feather
SU12	7	6	3	291	ra	t	2		distally retouched from the ventral, 16 x 6 x 3
SU12	7	6	3	292	f	t	2		broad, bending, feather
SU12	7	6	3	293	f	t	2		broad, bending, feather
SU12	7	6	3	294	ff	t	2		
SU12	7	6	3	295	ff	t	2		tuff pieces in this spit are likely related to those in this and above spit
SU12	7	6	3	296	d	qu	4	p	step
SU12	7	6	3	297	ff	ch	4		
SU12	7	6	3	298	fp	ch	2		these 2 chert pieces almost certainly related to chert in spit 2
SU12	7	6	3	299	ff	ch	2		distinctive very fine grained material. Rejuvenation piece
SU12	7	6	3	300	f	q	4		bipolar
SU12	7	6	3	301	f	q	3	p	compression flake
SU12	7	6	3	302	ff	q	4		bipolar features
SU12	7	6	3	303	ff	q	3		
SU12	7	6	3	304	ff	q	2		
SU12	7	6	3	305	ff	q	2		
SU12	7	6	3	306	ff	q	2		
SU12	7	6	3	307	ff	q	2		
SU12	7	6	3	308	fp	q	2		
SU12	7	6	3	309	fp	q	2		
SU12	7	6	3	310	fp	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	7	6	3	311	ff	q	2		
SU12	7	6	3	312	ff	q	1		
SU12	7	6	3	313	ff	q	1		quartz almost certainly related
SU12	7	6	4	314	ff	t	2	p	
SU12	7	6	4	315	ff	t	2		
SU12	7	6	4	316	ff	q	2		
SU12	8	1	1	1	ufp	t	9		irregularly shaped pebble with unifacial at 1 end, modern damage at other
SU12	8	1	1	2	ff	t	5	p	
SU12	8	1	1	3	f	t	5		could be a modern fracture - fresh ventral surface
SU12	8	1	1	4	f	t	3		focal, Hertzian, axial
SU12	8	1	1	5	ff	t	3		
SU12	8	1	1	6	f	t	3		focal, Hertzian, outrépassé
SU12	8	1	1	7	ff	t	2		rejuvenation flake
SU12	8	1	1	8	ff	t	4		
SU12	8	1	1	9	f	t	3		focal, Hertzian, axial
SU12	8	1	1	10	ff	t	2	p	
SU12	8	1	1	11	ff	ch	4		red, fine grained
SU12	8	1	1	12	fp	ch	3		red, fine grained - related to above
SU12	8	1	1	13	f	q	3		bipolar
SU12	8	1	2	14	ff	t	5	p	
SU12	8	1	2	15	f	t	6	p	compression flake
SU12	8	1	2	16	ff	t	3		
SU12	8	1	2	17	f	fgv	3		focal, Hertzian, axial, 1 ridge
SU12	8	1	2	18	ff	q	3		
SU12	8	1	2	19	ff	q	2	p	
SU12	8	1	2	20	ff	q	2		
SU12	8	1	2	21	ff	q	2		
SU12	8	1	2	22	ff	q	2		
SU12	8	1	2	23	ff	q	2		
SU12	8	1	2	24	fp	q	2	p	

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	1	2	25	ff	q	2		
SU12	8	1	3	26	ff	t	3		
SU12	8	1	3	27	p	t	2		broad, bending, step
SU12	8	1	3	28	ff	q	2		
SU12	8	1	3	29	ff	t	3	p	
SU12	8	2	1	30	f	t	4	p	focal, Hertzian, feather, 3 ridges
SU12	8	2	1	31	f	t	4		broad, Hertzian, feather, 2 ridges
SU12	8	2	1	32	f	t	4		broad, Hertzian, feather, 2 ridges
SU12	8	2	1	33	p	t	2		broad, Hertzian, step, 2 ridges
SU12	8	2	1	34	p	t	2		focal, Hertzian, step, 2 ridges
SU12	8	2	1	35	ff	t	3	p	
SU12	8	2	1	36	f	t	3		focal, Hertzian, feather, 2 ridges
SU12	8	2	1	37	ff	t	2		
SU12	8	2	1	38	f	t	2	p	focal, Hertzian, outrépassé, 1 ridge
SU12	8	2	1	39	ff	t	2		
SU12	8	2	1	40	ff	t	3	p	
SU12	8	2	1	41	ff	t	2	p	
SU12	8	2	1	42	ff	t	3		
SU12	8	2	1	43	ra	t	2		proximal, probably Bondi point, steep backing retouch from ventral, edge damage on opposing margin from ventral, consistent with use
SU12	8	2	1	44	f	t	3		focal, bending, hinge, overhang removal
SU12	8	2	1	45	f	t	2	p	focal, Hertzian, feather
SU12	8	2	1	46	ff	t	2		
SU12	8	2	1	47	ff	t	2		
SU12	8	2	1	48	p	t	2		broad, Hertzian
SU12	8	2	1	49	ff	t	2		
SU12	8	2	1	50	ff	t	2		
SU12	8	2	1	51	ff	t	2		
SU12	8	2	1	52	ff	t	2		
SU12	8	2	1	53	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	2	1	54	ff	t	2		
SU12	8	2	1	55	ff	t	1		
SU12	8	2	1	56	ff	t	2		
SU12	8	2	1	57	ff	t	2		
SU12	8	2	1	58	ff	t	1		
SU12	8	2	1	59	f	q	5	p	compression flake
SU12	8	2	1	60	ff	q	4		
SU12	8	2	1	61	c	q	3		single platform core
SU12	8	2	1	62	fp	q	3		
SU12	8	2	1	63	ff	q	3	p	
SU12	8	2	1	64	ff	q	3		
SU12	8	2	1	65	ff	q	3		
SU12	8	2	1	66	d	q	3		feather
SU12	8	2	1	67	ff	q	3		translucent
SU12	8	2	1	68	f	q	2		bipolar
SU12	8	2	1	69	ff	t	2		
SU12	8	2	1	70	ff	t	2		
SU12	8	2	1	71	ff	t	2		
SU12	8	2	1	72	ff	t	2		
SU12	8	2	1	73	ff	t	2		
SU12	8	2	1	74	ff	t	2		
SU12	8	2	1	75	ff	t	2		
SU12	8	2	1	76	ff	t	2		
SU12	8	2	1	77	ff	t	2		
SU12	8	2	1	78	ff	t	1		
SU12	8	2	1	79	ff	t	2		
SU12	8	2	1	80	ff	t	2		
SU12	8	2	1	81	ff	t	2		
SU12	8	2	1	82	ff	t	2		
SU12	8	2	1	83	ff	t	2		quartz pieces likely to be related

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	2	1	84	f	fgv	3		focal, Hertzian, feather, 2 ridges
SU12	8	2	1	85	d	ch	2		feather
SU12	8	2	1	86	ff	ch	1		
SU12	8	2	1	87	f	qu	4	p	broad, Hertzian, outrépassé, 2 ridges
SU12	8	2	2	88	f	t	3	p	broad, Hertzian, feather, 2 ridges
SU12	8	2	2	89	d	t	2		feather
SU12	8	2	2	90	d	t	2	p	feather
SU12	8	2	2	91	fp	t	2	p	
SU12	8	2	2	92	ff	t	2		
SU12	8	2	2	93	fp	t	2	p	
SU12	8	2	2	94	f	t	2		focal, Hertzian, feather
SU12	8	2	2	95	f	t	2		focal, Hertzian, step
SU12	8	2	2	96	ff	t	2		
SU12	8	2	2	97	ff	t	2	p	
SU12	8	2	2	98	ff	t	2		
SU12	8	2	2	99	f	t	2		focal, Hertzian, axial
SU12	8	2	2	100	pos	q	6	p	probable core fragment
SU12	8	2	2	101	ff	q	3	p	
SU12	8	2	2	102	f	q	3		bipolar
SU12	8	2	2	103	ff	q	2		
SU12	8	2	2	104	f	q	2		bipolar
SU12	8	2	2	105	ff	q	2		
SU12	8	2	2	106	fp	q	2	p	
SU12	8	2	2	107	ff	q	1		
SU12	8	2	2	108	ff	q	2		
SU12	8	2	2	109	ff	q	2		
SU12	8	2	2	110	ff	q	1		
SU12	8	2	2	111	f	q	2		crushed platform, feather, 2 ridges, translucent
SU12	8	2	2	112	ff	q	1		
SU12	8	2	2	113	ff	q	1		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	2	2	114	ff	q	2		
SU12	8	2b	1	115	fp	t	4	p	
SU12	8	2b	1	116	f	t	4		broad, Hertzian, hinge, longitudinally split
SU12	8	2b	1	117	f	t	3	p	focal, Hertzian, feather, overhang removal, 2 ridges
SU12	8	2b	1	118	f	t	3		focal, Hertzian, step, parallel arises
SU12	8	2b	1	119	f	t	3		focal, Hertzian, feather, 1 ridge
SU12	8	2b	1	120	f	t	2		broad, Hertzian, feather
SU12	8	2b	1	121	f	t	3	p	crushed, feather
SU12	8	2b	1	122	ff	t	3	p	
SU12	8	2b	1	123	f	t	2	p	broad, Hertzian, hinge
SU12	8	2b	1	124	f	t	3		broad, Hertzian, outrépassé
SU12	8	2b	1	125	ff	t	2		
SU12	8	2b	1	126	ff	t	2	p	
SU12	8	2b	1	127	f	t	2		crushed, overhang removal, feather, 2 ridges
SU12	8	2b	1	128	ra	t	2		geometric, flake, parallel arises, retouched distally from ventral. 17 x 9 x 3
SU12	8	2b	1	129	ff	t	2		
SU12	8	2b	1	130	ff	t	2		
SU12	8	2b	1	131	f	t	2		focal, Hertzian, step, overhang removal
SU12	8	2b	1	132	fp	t	2		
SU12	8	2b	1	133	ff	t	2		
SU12	8	2b	1	134	ff	t	2		
SU12	8	2b	1	135	f	t	2		focal, Hertzian, feather
SU12	8	2b	1	136	f	t	2		focal, crushed, feather, 1 ridge
SU12	8	2b	1	137	d	t	1		feather
SU12	8	2b	1	138	f	t	2		focal, feather, 2 ridges
SU12	8	2b	1	139	d	t	2		feather
SU12	8	2b	1	140	ff	t	2		
SU12	8	2b	1	141	f	t	1		focal, Hertzian, step, parallel arises. Tuff artefacts in this spit almost certainly related
SU12	8	2b	1	142	f	q	5	p	bipolar

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	2b	1	143	ff	q	5	p	
SU12	8	2b	1	144	ff	q	4		
SU12	8	2b	1	145	ff	q	2		
SU12	8	2b	1	146	f	q	3		focal, Hertzian, feather, 2 ridges
SU12	8	2b	1	147	ff	q	2		
SU12	8	2b	1	148	d	q	2		feather
SU12	8	2b	1	149	f	q	1		bipolar
SU12	8	2b	1	150	ff	q	1		
SU12	8	2b	1	151	ff	q	1		quartz artefacts in this spit are almost certainly related.
SU12	8	2b	1	152	f	qu	3		broad, feather, longitudinally broken
SU12	8	2b	1	153	ff	fgv	2		
SU12	8	2b	1	154	ff	ch	3		red/purple very fine grained
SU12	8	2b	1	155	ff	ch	3		
SU12	8	2b	1	156	d	ch	2		feather
SU12	8	2b	1	157	ff	ch	2		
SU12	8	2b	1	158	d	ch	2		feather
SU12	8	2b	1	159	ff	ch	1		
SU12	8	2b	2	160	f	t	3	p	broad, Hertzian, feather, longitudinally broken
SU12	8	2b	2	161	f	t	2		broad, Hertzian ,feather
SU12	8	2b	2	162	ff	t	2		
SU12	8	2b	2	163	f	t	2		focal, Hertzian, feather
SU12	8	2b	2	164	d	t	2		feather
SU12	8	2b	2	165	ff	t	2	p	
SU12	8	2b	2	166	ff	t	1		
SU12	8	2b	2	167	f	t	1		broad, Hertzian ,step
SU12	8	2b	2	168	ff	fgv	3		
SU12	8	2b	2	169	f	q	2		bipolar, longitudinally split
SU12	8	2b	2	170	ff	q	2		
SU12	8	2b	2	171	ff	q	2		
SU12	8	2b	2	172	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	2b	2	173	ff	q	2		
SU12	8	2b	2	174	f	q	2		focal, Hertzian, feather, longitudinally split
SU12	8	2b	2	175	ff	q	2		
SU12	8	2b	2	176	ff	q	1		
SU12	8	2b	2	177	ff	ch	2		
SU12	8	2b	2	178	ff	ch	1		
SU12	8	2b	3	179	f	fgv	2		broad, bending, step
SU12	8	2b	3	180	fp	q	2		
SU12	8	3	1	181	c	t	7	p	amorphous core, minor flaking from 1 cortical margin
SU12	8	3	1	182	f	t	5	p	focal, Hertzian, feather, 2 ridges
SU12	8	3	1	183	ff	t	7	p	
SU12	8	3	1	184	ff	t	6	p	
SU12	8	3	1	185	fp	t	5	p	
SU12	8	3	1	186	f	t	7		focal, Hertzian, feather, 2 ridges
SU12	8	3	1	187	f	t	7	p	crushed, outrépassé, parallel arises
SU12	8	3	1	188	ff	t	5		
SU12	8	3	1	189	f	t	4	p	broad, Hertzian, feather
SU12	8	3	1	190	f	t	3		broad, Hertzian, feather, 2 ridges
SU12	8	3	1	191	f	t	4	p	focal, outrépassé
SU12	8	3	1	192	ff	t	4		
SU12	8	3	1	193	f	t	4		focal, Hertzian, feather, longitudinally split
SU12	8	3	1	194	ff	t	3	p	
SU12	8	3	1	195	f	t	4	p	focal, Hertzian, feather, 2 ridges
SU12	8	3	1	196	f	t	3		crushed, hinge, 1 ridge
SU12	8	3	1	197	d	t	3		feather
SU12	8	3	1	198	f	t	3		focal, Hertzian, feather, overhang removal, 2 ridges
SU12	8	3	1	199	f	t	2	p	broad, Hertzian, axial
SU12	8	3	1	200	f	t	4	p	focal, Hertzian, feather, 2 ridges
SU12	8	3	1	201	ff	t	3		
SU12	8	3	1	202	ff	t	3		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	3	1	203	f	t	3		focal, Hertzian, hinge
SU12	8	3	1	204	f	t	2		focal, Hertzian
SU12	8	3	1	205	ff	t	2		
SU12	8	3	1	206	d	t	2		feather
SU12	8	3	1	207	p	t	2		focal, Hertzian, 1 ridge
SU12	8	3	1	208	f	t	2		crushed, feather, 2 ridges
SU12	8	3	1	209	f	t	2		focal, Hertzian, feather, 2 ridges
SU12	8	3	1	210	f	t	3		Hertzian, feather, longitudinally broken
SU12	8	3	1	211	ff	t	2		
SU12	8	3	1	212	ff	t	2		
SU12	8	3	1	213	ff	t	2		
SU12	8	3	1	214	ff	t	2		
SU12	8	3	1	215	f	t	2		broad, bending, hinge, 2 ridges
SU12	8	3	1	216	ff	t	2		
SU12	8	3	1	217	d	t	2		feather
SU12	8	3	1	218	f	t	2	p	crushed, feather
SU12	8	3	1	219	ff	t	2		
SU12	8	3	1	220	f	t	1		broad, bending, step
SU12	8	3	1	221	f	t	2		broad, bending, feather
SU12	8	3	1	222	f	t	1		crushed, feather, 1 ridge
SU12	8	3	1	223	ff	t	2		
SU12	8	3	1	224	f	t	2		broad, Hertzian, feather. Tuff artefacts in this spit are likely to be related
SU12	8	3	1	225	p	s	2		high quality white. Focal, Hertzian, parallel arises
SU12	8	3	1	226	d	qu	3		feather
SU12	8	3	1	227	f	ch	2	p	focal, Hertzian, feather, 2 ridges
SU12	8	3	1	228	f	ch	4	?	broad, Hertzian, feather, 2 ridges
SU12	8	3	1	229	ff	t	2		
SU12	8	3	1	230	ff	q	2	p	
SU12	8	3	1	231	ff	q	2		
SU12	8	3	1	232	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	3	1	233	ff	t	2		
SU12	8	3	2	234	f	t	5	p	broad, Hertzian, feather, 3 ridges
SU12	8	3	2	235	ff	t	4		
SU12	8	3	2	236	ff	t	5		
SU12	8	3	2	237	f	t	4	p	focal, Hertzian, feather, longitudinally split
SU12	8	3	2	238	ff	t	3	p	
SU12	8	3	2	239	ff	t	3		
SU12	8	3	2	240	ff	t	4		
SU12	8	3	2	241	ff	t	3	p	
SU12	8	3	2	242	ff	t	3	p	
SU12	8	3	2	243	f	t	3		focal, Hertzian, hinge
SU12	8	3	2	244	ff	t	3		
SU12	8	3	2	245	f	t	3		crushed, Hertzian, step, 1 ridge
SU12	8	3	2	246	f	t	3		broad, Hertzian, feather, longitudinally broken
SU12	8	3	2	247	f	t	3		broad, Hertzian, feather, longitudinally broken
SU12	8	3	2	248	ff	t	3		
SU12	8	3	2	249	f	t	3		focal, Hertzian, feather, longitudinally split
SU12	8	3	2	250	ff	t	2		
SU12	8	3	2	251	ff	t	2		
SU12	8	3	2	252	ff	t	2		
SU12	8	3	2	253	ff	t	2		
SU12	8	3	2	254	f	t	2		focal, Hertzian, step
SU12	8	3	2	255	ff	t	2		
SU12	8	3	2	256	f	t	2		focal, Hertzian, axial, 1 ridge
SU12	8	3	2	257	ff	t	2		
SU12	8	3	2	258	f	t	2		bending, feather
SU12	8	3	2	259	ff	t	2		
SU12	8	3	2	260	f	t	2		focal, Hertzian, feather
SU12	8	3	2	261	ff	t	2		
SU12	8	3	2	262	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	3	2	263	ff	t	2		
SU12	8	3	2	264	p	t	1		focal, Hertzian, 2 ridges
SU12	8	3	2	265	f	t	1		focal, Hertzian, feather. Tuff artefacts in this spit and spit above are likely to be related
SU12	8	3	2	266	f	q	4		compression flake
SU12	8	3	2	267	f	q	4		bipolar
SU12	8	3	2	268	d	q	3		feather
SU12	8	3	2	269	ff	q	3		
SU12	8	3	2	270	f	q	2		bipolar
SU12	8	3	2	271	ff	q	2		
SU12	8	3	2	272	d	q	2		feather
SU12	8	3	2	273	d	q	2		feather
SU12	8	3	2	274	ff	q	2		
SU12	8	3	2	275	ff	q	2		
SU12	8	3	2	276	ff	q	2		
SU12	8	3	2	277	ff	q	2		
SU12	8	3	2	278	ff	q	1		
SU12	8	3	2	279	f	q	1		crushed, Hertzian, feather, 1 ridge. Quartz pieces in this and the above spit are likely to be related
SU12	8	3	2	280	f	ch	2		1 of 6 related pieces - black high quality chert. Broad, Hertzian, feather, on 1 margin retouching from a larger piece - rejuvenation flake
SU12	8	3	2	281	ff	ch	2		
SU12	8	3	2	282	f	ch	2		gull wing, 2 initiation points, 2 érraillure scars, feather termination
SU12	8	3	2	283	f	ch	2		focal, Hertzian, feather, 2 ridges
SU12	8	3	2	284	m	ch	2		
SU12	8	3	2	285	f	ch	2		focal Hertzian, feather, core rotation, 2 ridges
SU12	8	3	2	286	f	ch	3	p	broad, Hertzian, feather, 3 ridges. Different material to the above
SU12	8	3	2	287	f	ch	1		focal, Hertzian, feather, 1 ridge
SU12	8	3	3	288	f	t	2		focal, Hertzian, feather, 2 ridges
SU12	8	4	1	289	ff	t	6	p	

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU12	8	4	1	290	f	t	6		crushed, feather, 2 scars, overhang removal
SU12	8	4	1	291	f	t	4	p	focal, Hertzian, feather, 2 ridges
SU12	8	4	1	292	pos	t	2		
SU12	8	4	1	293	f	t	2		focal, Hertzian
SU12	8	4	1	294	ff	t	2		
SU12	8	4	1	295	ff	t	2		
SU12	8	4	1	296	ff	t	2		
SU12	8	4	1	297	ff	t	2		
SU12	8	4	1	298	f	t	2		focal, Hertzian, step, 2 ridges
SU12	8	4	1	299	f	t	2		focal, Hertzian, feather, overhang removal
SU12	8	4	1	300	ff	q	4		
SU12	8	4	1	301	ff	q	2		
SU12	8	4	1	302	ff	q	2		
SU12	8	4	1	303	ff	q	2		
SU12	8	4	1	304	f	ch	2		focal, Hertzian, feather, 2 ridges
SU12	8	4	1	305	ff	ch	2		
SU12	8	4	2	306	f	ch	3		broad, Hertzian, step
SU12	8	4	2	307	ff	ch	2		
SU12	8	4	2	308	ff	t	1		
SU12	8	4	3	309	ff	t	2		
SU12	8	4	3	310	ff	q	1		
SU6	1	1	1	1	f	t	6	p	crushed platform; Hertzian; axial termination and 1 ridge
SU6	1	1	1	2	f	t	3		broad platform; Hertzian; feather; 3 ridges
SU6	1	1	1	3	f	t	6	p	focal; Hertzian; plunging; 2 ridges
SU6	1	1	1	4	f	t	3		crushed platform; axial; 2 ridges
SU6	1	1	1	5	f	t	3	p	broad; Hertzian; feather
SU6	1	1	1	6	f	t	3		focal; Hertzian; step
SU6	1	1	1	7	f	t	3		focal; Hertzian; feather; 3 ridges
SU6	1	1	1	8	ff	t	3	p	
SU6	1	1	1	9	f	t	3		focal; Hertzian; feather; 2 ridges

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	1	1	1	10	ff	t	2		
SU6	1	1	1	11	ff	t	2		
SU6	1	1	1	12	p	t	2		focal; Hertzian
SU6	1	1	1	13	f	t	2		focal; bending; feather; core rotation
SU6	1	1	1	14	d	t	2		feather
SU6	1	1	1	15	fp	ch	3		
SU6	1	1	1	16	fp	ch	2		
SU6	1	1	1	17	ff	ch	3		
SU6	1	1	1	18	ff	ch	2		
SU6	1	1	1	19	ff	ch	2		
SU6	1	1	1	20	f	ch	2		broad; Hertzian; feather; parallel arises
SU6	1	1	1	21	ff	ch	2		
SU6	1	1	1	22	ff	q	2		
SU6	1	1	1	23	f	fgv	3		focal; Hertzian; axial; 1 ridge
SU6	1	1	2	24	p	t	3		broad; Hertzian
SU6	1	1	2	25	f	t	3		broad; Hertzian; axial; longitudinally split
SU6	1	1	2	26	ff	t	3		
SU6	1	1	2	27	f	t	2	p	focal; Hertzian; feather; 2 ridges
SU6	1	1	2	28	f	t	3		focal; Hertzian; feather; 2 ridges
SU6	1	1	2	29	f	t	3		focal; Hertzian; feather; 1 ridge
SU6	1	1	2	30	ff	t	2		
SU6	1	1	2	31	ff	t	2		
SU6	1	1	2	32	ff	t	2		
SU6	1	1	2	33	ff	t	2		
SU6	1	1	2	34	m	t	2		
SU6	1	1	2	35	ff	t	2		
SU6	1	1	2	36	p	t	1		bending
SU6	1	1	2	37	f	t	1		broad; Hertzian; feather; overhang removal
SU6	1	1	2	38	pos	ch	3		
SU6	1	1	2	39	pos	ch	3		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	1	1	2	40	p	t	2		focal Hertzian; parallel arises
SU6	1	1	2	41	d	t	2		feather
SU6	1	1	3	42	ff	ch	3		
SU6	1	1	3	43	p	t	2		focal; Hertzian
SU6	1	1	3	44	p	t	2	p	broad; Hertzian
SU6	1	1	3	45	ff	q	3		
SU6	1	2	1	46	f	t	4		focal; Hertzian; axial; 4 ridges
SU6	1	2	1	47	f	t	6		broad; Hertzian; axial; 4 ridges
SU6	1	2	1	48	ff	t	3	p	
SU6	1	2	1	49	ff	t	4	p	
SU6	1	2	4	50	ff	t	4	p	
SU6	1	2	1	51	p	t	2		broad; Hertzian
SU6	1	2	1	52	ff	t	2		
SU6	1	2	1	53	p	t	1		broad; Hertzian
SU6	1	2	1	54	ff	t	2		
SU6	1	2	1	55	p	t	1		broad; Hertzian
SU6	1	2	1	56	pos	q	2		
SU6	1	2	1	57	f	ch	2		crushed; Hertzian; hinge
SU6	1	2	2	58	ff	t	5		
SU6	1	2	2	59	f	t	4		focal; Hertzian; feather; 1 ridge
SU6	1	2	2	60	f	t	3		focal; Hertzian; feather; 1 ridge
SU6	1	2	2	61	f	t	2	p	broad; Hertzian; feather
SU6	1	2	2	62	f	t	2		focal; Hertzian; step; parallel arises
SU6	1	2	2	63	p	t	2		focal; Hertzian; parallel arises
SU6	1	2	2	64	ff	t	2		
SU6	1	2	2	65	pos	q	3		
SU6	1	2	2	66	ff	q	1		
SU6	1	2	2	67	d	ch	4		axial
SU6	1	2	2	68	f	ch	2		focal; Hertzian; step
SU6	1	2	2	69	p	ch	2		focal; Hertzian

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	1	2	2	70	ff	ch	2		
SU6	1	2	3	71	ff	q	3		
SU6	1	2	4	72	ff	q	2		
SU6	1	3	1	73	f	t	4	p	focal; Hertzian; feather; 3 ridges
SU6	1	3	1	74	f	t	3		focal; Hertzian; step; 1 ridge
SU6	1	3	1	75	ff	t	3		
SU6	1	3	1	76	ff	t	2		
SU6	1	3	1	77	f	q	4	p	broad; compression flake; 1 ridge
SU6	1	3	1	78	f	q	3		focal; Hertzian; feather; 3 ridges
SU6	1	3	1	79	fp	q	3	p	
SU6	1	3	1	80	f	q	3		focal; Hertzian; hinge; 2 ridges
SU6	1	3	1	81	fp	ch	2		
SU6	1	3	1	82	fp	ch	2		
SU6	1	3	2	83	f	t	4		focal; Hertzian; feather; overhang removal; numerous ridges
SU6	1	3	2	84	f	t	4	p	broad; Hertzian; overhang removal
SU6	1	3	2	85	f	t	3		broad; Hertzian; feather
SU6	1	3	2	86	ff	t	3		
SU6	1	3	2	87	p	t	3		focal; Hertzian
SU6	1	3	2	88	ff	t	2		
SU6	1	3	2	89	d	t	2		feather
SU6	1	3	2	90	ff	t	2		
SU6	1	3	2	91	ff	t	2		
SU6	1	3	2	92	ff	t	2		
SU6	1	3	2	93	p	t	2		focal; Hertzian
SU6	1	3	2	94	ff	t	2		
SU6	1	3	2	95	ff	t	2		
SU6	1	3	2	96	pos	q	3		
SU6	1	3	2	97	ff	q	2		
SU6	1	3	2	98	ff	q	2		
SU6	1	3	2	99	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	1	3	2	100	ff	q	1		
SU6	1	3	2	101	d	t	1		feather
SU6	1	3	3	102	p	ch	2		focal; Hertzian
SU6	1	3	3	103	fp	q	3	p	
SU6	1	3B	1	104	f	t	5	p	broad; Hertzian; feather; 1 ridge
SU6	1	3B	1	105	f	t	3		broad; Hertzian; step; 2 ridges
SU6	1	3B	1	106	f	t	5	p	focal; Hertzian; outrépassé; overhang removal
SU6	1	3B	1	107	f	t	3		broad; Hertzian; step; 1 ridge
SU6	1	3B	1	108	ff	t	3		
SU6	1	3B	1	109	ff	t	2		
SU6	1	3B	1	110	f	t	2		focal; Hertzian; feather; parallel arises
SU6	1	3B	1	111	ff	t	2		
SU6	1	3B	1	112	f	t	2		focal; Hertzian; feather
SU6	1	3B	1	113	ff	t	2		
SU6	1	3B	1	114	ff	t	2		
SU6	1	3B	1	115	ff	t	2		
SU6	1	3B	1	116	ff	t	2		
SU6	1	3B	1	117	f	t	2		broad; Hertzian; feather
SU6	1	3B	1	118	ff	t	2		
SU6	1	3B	1	119	f	t	2		focal; Hertzian; feather
SU6	1	3B	1	120	f	t	2		focal; Hertzian; feather
SU6	1	3B	1	121	f	ch	3		focal; Hertzian; step; 1 ridge; grey; high quality
SU6	1	3B	1	122	f	q	1		focal; Hertzian; feather
SU6	1	3B	1	123	ff	q	2		
SU6	1	3B	1	124	ff	q	2		
SU6	1	3B	2	125	f	t	6		focal; Hertzian; feather; 2 ridges; longitudinally split
SU6	1	3B	2	126	f	t	3		focal; Hertzian; feather
SU6	1	3B	2	127	d	t	3		feather; parallel arises
SU6	1	3B	2	128	d	t	3		feather; 1 ridge
SU6	1	3B	2	129	d	t	3		feather

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	1	3B	2	130	ra	t	3		broken; probably distal; bifacial retouch backing
SU6	1	3B	2	131	ff	t	3		
SU6	1	3B	2	132	ra	t	2		proximal portion; retouch along part of one margin
SU6	1	3B	2	133	f	t	2		focal; Hertzian; feather
SU6	1	3B	2	134	f	ch	2	p	broad; Hertzian; feather; 2 ridges
SU6	1	3B	2	135	ff	ch	2		
SU6	1	3B	2	136	f	ch	2		broad; Hertzian; feather
SU6	1	3B	2	137	m	ch	2		
SU6	1	3B	2	138	ff	ch	2		
SU6	1	3B	2	139	ff	t	1		
SU6	1	3B	2	140	ff	ch	2		
SU6	1	3B	2	141	fp	q	2		
SU6	1	3B	2	142	f	q	1		focal; Hertzian; feather; 1 ridge
SU6	1	4	1	143	ff	t	2		
SU6	1	4	1	144	pos	ch	2		
SU6	1	4	1	145	pos	ch	2		
SU6	1	4	1	146	pos	s	1		
SU6	1	4	1	147	f	ch	2		focal
SU6	1	4	1	148	f	qu	4	p	broad; Hertzian; feather
SU6	1	4	2	149	f	t	4	p	broad; Hertzian; feather
SU6	1	4	2	150	ff	t	3		
SU6	1	4	2	151	ff	t	3	p	
SU6	1	4	2	152	f	t	3		parallel arises
SU6	1	4	2	153	ff	q	5	p	
SU6	1	4	2	154	f	q	2		broad; Hertzian; feather; longitudinally split
SU6	1	4	2	155	ff	q	2		
SU6	1	4	2	156	ff	ch	1		
SU6	1	4	3	157	d	q	2		feather
SU6	1	5	1	158	f	t	1		focal; Hertzian; feather
SU6	1	5	1	159	pos	ch	1		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	1	5	1	160	p	q	2		broad; Hertzian
SU6	1	5	2	161	p	ch	2		broad; Hertzian; black high quality
SU6	1	5	2	162	ff	q	1		
SU6	1	5	3	163	ff	t	2		
SU6	1	5	3	164	ff	q	1		
SU6	1	5	3	165	ff	q	4		
SU6	1	6	1	166	f	t	5	p	focal; Hertzian; feather
SU6	1	6	1	167	f	t	4		focal; Hertzian; axial
SU6	1	6	1	168	f	t	3		focal; Hertzian; feather; 1 ridge
SU6	1	6	1	169	ff	q	3		
SU6	1	6	1	170	ff	q	2		
SU6	1	6	1	171	ff	q	2		
SU6	1	6	1	172	ff	q	2		
SU6	1	6	1	173	f	q	2		bipolar
SU6	1	6	1	174	ra	q	2		broken Bondi point
SU6	1	6	1	175	ff	q	2		
SU6	1	6	1	176	ff	q	2		
SU6	1	6	1	177	f	q	1		bipolar
SU6	1	6	2	178	ff	q	3		
SU6	2	1	1	1	f	t	2	p	broad; bending; feather
SU6	2	1	1	2	ff	t	4	p	
SU6	2	1	1	3	f	t	4		focal; Hertzian; feather; 1 ridge
SU6	2	1	1	4	d	t	4	p	feather
SU6	2	1	1	5	f	t	3		focal; Hertzian; outrépassé; 3 ridges
SU6	2	1	1	6	f	t	4		broad; Hertzian; feather; longitudinally split
SU6	2	1	1	7	ff	t	2		
SU6	2	1	1	8	ff	t	2		
SU6	2	1	1	9	f	t	2		focal; Hertzian; feather
SU6	2	1	1	10	ff	t	1		
SU6	2	1	1	11	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	2	1	1	12	d	t	2		feather
SU6	2	1	1	13	pos	q	3		
SU6	2	1	1	14	ff	q	1		
SU6	2	1	2	15	f	t	5	p	focal; Hertzian; hinge
SU6	2	1	2	16	ff	t	4	p	
SU6	2	1	2	17	ff	t	3		1 ridge
SU6	2	1	2	18	f	t	4	p	focal; Hertzian; feather; 1 ridge
SU6	2	1	2	19	d	t	3		feather
SU6	2	1	2	20	d	t	3		feather
SU6	2	1	2	21	ff	t	2		
SU6	2	1	2	22	f	t	2		broad; Hertzian; feather
SU6	2	1	2	23	ff	t	2		
SU6	2	1	2	24	ff	t	3		
SU6	2	1	2	25	p	t	1		
SU6	2	1	2	26	f	t	2		broad; Hertzian; step
SU6	2	1	2	27	ff	t	2		all tuff arts in spit 2 are probably related
SU6	2	1	2	28	ff	q	3	p	
SU6	2	1	2	29	ff	q	3		
SU6	2	1	2	30	f	q	2		focal; Hertzian; feather
SU6	2	1	2	31	f	q	2		bipolar
SU6	2	1	2	32	ff	ch	2		black high quality
SU6	2	1B	1	33	cf	t	5		
SU6	2	1B	1	34	p	t	3		broad; Hertzian; 2 ridges
SU6	2	1B	1	35	f	t	2		broad; bending; step
SU6	2	1B	1	36	ff	t	2		
SU6	2	1B	1	37	ff	t	2		
SU6	2	1B	1	38	ff	t	3	p	
SU6	2	1B	1	39	f	t	6	p	broad; Hertzian; feather
SU6	2	1B	1	40	cf	q	6	p	
SU6	2	1B	1	41	fp	q	3		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	2	1B	1	42	ff	q	1		
SU6	2	1B	1	43	ff	q	1		
SU6	2	1B	1	44	ff	ch	1		
SU6	2	1B	2	45	ff	t	2		
SU6	2	1B	2	46	ff	t	4		
SU6	2	1B	2	47	ff	t	2	p	
SU6	2	1B	2	48	fp	t	2		
SU6	2	1B	2	49	f	t	2		broad; Hertzian; step; 2 ridges
SU6	2	1B	2	50	ff	q	4		
SU6	2	1B	2	51	ff	q	3		
SU6	2	1B	2	52	ff	q	2		
SU6	2	1B	2	53	f	ch	3		focal; Hertzian; feather; parallel arises; dark grey
SU6	2	1B	2	54	f	ch	2		broad; Hertzian; feather; 2 ridges
SU6	2	1B	3	55	f	t	2		focal; bending; feather; 2 ridges; overhang removal
SU6	2	1B	3	56	ff	q	1		
SU6	2	3	1	57	p	t	2		crushed platform; step; 2 ridges
SU6	2	3	1	58	ff	t	3		
SU6	2	3	1	59	p	t	1		focal; Hertzian; 2 ridges
SU6	2	3	1	60	ff	t	3	p	
SU6	2	3	1	61	d	fgv	2		feather
SU6	2	3	2	62	d	t	3	p	
SU6	2	3	2	63	f	q	3		focal; Hertzian; 1 ridge
SU6	2	3	3	64	ff	q	2		
SU6	2	3	4	65	f	t	2		broad; Hertzian; feather; overhang removal
SU6	2	3B	1	66	f	t	3		broad; Hertzian; step
SU6	2	3B	1	67	ff	t	3	p	
SU6	2	3B	1	68	ra	t	3		broken in two; tip missing; Bondi point
SU6	2	3B	1	69	ff	t	2		
SU6	2	3B	2	70	f	t	2		focal; Hertzian; feather
SU6	2	3B	2	71	f	q	2		broad; Hertzian; feather

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU6	2	3B	2	72	ff	q	2		
SU6	2	3B	2	73	f	q	5	p	compression flake
SU6	2	4	1	74	d	t	2		feather
SU6	2	4	1	75	ff	t	2		
SU6	2	4	1	76	ff	q	2		
SU6	2	4	1	77	p	t	1		focal; Hertzian; overhang removal
SU6	2	4	1	78	f	q	1		focal; Hertzian; step
SU6	2	4	1	79	ff	q	2		
SU6	2	4	1	80	ff	q	2		
SU6	2	4	3	81	p	q	2		broad; Hertzian
SU6	2	4	3	82	ff	q	1		
SU6	2	4	3	83	d	q	2		feather
SU6	2	4	3	84	ff	q	1		
SU6	2	5	1	85	f	t	4	p	broad; Hertzian; step
SU6	2	5	1	86	f	t	2		focal; Hertzian; feather
SU6	2	5	1	87	f	t	1		possible érraillure
SU6	2	5	2	88	p	t	3		focal; Hertzian; 3 ridges
SU6	2	5	2	89	ff	q	2		
SU8	1	4C	1	1	pos	qu	3		
SU8	1	4C	1	2	pos	qu	8		
SU8	1	4D	10	3	pos	ch	6	p	flake like features; focal platform with an outrépassé termination; the entire piece is heavily waterworn and smooth; inclusive of the ventral surface and all edges
SU8	3	1	2	1	d	t	1		hinge
SU8	3	1	3	2	pos	t	3		flake like features; broad crush platform; Hertzian; hinge; all surfaces very weathered and smooth including all margins
SU8	3	1	3	3	pos	t	4		small pebble with 1 negative scar and crushing at top and bottom of scar; all surfaces very smooth including margins
SU8	3	1	3	4	pos	q	2		flake fragment like; highly smooth surfaces and edges
SU8	3	1	4	5	pos	t	2		fresh fracture; possible flake fragment; all faces and edges highly weathered and smooth

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU8	3	1	4	6	pos	t	2		fresh fracture; possible flake fragment; all faces and edges highly weathered and smooth
SU8	3	2B	5	7	pos	t	3		fresh fracture; possible flake fragment; all faces and edges highly weathered and smooth
SU8	3	2	2	8	ff	t	5	p	
SU8	3	2	5	9	pos	t	2		flake like features; highly weathered; smooth surfaces and edges
SU8	3	3	1	10	ff	q	2		
SU8	3	3	2	11	f	t	2	p	focal; Hertzian; feather
SU8	3	3	2	12	pos	ch	3		
SU8	3	3	2	13	p	ch	4		focal; crushed; 1 ridge
SU8	3	3	3	14	pos	t	1		flake like features; highly weathered; smooth surfaces and edges
SU8	3	3	3	15	pos	t	5	p	flake like features; highly weathered; smooth surfaces and edges
SU8	3	3	5	16	f	t	4	p	bending; feather; overhang removal; 4 ridges
SU8	3	3	5	17	f	t	3		broad; Hertzian; feather; overhang removal; 2 ridges
SU8	3	3	5	18	f	t	3	p	focal; Hertzian; axial; overhang removal; 3 ridges
SU8	3	3	5	19	f	t	3		broad; Hertzian; feather; overhang removal; 1 ridge
SU8	3	3	5	20	f	t	3		crushed; step; 2 ridges
SU8	3	3	5	21	f	t	3	p	broad; Hertzian; overhang removal; 3 ridges
SU8	3	3	5	22	f	t	3		broad; Hertzian; feather; modern break
SU8	3	3	5	23	f	t	2	p	broad; Hertzian; hinge; overhang removal
SU8	3	3	5	24	p	t	2		crushed; Hertzian; overhang removal; 2 ridges
SU8	3	3	5	25	pos	t	2	p	all surfaces smooth and all edges rounded; all tuff in spit 5 most likely related event
SU8	3	3	5	26	c	ch	4		part of one knapping event; #26 - 45; single platform core; platform pebble cortex; whitish fine grained; numerous scars all over
SU8	3	3	5	27	f	ch	3		crushed; step; overhang removal
SU8	3	3	5	28	ra	ch	3		flake fragment; 1 ridge; retouched both ends and one margin; chord has some possible damage consistent with use
SU8	3	3	5	29	f	ch	2		crushed; feather
SU8	3	3	5	30	f	ch	3		crushed; feather; 2 ridges; overhang removal

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU8	3	3	5	31	ra	ch	3		flake with crushed platform; 1 ridge; retouched on one margin from ventral and only on the distal portion
SU8	3	3	5	32	ff	ch	2		
SU8	3	3	5	33	ff	ch	2		
SU8	3	3	5	34	ra	ch	3		flake; 2 ridges; distally retouched on one margin from the ventral; edge damage with use on the chord
SU8	3	3	5	35	ra	ch	2		flake fragment; triangular in plan view; retouched from ventral on one margin
SU8	3	3	5	36	ff	ch	3		
SU8	3	3	5	37	ff	ch	2		
SU8	3	3	5	38	f	ch	2		broad; bending; step; 1 ridge
SU8	3	3	5	39	f	ch	2	p	pebble cortex on platform; focal; Hertzian; feather; overhang removal; 2 ridges
SU8	3	3	5	40	ff	ch	3		
SU8	3	3	5	41	f	ch	2		focal; Hertzian; step; overhang removal; 2 ridges
SU8	3	3	5	42	ff	ch	2		
SU8	3	3	5	43	ff	ch	2		
SU8	3	3	5	44	ff	ch	2		
SU8	3	3	5	45	ff	ch	2		
SU8	3	3	5	46	f	s	1		focal; Hertzian; feather; overhang removal; 2 ridges; fine grained brown
SU8	3	3B	2	47	ff	t	2		
SU8	3	3B	4	48	ff	q	2		
SU8	3	3B	5	49	f	t	5		the following tuff artefacts will be related to the tuff from square 3 spit 5; focal; Hertzian; hinge; overhang removal; 2 ridges
SU8	3	3B	5	50	p	t	4		broad; Hertzian; overhang removal; 2 ridges
SU8	3	3B	5	51	f	t	3		focal; Hertzian; feather; 1 ridge
SU8	3	3B	5	52	f	t	4	p	crushed; Hertzian; feather
SU8	3	3B	5	53	m	t	4		2 scars
SU8	3	3B	5	54	p	t	2		broad; Hertzian; overhang removal
SU8	3	3B	5	55	d	t	4	p	feather
SU8	3	3B	5	56	f	t	3	p	focal; Hertzian; feather; overhang removal
SU8	3	3B	5	57	f	t	2		crushed; feather; overhang removal

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU8	3	3B	5	58	f	t	3		crushed; feather; 1 ridge
SU8	3	3B	5	59	ra	t	2		flake fragment; retouch from ventral along one concave shaped margin
SU8	3	3B	5	60	ff	t	2		
SU8	3	3B	5	61	ff	t	2		
SU8	3	3B	5	62	ff	t	2		
SU8	3	3B	5	63	ff	t	2		
SU8	3	3B	5	64	ra	ch	3		flake; 1 ride; distally backed from the ventral; possible use wear on the chord
SU8	3	3B	5	65	ff	ch	3		
SU8	3	3B	5	66	ra	ch	2		triangular in plan view
SU8	3	3B	5	67	d	ch	1		feather
SU8	3	3B	5	68	ff	ch	2		all chert in square 3B spit 5 #64 - 68 related to the chert in square 3 spit 5
SU8	3	3B	5	69	m	s	2		brown; almost certainly related to the piece in square 3 spit 5
SU8	3	4	2	70	f	t	5		focal; Hertzian; outrépassé; core has been rotated
SU8	3	4	3	71	f	t	4	p	broad; Hertzian; feather; 1 ridge; overhang removal
SU8	4	1	3	1	f	t	3		broad; Hertzian; feather; 2 ridges
SU8	4	1	4	2	c	t	7	p	split pebble; small amount of flaking from the ventral on two margins
SU8	4	3	2	3	pos	ch	2		
SU10	1	1	1	1	f	t	2		focal; Hertzian; hinge; 1 ridge
SU10	1	2	1	2	d	t	3		feather
SU10	1	2	1	3	ff	t	2	p	
SU10	1	2	1	4	f	t	2	p	focal; Hertzian; feather
SU10	1	2	1	5	p	q	2		focal; Hertzian
SU10	1	2	1	6	ff	q	1		
SU10	1	3	1	7	f	t	3		focal; Hertzian; step; 2 ridges
SU10	1	3	1	8	ff	t	3		
SU10	1	3	1	9	f	t	2		broad; bending ; feather
SU10	1	3	1	10	cf	ch	4	p	
SU10	1	3	1	11	ff	t	2	p	
SU10	1	3	1	12	ff	q	4	p	
SU10	1	3	2	13	f	t	4		focal; Hertzian; feather; 2 ridges

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU10	1	3	2	14	ff	t	2	p	
SU10	1	3	2	15	ff	t	2		
SU10	1	3	2	16	f	t	1		focal; Hertzian; feather
SU10	1	3	2	17	ff	q	2		
SU10	1	3	3	18	ff	t	2		
SU10	1	3	3	19	ff	t	2		
SU10	1	3	3	20	f	qu	3		broad; Hertzian; feather; 1 ridge
SU10	1	3	3	21	f	ch	2		focal; feather
SU10	1	4	1	22	f	t	5	p	compression flake
SU10	1	4	1	23	ff	t	3	p	
SU10	1	4	1	24	ff	t	3		
SU10	1	4	1	25	fp	t	2	p	
SU10	1	4	1	26	uu	t	2	p	edge damage consistent with use on one margin; item has modern breakage
SU10	1	4	1	27	ff	t	2		modern damage
SU10	1	4	1	28	fp	t	2		modern damage
SU10	1	4	1	29	ff	t	2		
SU10	1	4	1	30	ff	t	1	p	
SU10	1	4	1	31	f	t	2	p	focal; Hertzian; feather
SU10	1	4	1	32	fp	t	2	p	
SU10	1	4	1	33	ff	t	3		
SU10	1	4	1	34	ff	t	2	p	
SU10	1	4	1	35	f	t	1		broad; Hertzian; feather
SU10	1	4	1	36	pos	q	5	p	
SU10	1	4	1	37	f	q	2		focal; Hertzian; feather; 3 ridges
SU10	1	4	1	38	ff	q	2		
SU10	1	4	1	39	fp	q	2		
SU10	1	4	1	40	ff	q	2		
SU10	1	4	1	41	fp	q	2		
SU10	1	4	1	42	ff	q	2		
SU10	1	4	1	43	f	q	2		crushed; Hertzian; feather

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU10	1	4	1	44	p	ch	1		edge damage consistent with use on one margin; very fine grained; high quality
SU10	1	4	1	45	ra	ch	2		fine grained; distally retouched from ventral
SU10	1	4	1	46	uu	ch	2		Hertzian flake; edge damage consistent with use from the dorsal on one margin
SU10	1	4	1	47	f	ch	2		focal; Hertzian; feather
SU10	1	4	2	48	f	q	3	p	bipolar
SU10	1	4	2	49	f	q	2		focal; Hertzian; feather
SU10	1	4	2	50	fp	q	2		
SU10	1	4	2	51	pos	q	2		
SU10	1	4	2	52	f	q	2		focal; Hertzian; feather; grey quartz with parallel arises
SU10	1	4	2	53	fp	q	2	P	
SU10	1	4	4	54	ff	q	1		
SU10	1	5	1	55	c	fgv	7	p	bifacial core
SU10	1	5	1	56	f	t	3		crushed; Hertzian; feather; 2 ridges
SU10	1	5	1	57	ff	q	2		
SU10	1	5	1	58	ff	ch	3		
SU10	1	5	1	59	ff	ch	2		
SU10	1	5	1	60	ff	ch	2		
SU10	1	5	1	61	f	ch	1		focal; Hertzian; feather
SU10	1	5	1	62	ff	ch	1		
SU10	1	5	1	63	pos	ch	2		
SU10	1	5	1	64	ff	t	1	p	
SU10	1	5	2	65	c	t	6	p	split pebble; minor flaking; from the ventral
SU10	1	5	2	66	cf	t	5	p	
SU10	1	5	2	67	f	t	4		broad; Hertzian; hinge
SU10	1	5	2	68	f	t	3		focal; Hertzian; step; 3 ridges
SU10	1	5	2	69	f	t	4		focal; Hertzian; feather; 2 ridges
SU10	1	5	2	70	fp	t	3		
SU10	1	5	2	71	ff	t	4		
SU10	1	5	2	72	f	t	3		focal; Hertzian; feather; 2 ridges
SU10	1	5	2	73	p	t	3		focal; Hertzian; 1 ridge

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU10	1	5	2	74	f	t	4		broad; Hertzian; feather
SU10	1	5	2	75	ff	t	3	p	
SU10	1	5	2	76	f	t	3		focal; Hertzian; feather
SU10	1	5	2	77	p	t	3		focal; Hertzian
SU10	1	5	2	78	ff	t	2	p	
SU10	1	5	2	79	f	t	3		broad; Hertzian; feather; 2 ridges
SU10	1	5	2	80	ff	t	2		
SU10	1	5	2	81	ff	t	2		
SU10	1	5	2	82	ff	t	2		
SU10	1	5	2	83	ff	t	2		
SU10	1	5	2	84	d	t	2		feather
SU10	1	5	2	85	p	t	2		broad; Hertzian
SU10	1	5	2	86	ff	q	4		
SU10	1	5	2	87	ff	q	4		
SU10	1	5	2	88	f	q	3		bipolar
SU10	1	5	2	89	ff	q	3		
SU10	1	5	2	90	f	q	3		bipolar
SU10	1	5	2	91	m	q	3		
SU10	1	5	2	92	ff	q	3		
SU10	1	5	2	93	ff	q	2		
SU10	1	5	2	94	d	q	2		feather
SU10	1	5	2	95	ff	q	2		
SU10	1	5	2	96	ff	q	2	p	
SU10	1	5	2	97	ff	q	2		
SU10	1	5	2	98	p	q	2		crushed; Hertzian
SU10	1	5	2	99	f	q	2		broad; Hertzian; feather
SU10	1	5	2	100	ff	q	2		
SU10	1	5	2	101	ff	q	2		
SU10	1	5	2	102	ff	q	2		
SU10	1	5	2	103	ff	q	1	p	

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU10	1	5	2	104	ff	q	2		
SU10	1	5	2	105	ff	q	1		
SU10	1	5	2	106	ff	q	1		
SU10	1	5	2	107	pos	qu	2		
SU10	1	5	2	108	fp	q	1		
SU10	1	5	2	109	ff	t	1		
SU10	1	5	2	110	f	t	3		broad; Hertzian; feather; modern damage
SU10	1	5	2	111	f	ch	3		focal; Hertzian; feather
SU10	1	5	2	112	ff	ch	2		
SU10	1	5	2	113	ff	ch	2		
SU10	1	5	2	114	ff	q	2		
SU10	1	5	2	115	ff	q	1		
SU10	1	5	3	116	fp	q	2		
SU10	1	5	3	117	ff	q	2		
SU10	1	6	1	118	f	t	4	p	focal; Hertzian; feather
SU10	1	6	1	119	fp	t	4	p	
SU10	1	6	1	120	ff	t	3		
SU10	1	6	1	121	f	t	3		longitudinally split; modern damage;
SU10	1	6	1	122	f	t	3		broad; Hertzian; hinge
SU10	1	6	1	123	fp	t	3		modern damage
SU10	1	6	1	124	f	t	3	p	focal; Hertzian; feather
SU10	1	6	1	125	ff	t	3		
SU10	1	6	1	126	f	t	3		focal; Hertzian; outrépassé
SU10	1	6	1	127	f	t	3		focal; bending; outrépassé; 2 ridges
SU10	1	6	1	128	ff	t	2		modern damage
SU10	1	6	1	129	ff	t	3		
SU10	1	6	1	130	ff	t	2		
SU10	1	6	1	131	p	t	2		broad; bending
SU10	1	6	1	132	ff	t	2		
SU10	1	6	1	133	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU10	1	6	1	134	ff	t	2		
SU10	1	6	1	135	f	t	2		broad; Hertzian; feather; overhang removal
SU10	1	6	1	136	ff	t	2		
SU10	1	6	1	137	ff	t	2		
SU10	1	6	1	138	ff	t	2		
SU10	1	6	1	139	ff	t	3		
SU10	1	6	1	140	ff	t	2		
SU10	1	6	1	141	ra	t	3		distally retouched only from the ventral
SU10	1	6	1	142	ra	t	2		Bondi point shape; missing tip; retouched from ventral at both ends; all of the tuff artefacts in square 6 spit 1 probably all related
SU10	1	6	1	143	f	q	5	p	compression flake; modern damage
SU10	1	6	1	144	ff	q	2		
SU10	1	6	1	145	ff	q	2		
SU10	1	6	1	146	fp	q	2		
SU10	1	6	1	147	ff	q	1		
SU10	1	6	1	148	ff	ch	2		
SU10	1	6	1	149	f	ch	2		focal; Hertzian; feather
SU10	1	6	1	150	ff	ch	3		
SU10	1	6	2	151	pos	q	7	p	
SU10	1	6	2	152	ff	q	2		
SU10	1	6	2	153	ff	q	2		
SU10	1	6	2	154	ff	q	2		
SU10	1	6	2	155	f	q	3	p	
SU10	1	6	2	156	ff	q	1		
SU10	1	6	2	157	ff	q	1		
SU10	1	6	2	158	ff	t	2		
SU10	1	6	2	159	ff	ch	1		
SU10	2	1	1	1	c	ch	6	p	pebble amorphous core
SU10	2	1	1	2	ff	t	4	p	
SU10	2	1	1	3	ff	t	3		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU10	2	1	1	4	ff	t	3	p	
SU10	2	1	1	5	ff	t	2		
SU10	2	1	1	6	ff	t	2		
SU10	2	1	1	7	ff	t	2		
SU10	2	1	1	8	ff	ch	2		
SU10	2	1	1	9	ff	q	4		
SU10	2	1	1	10	ff	q	2		
SU10	2	1	1	11	f	q	2		bipolar
SU10	2	1	1	12	f	ch	2		focal; Hertzian; step
SU10	2	1	1	13	ff	t	2		
SU10	2	1	1	14	f	t	2		focal; Hertzian; feather
SU10	2	1	1	15	ff	q	1		
SU10	2	1	1	16	ff	t	1		
SU10	2	1	1	17	ff	t	1		
SU10	2	1	1	18	ff	t	1		
SU10	2	2	1	19	ff	qu	3	p	
SU10	2	2	1	20	ff	t	3	p	
SU10	2	2	1	21	ff	t	2		
SU10	2	2	1	22	ff	ch	2		
SU10	2	3	2	23	ff	t	4	p	
SU10	2	3	2	24	ff	t	3		
SU10	2	3	2	25	f	ch	1		focal; Hertzian; feather
SU10	2	3	1	26	ff	t	4		
SU10	2	3	1	27	ff	t	5	p	
SU10	2	3	1	28	ff	t	2		
SU10	2	3	1	29	ff	q	1		
SU10	2	4	1	30	cf	t	4		
SU10	2	4	1	31	f	t	4		focal; bending; feather
SU10	2	4	1	32	f	t	3		focal; Hertzian; feather; 1 ridge; overhang removal
SU10	2	4	1	33	f	t	2		focal; Hertzian; feather; longitudinally split

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU10	2	4	1	34	ff	t	2		
SU10	2	4	1	35	f	ch	1		focal; Hertzian; feather
SU10	2	4	1	36	ff	q	3		
SU10	2	4	1	37	ff	q	2		
SU10	2	4	1	38	ff	q	2		
SU10	2	4	1	39	ff	q	2		
SU10	2	4	1	40	ff	q	2		
SU10	2	4	1	41	ff	q	2		
SU10	2	5	1	42	ff	t	4	p	
SU10	2	5	1	43	f	t	2		broad; Hertzian; axial; 2 ridges
SU10	2	5	1	44	f	t	1		focal; Hertzian; feather; overhang removal
SU10	2	5	1	45	ff	ch	2		
SU10	2	5	1	46	f	ch	2		focal; Hertzian; feather
SU10	2	5	1	47	ff	q	3		
SU10	2	5	2	48	f	t	3		broad; Hertzian; axial; 3 ridges
SU10	2	5	2	49	f	t	3		focal; Hertzian; feather
SU10	2	5	2	50	f	t	2	p	crushed; feather
SU10	2	5	2	51	f	t	2		broad; Hertzian; step; overhang removal
SU10	2	5	2	52	ff	t	2	p	
SU10	2	5	2	53	ff	t	2		
SU10	2	5	2	54	d	ch	2		feather
SU10	2	5	2	55	ff	ch	2		purple chert
SU10	2	5	2	56	ff	qu	3	p	
SU10	2	5	2	57	f	qu	2		focal; Hertzian; feather; longitudinally split
SU10	2	5	2	58	ff	q	3		
SU10	2	5	2	59	ff	q	3		
SU10	2	5	2	60	d	q	2		feather
SU10	2	6	1	61	f	t	5		broad; Hertzian; feather
SU10	2	6	1	62	uu	t	4		edge damage consistent with use wear on one margin from ventral
SU10	2	6	1	63	f	t	2		focal; Hertzian; feather; 1 ridge

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU10	2	6	1	64	ff	t	3	p	
SU10	2	6	1	65	f	q	4	p	compression flake
SU10	2	6	1	66	ff	q	2		
SU10	2	6	1	67	ff	q	2		
SU10	2	6	1	68	ff	q	1		
SU10	2	6	1	69	ff	q	1		
SU10	2	6	1	70	f	q	1		crushed ; Hertzian; feather
SU10	2	6	1	71	ff	q	1		
SU10	2	6	1	72	ff	t	2		
SU10	2	6	2	73	ff	t	2		
SU10	2	6	2	74	ff	t	2		
SU10	2	6	2	75	ff	q	3		
SU10	2	6	2	76	ff	q	1		
SU11	1	1	1	1	ff	t	3		
SU11	1	1	2	2	f	t	5	p	broad; Hertzian; feather
SU11	1	1	2	3	f	t	5	p	broad; Hertzian; feather
SU11	1	1	2	4	ff	t	5	p	
SU11	1	1	2	5	f	t	2		broad; Hertzian; feather
SU11	1	1	2	6	ff	t	2		
SU11	1	1	2	7	d	t	2	p	hinge
SU11	1	1	2	8	f	t	4		crushed; Hertzian; feather; 2 ridges
SU11	1	1	2	9	ff	t	2	p	
SU11	1	1	2	10	d	t	2	p	feather
SU11	1	1	2	11	ff	t	2	p	
SU11	1	1	2	12	ff	t	2	p	
SU11	1	1	2	13	ff	t	1		
SU11	1	1	2	14	d	t	1		feather
SU11	1	1	2	15	ff	q	2		
SU11	1	1	2	16	ff	q	1		
SU11	1	2	1	17	c	t	4		one rotation; numerous blade scars

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU11	1	2	1	18	ff	t	4		
SU11	1	2	1	19	ff	t	4		
SU11	1	2	1	20	f	t	2		broad; Hertzian; feather; 1 ridge
SU11	1	2	2	21	f	t	2		focal, Hertzian, feather, 1 ridge
SU11	1	2	2	22	ff	t	2		
SU11	1	2	2	23	f	t	2	p	focal, Hertzian, feather, 2 ridges
SU11	1	2	2	24	ff	ch	2		rejuvenation flake
SU11	1	3	2	25	f	t	4		crushed, Hertzian, axial
SU11	1	3	2	26	d	t	4		feather
SU11	1	3	2	27	f	fgv	3		focal, Hertzian, feather, 2 ridges, purple
SU11	1	3	2	28	p	fgv	2		broad, Hertzian
SU11	1	3	2	29	c	q	3		bipolar
SU11	1	3	2	30	f	q	2		broad, Hertzian, feather
SU11	1	3	3	31	f	t	4	p	broad, Hertzian, feather
SU11	1	3	3	32	ff	t	3		
SU11	1	3	3	33	f	t	2		crushed, feather
SU11	1	3	3	34	f	t	3	p	focal, Hertzian, 1 ridge
SU11	1	3	3	35	f	t	2		focal, Hertzian, feather
SU11	1	3	3	36	ff	t	1		
SU11	1	3	3	37	f	fgv	2		focal, Hertzian, hinge, overhang removal. Related to the 2 pieces above - purple
SU11	1	4	1	38	f	q	2		bipolar
SU11	1	4	3	39	ff	t	6	p	
SU11	1	4	3	40	f	t	5	p	focal, Hertzian, feather, 2 ridges
SU11	1	4	3	41	ff	t	2		
SU11	1	4	3	42	ff	t	2		
SU11	1	4	3	43	ff	t	2		
SU11	1	4	3	44	d	t	2		hinge
SU11	1	4	3	45	f	t	2		focal, Hertzian, feather
SU11	1	4	3	46	d	t	2		
SU11	1	4	3	47	fp	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU11	1	4	3	48	f	t	4		focal, Hertzian, feather
SU11	1	4	3	49	ff	t	2		
SU11	1	4	3	50	f	t	2		broad, Hertzian, feather
SU11	1	4	3	51	ff	t	2		
SU11	1	3	3	52	ff	t	2		
SU11	1	3	3	53	f	ch	2		crushed, Hertzian, feather, 2 ridges
SU11	2	1	3	1	pos	t	3	p	highly weathered
SU11	2	1	3	2	ff	chal	2		high quality white
SU11	2	1	3	3	c	t	5	p	1 platform, several scars
SU11	2	3	2	4	f	t	3		focal, Hertzian, feather, 2 ridges
SU11	2	3	2	5	p	q	2		broad, Hertzian
SU11	2	3	2	6	f	q	2		crushed, Hertzian, feather
SU11	2	4	2	7	d	t	3		feather, 1 ridge
SU11	2	4	3	8	f	q	2		focal, Hertzian, step, 1 ridge
SU11	2	4	3	9	ff	q	2		
SU11	2	4	4	10	ff	q	2		
SU11	2	4	4	11	p	q	1		broad, Hertzian
SU11	2	5	1	12	f	t	2		focal, Hertzian, feather
SU11	2	6	1	13	ff	t	1		
SU11	3	2	2	1	ff	q	1		
SU11	3	3	2	2	f	q	2		focal, Hertzian, feather, 1 ridge
SU11	3	4	1	3	ff	t	3	p	
SU11	3	4	2	4	ff	q	2		
SU11	3	4	2	5	p	q	1		focal, Hertzian
SU11	3	5	1	6	f	q	1		focal, Hertzian, feather
SU5	1	1	1	1	ff	t	2		
SU5	1	1	1	2	ff	t	2		
SU5	1	1	1	3	f	t	2		longitudinally split
SU5	1	1	1	4	ff	t	1		
SU5	1	1	1	5	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	1	1	1	6	d	q	3		feather
SU5	1	1	1	7	f	q	2		broad, Hertzian, feather, overhang removal
SU5	1	1	1	8	ff	q	2		
SU5	1	1	2	9	f	t	3		focal, Hertzian, step, 1 ridge
SU5	1	1	2	10	fp	t	3		
SU5	1	1	2	11	f	t	2		broad, Hertzian, axial
SU5	1	1	2	12	f	t	2		longitudinally split
SU5	1	1	2	13	f	t	2		broad, Hertzian, feather
SU5	1	1	2	14	f	t	3	p	broad, Hertzian, feather
SU5	1	1	2	15	f	t	2		focal, Hertzian, feather
SU5	1	1	2	16	ff	t	1		
SU5	1	1	2	17	ff	t	2		
SU5	1	1	2	18	f	q	3		bipolar
SU5	1	1	2	19	f	q	2		bipolar
SU5	1	1	2	20	f	q	1		focal, Hertzian, feather
SU5	1	1	2	21	ff	t	1	p	
SU5	1	1	2	22	ff	t	1		
SU5	1	1	2	23	ff	qu	3	p	
SU5	1	1	4	29	ff	q	2		
SU5	1	1	4	30	ff	q	2		
SU5	1	1	4	31	f		1		bipolar
SU5	1	1b	1	24	f	t	3		broad, Hertzian, feather
SU5	1	1b	1	25	f	t	2	p	broad, bending, feather
SU5	1	1b	1	26	f	q	2		bipolar
SU5	1	1b	1	27	ff	q	2		
SU5	1	1b	1	28	ff	q	2		
SU5	1	1b	2	32	ff	t	5	p	
SU5	1	1b	2	33	ff	t	2		
SU5	1	1b	2	34	ff	t	2		
SU5	1	1b	2	35	ff	q	1		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	1	1c	1	36	f	t	3	p	broad, Hertzian, feather
SU5	1	1c	1	37	ff	t	2		
SU5	1	1b	1	38	f	t	2		focal, Hertzian, feather, 2 ridges
SU5	1	1b	1	39	ff	t	1		
SU5	1	1c	1	40	f	t	5		focal, Hertzian, feather, parallel arises, overhang removal
SU5	1	1c	1	41	f	ch	4		focal, Hertzian, hinge
SU5	1	1c	2	42	f	t	4	p	broad, Hertzian, feather, 1 ridge
SU5	1	1c	2	43	f	t	5	p	focal, Hertzian, feather
SU5	1	1c	2	44	f	t	2	p	focal, Hertzian, feather
SU5	1	1c	2	45	d	t	2		feather
SU5	1	1c	2	46	fp	t	2		
SU5	1	1c	2	47	f	t	2	p	broad, Hertzian, feather
SU5	1	1c	2	48	f	t	2		focal, Hertzian, feather
SU5	1	1c	2	49	d	q	2		feather
SU5	1	1c	2	50	ff	q	2		
SU5	1	1c	2	51	ff	chal	2		white, mix of very fine material and a coarse silcrete like material
SU5	1	1d	1	52	f	t	3		focal, Hertzian, feather
SU5	1	1d	1	53	f	t	2		crushed, feather
SU5	1	1d	1	54	ff	t	2		
SU5	1	1d	1	55	ff	t	1	p	
SU5	1	1d	1	56	ff	t	2		
SU5	1	1d	1	57	d	t	2		
SU5	1	1d	1	58	p	t	1		broad, Hertzian
SU5	1	1d	1	59	ff	q	2		
SU5	1	1d	1	60	ff	q	2		
SU5	1	1d	2	61	ff	t	5	p	
SU5	1	1d	2	62	ff	t	3		
SU5	1	1d	2	63	f	t	2		focal, feather
SU5	1	1d	2	64	ff	t	2		
SU5	1	1d	2	65	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	1	1d	2	66	f	t	2		focal, Hertzian, feather
SU5	1	1d	2	67	p	q	2		broad, Hertzian
SU5	1	1d	2	68	ff	qu	3		
SU5	1	1d	2	69	f	qu	3	p	longitudinally split
SU5	1	1d	2	70	fp	qu	2		
SU5	1	1d	3	71	f	t	2		focal, Hertzian, outrépassé
SU5	1	2	1	72	f	t	3		broad, Hertzian, feather
SU5	1	2	1	73	f	t	3	p	focal, Hertzian, feather
SU5	1	2	1	74	f	t	3		focal, Hertzian, feather, 2 ridges
SU5	1	2	1	75	f	t	3		broad, Hertzian, feather
SU5	1	2	1	76	f	t	2		broad, Hertzian, step, 1 ridge
SU5	1	2	1	77	ff	t	3		
SU5	1	2	1	78	ff	t	2		
SU5	1	2	1	79	f	t	2		longitudinally split
SU5	1	2	1	80	ff	t	2		
SU5	1	2	1	81	f	t	1		focal, Hertzian, step. Tuff artefacts in this spit probably related
SU5	1	2	1	82	f	q	3		bipolar
SU5	1	2	1	83	ff	q	2		
SU5	1	2	1	84	ff	q	2		
SU5	1	2	2	85	f	t	7	p	focal, Hertzian, feather
SU5	1	2	2	86	f	t	2		focal, Hertzian, feather
SU5	1	2	2	87	f	t	2		focal, Hertzian, feather
SU5	1	2	2	88	ff	t	2		
SU5	1	2	2	89	f	t	2		broad, Hertzian, feather
SU5	1	2	2	90	ff	t	2		
SU5	1	2	2	91	ff	t	2		
SU5	1	2	2	92	f	chal	2		focal, Hertzian, feather, white
SU5	1	2	2	93	ff	q	2		
SU5	1	3	1	94	cf	t	4		
SU5	1	3	1	95	p	t	2		focal, Hertzian

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	1	3	1	96	f	t	2		focal, Hertzian, hinge
SU5	1	3	1	97	ff	t	2		
SU5	1	3	1	98	ff	t	2		
SU5	1	3	1	99	ff	t	1		
SU5	1	3	1	100	f	q	2		broad, Hertzian, feather
SU5	1	3	2	101	f	t	5	p	focal, Hertzian, feather, 1 ridge
SU5	1	3	2	102	f	t	4		focal, Hertzian, feather
SU5	1	3	2	103	f	t	4	p	broad, Hertzian, axial
SU5	1	3	2	104	f	q	5	p	focal, Hertzian, outrépassé
SU5	1	3	2	105	f	q	6	p	compression flake
SU5	1	3	2	106	ff	t	2		
SU5	1	3	2	107	p	t	2	p	focal, Hertzian
SU5	1	3	2	108	f	ch	2		broad, Hertzian, feather
SU5	1	3	2	109	f	ch	2		focal, Hertzian, feather
SU5	1	4	1	110	d	ch	3		feather
SU5	1	4	1	111	ff	q	2		
SU5	1	4	2	112	f	q	4		broad, Hertzian, feather
SU5	1	4	2	113	f	q	2		longitudinally split
SU5	1	5	1	114	f	t	3	p	longitudinally split
SU5	1	5	1	115	d	t	3		feather
SU5	1	5	2	116	ff	ch	2		
SU5	1	5	2	117	d	ch	2		feather
SU5	1	5	2	118	ff	q	2		
SU5	1	6	1	119	f	q	2		crushed, feather
SU5	2	2	1	1	ff	t	2		
SU5	2	2	1	2	ff	fgv	2		
SU5	2	2	1	3	ff	qu	2		
SU5	2	2	2	4	pos	t	7	p	
SU5	2	2	2	5	ff	t	2	p	
SU5	2	2	2	6	pos	q	3		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	2	2	2	7	ff	q	1		
SU5	2	2	2	8	p	q	1		focal, Hertzian
SU5	2	3	1	9	d	t	4	p	
SU5	2	3	1	10	ff	t	3		
SU5	2	3	1	11	p	t	2		broad, Hertzian
SU5	2	3	1	12	f	t	2		focal, bending, feather
SU5	2	3	1	13	f	t	2		focal, Hertzian, outrépassé
SU5	2	3	1	14	f	q	4		bipolar
SU5	2	3	1	15	ff	q	2		
SU5	2	3	1	16	ff	q	2		
SU5	2	3	1	17	d	q			
SU5	2	3	1	18	ff	fgv	2		
SU5	2	3	1	19	ff	ch	3		
SU5	2	3	2	20	uu	t	4		edge damage consistent with use on 1 margin
SU5	2	3	2	21	uu	t	3		edge damage consistent with use from ventral on distal
SU5	2	3	2	22	ff	t	2	p	
SU5	2	3	2	23	f	t	2	p	focal, Hertzian, feather
SU5	2	3	2	24	ff	t	2		
SU5	2	3	2	25	f	t	4	p	compression flake
SU5	2	3	2	26	f	q	3	p	crushed, Hertzian, feather
SU5	2	3	2	27	f	q	2	p	bipolar
SU5	2	3	2	28	ff	q	2		
SU5	2	3	2	29	ff	q	2		
SU5	2	3	2	30	ff	q	1		
SU5	2	3	2	31	ff	ch	3		
SU5	2	3	2	32	d	ch	3	p	feather
SU5	2	3	2	33	d	ch	2		feather
SU5	2	4	1	34	f	t	2		crushed, Hertzian, hinge
SU5	2	4	1	35	ff	q	1		
SU5	2	4	1	36	d	q	1		feather

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	2	4	2	37	ff	t	2		
SU5	2	4	2	38	f	fgv	2		broad, Hertzian, feather, 2 ridges
SU5	2	6	1	39	ff	t	2		
SU5	2	6	2	40	f	t	6		broad, Hertzian, feather, 2 ridges
SU5	2	6	2	41	ff	q	3		
SU5	3	1	1	1	f	t	4	p	focal, Hertzian, feather
SU5	3	1	1	2	p	t	3		broad, Hertzian
SU5	3	1	1	3	f	t	3		broad, Hertzian, step
SU5	3	1	1	4	ff	t	3		
SU5	3	1	1	5	f	t	2		focal, Hertzian, axial, overhang removal
SU5	3	1	1	6	ff	q	4		
SU5	3	1	1	7	d	q	2		feather
SU5	3	1	1	8	fp	q	2		
SU5	3	1	1	9	f	q	2		broad, Hertzian, feather
SU5	3	1	1	10	ff	q			
SU5	3	1	1	11	f	s	3		focal, Hertzian, feather, white with mixture of fine grain
SU5	3	1	2	12	ff	t	3		
SU5	3	1	2	13	ff	t	3		
SU5	3	1	2	14	ff	t	2		
SU5	3	1	2	15	ff	t	2		
SU5	3	1	2	16	f	t	2		focal, Hertzian, feather
SU5	3	1	2	17	f	q	3		bipolar
SU5	3	1	2	18	ff	q	1		
SU5	3	2	1	19	f	t	7	p	broad, Hertzian, feather
SU5	3	2	1	20	f	t	3		broad, Hertzian, feather, 1 ridge
SU5	3	2	1	21	f	t	1		broad, Hertzian, feather, overhang removal
SU5	3	2	1	22	f	q	2		bipolar
SU5	3	2	1	23	fp	q	1	p	
SU5	3	2	1	24	ff	q	2		
SU5	3	2	1	25	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	3	2	1	26	p	q	2		focal, Hertzian
SU5	3	2	1	27	ff	ch	2		
SU5	3	2	2	28	d	t	3		feather
SU5	3	2	2	29	f	t	3		focal, Hertzian, feather
SU5	3	2	2	30	f	t	3	p	crushed, Hertzian, feather
SU5	3	2	2	31	ff	t	2		
SU5	3	2	2	32	ff	t	2		
SU5	3	2	2	33	ff	t	2		
SU5	3	2	2	34	f	q	3	p	compression flake
SU5	3	2	2	35	ff	q	2		
SU5	3	2	2	36	d	q	2		feather
SU5	3	2	2	37	m	q	1	p	
SU5	3	2	2	38	ff	q	2		
SU5	3	2	2	39	ff	t	2	p	
SU5	3	3	2	40	f	q	3		compression flake
SU5	3	3	2	41	p	q	1		focal, Hertzian
SU5	3	5	2	42	ff	t	2	p	
SU5	3	6	2	43	f	t	2		focal, Hertzian, step, overhang removal
SU5	3	6	2	44	f	q	1		focal, Hertzian, feather, translucent, high quality
SU5	4	1	1	1	uu	t	5	p	Hertzian flake with edge crushing and rounding consistent with use on 1 margin
SU5	4	1	1	2	f	t	4		broad, Hertzian, feather
SU5	4	1	1	3	f	t	4		focal, Hertzian, feather, 2 ridges
SU5	4	1	1	4	f	t	3	p	focal, Hertzian, feather, 1 ridge
SU5	4	1	1	5	f	t	2		focal, Hertzian, step
SU5	4	1	1	6	f	t	2		longitudinally split
SU5	4	1	1	7	pos	t	2	p	
SU5	4	1	1	8	pos	t	2		
SU5	4	1	1	9	ff	t	2		
SU5	4	1	1	10	m	t	2		
SU5	4	1	1	11	fp	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	4	1	1	12	f	t	2		focal, Hertzian, step
SU5	4	1	1	13	ff	t	2		
SU5	4	1	1	14	ff	q	1		
SU5	4	1	1	15	ff	t	1		
SU5	4	1	2	16	f	t	2	p	longitudinally split
SU5	4	1	2	17	f	t	3		broad, Hertzian, feather, overhang removal
SU5	4	3	2	18	f	q	6		compression flake
SU5	4	3	2	19	f	q	2		bipolar
SU5	4	3	2	20	ff	q	2		
SU5	4	3	2	21	f	q	3	p	bipolar
SU5	4	3	2	22	f	q	2		bipolar
SU5	4	3	2	23	ff	q	2	p	
SU5	4	1	1	24	f	q	2		bipolar
SU5	4	1	1	25	f	q	2		bipolar
SU5	4	1	1	26	fp	q	2	p	
SU5	4	1	1	27	f	q	2	p	crushed, feather
SU5	4	1	1	28	f	q	2		bipolar
SU5	4	1	1	29	ff	q	1		
SU5	4	1	1	30	ff	q	1		
SU5	4	1	1	31	ff	q	1		
SU5	4	1	1	32	fp	q	1		quartz pieces are poor quality and almost certainly related
SU5	4	3	3	33	ff	t	4		
SU5	4	1	1	34	ff	t	1		
SU5	4	3b	1	35	pos	t	6	p	
SU5	4	3b	1	36	f	q	3	p	bipolar
SU5	4	3b	1	37	ff	q	2		
SU5	4	3b	1	38	ff	q	1		
SU5	4	3b	2	39	pos	qu	4	p	
SU5	4	3b	2	40	f	q	4		longitudinally split
SU5	4	3b	2	41	fp	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	4	3b	3	42	f	t	3	p	focal, Hertzian, feather
SU5	4	3c	1	43	f	t	4		broad, Hertzian, hinge, overhang removal, 2 ridges
SU5	4	3c	1	44	p	t	6		broad, Hertzian
SU5	4	3c	1	45	ff	t	4		
SU5	4	3c	1	46	f	t	5	p	longitudinally split
SU5	4	3c	1	47	d	t	4	p	
SU5	4	3c	1	48	f	t	3		longitudinally split
SU5	4	3c	1	49	f	t	4	p	longitudinally split
SU5	4	3c	1	50	f	t	3	p	longitudinally split
SU5	4	3c	1	51	ff	t	3		
SU5	4	3c	1	52	ff	t	3	p	
SU5	4	3c	1	53	f	t	2		broad, Hertzian, feather, 1 ridge, overhang removal
SU5	4	3c	1	54	ff	t	2	p	
SU5	4	3c	1	55	f	t	3		focal, Hertzian, feather
SU5	4	3c	1	56	ff	t	2		
SU5	4	3c	1	57	d	t	2	p	feather
SU5	4	3c	1	58	f	t	2		focal, Hertzian, feather
SU5	4	3c	1	59	f	t	2		focal, Hertzian, feather
SU5	4	3c	1	60	ff	t	2	p	
SU5	4	3c	1	61	f	t	2		broad, Hertzian, step. Tuff artefacts likely to be related
SU5	4	3c	1	62	f	q	2		broad, Hertzian, feather
SU5	4	3c	1	63	ff	q	2		
SU5	4	3c	1	64	f	q	2		longitudinally split
SU5	4	3c	1	65	ff	q	2		
SU5	4	3c	1	66	d	ch	2		feather
SU5	4	3c	1	67	f	ch	3		longitudinally split
SU5	4	3c	2	68	f	t	3	p	focal, Hertzian, feather
SU5	4	3c	2	69	ff	t	4		
SU5	4	3c	2	70	f	t	2		longitudinally split
SU5	4	3c	2	71	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	4	3c	2	72	f	q	4		bipolar
SU5	4	3c	2	73	f	ch	1		focal, Hertzian, feather
SU5	4	3c	3	74	f	ch	2		longitudinally split
SU5	4	3d	1	75	c	t	7	p	split pebble with 1 flake scar
SU5	4	3d	1	76	f	t	5	p	focal, Hertzian, outrépassé
SU5	4	3d	1	77	f	t	4		focal, Hertzian, feather
SU5	4	3d	1	78	fp	t	3	p	
SU5	4	3d	1	79	ff	t	2		
SU5	4	3d	1	80	ff	t	2		
SU5	4	3d	1	81	ff	t	2		
SU5	4	3d	1	82	f	ch	2		focal, Hertzian, feather
SU5	4	3d	1	83	f	ch	2		longitudinally split
SU5	4	3d	1	84	f	ch	2		longitudinally split
SU5	4	3d	1	85	p	ch	2		broad, Hertzian
SU5	4	3d	1	86	ff	ch	2		
SU5	4	3d	1	87	f	q	2		longitudinally split
SU5	4	3d	2	88	f	ch	3		focal, Hertzian, outrépassé
SU5	4	3d	2	89	d	q	2		feather
SU5	4	3e	1	90	f	t	5		focal, Hertzian, feather
SU5	4	3e	1	91	f	t	3		focal, Hertzian, hinge, 1 ridge
SU5	4	3e	1	92	ff	t	3		
SU5	4	3e	1	93	f	t	3		focal, Hertzian, feather
SU5	4	3e	1	94	ff	ch	3		
SU5	4	3e	1	95	d	ch	2		feather
SU5	4	3e	1	96	f	ch	2		focal, Hertzian, step
SU5	4	3e	1	97	f	ch	2		longitudinally split
SU5	4	3e	1	98	p	ch	2		focal, Hertzian
SU5	4	3e	1	99	ff	ch	2		
SU5	4	3e	1	100	ff	t	2		
SU5	4	3e	1	101	ff	t	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	4	3e	1	102	ff	t	2		
SU5	4	3e	1	103	ff	t	3		
SU5	4	3e	1	104	f	q	2		focal, Hertzian, feather
SU5	4	3e	2	105	ff	t	2		
SU5	4	3e	2	106	ff	t	2		
SU5	4	3e	2	107	f	ch	2		focal, Hertzian, outrépassé, 1 ridge
SU5	4	3e	2	108	f	q	3		bipolar
SU5	4	3e	2	109	ff	q	2		
SU5	4	3e	2	110	f	q	2		Hertzian, feather
SU5	4	3f	1	111	f	t	6	p	focal, Hertzian, feather
SU5	4	3f	1	112	f	t	3		broad, Hertzian ,step, 3 ridges
SU5	4	3f	1	113	d	t	2		feather, parallel arises
SU5	4	3f	1	114	f	t	3	p	focal, Hertzian
SU5	4	3f	1	115	p	t	2		focal, Hertzian
SU5	4	3f	1	116	ff	fgv	4		
SU5	4	3f	1	117	fp	t	2		
SU5	4	3f	1	118	f	ch	2		focal, Hertzian, feather
SU5	4	3f	1	119	ff	q	4		
SU5	4	3f	2	120	f	ch	3		focal, Hertzian, hinge
SU5	4	3f	2	121	d	ch	2		feather
SU5	4	4	1	122	cf	t	5		
SU5	4	4	1	123	f	t	4		bending, feather, overhang removal, 3 scars
SU5	4	4	1	124	ff	t	3		
SU5	4	4	1	125	ff	t	3		
SU5	4	4	1	126	f	t	2		focal, Hertzian, step
SU5	4	4	1	127	f	t	2		focal, Hertzian, feather
SU5	4	4	2	128	f	t	5	p	focal, Hertzian, feather
SU5	4	4	2	129	f	t	3		broad, Hertzian, feather
SU5	4	4	2	130	f	q	4	p	longitudinally split
SU5	4	4	2	131	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	4	5	1	132	f	t	3	p	broad, Hertzian, hinge
SU5	4	5	1	133	ff	t	3	p	
SU5	4	5	1	134	f	t	3		broad, Hertzian, feather
SU5	4	5	1	135	f	q	3		crushed, Hertzian, feather
SU5	4	5	2	136	d	t	2		feather
SU5	4	5	2	137	ff	q	2		
SU5	4	6	1	138	f	t	5	p	focal, Hertzian ,feather
SU5	4	6	1	139	f	t	4	p	focal, Hertzian, feather
SU5	4	6	1	140	ff	t	1		
SU5	4	6	1	141	ra	t	2		Bondi point 12 x 5 x 3
SU5	4	6	1	142	f	q	4	p	bipolar
SU5	4	6	1	143	f	q	2		longitudinally split
SU5	4	6	1	144	f	q	2		bipolar
SU5	4	6	1	145	ff	q	2		
SU5	4	6	1	146	ff	q	1		
SU5	4	6	2	147	ff	t	2	p	
SU5	4	6	2	148	d	t	2		feather
SU5	4	6	2	149	m	t	1		
SU5	4	6	2	150	ff	q	2		
SU5	4	6	2	151	d	q	2		feather, translucent
SU5	4	6	2	152	p	q	2		Hertzian
SU5	4	6	2	153	ff	t	2		
SU5	4	6	3	154	f	q	2		crushed, Hertzian, feather
SU5	5	1	1	1	ff	t	2		
SU5	5	1	1	2	ff	ch	3	p	
SU5	5	1	1	3	f	q	2		focal, Hertzian, feather
SU5	5	1	1	4	f	q	2		bipolar
SU5	5	1	1	5	f	q	2		focal, Hertzian, feather
SU5	5	1	1	6	f	q	2		bipolar
SU5	5	1	1	7	ff	q	2		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	5	1	1	8	f	q	2		broad, Hertzian, feather
SU5	5	1	1	9	ff	q	2		
SU5	5	1	1	10	p	q	1	p	focal, Hertzian
SU5	5	1	1	11	ff	q	1		
SU5	5	1	2	12	f	t	4	p	longitudinally split
SU5	5	1	2	13	p	t	3		focal, Hertzian
SU5	5	1	2	14	f	t	3		focal, Hertzian, hinge
SU5	5	1	2	15	p	t	2		focal, Hertzian
SU5	5	1	2	16	ff	t	2		
SU5	5	1	2	17	p	t	2		focal, bending
SU5	5	1	2	18	f	t	2		crushed, feather
SU5	5	1	2	19	ra	t	3		Bondi point, 2 pieces
SU5	5	1	2	20	ff	t	2		
SU5	5	1	2	21	f	t	2		focal, bending, feather
SU5	5	1	2	22	p	t	2		focal, Hertzian
SU5	5	1	2	23	f	t	2		focal, Hertzian, feather
SU5	5	1	2	24	f	q	3		longitudinally split
SU5	5	1	2	25	f	q	2	p	bipolar
SU5	5	1	2	26	f	q	3		bipolar
SU5	5	1	2	27	f	q	2		focal, Hertzian, step
SU5	5	1	2	28	f	q	2		longitudinally split
SU5	5	1	2	29	f	q	2		bipolar
SU5	5	1	2	30	fp	q	2	p	
SU5	5	1	2	31	d	q	2		feather
SU5	5	1	1	32	ff	q	2		
SU5	5	1	1	33	ff	q	2	p	
SU5	5	1	1	34	ff	q	1		
SU5	5	1	1	35	f	q	1		broad, Hertzian, feather
SU5	5	1	1	36	ff	q	2		
SU5	5	1	1	37	ff	q	1		

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	5	1	1	38	ff	q	1		
SU5	5	1	1	39	f	t	2		focal, Hertzian, feather, overhang removal, 2 ridges
SU5	5	1b	1	40	f	t	4	p	broad, Hertzian, feather
SU5	5	1b	1	41	ff	t	5	p	
SU5	5	1b	1	42	ff	t	4	p	
SU5	5	1b	1	43	d	t	7	p	feather
SU5	5	1b	1	44	f	t	4	p	crushed, Hertzian, feather
SU5	5	1b	1	45	f	t	3	p	crushed, Hertzian, feather
SU5	5	1b	1	46	f	t	3		crushed, feather
SU5	5	1b	1	47	f	t	2		focal, Hertzian, feather
SU5	5	1b	1	48	f	t	2		crushed, Hertzian, feather
SU5	5	1b	1	49	ff	t	2		tuff artefacts are most probably related, and related to tuff artefacts in Sq 1
SU5	5	1b	1	50	f	q	3		broad, Hertzian, feather
SU5	5	1b	1	51	f	q	3		bipolar
SU5	5	1b	1	52	f	q	3		focal, Hertzian, feather
SU5	5	1b	1	53	ff	q	2		
SU5	5	1b	1	54	m	q	2		
SU5	5	1b	1	55	f	q	2		crushed, feather
SU5	5	1b	1	56	ff	q	2		
SU5	5	1b	1	57	f	q	2		longitudinally split
SU5	5	1b	1	58	d	q	2		feather
SU5	5	1b	1	59	f	q	2		crushed, feather
SU5	5	1b	1	60	ff	q	2		
SU5	5	1b	1	61	ff	q	2		
SU5	5	1b	1	62	d	t	2		feather
SU5	5	1b	1	63	f	qu	3		broad, Hertzian, feather
SU5	5	1b	1	64	ff	s	2		grey silcrete
SU5	5	1b	2	65	f	q	5		compression flake, probably related to those above
SU5	5	2	1	66	f	t	5		focal, Hertzian, feather, 2 ridges
SU5	5	2	1	67	ff	t	2	p	

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	5	2	1	68	f	q	3	p	broad, Hertzian, feather
SU5	5	2	1	69	f	q	2	p	longitudinally split
SU5	5	2	1	70	fp	q	2		
SU5	5	2	1	71	fp	q	1		
SU5	5	2	2	72	uu	t	7	p	edge damage on 1 margin consistent with use
SU5	5	2	2	73	ff	t	4	p	
SU5	5	2	2	74	p	t	3		broad, Hertzian
SU5	5	2	2	75	p	t	2		focal, Hertzian
SU5	5	2	2	76	ff	t	3		
SU5	5	2	2	77	f	t	2		broad, bending, feather
SU5	5	2	2	78	f	t	2		focal, Hertzian, step
SU5	5	2	2	79	f	t	2		focal, Hertzian, step
SU5	5	2	2	80	f	t	2		broad, Hertzian, feather
SU5	5	2	2	81	ff	t	1		
SU5	5	2	2	82	ff	t	1		
SU5	5	2	2	83	f	t	2		focal, Hertzian, step
SU5	5	2	2	84	ff	t	1		Tuff artefacts could possibly be related to those above
SU5	5	2	3	85	p	t	4	p	broad, Hertzian
SU5	5	3	1	86	f	t	4	p	focal, Hertzian, axial
SU5	5	3	1	87	ff	t	4	p	
SU5	5	3	1	88	p	t	4	p	broad, bending
SU5	5	3	1	89	ff	t	3		
SU5	5	3	1	90	ff	t	3		
SU5	5	3	1	91	ff	t	2		
SU5	5	3	1	92	f	t	2		longitudinally split
SU5	5	3	1	93	ff	t	2		
SU5	5	3	1	94	ff	t	2		
SU5	5	3	1	95	ff	t	2		
SU5	5	3	1	96	f	t	2		focal, Hertzian, feather
SU5	5	3	1	97	d	t	1		feather

SU	TT	Sq	Sp	#	Type	Material	Size	cortex	Comments
SU5	5	3	1	98	d	t	2		feather
SU5	5	3	1	99	p	t	2		focal, Hertzian
SU5	5	3	1	100	ff	t	2		
SU5	5	3	1	101	ff	t	2		
SU5	5	3	1	102	d	q	2		feather
SU5	5	3	2	103	f	q	2		bipolar
SU5	5	4	1	104	f	q	5		bipolar
SU5	5	4	1	105	f	q	5		compression flake, longitudinally split
SU5	5	4	1	106	f	q	3	p	focal, Hertzian, feather
SU5	5	4	1	107	f	q	4		longitudinally split
SU5	5	4	1	108	fp	q	2		
SU5	5	5	1	109	cf	t	6	p	
SU5	5	5	1	110	f	t	3		focal, Hertzian, step, parallel arises
SU5	5	5	1	111	f	t	4		broad, Hertzian, feather, 1 ridge
SU5	5	5	1	112	d	t	3		feather
SU5	5	5	1	113	ff	t	2		
SU5	5	5	1	114	f	t	3		focal, Hertzian, feather, rejuvenation flake
SU5	5	5	1	115	f	t	2		longitudinally split
SU5	5	5	1	116	m	ch	2		
SU5	5	5	2	117	f	t	6	p	focal, Hertzian, feather
SU5	5	5	2	118	f	t	3		crushed, feather
SU5	5	5	2	119	m	t	2		
SU5	5	6	1	120	f	t	4	p	focal, Hertzian, feather
SU5	5	6	1	121	d	t	1		feather
SU5	5	6	1	122	f	qu	5	p	crushed, feather
SU5	5	6	1	123	f	q	2		bipolar
SU5	5	6	2	124	c	t	7		amorphous core, 1 platform
SU5	5	6	2	125	f	q	2		focal, Hertzian, feather
SU5	5	6	2	126	p	fgv	2		focal, Hertzian