Heritage Expert Report

Heritage Assessment Report:

Project to reintroduce extinct mammals to Sturt National Park

By: Dr Justin Shiner and Jane Stradwick

Date: 15 May 2017

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Document Control Information

Document information
Client: Wild Deserts: University of New South Wales
Client Contact: Reece Pedler and Rebecca West
Title: Heritage Assessment Report
Subtitle: Project to reintroduce extinct mammals to Sturt National Park
Our Ref: UNSW01
Date: 15 May 2017

Version	Date	Details

Recipient Name	Organisation	Hardcopy	Electronic	Transmission Method	Purpose	Date

Author, Reviewer and Approver details				
Prepared by:	Dr Justin Shiner and Jane Stradwick	Date: 15 May 2017	Signature:	
Reviewed by:	Dr Justin Shiner	Date: 15 May 2017	Signature:	
Approved by:		Date:	Signature:	

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Spatial Data

Spatial data captured by Australian Cultural Heritage Management (Victoria) Pty Ltd in this document for any newly recorded sites has been obtained by using hand held or differential GPS units using the GDA94 co-ordinate system.

Acknowledgements

ACHM would like to acknowledge and thank the following people:

Mr Reece Pedler

Ms Rebecca West

Mr Cecil Ebsworth

Ms Ainsley Ebsworth

Mr Myles Lalor

Mr Dave Pollock

Ms Roxanne Robertson

Mr Mark Sutton

Mr Gerald Quayle

Executive Summary

Introduction

The following Heritage Report outlines the results of an archaeological surface survey of infrastructure associated with the construction and maintenance of two predator proof exclosures and potential wing fences within the Fort Grey area of Sturt National Park, Western New South Wales. This infrastructure will be located within a 350 km^2 area of the park referred to as the Sturt Service Site that will be managed by Wild Deserts on behalf of the Office of Environment and Heritage (NSW). The purpose of the predator proof exclosures is to allow for the re-introduction of seven locally extinct mammal species. These species consist of the bilby, burrowing bettong, greater bilby, the greater stick nest rat, western barred bandicoot, golden bandicoot, crest-tailed mulgara and the western quoll.

Aboriginal Cultural Heritage Context

The Fort Grey area of Sturt National Park is located in one of the most remote parts of Western New South Wales. Other than established pastoral stations and the National Park, the area contains little in the way of built infrastructure. As such, very little formal archaeological work has been conducted in the region. A search of the NSW OEH Aboriginal Heritage Information System (AHIMS) reveals that there are no previously recorded archaeological sites within the Project Area or immediate surrounds. Despite this, previous archaeological research throughout the wider region demonstrates that Sturt National Park and the wider region contains a diverse and extensive archaeological record.

Field Survey

A pedestrian survey was carried out to determine if any Aboriginal archaeological sites were located within the Project Area, to identify areas of Aboriginal archaeological sensitivity across the Project Area and to identify areas of no archaeological sensitivity and map areas of high disturbance if possible. The archaeological survey was conducted over five days between March 20 and March 24, 2017, led by Dr Justin Shiner (Operations Manager – ACHM). The survey team consisted of Reece Pedler (Wild Deserts Project Manager), Ms Rebecca West (Wild Deserts Ecologist), Mr Cecil Ebsworth (Wongkumara Elder and Representative), Ms Ainsley Ebsworth (Wongkumara Representative), Mr Myles Lalor (Chairperson Tibooburra Local Aboriginal Land Council), Mr Dave Pollock (Representative Tibooburra Local Aboriginal Land Council) and Mrs Roxanne Robertson (CEO Tibooburra Local Aboriginal Land Council). Due to logistical constraints that prevented all parties being present during the main survey, a two-day field inspection was undertaken with Maljangapa Aboriginal Representatives Mr Mark Sutton and Mr Gerald Quayle on 25-26 March 2017), including touring the entire Project Area and a reinspection of each site recorded during the survey.

The survey methodology involved walking in evenly spaced transects (individuals at approximately 3-5 m spacing) covering the entire Project Area. The width of the Project Area (survey area) is 30 m with the exception of laydown areas and borrow pits. The actual area required for the installation of fences and construction of tracks is 8 m. This is the extent of the potential area of impacts. Exposures were thoroughly inspected as per proper archaeological practice.

Survey Results

The archaeological survey resulted in the discovery of 42 previously unrecorded surface stone artefact distributions. Sites were recorded in seven distinct landscape contexts but were most commonly found on the interface between the scalded dune base and swale with 28 of the 42 recorded sites occurring in this landscape context. The scalded character of these areas presents excellent surface visibility for the detection of stone artefacts.

The condition (spatial integrity) of all sites was assessed as poor. The Project Area has experienced significant historical and ongoing soil disturbance. The pastoral land use of the area has led to extensive erosion of sediment. The impacts of this are still evident today with the widespread presence of scalding throughout the Project Area. Historically hard hoofed livestock loosened the sediment, which has in turn resulted in erosion. Stone artefacts have become displaced from their original contexts due to fluvial and Aeolian processes, the effects of which are exacerbated by the weakened land surface.

In addition, a number of sites such as those along the Southern Exclosure and Southern Wing Fence have been directly impacted by the creation (long ago) of formal management tracks. The creation and on-going maintenance of these tracks has also contributed to the poor spatial integrity of the sites.

Significance Assessment

The 42 sites recorded during the survey were assessed as being of low scientific and cultural significance. This assessment was undertaken with the input of the Aboriginal Representatives who participated in the survey.

Harm

Harm (either complete or partial) may potentially occur to all 42 sites (surface stone artefact scatters) recorded during the survey. A number of the sites extend beyond the boundaries of the survey area, therefore these may only partially be impacted. Construction of the fenced exclosures and maintenance tracks may involve activities that have the potential to cause harm to the cultural heritage recorded during the survey, these are:

- Grading;
- Vegetation removal,
- Track maintenance; and
- Fence construction

The archaeological survey effectively assessed a 30 m wide corridor. This is much larger than the 8 m area of potential disturbance. Harm will only occur to sites/artefacts that occur within the 8 m wide area of potential disturbance.

Where possible the proposed fence line and access tracks were realigned to avoid harm to archaeological materials and potentially sensitive landforms.

Avoiding Harm

Significant effort has been made to proactively reduce the potential harm arising from the project activity. Infrastructure has been aligned as closely as possible to pre-existing areas of disturbance such as maintenance tracks and previous fence lines. Prior to the archaeological survey the results of a background assessment and predictive model were used to adjust and ground truth the placement of infrastructure so as to avoid areas of the landscape of high archaeological potential. This has resulted in proposed infrastructure corridors with minimal interaction with archaeological or cultural heritage sites.

Mitigating Harm

Where harm is unavoidable, it is proposed to collect and relocate stone artefacts. These will be relocated to adjacent areas outside of the disturbance footprint. This strategy was endorsed by the Aboriginal Representatives consulted during the cultural heritage assessment.

Aboriginal Heritage Impact Permit

An Aboriginal Heritage Impact Permit (AHIP) will be required allow the project to proceed.

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1 Introduction

1.1 The Proponent

The Office of Environment and Heritage is the project proponent. OEH has contracted the University of New South Wales, who are working in partnership with Ecological Horizons, to deliver the contract to reintroduce locally extinct mammals to Sturt National Park. This OEH/UNSW/Ecological Horizons collaborative project has been termed 'Wild Deserts' and is henceforth used to describe the project and the entity which is to manage the project.

1.2 The Proposal and Project Area

The following Heritage Report outlines the results of an archaeological surface survey of infrastructure associated with the construction and maintenance of two predator proof exclosures and potential wing fences within the Fort Grey area of Sturt National Park, Western New South Wales (Map 1-1). This infrastructure will be located within a 350 km^2 area of the park referred to as the Sturt Service Site that will be managed by Wild Deserts on behalf of the Office of Environment and Heritage (NSW). The extent of the Project Area for the purposes of this cultural heritage assessment is presented on (Map 1-2). The purpose of the predator proof exclosures is to allow for the re-introduction of seven locally extinct mammal species, including the bilby, burrowing bettong, greater stick nest rat, western barred bandicoot, golden bandicoot, crest-tailed mulgara and western quoll. Part of this programme includes the removal of feral species (introduced predators and rabbits) from the exclosures.

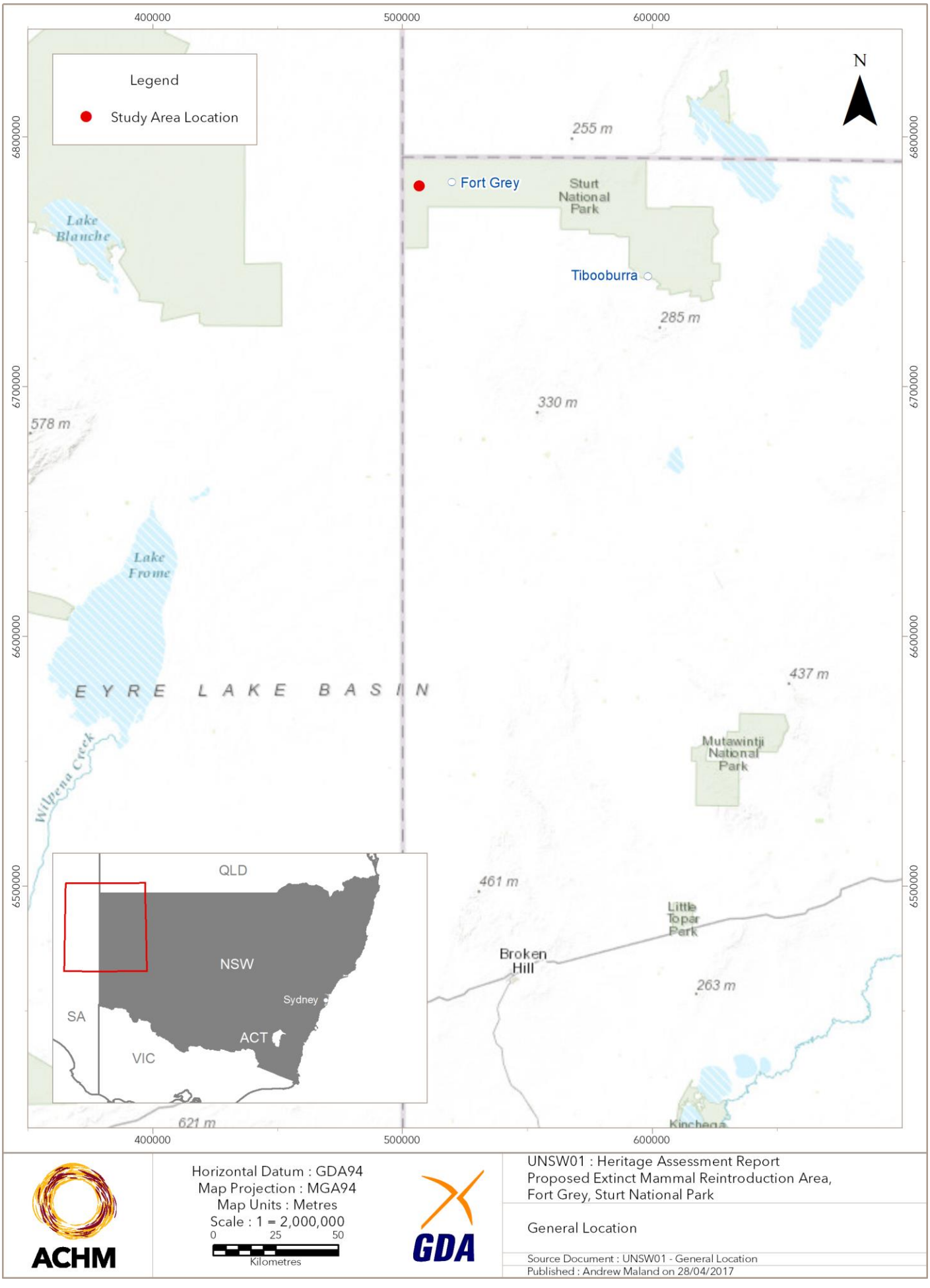
The following infrastructure will be constructed:

- Two fenced paddocks (referred to as exclosures), each with an area of approximately 20 km^2 with an approximate perimeter of 19 km (total 40 km^2 area, 38 km perimeter)
- An all-weather access track of 3.6 km;
- Two 8 ha soft release pens of approximately 400 m x 200 m;
- Three sections of wing fence that link the exclosures and a border dog fence to create a 104 km^2 area called the Wild Training Zone in which some re-introduced species will be released with a tightly controlled predator population to enable learning of anti-predator behaviour;
- A four metre easement for the creation of tracks along the internal and external perimeters of all fences to allow for the maintenance and management of the fences (total 8 m);
- Two laydown areas of approximately 200 m x 100 m for the temporary storage of fencing and construction materials;
- Six 40 m x 50 m borrow pits to allow for the extraction of clay to cap the top of several large dunes where sand drift may impact the fence.

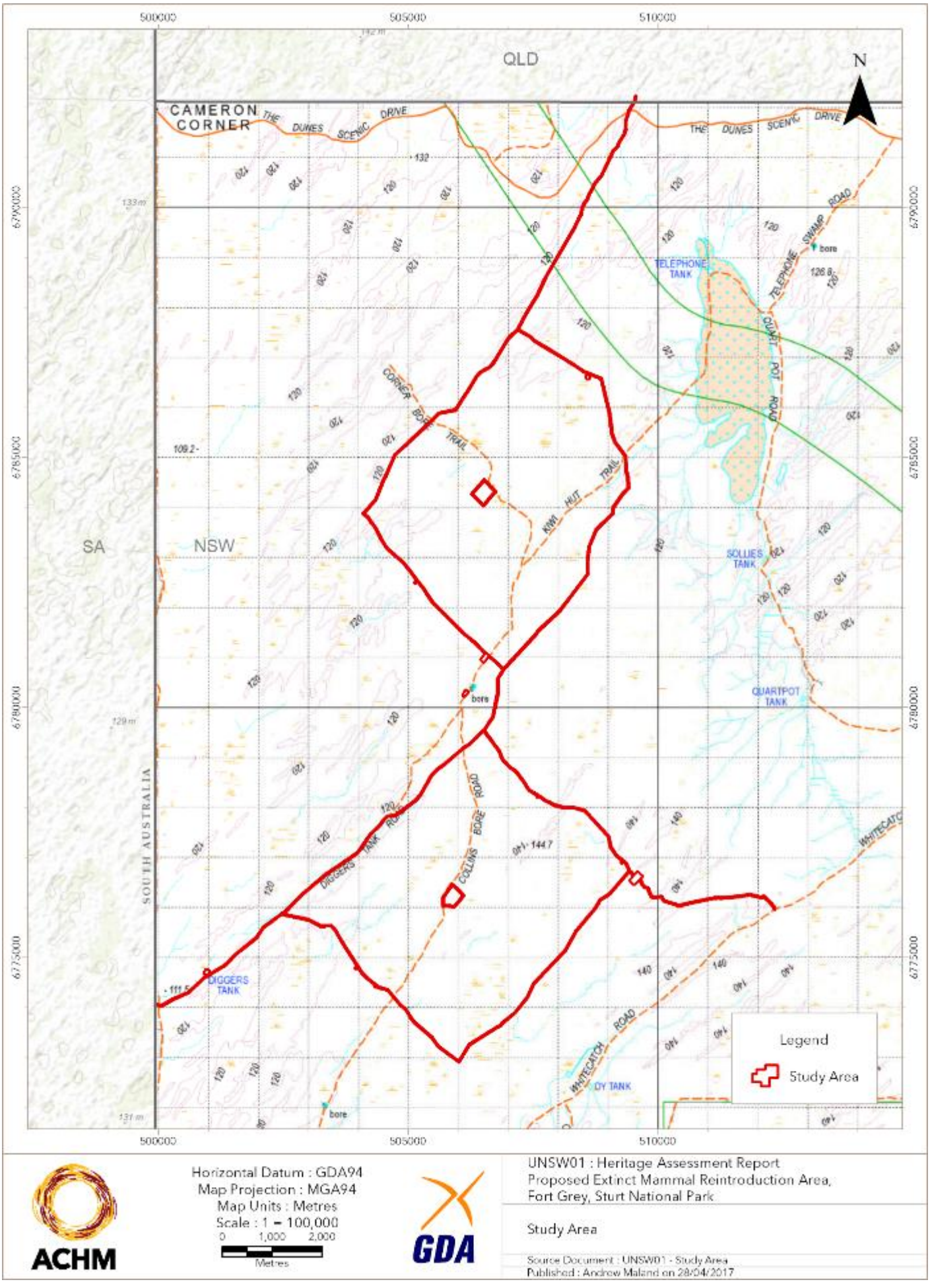
Construction will involve the clearing of vegetation within the 8 m fence line corridor. The method of vegetation clearing will vary according to the size and density of the vegetation. In places of minimal vegetation (such as swales with annual species only) this will involve hand clearing, whilst in areas of denser vegetation this may involve mechanical clearing. Grading of the fence line route and tracks may be undertaken in certain areas where the ground surface is uneven. A light grading will be undertaken when possible, otherwise grading may be undertaken to a maximum depth of 20 cm. Great lengths have been taken to minimise impact from the siting of the fence and this low impact approach will be used during construction to minimise disturbance.

1.3 Aims of the Assessment

The objective of this study is to provide Wild Deserts with an Aboriginal Cultural Heritage Assessment (ACHA) for inclusion in a Review of Environmental Factors. The investigation involves a description of the context of the Project Area in terms of its environmental, historical and cultural characteristics. It includes the identification of heritage places and cultural values in the Project Area, an assessment of the potential impacts to Aboriginal heritage as a result of the Project, and development of recommendations to minimise, manage and mitigate these potential impacts.



Map 1-1: General location of the Project Area



Map 1-2: Extent of the Project Area

1.4 Lead Investigator and Primary Report Author

The fieldwork and writing components of this Heritage Report were undertaken by Australian Cultural Heritage Management Pty Ltd (ACHM). The project supervisor, archaeologist, and author of this Heritage Report is Dr Justin Shiner. Dr Shiner is a highly experienced cultural heritage professional with over 12 years' experience working throughout Australia and internationally. He has managed a wide range of complex cultural heritage projects with a focus on mining in remote areas of Cape York and the Northern Territory as well as the Hunter Valley in NSW. This has included the design and implementation of risk based cultural heritage management systems at mine sites in Weipa, Gove and ERA at Jabiru where he gained extensive experience consulting with Indigenous communities about cultural heritage management including the management of shared historic heritage and intangible cultural heritage values.

Justin has a detailed knowledge of cultural heritage management legislation and requirements. In addition, working as an internal consultant with Rio Tinto he has provided high level cultural heritage advice to Rio Tinto Coal Australia in NSW and QLD, Rio Tinto Alcan in Queensland, Rio Tinto Technology and Innovation and Rio Tinto in Mongolia, Peru and Namibia. Justin has maintained a research and publication record with two published monographs and numerous articles and chapters published on Australian archaeology and stone artefacts in Australian and international journals and edited volumes. He is a highly experienced field archaeologist with extensive survey and excavation experience with a specialisation in stone artefact identification. Justin is the Operations Manager for Victoria, Queensland and New South Wales.

2 Consultation Process

A detailed record of consultation undertaken with interested parties regarding the management of cultural heritage associated with the project is presented in this section. The consultation programme was undertaken in accordance with the Office of Environment and Heritage (formerly Department of Environment and Conservation) guidelines *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (NSW Department of Environment Climate Change & Water, 2010b).

2.1 Identification of Traditional Owner/Aboriginal Community Representatives

In accordance with the consultation guidelines, advice was sought from the following individuals and organisations regarding the identification of Aboriginal people and organisations who may hold cultural knowledge relevant to determining the cultural significance of the Project:

- Sarah Martin (OEH, Broken Hill);
- John Holcombe (West Darling Area Manager, OEH, Broken Hill)
- Jodielyn Edge (Heritage Conservation Officer OEH, Broken Hill)
- Phil Purcell (OEH, Dubbo); and
- Patricia Fanning (Macquarie University) and Simon Holdaway (University of Auckland)

Based on the advice received from those listed above, three groups were identified as potentially having an interest in and knowledge of the cultural heritage values of the Project Area. These are listed below:

- The Tibooburra Local Aboriginal Land Council;
- Cecil and Ainsley Ebsworth (Wongkumara Traditional Owner Representatives); and
- Mark Sutton and Gerald Quayle (Maljangapa Traditional Owner Representatives)

At the timing of writing no Native Title determination has been made for the Project Area. The Wongkumara (Wankamarra) People registered a Native Title Claim (Claim QC2008/03) with the National Native Title Tribunal on 12 April 2008 that lies to the east and north of the Project Area.

Notification of the Project was also provided in Broken Hill local newspaper (The Barrier Daily Truth) in order to identify Traditional Owners who wanted to be consulted in regard to the Aboriginal Archaeological and Cultural Heritage Impact Assessment. The advertisement was run from the 15 – 22 February 2017. No responses were received to the advertisement.

Table 2-1: Consultation record

Who	How	When	Purpose of consultation	Results of consultation
Sarah Pizzey, Bryony Horton, Dan Hough, John Holcombe, Mike Spinaze, Keno Brueggeman, John Holcombe, Jaymie Norris, Ben Matthias, Richard Kingsford, Reece Pedler, Rebecca West	Meeting in person, Broken Hill	27 Sep 2016	Initial introductions and information gathering	Told to contact Sarah Martin and Phil Purcell for advice on best people to contact for aboriginal cultural heritage.
Steven Cox, Phil Purcell, Rebecca West	Phone	18 Oct 2016	Introductions and information gathering on AHIP processes and aboriginal stakeholders in the area	Received details on AHIP processes and procedures. Phil conducted AHIMS search – no records in the Project Area. Informed Sarah Martin is the best person to speak to about aboriginal stakeholders for the area.
Sarah Martin, Rebecca West	Phone	19 Oct 2016	Introduction and information gathering on aboriginal stakeholders	Sarah informed that there is no native title determination for our Project Area so best to consult Tibooburra Land Council, Wongkumara and Maljangapa groups. Suggested that Trish Fanning and Simon Holdaway ran a large archaeological project in Sturt National Park and would be useful to talk to.
Trish Fanning, Rebecca West	Phone	20 Oct 2016	Introduction and information gathering on previous archaeological project in SNP	Trish described the project conducted in the east of Sturt NP. Provided information on documents to look at and contacts for archaeologists who have worked in the area.
Trish Fanning, Simon Holdaway, Reece Pedler	Meeting in person, Broken Hill	28 Nov 2016	Trish and Simon were in town to discuss another project with Mark Sutton and Gerald Quayle, Maljangapa contacts. Opportunity for us to be introduced and describe our project.	Mark and Gerald did not attend meeting. Trish and Simon provided guidance on surface archaeological survey methods and contact details for archaeologists who could conduct surveys.
Mark Sutton, Reece Pedler, Rebecca West	Meeting in person, Mount Gipps Homestead	4 Dec 2016	To meet Maljangapa representative and outline project.	Mark registered his interest in being involved in surveys and suggested that his cousin, Gerald Quayle would be a key contact. Mark said he would inform Mutawintji Land Council about the project.
Roxanne Robertson, Reece Pedler, Rebecca West	Meeting in person, Tibooburra	8 Dec 2016	Introduce project to Tibooburra Local Aboriginal Land Council	General support for project and happy to engagement in surveys. TLALC will also support community information session to introduce project to TLALC Board Members.

Phil Purcell, Reece Pedler, Rebecca West	Phone	19 Dec 2016	Confirm aboriginal consultation approach based on information gathered.	Phil supported approach to engage with 3 groups, suggested archaeologist would also be required for surveys.
Sarah Martin, Reece Pedler, Rebecca West	Meeting in person, Broken Hill	4 Jan 2017	Acquire contact details for aboriginal stakeholders, confirm consultation approach.	Sarah supported proposed consultation approach. Sarah provided contact details for Maljangapa representatives but did not have contact details for Wongkumara. Suggested contacting lawyers dealing with native title claim.
Cecil Ebsworth	Phone	6 Jan 2017	Introduction to project	Described nature of project to Cecil. He registered his interest in being involved in the surveys with his daughter, Ainsley.
General community	Advert (A5 flyer)	19 Jan 2017	Invitation to attend community information session	Written invitation posted to 60 addresses via the Tibooburra Post Office. A4 adverts also placed in TLALC office, TJ's Roadhouse and Tibooburra Two Storey Pub.
General community	Community Info Session, Tibooburra	10 Feb 2017	To provide information on project to local community members	15 attendees at meeting, atmosphere of support and interest in the project.
General community	Advert in Barrier Daily Truth	15 – 22 Feb 2017	To advertise of other aboriginal people with cultural knowledge of the area who might be interested in the project.	Advert placed in local newspaper serving Project Area for 1 week. No responses received.
Gerald Quayle, Reece Pedler	Phone	15 Feb 2017	To introduce project and confirm availability for cultural heritage surveys week of Mar 20	Gerald expressed interest in participating in cultural heritage surveys in area
Mark Sutton, Reece Pedler	Phone	15 Feb 2017	To confirm availability for cultural heritage surveys week of Mar 20	Confirmed interest in participating in cultural heritage surveys
Cecil Ebsworth, Reece Pedler	Phone	15 Feb 2017	To confirm availability for cultural heritage surveys week of Mar 20	Confirmed interest in participating in cultural heritage surveys
Cecil Ebsworth	Letter	Sent 15 Feb 2017	To provide opportunity for comment on survey design	Confirmed availability to participate in surveys via email from Ainsley Ebsworth on 2 Mar 2017. Happy with survey design.
Tibooburra Local Aboriginal Land Council	Letter	Sent 15 Feb 2017	To provide opportunity for comment on survey design	Email received 7 Mar 2017 confirming availability and happy with survey design.
Mark Sutton, Gerald Quayle	Email	Sent 15 Feb 2017	To provide opportunity for comment on survey design	Response received via phone from G Quayle 13 Mar and M Sutton 21 Mar confirming availability and details of survey design.

Cecil Ebsworth, Ainsley Ebsworth, Myles Lalor, Dave Pollack, Justin Shiner, Reece Pedler, Rebecca West	In person, meeting	20 Mar 2017	To outline project and survey plan for the week	Traditional owners very supportive of project and happy with survey methodology. It was agreed that a 30 m corridor (with the fence line in the centre) would be surveyed. This would provide flexibility to realign the fence where possible to avoid archaeological sites.
Cecil Ebsworth, Ainsley Ebsworth, Myles Lalor, Dave Pollack, Justin Shiner, Reece Pedler, Rebecca West	In person, meeting	22 Mar 2017	Review results of southern paddock survey and discuss options for artefacts within 30m corridor	Traditional owners all in agreement that no significant sites being passed through by southern paddock fence. 4 sites where artefacts present are already highly disturbed (on existing roads or erosion areas). Happy for an AHIP application to be made to move artefacts within the corridor to inside the exclosures, away from fence and track (approx. 20m).
Cecil Ebsworth, Ainsley Ebsworth, Roxann Robertson, Dave Pollack, Justin Shiner, Reece Pedler, Rebecca West	In person, meeting	24 Mar 2017	Review results of survey week and discuss next steps	Traditional owners agreed that no significant impact on aboriginal cultural heritage will occur from proposed fence line. In sites where a small number of disturbed artefacts occur and AHIP will be submitted to move those artefacts to within the exclosure boundaries.
Mark Sutton, Gerald Quayle, Reece Pedler, Rebecca West	In person, meeting	25 Mar 2017	To outline project and survey plan for the weekend including results from surveys earlier in the week	Survey participants very supportive of project and happy with survey design and results so far.
Mark Sutton, Gerald Quayle, Reece Pedler, Rebecca West	In person, meeting	26 Mar 2017	Review results of survey and discuss next steps	During the 2-day visit (25-26/3/17) the 48 km of proposed fence line corridor and associated laydown areas and borrow pits were toured and inspected. Comments regarding fence and infrastructure placement and the project more generally happy with the approach taken, which takes the 'path of least resistance' by avoiding areas with high density of aboriginal stone artefacts and significant cultural heritage sites. commended the use of previously disturbed areas for fenceline corridors, including the use of graded vehicle tracks and old stock fencelines to minimise the impact from new fences excited and supportive of the project's aims to reintroduce locally extinct mammals, which are important in aboriginal culture and play a key ecosystem role. Important that these previous totem animals are brought back to country. Recommendations: Grading and use of maintenance tracks along proposed fencelines may expose artefacts which are currently below the surface, particularly in areas along the base of sand dunes or near claypan or scald edges. This risk may be reduced in some sensitive areas by capping with fill material excavated from pits near the fenceline. Six potential pits were identified along the exclosure fencelines. In addition, the

				clay walls of the now defunct Diggers Tank were identified as a possible source of previously disturbed clay material for use along the southern Wing Fence (alleviating the need to disturb new areas by digging additional pits). An AHIP application should identify artefacts documented within the surveyed 8 m fence corridor for relocation outside of the corridor – preferably just a few metres away to a safe area on the inside of the exclosure. Proposed fenceline corridors, such as the previously graded Diggers Tank Track (6 m wide) should be widened to 8 m with any disturbed artefacts relocated outside the corridor The AHIP should specify that during grading of fencelines and excavation of borrow pits, monitors will be present to identify and relocate any artefacts that are unearthed. Such artefacts should be treated in the same way as those relocated prior to the commencement of earthworks.

2.2 Survey Participants

ACHM were engaged by the University of New South Wales on behalf of Wild Deserts to complete the archaeological survey. The archaeological survey was conducted over five days between March 20 and March 24, with a post survey field inspection 25-26 March, 2017. The survey was led by Dr Justin Shiner (Operations Manager – ACHM). The survey team consisted of the following people:

- Dr Justin Shiner (survey leader),
- Mr Reece Pedler (Wild Deserts Project Manager),
- Ms Rebecca West (Wild Deserts Ecologist),
- Mr Cecil Ebsworth (Wongkumara Elder and Representative),
- Ms Ainsley Ebsworth (Wongkumara Representative),
- Mr Myles Lalor (Chairperson Tibooburra Local Aboriginal Land Council),
- Mr Dave Pollock (Representative Tibooburra Local Aboriginal Land Council); and
- Mrs Roxanne Robertson (CEO Tibooburra Local Aboriginal Land Council)
- Mr Mark Sutton Maljangapa representative) - Post survey field inspection only
- Mr Gerald Quayle (Maljangapa representative) - Post survey field inspection only

Daily participation in the survey is presented in Table 2-2. Green indicates participation and red non-participation.

Table 2-2: Participation in Fieldwork. Archaeological survey 20-25 March, post survey inspection 25-26 March

Name	March 20	March 21	March 22	March 23	March 24	March 25	March 26
Dr Justin Shiner							
Mr Reece Pedler							
Ms Rebecca West							
Mr Cecil Ebsworth							
Ms Ainsley Ebsworth							
Mr Myles Lalor							
Mr Dave Pollock							
Ms Roxanne Robertson							
Mr Mark Sutton							
Mr Gerald Quayle							

3 Description of the Project Area

3.1 Land Use History

3.1.1 Aboriginal Land Use

There is little detailed ethno-historical information on the Aboriginal occupation of the Project Area. Early European explorers such as Charles Sturt made some general observations, however these are difficult to reconcile into a detailed ethno-historical account of Aboriginal occupation (see Witter 1992). Aboriginal sites including quarries, camp sites, ceremonial sites, artefact scatters and scarred trees are scattered throughout the area. In the 1930s nearly all of the local Aboriginal population were moved to Brewarrina to the east. Many contemporary Aboriginal people of the region live in communities at Broken Hill, Tibooburra, Wilcannia and Cobar.

Mr Cecil Ebsworth (Wongkumara Elder and Representative). has extensive knowledge and experience of the Fort Grey area and is a primary knowledge holder for the Wongkumara people in relation to the Project Area. As a teenager and young man Mr Ebsworth spent a considerable amount of time travelling the various Pastoral Stations of the area with his father who was employed by the Stations as a wild dog trapper. Mr Ebsworth has a detailed knowledge of the environment and pastoral history of the wider Cameron Corner area. Whilst he is unaware of any ethnographic or spiritual sites situated within the actually project area he has knowledge of other significant cultural sites located within Sturt National Park and neighbouring properties. These sites will not be impacted by the current proposal.

3.1.2 European Land Use

The land use history of the Project Area reflects its isolated location. Explorer Charles Sturt established a depot, 'Fort Grey' at Lake Pinnaroo in 1845 during his expedition to Central Australia to locate the fabled inland sea. Sturt's expedition encountered harsh climatic conditions and little interest in the area immediately followed Sturt's visit. In the 1870s the area was taken up by pastoralists, with Fort Grey Station Homestead established on the shore of Lake Pinnaroo (the present Fort Grey Homestead is in a different location). The 1890s saw the expansion of rabbits in the arid zone, with huge plagues decimating vegetation and denuding the landscape. In combination with high stocking densities, the erosional power of wind and water in the landscape made substantial and irreversible changes to soil and vegetation. In 1898 Robert Dawes acquired the Fort Grey Lease, adding it to Yandama Station, which comprised 3,000 square miles and the leases: Fort Grey, Boulka, Tilcha, Warratta and Mokely. In 1899 Yandama Station shore 52,568 sheep and sent 5,383 sheep and 1500 head of cattle to market. At the time of Yandama Station's sale to S Norton and Company in 1912 it carried 11,000 cattle and 21,000 sheep. By 1918, Yandama was sold to Sidney Kidman, adding to his empire of over a dozen properties in the district and many others in Queensland and South Australia. Following World War II, Yandama Station and others in the district were broken up into component leases as soldier settler blocks for returned servicemen. Small leases, such as Fort Grey were difficult to derive sustainable income from given the required stock densities, historical damage from rabbits and overgrazing in this arid and climatically unpredictable landscape.

During the 1950s, a number of new pastoral bores were established on Fort Grey Station to areas remote from grazing by sheep (and previously only subjected to light grazing impact by sheep and cattle). These included several bores within the proposed Wild Deserts Project Area: Devis Bore (sunk 1952; failed 1968), Collins Bore (sunk 1955) and Watties Bore (sunk 1960). In 1972 Fort Grey, along with five other neighbouring pastoral leases, was acquired by the NSW Government and proclaimed as Sturt National Park. Artificial waterpoints such as Watties and Collins Bores were capped in 1972 and other earthen tanks (or dams) decommissioned in years following. In 1995 Rabbit Haemorrhagic Disease Virus (RHDV) was released in Australia, dramatically reducing rabbit densities, particularly in the arid zone and sites such as Sturt National Park and leading to improvements in vegetation and ground cover.

Despite Red Kangaroos being rare in the region during the 1800s, the dunefields within Sturt National Park now support very high numbers of Red Kangaroos, with their densities many times higher than neighbouring areas outside the park in SA and Qld. The effects on vegetation structure and reduced soil cover from high kangaroo densities are likely to exacerbate soil erosional processes.

The Fort Grey area of Sturt National Park is now the gateway to Cameron Corner and is popularly referred to as 'Corner Country'. Camping facilities for the public are provided at Lake Pinnaroo, however other than the main road and several access tracks the majority of the park is not presently accessible to the public.

3.2 Environmental Context

3.2.1 Geology and Soils

The geology of the wider area within which the Project Area is situated is characterised by ancient eroded mountain ranges and vast gibber plains. The dunes and sandplains of this Project Area developed on Tertiary and Quaternary alluvial sediments. There are also thinner sheets of wind-blown sand as sandplains, with no marked dune structure.

The dunes within the Project Area are predominantly stable, however degradation by grazing (primarily historic) means that some have active crests. Dune spacing varies from 50 to 500 m and the intervening swales may expose underlying stony plain, deep alluvial sands and clays, or calcareous sandy soils. There are few rock outcrops in the sand dune country other than small flat-topped hills of Cretaceous or Tertiary sediments, including silcrete.

Both the dunefields and the sandplains contain clay pans and ephemeral lake beds. Stream channels from the Tibooburra and Barrier Ranges flow toward Lake Callabonna and Lake Frome in north-eastern SA and flood local claypans, but runoff is insufficient to reach the distant lakes.

3.2.2 Land Systems

The Fort Grey area of Sturt National Park consists of four distinct land systems described on the Milparinka Land Systems Series Sheet (SH54-7). These are:

- FG (Fort Grey - Playas and Basins): Small lakes with massive brown clay soils and bare surfaces. Pans of deep, widely cracking, self-mulching grey and brown clays. Canegrass and lignum in lake centres, with sparse grass and forbs. Pan margins with sandy surfaces overlying earthy pans, sparse mulga with forbs and grasses.
- ND (Nundooka - Rolling Downs and Lowlands): Stony plains with relief to 10m. Bare stony surfaces with red desert loams and bands sparse saltbush or forbs and grasses on stone-free areas. Dunes of deep clayey sand with open mulga and abundant forbs and grasses.
- CR (Corner - Sandplains and Dunefields): Parallel high dunes of deep red clayey sand with sparse mulga, isolated areas of unpalatable shurbs, abundant forbs and grasses. Unstable dune crests of deep, loose sand, isolated grevilleas with rattlepod, white fox tail and sparse fobs. Scattered alluvial flats of sandy red earths and texture contrast soils with calcareous subsoils or earthy pans exposed in scalds, isolated fuchsia bush abundant grasses and forbs with canegrass in small brown and grey cracking clay pans.
- PG (Pulgamurtie - Tablelands): Dissected rolling stony tablelands with relief to 40m. Mainly brown lithosols and deeper red desert loams with red clays in gilgai depressions on lower slopes. Scattered mulga, perennial shrubs and abundant forbs and grasses.

Map 3-1 displays the location of these land systems relative to the Project Area.

Map 3-1: Land systems present in the Project Area

3.2.3 Topography

The Project Area has relatively low relief which reflects is location with the Strzelecki Dunefield. Elevations vary between 135 m above sea level to 170 m above sea level.

3.2.4 Vegetation

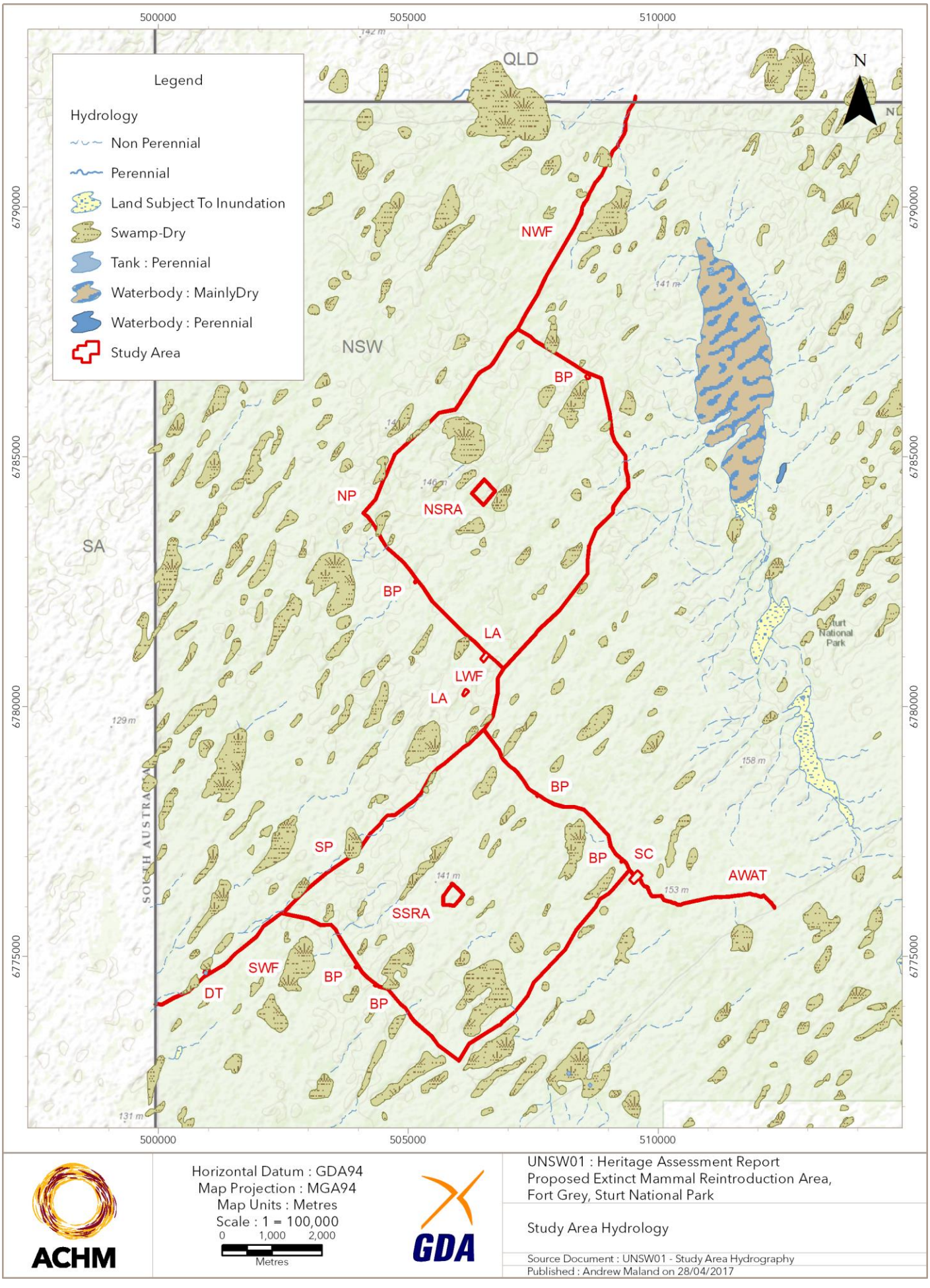
Vegetation varies throughout the Project Area according to the four land systems.

The Project Area is devoid of large trees. Coolabah trees (Eucalyptus coolibah) occur in isolated pockets in the northern section of the Project Area near an ephemeral lake, as do Beefwoods (Grevellia striata). The majority of the Project Area consists of a Mulga (Acacia spp.) dominated shrub land with ground cover predominantly consisting of short-lived annuals.

3.2.5 Hydrology and Climate

The Project Area lies within the Australian Arid Zone, which is characterised by low rainfall. Rainfall data for Fort Grey is available from 1899 although not all years contain complete records. The mean annual rainfall is just 175.8 mm making Fort Grey one of the driest places in NSW. January through to March are on average the wettest months of the year, although with such a small average rainfall differences between the wettest month (February 25.3 mm) and the driest month (April 8.6 mm) are only slight.

Due to its arid environment the Project Area contains no natural sources of permanent surface water (Map 3-2). In the western half of the Sturt National Park (but outside the Project Area), the largest creek is Fromes Creek which drains into Fromes Swamp and then Fort Grey basin (Lake Pinnaroo). The basins flood during wet seasons and may hold water for several years. Fromes Creek in northwest New South Wales starts at an elevation of 180 m and declines approximately 55.7 m over its 90.9 km length flowing through Frome Waterhole and Fort Grey Basin.



Map 3-2: Hydrology of the Project Area

Figure 3-1: North exclosure looking from the base of a dune across a clay pan

Figure 3-2: Swale in proposed south exclosure

Figure 3-3: Proposed site of wing fence between south and north exclosure

Figure 3-4: Gibber pavement, proposed all weather access track

4 Aboriginal Cultural Heritage Context

4.1 Previous Archaeological Studies

The Fort Grey area of Sturt National Park is located in one of the most remote parts of Western New South Wales. Other than established pastoral stations and the National Park, the area contains little in the way of built infrastructure. As such, very little formal archaeological work has been conducted in the region. A search of the NSW OEH Aboriginal Heritage Information System (AHIMS) reveals that there are no previously recorded archaeological sites within the Project Area or immediate surrounds. Despite this, previous archaeological research throughout the wider Cameron Corner and Tibooburra region of western NSW demonstrates that Sturt National Park and the wider region contains a diverse and extensive archaeological record. Much of this research was summarised by Witter (1992) in his PhD Thesis which notionally includes the Fort Grey area. Witter identified that with the exception of a single heat retainer hearth dated to approximately 25,000 years BP from Lake Yantara to the south of Tibooburra (Dury and Langford-Smith 1970), the known archaeology of the region is Late Holocene in age. Witter acknowledges that older archaeological deposits may occur in areas of valley fill, however these are apparently not well exposed. In addition, it is also possible that some of the numerous silcrete stone quarries recorded throughout the region could provide evidence of use that pre-dates the Late Holocene. Witter also notes that other sites known to occur in the region include rock wells, rock engravings, stone arrangements, extensive open occupation sites consisting of stone artefacts, hearths and scarred trees.

Witter characterised his study area in terms of Archaeological Land Systems. These units were based on the New South Wales Soil Conservation Service Land Systems mapping and were defined according to their environmental and geological attributes. Although not directly coinciding with the Fort Grey area the Tibooburra Dunes Land System is of relevance to the current study. Unlike the well-formed longitudinal dunes alternating with swales found in the Fort Grey area, Witter's Tibooburra Dunes Land System is defined as sand drifts and sand hills. However, Witter's observations regarding the archaeological potential of the dunes is relevant. He notes that very few artefacts occur on the loose sand of the dunes, but are more commonly found were lag exposure occurs on the clay pans or within blow-outs in the dune.

The Mount Wood area in the eastern portion of Sturt National Park was the focus of intensive archaeological investigations in the late 1990s. The Western New South Wales Archaeological Programme (WNSWAP) mapped an extensive record of surface stone artefact scatters and silcrete quarries in the Stud Creek Valley. This research also included the excavation of heat retainer hearths (fireplaces) which established an episodic occupational history of the Stud Creek Valley extending back at least 2,000 years BP. Whilst the Stud Creek Valley is not a direct analogue for the Fort Grey area, there are some similarities between the areas. Stud Creek is situated in a more rangeland context compared to the dunefield context of Fort Grey, however both areas contain extensive silcrete gibber pavements. Analysis of stone artefact assemblages from Stud Creek indicate that gibber pavements were a source of raw material for stone artefact manufacture (Holdaway et. al. 2004).

A search of AHIMS revealed three previous cultural heritage assessments relevant to the present study, these are summarised below.

An archaeological report was prepared by members of the Australian and New Zealand Scientific Exploration Society (ANZSES) in 1988 which documented the results of a fieldwork program designed by Dan Witter of the New South Wales Parks and Wildlife Service (NSWNPWS). The fieldwork was carried out in conjunction with the National Parks and Wildlife Service. The main aim of the expedition was to identify and record Aboriginal cultural sites to help develop models of Aboriginal land use in arid conditions. Four areas in the Sturt National Park were the focus of the study and over thirty new sites were recorded by ANZSES. One of the areas, Olive Downs Homestead, which is approximately 70km east of the present study area, is noted to contain areas of significance including three stone circles and a possible burial. In another area, Binerah Downs, approximately 37 km east from the current study area, two large high density quarries were recorded between scoured clay pans.

A Cultural Resources Management investigation was undertaken by Clayton and Witter in 1990 to assess the impact of visitors to the Fort Grey campground and the proposed Sturts Tree walking track. The report to National Parks and Wildlife Service notes an absence of cultural material along the western shore of Lake Pinaroo and suggests that occupation was usually concentrated in specific areas and not continuous along the lake margin. An extensive Aboriginal site where Frome's Creek enters Lake Pinaroo is detailed in the report and noted to contain a high density of flakes and flaked tools estimated to be from the last 1000 or 2000 years. Historic sites in the area include the Fort Grey ruins and shearing complex.

A report was prepared by Martin (1995) for the Roads and Traffic Authority, NSW, detailing the results of and an archaeological investigation of road alignments and gravel pits at Warratta Creek and Waka Woolshed near Tibooburra. Of the three sections surveyed, section two was the only area to contain significant archaeological material. Within this area, an extensive site, including a workshop area, was located on the southern side of one

the existing gravel pits. A total of 23 artefacts were recorded in a 2 m x 2 m sample area. It was noted that the assemblages mainly consisted of immediately local stone sources such as quartz and quartzite and that the fine silcrete would have been brought in from some distance.

The information presented above is used to inform the predictive model outlined in Section 5.3.

4.2 Types of Aboriginal Cultural Heritage Potentially Occurring within the Project Area

The following types of cultural heritage site are assessed as potentially occurring within the Project Area.

Heat Retainer Hearths

Hearths consist of lumps of burnt clay or stone cobble (gibber) hearthstones. Sometimes ash and charcoal are preserved. Hearths probably represent the remains of cooking ovens. These were lined with baked clay nodules and stone cobbles to retain heat. Hearths may be isolated or occur in clusters and may be associated with open artefact scatters.

Stone Artefact Scatters

Scatters of stone artefacts exposed on the ground surface are one of the most common type of archaeological site in WNSW. The remains of heat retainer hearths may also be associated with the artefacts. Stone artefact scatters are commonly found as surface expressions due to the extensive nature of erosion in WNSW, however some areas of the landscape have the potential to contain shallow stratified deposits, but this is locally dependent upon prior land use history and land surface composition. Previous research in WNSW indicates that stone artefact scatters may occur almost anywhere, but generally occur in higher densities and have a more complex in composition in areas near water sources.

Quarries

These are locations where Aboriginal people obtained raw material for their stone tools. Materials in WNSW commonly used for making flaked stone tools include silcrete, quartz and quartzite. These materials were obtained from exposed sedimentary formations or picked up as loose rock on the surface e.g. gibber pavements.

Stone Arrangements, Ceremonial Rings and Ceremony and Dreaming Sites

Stone arrangements range from cairns or piles of rock to more elaborate arrangements such as stone circles or other patterns. Other features associated with the spiritual aspects of Aboriginal life are those now called ‘sacred sites' or 'dreaming’ sites. These can be either stone arrangements or natural features such as rock outcrops, waterholes or distinctive landscape features, which may be associated with initiation ceremonies or the activities of ancestral beings.

Burials

Sand dunes are a sensitive landform for the presence of buried human skeletal remains. The sand dunes within the study area may potentially contain human burials, although the harsh environmental conditions of the area mean that human skeletal material is unlike to survive for any length of time if exposed through erosion.

4.3 Predictive Model

Sturt National Park contains an extensive and diverse archaeological record. The vast majority of information supporting this statement is drawn from academic research projects. The sites investigated during these projects have not been entered into AHIMS. Therefore, AHIMS contains no direct information for the immediate area surrounding the Fort Grey area of Sturt National Park. Despite this, information drawn from other sources such as the various academic research projects can be used to develop a predictive model and series of statements regarding the potential archaeological value of the Project Area. In the absence of detailed site distribution data it was decided that the predictive model should be framed in terms of the Land Systems present within the Project Area. These were described in section 4.

Understanding the environmental character of the Project Area is critical to the development of an informed archaeological predictive model. The environmental characteristics of the Project Area were summarised in detail in section 3.2. Some key characteristics of the environment relevant to the predictive model are as follows:

- The Fort Grey area is one of the most arid areas of New South Wales with an average annual rainfall of 175 mm;
- There is no natural permanent standing water within the Project Area;

- The area is dominated by sand dunes and these make up a small portion of the much larger Simpson–Strzelecki Dunefields bioregion which is predominantly comprised of long parallel sand dunes;
- Vegetation is generally sparse and consists primarily of acacia and grassy shrublands

In addition to the above, the Fort Grey area also contains several larger ephemeral swamps, the largest of which is Lake Pinnaroo. Lake Pinnaroo is located approximately 20 km to the east of the Project Area. Despite the arid characteristics of the Project Area, a range of flora and faunal resources were available to support human occupation. These include kangaroo, emu, and a range of mammal species (many of which are now locally extinct in Sturt National Park), a range of reptile species and a range of bird species. In summary, under suitable conditions of water availability the Project Area would have afforded Aboriginal people to occupy the area on an opportunistic basis. This occupation was likely to be highly mobile and episodic in nature. In good years, clay pans and larger swamps such as Lake Pinnaroo would have held water which may have enabled people to move throughout the region.

The relationship between people and the environment has yet to be investigated through a comprehensive archaeological research programme. The most detailed parallel data comes from Stud Creek in the eastern section of the park. Although not situated within the dunefields, Stud Creek is similarly arid and lacks permanent sources of surface water. Information drawn from the radiometric dating of heat retainer hearths along Stud Creek provides some insight into the episodic nature of Late Holocene occupation in the arid zone of Western New South Wales. Holdaway et al. (2005) obtained radiocarbon determinations from 28 heat retainer hearths. A statistical analysis of these indicated a significant period of time when hearths were not constructed within this particular section of Stud Creek, including a major hiatus spanning nearly 300 years. After accounting for differential erosion and other factors that may have selectively removed hearths of a certain age Holdaway et. al (2005) concluded that the gaps in the chronology of hearth ages represented periods when people were not intensively occupying the Stud Creek Valley.

The following general conclusions can be drawn from knowledge gained during previous consulting reports, previous archaeological research (e.g. Witter 1992 and Holdaway et. al. 2004) and consideration of the environmental characteristics of the Project Area:

- Occupation of the Project Area is likely to have been opportunistic and episodic in nature, with people taking advantage of wet periods to expand their range of movement into the less well watered areas of the dunefields;
- Sturt National Park contains an extensive and diverse archaeological record consisting of quarries, rock wells, rock engravings, stone arrangements, extensive open occupation sites consisting of stone artefacts and hearths, and scarred trees;
- The majority of archaeological sites are likely to be relatively recent in age (Late Holocene);
- Pleistocene archaeological deposits may be present, however these are rare, difficult to identify and likely to be buried under extensive sediment given the historically mobile nature of sediment in the Project Area;
- The most common site types are open occupation sites consisting of stone artefacts and often hearths;
- Open sites are often spatially extensive and contain a large number of stone artefacts in varied densities;
- Open sites will occur in all Land Systems and are visible where scalding, blow-outs or erosion is present;
- Quarries are likely to be restricted to tablelands or within the stony plains;
- The presence of rock wells, rock engravings, and stone arrangements are dependent on the presence of a suitable geological resource and as such these are less likely to occur in the dunefields; and
- Ethnographic sites of value to contemporary people do occur within the wider Tibooburra region, however; the location of these is difficult to predict and knowledge of these is dependent on Aboriginal knowledge holders.

Table 4-1: Archaeological predictive model for the Project Area

Land System Unit	Key Characteristics	Vegetation Composition	Predicted Archaeological Site Types	Predicted Site Locations	Archaeological Potential
FG (Fort Grey - Playas and Basins)	Small lakes and swamps capable of holding water for short periods of time	Canegrass and lignum in lake centres, with sparse grass and forbs	Surface stone artefact scatters, hearths	On the margins of lakes and swamps, decreasing in probability with increased distance from these features	High – sites are expected to occur wherever lakes and swamps occur, however this is also dependant on localised ground surface conditions
ND (Nundooka - Rolling Downs and Lowlands)	Stony plains (gibber) with low relief	Sparse saltbush or forbs and grasses on stone-free areas. Dunes of deep clayey sand with open mulga and abundant forbs and grasses	Surface stone artefact scatters, hearths, and quarries (if outcropping silcrete is present)	Surface stone artefact scatters and hearths have the potential to be located anywhere within this land system, but are predicted to be more common near the boundaries of this and adjoining land systems. Quarries may potentially occur wherever silcrete outcrops are present, these are predicted to be relatively rare and concentrated in their distribution boundaries of this and adjoining land systems. Quarries may potentially occur wherever silcrete outcrops are present, these are predicted to be relatively rare and concentrated in their distribution	Medium – sites are generally likely to be low density in nature, but may be of a higher density near the boundaries of this and adjoining land systems.
CR (Corner - Sandplains and Dunefields)	Parallel high dunes often with swales situated between dunes. Clay pans holding temporary water may be present	Sparse mulga, isolated areas of unpalatable shrubs, abundant forbs and grasses	Surface stone artefact scatters and hearths	Previous work (e.g. Witter) suggests that the majority of sites are likely to occur in the transitional zone between the lower dune slope and the swales	High – sites are expected to occur throughout this area, but especially in areas where claypans are present
PG (Pulgamurtie - Tablelands)	Dissected rolling stony tablelands with relief to 40m	Scattered mulga, perennial shrubs and abundant forbs and grasses	Surface stone artefact scatters, hearths, and quarries (if outcropping silcrete is present)	Surface stone artefact scatters and hearths have the potential to be located anywhere within this land system, but are predicted to be more common near the boundaries of this and adjoining land systems. Quarries may potentially occur wherever silcrete outcrops are present, these are predicted to be relatively rare and concentrated in their distribution	Medium – sites are generally likely to be low density in nature, but may be of a higher density near the boundaries of this and adjoining land systems.

The archaeological predictive model concludes that all four Land System Units have the potential to contain archaeological sites. There are key differences in the types of sites likely to occur within each unit. Stone artefact scatters are the most common type of site likely to occur within the Project Area and these may be associated with heat retainer hearths. These are most likely to be found near playas and basins and in the dunefields, especially on the margins of swales between dunes where claypans are present. Quarries may also occur within the Project Area, however these are likely to be highly concentrated in their distribution to areas of suitable rock outcrops. Stone arrangements, ceremonial rings and dreaming sites may occur; however, the likelihood and potential location of these is harder to predict due to the intangible nature of these sites. The input of the Aboriginal Representatives present on the survey will be critical in determining if any of these types of site are present within the Project Area.

5 Field Survey

5.1 Field Methods

The archaeological assessment for the project involved an archaeological surface survey. No sub—surface archaeological investigations were undertaken as part of this assessment.

The specific aims of the Aboriginal archaeological survey were as follows:

- To determine if any Aboriginal archaeological sites were located within the Project Area;
- To identify areas of Aboriginal archaeological sensitivity across the Project Area;
- To identify areas of no archaeological sensitivity and map areas of high disturbance if possible.

The Project Area was defined according to the proposed location of the following infrastructure:

- Two fenced paddocks (referred to as exclosures), each with an area of approximately 20 km^2 with an approximate perimeter of 19 km (total 40 km^2 area, 38 km perimeter)
- An all-weather access track of 3.6 km;
- Two 8 ha soft release pens of approximately 400m x 200m;
- Three wing fences that link the exclosures and a border dog fence to create a 104km^2 area called the Wild Training Zone in which some re-introduced species will be released with a tightly controlled predator population to enable learning of anti-predator behaviour;
- A four metre easement for the creation of tracks along the internal and external perimeters of all fences to allow for the maintenance and management of the fences;
- Two laydown areas of approximately 200 m x 100 m for the temporary storage of fencing and construction materials;
- Six 40 m x 50 m borrow pits to allow for the extraction of clay to cap the top of several large dunes where sand drift may impact the fence.

These features were used to define survey units and these are described in Table 5-1 and presented on **Error! Reference source not found.**. Dunefields account for approximately 90% of the overall survey area. The remaining 10% of the survey area are made up of Rolling Downs and Lowland and to a lesser degree Playas and Basins.

Table 5-1:Descrition of Survey Units

Infrastructure Name	Survey Unit Field Code	Area/Length	Major Land System	Minor Land System
Southern Exclosure Fence and Track	SP	19 km linear	Dunefields	Playas and Basins
Northern Exclosure Fence and Track	NP	19 km linear	Dunefields	Rolling Downs and Lowland, Tablelands
Southern Soft Release Area Fence and Track	SSRA	1.2 km linear	Dunefields	N/A
Northern Soft Release Area Fence and Track	NSRA	1.2 km linear	Dunefields	N/A
Southern Wing Fence and Track	SWF	3.3 km linear	Dunefields	N/A
Linking Wing Fence and Track	LWF	1.3 km linear	Dunefields	N/A
Northern Wing Fence and Track	NWF	5.3 km linear	Dunefields	Rolling Downs and Lowland, Tablelands
All Weather Access Track	AWAT	3.6 km linear	Rolling Downs and Lowland, Tablelands	Dunefield
Two Laydown Areas	LA	200 m x 100 m	Dunefields	N/A
Six Borrow Pits	BP	40 m x 50 m	Dunefields	N/A

Map 5-1: Location of Survey Units

The survey methodology involved walking in evenly spaced transects (individuals at approximately 3-5 m spacing) covering the entire Project Area. The width of the Project Area was 30 m with the exception of laydown areas and borrow pits. Exposures were thoroughly inspected as per proper archaeological practice.

Spatial data for the Project Area was uploaded onto a Trimble Juno GPS. The Juno was used to guide the survey team and to record data on the results of the survey, including site locational information. The data recorded on the Trimble was post-processed to obtain sub metre spatial accuracy. All archaeological sites discovered during the survey were recorded according to the *Guide to completing the AHIMS Site Recording Form*. For sites containing 15 or less stone artefacts all artefacts were recorded. At larger sites where time did not permit the recording of all artefacts either a 1 m x 1 m or a 2 m x 2 m sample of stone artefacts were recorded. The size of the sampling area was chosen based on the input of the Traditional Owner representatives. The objective of the sample was to obtain information on the density and representation of different artefact forms.

5.2 Archaeological Survey Results

5.2.1 Conditions of Visibility

Conditions of ground surface visibility can affect how many archaeological sites are located and as such may skew the results of a survey, especially if conditions of ground surface visibility vary significantly between different environments. In this case, the area with the best conditions of visibility may be reported as having the highest number of sites (they are more likely to be visible on the ground) while another area with less visibility may appear to have fewer sites. Therefore, it is important to consider the potential effects of ground surface visibility on archaeological survey results.

Conditions of ground surface visibility (defined as percentage of bare ground per square metre) varied between 75 - 90% in all areas. Grass and herbaceous plant growth was sparse throughout all survey units. Large areas of 100% surface visibility were encountered through all survey units, predominantly as scalds and claypans.

Survey units and descriptions of the visibility conditions for each survey unit are provided in Table 5-2.

Table 5-2: Conditions of ground surface visibility per survey unit

Survey Unit	Landforms	Vegetation	Exposures	Visibility	Survey Method
Southern Exclosure Fence and Track	Dunes and Swales Gibber pavements	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Vehicle tracks Lagged surfaces Blowouts Claypans	75-90%	Pedestrian
Northern Exclosure Fence and Track	Dunes and Swales Gibber pavements	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Vehicle tracks Lagged surfaces Blowouts Claypans	75-90%	Pedestrian
Southern Soft Release Area Fence and Track	Dunes and Swales	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Lagged surfaces Blowouts	75-90%	Pedestrian
Northern Soft Release Area Fence and Track	Dunes and Swales	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Lagged surfaces Blowouts	75-90%	Pedestrian
Southern Wing Fence and Track	Dunes and Swales Clay pans	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Vehicle tracks Lagged surfaces Blowouts Claypans	75-90%	Pedestrian
Linking Wing Fence and Track	Dunes and Swales	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Lagged surfaces Blowouts Claypans	75-90%	Pedestrian
Northern Wing Fence and Track	Dunes and Swales Gibber pavements	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Vehicle tracks Lagged surfaces Blowouts Claypans	75-90%	Pedestrian
Pit Fall Sites	Dunes and Swales	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Vehicle tracks Lagged surfaces Blowouts	75-90%	Pedestrian
All Weather Access Track	Dunes and Swales Gibber pavements	Open mulga woodland with grasses and low herbaceous shrubs	Scalds Lagged surfaces Blowouts Claypans	75-90%	Pedestrian

Figure 5-1: Example of surface visibility on a swale between sand dunes

5.2.2 Analysis of Survey Coverage

The actual or effective area covered by an archaeological survey depends on the conditions of ground surface visibility. Conditions of surface visibility are affected by vegetation cover, geomorphic processes such as sedimentation and erosion rates and the abundance of natural rock that may obscure archaeological materials.

All of the surface areas of the proposed development were inspected on foot. The intensive nature of the survey (pedestrian) combined with excellent conditions of surface visibility means that the survey was highly effective.

5.2.3 Summary of Survey Results

The archaeological survey resulted in the discovery of 42 previously unrecorded surface stone artefact distributions. This was the only site type discovered during the survey. The number of sites per survey is summarised in

Table 5-3.

Survey Unit	Number of Sites	Total Length of Survey Unit	Number of Sites per Kilometres
Survey Unit	Number of Sites	Total Length of Survey Unit	Number of Sites per Kilometres
~~Southern Release Yard~~	~~0~~	~~1.2~~	~~0~~
~~All Weather Access Track~~	~~0~~	~~3.4~~	~~0~~
~~Wing Fence South~~	~~3~~	~~3.2~~	~~0.9~~
~~Southern Exclosure (including borrow pits)~~	~~13~~	~~20~~	~~0.7~~
~~Wing Fence Central~~	~~0~~	~~1.2~~	~~0~~
~~Southern Release Yard~~	~~0~~	~~1.2~~	~~0~~
~~Northern Exclosure (including borrow pits and laydown area)~~	~~20~~	~~18~~	~~0.9~~
~~Wing Fence South~~	~~3~~	~~3.2~~	~~0.9~~
~~Northern Release Yard~~	~~0~~	~~1.4~~	~~0~~
~~Wing Fence Central~~	~~0~~	~~1.2~~	~~0~~
~~Wing Fence North~~	~~5~~	~~5.2~~	~~0.9~~
~~Northern Exclosure (including borrow pits and laydown area)~~	~~20~~	~~18~~	~~0.9~~
~~Total~~	~~42~~	~~53.6~~	~~N/A~~
~~Northern Release Yard~~	~~0~~	~~1.4~~	~~0~~
Wing Fence North	5	5.2	0.9
Total	42	53.6	N/A

Table 5-3: Number of sites located per survey.

Map 5-2 Results of Archaeological survey:

This map has been removed to ensure the location of Aboriginal heritage sites remains confidential.

Figure 5-2: An example of a site recorded during the archaeological survey. This is the North Paddock 16 site.

Figure 5-3: Two silcrete flakes from the North Paddock 2 site. These are typical of the types of flaked artefacts recorded during the survey.

5.2.4 Archaeological Site Definition

Surface distributions of stone artefacts were the only type of archaeological site discovered during the survey. This is not surprising as this site type is considered to be locally abundant in WNSW (see Holdaway et al. 2004). The definition of site extents and boundaries is challenging in arid environments. Excellent conditions of surface visibility extending over large areas can often give the impression of a near continuous distribution of archaeology without obvious boundaries. The current project area is no exception. In addition, the survey coverage was confined to a relatively narrow corridor (30 m wide) consistent with the potential scale of impact associated with the installation of the fence lines and access tracks (8 m alignment within the 30 m wide survey corridor). This

means that the survey corridor intersected a range of landforms such as dunes, clay pans and scalded sand sheets that extended beyond the width of the survey corridor.

Sites were defined according to both the spatial relationship between artefacts and landform/exposure surface (mainly scalded surfaces). Wherever possible scalded and lagged surfaces were used to define site extents. Where the boundaries of these extended beyond the survey area the total number of artefacts on the scalded surface were estimated.

5.3 Archaeological Analysis

5.3.1 Site Location

Sites were recorded in eight distinct landscape contexts. These are presented in Table 5-4. Sites were most commonly found on the interface between the scalded dune base and swale interface with 28 of the 42 recorded sites occurring in this landscape context. The scalded character of these areas presents excellent surface visibility for the detection of stone artefacts. This is a pattern similar to that identified by Witter (1992). Witter noted that the majority of sites within the dunefields were located at the base of dunes near the transition to the swale.

Table 5-4: Number of sites per landscape unit

Landscape Context	Number of Sites	Percentage
Crest of Dune	1	2.4%
Gravel (Gibber) Flat between dunes	4	9.5%
Lagged Surface on Crest of Dune	2	4.8%
Lagged Surface on Dune Slope	1	2.4%
Lagged Sand Sheet on Edge of Dune	2	4.8%
Scald at base of Sandy Rise	3	7.1%
Scald at base of Dune/Edge of Swamp	1	2.4%
Scald base of Dune/Swale Interface	28	66.7%
Total	42	100%

5.3.2 Site Size and Contents

At 31 sites every artefact present was individually recorded. These sites were relatively discrete in character and the actual number of artefact present was easily quantified.

The majority of these sites contained a low number of artefacts. Twenty-six sites contain between 1 and 10 artefacts, with 10 sites consisting of single artefacts only. The remaining five contained between 11 and 19 artefacts. The details of these sites are summarised in

Table 5-5.

Table 5-5: Number of artefacts per site where all artefacts were recorded

Site Name	AHIMS Number	Number of Artefacts Recorded
Southern Paddock 1	05-1-0035	3
Southern Paddock 4	05-1-0038	1
Southern Paddock 9	05-1-0043	1
Southern Paddock 10	05-1-0044	1
Southern Paddock 11	05-1-0045	2
Southern Paddock 12	05-1-0046	1
North Paddock Laydown Area	05-1-0034	1
Northern Paddock 1	05-1-0014	2
Northern Paddock 2	05-1-0015	3
Northern Paddock 3	05-1-0016	5
Northern Paddock 4	05-1-0017	1
Northern Paddock 5	05-1-0018	2
Northern Paddock 7	05-1-0020	7
Northern Paddock 8	05-1-0021	5
Northern Paddock 9	05-1-0022	4
Northern Paddock 12	05-1-0025	2
Northern Paddock 13	05-1-0026	1
Northern Paddock 14	05-1-0027	1
Northern Paddock 15	05-1-0028	1
Northern Paddock 16	05-1-0029	9
Northern Paddock 17	05-1-0030	6
Northern Paddock 18	05-1-0031	1
Wing Fence North 2	05-1-0049	4
Wing Fence North 3	05-1-0050	2
Wing Fence North 4	05-1-0051	8
Wing Fence North 5	05-1-0052	1
Northern Paddock 6	05-1-0019	14
Northern Paddock 10	05-1-0023	19
Northern Paddock 11	05-1-0024	13
Northern Paddock 20	05-1-0033	12
Wing Fence North 1	05-1-0048	14
Total Number of Artefacts		147

Due to site size and time constraints sampling (artefacts within a small area of the site were recorded in detail to provide an indicative sample of the artefact forms present and artefact density) was undertaken at the remaining eleven larger sites recorded during the survey. The details of these sites are summarised in

Table 5-6. Four sites were estimated to contain approximately 100 artefacts, however the extent of these sites extends beyond the survey area and the majority of these artefacts are outside of the 30 m wide survey corridor. A further two sites were estimated to contain approximately 20 artefacts, however as above the extent of these sites extends beyond the survey area. One site was estimated to contain approximately 80 artefacts and another 40 artefacts, however these sites also extend beyond the survey area. The remaining three sites contain 16, 12 and 7 artefacts, all of which are situated within the survey corridor.

Table 5-6: Details of sites where sampling was undertaken

Site Name	AHIMS Number	Sampling Method	Number of Artefacts Recorded	Estimated Number of Artefacts
Southern Paddock 2	05-10036	1m x 1m Sample	2	16
Southern Paddock 3	05-1-0037	1m x 1m Sample	2	7
Southern Paddock 5	05-1-0039	1m x 1m Sample	1	12
Southern Paddock 6	05-1-0040	1m x 1m Sample	3	100 (site extends beyond survey area)
Southern Paddock 7	05-1-0041	1m x 1m Sample	10	100 (site extends beyond survey area)
Southern Paddock 8	05-1-0042	1m x 1m Sample	3	100 (site extends beyond survey area)
Southern Paddock 13	05-1-0047	2m x 2m Sample	7	100 (site extends beyond survey area)
Wing Fence South 1	05-1-0055	10m x 10m Sample	1	20 Artefacts (site extends beyond survey area)
Wing Fence South 2	05-1-0053	10m x 10m Sample	1	20 Artefacts (site extends beyond survey area)
Wing Fence South 3	05-1-0054	2m x 2m Sample	2	80 Artefacts (site extends beyond survey area)
Northern Paddock 19	05-1-0032	1m x 1m Sample	9	40 Artefacts (site extends beyond survey area)
Total Number of Artefacts Recorded During Sampling			41	

5.3.3 Site Condition

The condition (spatial integrity) of all sites is assessed as poor. The Project Area has experienced significant historical and ongoing soil disturbance. The pastoral land use of the area has led to extensive erosion of sediment. The impacts of this are still evident today with the widespread presence of scalding throughout the Project Area. Hard hoofed livestock loosened the sediment which has in turn resulted in erosion. Stone artefacts have become displaced from their original contexts due to fluvial and Aeolian processes, the effects of which are exacerbated by the weakened land surface.

In addition, a number of sites such as those along the Southern Wing Fence have been directly impacted by the creation (long ago) of formal management tracks. The creation and on-going maintenance of these tracks has also contributed to the poor spatial integrity of the sites.

5.3.4 Stone Artefact Analysis

The total number of artefacts recorded during the survey (188) is too small for a meaningful analysis of patterns in the composition of stone artefact assemblages across the area. As nearby studies have demonstrated (e.g. Holdaway et al. 2004, Shiner 2006) assemblages of several thousand or more artefacts are required to demonstrate clear patterns in both intra and inter assemblage composition and variability. Despite this, some general inferences regarding patterns of stone artefact manufacture and discard can be drawn from the data collected during the survey.

All stone artefacts with the exception of two ground stone fragments are manufactured from silcrete. This is a pattern that has been demonstrated in other local studies (e.g. Holdaway et al 2004, Shiner 2006). Potential sources of silcrete suitable for the manufacture of stone artefacts occur locally. Although not present within the survey area whilst travelling to the survey units, several large outcrops of silcrete were noted to occur with the Fort Grey area of Sturt National Park. These may potentially be silcrete quarries. These areas will not be impacted by the proposed development and were therefore not investigated. Holdaway et al. (2004 and Witter (1992) have also noted that silcrete is locally abundant both in outcrop and gibber form in Northwest NSW.

The number of artefacts per technological type is summarised in Table 5-7. Complete flakes are the most common artefact type accounting for 109 of the 188 artefacts. In addition, 13 complete tools were also recorded. These consist of ten scrapers, one denticulate, one pirri point, and one notch. Nine cores were recorded, these consist of uni-platformed and multi-platformed forms. Only 20 artefacts retained cortex. The average maximum dimension of all artefacts is 35.8mm.

Table 5-7: Number of artefacts per technology type.

Artefact Type	Quartzite	Silcrete	Total
Broken Flake		25	25
Broken Tool		1	1
Complete Flake		109	109
Complete Split		12	12
Complete Tool		13	13
Core		9	9
Distal Flake		6	6
Distal Tool		2	2
Ground Stone	2		2
Medial Flake		1	1
Medial Tool		1	1
Proximal Flake		7	7
Total	2	186	188

5.4 Assessment of Survey Results

5.4.1 Effectiveness of the Survey

The findings of the survey largely confirm the predictive model outlined in Section 5.3. The most obvious exception to this is the surprising absence of heat retainer hearths within the Project Area. Heat retainer hearths are relatively common across much of WNSW (Holdaway et al. 2004), therefore reasons as to why these are absent from the Project Area are not immediately obvious. Suitable stone for heat retainers in the form of silcrete gibber cobbles occur widely throughout the area. The Aboriginal Representatives present on the survey attributed the absence of heat retainer hearths to be a reflection of the absence of large campsites. Another possible explanation is the heavily eroded nature of the landscape in this area of Sturt National Park. This interpretation does not hold up when it is considered that Holdaway et. al 2004 also documented significant erosion along Stud Creek where numerous hearths were documented. It is also possible that the absence of hearths reflects past patterns of land use and micro-environmental factors. The survey area did not include extensive areas of playas and swamps (as these areas were avoided for fence line placement as they would likely effect fence integrity). It is possible that hearths are more likely to occur in these locations where more intensive occupation could be supported by more

permanent water. Interestingly Witter (1992) also noted an absence of hearths in the dune systems, therefore the absence of hearths would appear to be consistent with the results of earlier work.

Quarries were not directly encountered within the Project Area, however several potential outcrops of silcrete were noted in areas close to the survey area. On this basis it is concluded that quarries almost certainly exist within the wider Fort Grey area, however not directly within the survey area. Therefore, despite the lack of quarries recorded during the survey it is felt that the high likelihood that they occur locally and that this also validates the predictive model.

In summary, the survey has been effective at identifying the nature and extent of the archaeological record within the Project Area. The archaeology is characterised as consisting of low density surface or shallow surface distributions of stone artefacts lacking hearths and other feature. These sites have experienced a significant degree of spatial disturbance.

5.4.2 Aboriginal Land Use

The results of the survey also tell us about past patterns of Aboriginal land use, although based on the highly disturbed nature of the sites and the small amount of material present, only generalised statements can be made. As demonstrated by Holdaway et al (2004) and other studies e.g., Shiner (2006), the surface archaeological record of WNSW is characteristically a deflated palimpsest of material, primarily stone artefacts. The heavily deflated nature of the record is a result of the extensive surface erosion that has coincided with pastoral land use. Compared to the large deflated sites studied in detail elsewhere in WNSW (e.g. Holdaway et al. 2004, Shiner 2006) the sites recorded during the present Project Area are relatively small and low density in nature. It should also be noted that the relatively narrow survey corridor (30 m wide) means that it is likely that some of the sites extend beyond the area surveyed. Defining discrete site extents or boundaries in a landscape such as WNSW is difficult as the good conditions of surface visibility serve to demonstrate both the extensive and continuous nature of stone artefact distributions. This means that the survey results merely represent the intersection between the survey extent and the near continuous distribution of stone artefacts. In this sense the survey results provide a glimpse of a much wider archaeological distribution.

Water is the most important factor influencing Aboriginal land use in the Project Area. The Project Area is one of the most arid in NSW. There were no permanent sources of surface water available to Aboriginal people for much of the period of potential human occupation. The Project Area contains a number of swamps and playas which may hold water for short periods after heavy rain. When carrying water these would have allowed Aboriginal people to sustain a presence in the area for a period of time. Occupation of the wider area is likely to have been episodic and highly mobile due to the climatic characteristics of the area. The nearest occupational chronology for Aboriginal occupation in a similar environment comes from Stud Creek to the east of the Project Area. At Stud Creek Holdaway e. al. (2005) obtained radiocarbon determinations on charcoal from heat retainer hearths which demonstrated an episodic and discontinuous occupation of Stud Creek with a major 300-year hiatus. Although some 100 km further to the west of Stud Creek it is not unreasonable to expect given the similarly arid environment that a somewhat similar occupational pattern existed and that this would be largely influenced by resource availability and in particular the presence of water.

5.4.3 Potential Archaeological Deposits

The effectiveness and coverage of the survey is assessed as very high. This is due to both the survey methodology (intensive pedestrian) and the exceptional conditions of surface visibility and exposure throughout the Project Area. This provides a high degree of confidence that the results of the survey provide a representative indication of the archaeological resource of the Project Area. Having said this, the mobile nature of sediment in this environment means that there is some potential for obscured archaeological materials, especially on dunes. Lagged areas (clay deposits) on the slopes and crest of dunes discovered during the survey did occasionally contain a very low density of archaeological materials, however this occurred in much lower densities compared to the material found on the dune base/swale interface. Only six of the 42 sites recorded during the survey were either located on the dune crest or dune slope despite excellent conditions of surface visibility. In summary, the survey is assessed as being effective at identifying a highly representative impression of the nature and extent of the archaeological record within the Project Area.

Witter (1992) noted that the dune/swale interface is an area of high sediment mobility, which has the effect of both exposing and covering the surface archaeological record. Over time this erosion has led to the down slope movement of stone artefacts onto the clay pan surfaces between dunes. He also noted that sites are possible in the loose dune sediment, however these are not common and are likely to be if not identical, then similar in composition to sites found within the dune base/swale interface.

6 Cultural Heritage Values and Statement of Significance

6.1 Assessing Significance

The 42 sites recorded during the survey are assessed in terms of cultural and scientific (archaeological) significance. The criteria by which this assessed has been undertaken are outlined in the following sections. The outcomes of this assessment are presented in the Statement of Significance.

6.1.1 Cultural Significance

There are two distinct categories of cultural place that attract Aboriginal cultural significance:

Places of cultural significance through their association with creator beings, spirit beings, traditional activities, historical events or contemporary values where there may not be any physical material; and

Places where there is material (either organic or inorganic) that derives from the cultural activities of Aboriginal people, commonly called archaeological material and which constitutes the objects protected under the NPWS Act.

Only the latter category of place (i.e. material) with Aboriginal cultural significance has been identified within the Project Area. The consultant has been notified by the participants in the survey that none of the Aboriginal cultural heritage sites identified during the survey are the subject of any specific requirements or restrictions in order to address issues of cultural sensitivity.

6.1.2 Scientific (Archaeological) Significance

Scientific significance is assessed by examining the research potential and representativeness of an archaeological site. This is achieved by assessing the value the site or place has for scientific investigation, through an analysis of the site condition, rarity, contents and structure. The system advocated here is based on approaches originally outlined in Sullivan and Bowdler (1984) and are commonly used in archaeological significance assessments throughout Australia.

This system may be applied differently depending on the occurrence of disparate site types. As an example, it is generally not possible to rate both scarred trees and other types of archaeological site together, though the same criteria may be applied to each site type separately. Research potential is assessed by examining site contents and condition. Site contents refer to all cultural materials and organic remains associated with human activity at a site. Site contents also refer to the site structure - the size of the site, the patterning of cultural materials within the site and the presence of any stratified deposits. Site condition refers to the degree of disturbance to the contents of a site at the time it was recorded.

Representativeness refers to the regional distribution of a site type. It is assessed on whether the site is common, occasional or rare in each region. Assessments of representativeness are subjectively biased by current knowledge of the distribution and numbers of archaeological sites in a region. This varies from place to place depending on the extent of previous archaeological research. Consequently, a site that is assigned low significance values for contents and condition, but a high significance value for representativeness, can only be regarded as significant in terms of current knowledge of the regional archaeology. Any such site should be subject to further re-assessment as additional archaeological research is carried out. Assessment of representativeness also considers the contents and condition of a particular site. For example, in any region, there may only be a limited number of sites of any type that have suffered minimal disturbance. Such sites would therefore be given a high significance rating for representativeness, although they may occur commonly within the region.

Table 6-1: Significance assessment criteria for assessing the scientific significance of archaeological sites.

		Rank	Definition
1	Site Contents	0	No cultural materials remaining or materials of questionable provenance.
		1	Site contains a small number or limited range of cultural materials with no evidence of association or stratification.
		2(a)	A larger number, but limited range of cultural materials, and/or
		2(b)	Some intact stratified deposit remains.
		3(a)	A large number and diverse range of cultural materials; and/or
		3(b)	Largely intact stratified deposit; and/or
		3(c)	Surface spatial patterning of cultural materials that still reflect the way in which the cultural materials were laid down.
2	Site Condition	0	Site has either been destroyed, or is in a highly-deteriorated state with very few cultural materials remaining.
		1	Site in a deteriorated condition with a high degree of disturbance, though with some cultural materials remaining.
		2	Site in a fair to good condition, but with some disturbance.
		3	Site in an excellent condition with little or no disturbance. For surface artefact scatters this may mean that the spatial patterning of cultural materials still reflects the way in which the cultural materials were laid down.
3	Representativeness	1	Common occurrence both in the local environment and throughout the region as a whole
		2	Occasional occurrence, either within the study locality or the region as a whole
		3	Rare or previously undocumented site type within the region

Overall scientific significance ratings for sites, based on a cumulative score following assessment of site content, site integrity and representativeness as shown in Table 6-2 below.

Table 6-2: Significance scoring based on the criteria outlined in this section, and the attributes listed in numerical order.

Score	Significance
1-4	Low scientific significance
5-7	Moderate scientific significance
8-9	High scientific significance

6.2 Statement of Significance

The following section contains statements on the Cultural and Scientific Significance of each site recorded during the survey. The criteria used to establish the Statement of Significance are based on the criteria outlined in Section 6.1. In the case of establishing cultural significance the views of the Aboriginal Representatives present during the survey and subsequent Project Area Inspection were specifically sought.

6.2.1 Cultural Significance

The views of the Aboriginal Representatives on the cultural significance of each site were sought during the site recording process. This involved a discussion about the contents, condition, landscape location and future management of each site. At the conclusion of the survey two separate meetings were held with the Aboriginal Representatives who participated in the Heritage Assessment to formally establish the cultural significance of the sites recorded during the Heritage Assessment. The Aboriginal Representative were specifically asked to comment on the cultural significance of the cultural heritage places recorded during the survey. The details of these meeting, including the Aboriginal Representatives views are outlined in Table 6-3.

Table 6-3: Consultation regarding cultural significance of sites

Date	Present at Meeting	Comments on Cultural Significance
24 March 2017	• Dr Justin Shiner (survey leader) • Mr Reece Pedler (Wild Deserts Project Manager), • Ms Rebecca West (Wild Deserts Ecologist), • Mr Cecil Ebsworth (Wongkumara Elder and Representative), • Ms Ainsley Ebsworth (Wongkumara Representative), • Mr Dave Pollock (Representative Tibooburra Local Aboriginal Land Council); and • Mrs Roxanne Robertson (CEO Tibooburra Local Aboriginal Land Council)	• Sturt National Park contains many significant Aboriginal Places including sacred places such as stone arrangements and story places • None of the above places are located within the Project Area • No sites of cultural significance were discovered during the survey • The sites discovered during the survey are not of cultural significance because they only contain a small number of artefacts and they have been disturbed either by erosion or on existing tracks • None of the sites contain hearths and therefore are not regarded as main camp sites • The Aboriginal Representatives believed that the re-introduction of the locally extinct mammals was of important cultural benefit to both the Aboriginal and wider communities
25-26 March 2017	• Mr Reece Pedler (Wild Deserts Project Manager), • Ms Rebecca West (Wild Deserts Ecologist), • Mr Gerald Quayle (Maljangapa Aboriginal Representative) • Mr Mark Sutton (Maljangapa Aboriginal Representative)	• Agreed with the approach taken, which takes the 'path of least resistance' by avoiding areas with high density of Aboriginal stone artefacts and significant cultural heritage sites. • Commended the use of previously disturbed areas for fenceline corridors, including the use of graded vehicle tracks and old stock fencelines to minimise the impact from new fences • Agreed with the Wongkumara Representatives and Tibooburra Local Aboriginal Land Council Representatives statements on cultural significance

In summary, the Aboriginal Representatives involved in the archaeological survey concluded that all of the sites recorded during the survey are of low cultural significance. The main reasons for this were:

- The sites are all highly disturbed due to erosion;
- The sites contain a relatively small number of artefacts;
- None of the sites contain hearths and therefore are not regarded as main camp sites

6.2.2 Scientific Significance

The 42 archaeological sites recorded as part of this assessment are all attributed with a low scientific (archaeological) significance rating. The primary reasons for this are they are of low density, exhibit a single common raw material type characteristic of the wider region, and contain artefact forms that are characteristic of the wider region. All sites occur within disturbed contexts (eroded land surfaces). Fanning and Holdaway (2004) demonstrated in studies undertaken elsewhere within Sturt National Park that stone artefacts in such context have undergone significant spatial displacement. In addition, none of the sites are in association with heat retainer hearths or stone sources. Previous studies of the surface archaeology in the east of Sturt National Park (e.g. Holdaway et. al 2004) have reported on examples of large and diverse surface artefacts associated with heat retainer hearths and nearby quarry sources. The absence of hearths limits the research potential of the sites. As demonstrated by Holdaway et. al. (2004) the radiometric dating of heat retainer hearths in association with detailed geomorphological investigation can be used to establish general occupational contexts for deflated surface artefact distributions in WNSW. The lack of heat retainer hearths in the Project Area means that this avenue of archaeological research is not possible. The surface artefact distributions recorded during the present study do not exhibit characteristics consistent with the large sites investigated by Holdaway et. al. (2004).

The sites recorded during this study are the first formally recorded archaeological sites from this part of Sturt National Park. Archaeological sites, and especially surface distributions of stone artefacts, are not rare or uncommon in this part of NSW. The absence of sites in the AHIMS Register reflects both the remoteness of the region and the relative lack of development that occurs requiring cultural heritage assessment. Previous academic archaeological research programmes in Sturt National Park have revealed a rich and varied archaeological record. In places this has been demonstrated to be of very high research potential and archaeological significance. Sturt National Park as a whole has the potential to contain thousands of Aboriginal archaeological and cultural heritage sites. The sites recorded during the present study are merely a very small sample of the overall archaeological potential of Sturt National Park. The assessment that these sites are of low archaeological potential in no way diminishes the potential that examples of larger multi-component sites may exist in other as yet unsurveyed areas of Sturt National Park. However, such sites were not encountered in the current study.

6.3 Summary of Significance

All 42 archaeological sites are assessed as being of low scientific and cultural significance. This assessment is based on the following information:

- Comments provided by the Aboriginal Representatives involved in the survey regarding the sites;
- The low density and disturbed nature of the sites;
- The lack of diversity in raw materials and stone artefact forms; and
- The absence of other features such as heat retainer hearths

The sites do contribute to our understanding of Aboriginal land use in the region, however they are of limited information potential in comparison to the other less disturbed higher density multi-component sites that likely occur in the wider region.

7 Avoiding or Mitigating Harm

7.1 Description of the Actual or Likely Harm

Partial or complete harm may potentially occur to all 42 sites (surface stone artefact scatters) recorded during the survey. A number (8) of the sites extend beyond the boundaries of the survey area. Therefore, these sites will partially be impacted. The remaining 34 sites may either be subject to complete or partial disturbance. Construction of the fenced exclosures and maintenance tracks may involve activities that have the potential to cause harm to the cultural heritage recorded during the survey, these are:

- Grading (to a maximum depth of 20 cm);
- Vegetation removal,
- Track maintenance; and
- Fence construction

> The archaeological survey effectively assessed a 30 m wide corridor. This is much larger than the 8 m area of potential disturbance. Harm will only occur to sites/artefacts that occur within the 8 m wide area of potential disturbance. Impact will not occur to artefacts that reside outside the 8 m wide fence line and access track corridor.

Table 7-1 presents the potential level of disturbance to each site.

7.2 Description of the Measures to Avoid Harm

In developing and implementing measures to avoid harm to Aboriginal cultural heritage, the five core principles of ecologically sustainable development (DEWHA 2010) have been taken into account to the extent that they can reasonably be extended to include Aboriginal cultural heritage. The Project Area is situated within Sturt National Park. One of the roles of the National Park is to preserve both Aboriginal and European cultural heritage. On this basis the Wild Deserts Team have sought wherever possible to minimise the potential of their activity to cause harm to cultural heritage. In accordance with this objective three distinct measures have been taken to avoid harming Aboriginal cultural heritage in the broader Project Area. Firstly, proposed fences and maintenance tracks were aligned as closely as possible to pre-existing areas of disturbance such as former pastoral tracks and NSWNPWS maintenance tracks. Secondly, prior to the archaeological survey the Wild Deserts Team in consultation with Dr Justin Shiner used the results of the background assessment and predictive model to adjust the location of the fences and maintenance tracks to avoid areas of the landscape of high archaeological potential. And thirdly, this area was then ground checked by the Wild Deserts Team prior to the survey to ensure that landforms and areas of high archaeological potential were avoided. These tasks were undertaken to pro-actively reduce the potential of harm to arise from the activity. The outcome of this is that the fence line was adjusted several times prior to the survey to avoid areas identified as being of high archaeological potential.

It is important to note that the Project Area (and in turn the area covered by the archaeological survey) accounts for a very small proportion of Sturt National Park. Previously archaeological studies reviewed in this report indicate that Sturt National Park is an area of high archaeological sensitivity and many more as yet recorded sites are likely to occur both within the Fort Grey area of the park and throughout the wider landscape.

Table 7-1: Potential degree of disturbance for each recorded site

Site Name	AHIMS Number	Potential Harm
Southern Paddock 1	05-1-0035	Partial/Complete
Southern Paddock 4	05-1-0038	Partial/Complete
Southern Paddock 9	05-1-0043	Partial/Complete
Southern Paddock 10	05-1-0044	Partial/Complete
Southern Paddock 11	05-1-0045	Partial/Complete
Southern Paddock 12	05-1-0046	Partial/Complete
North Paddock Laydown Area	05-1-0034	Partial/Complete
Northern Paddock 1	05-1-0014	Partial/Complete
Northern Paddock 2	05-1-0015	Partial/Complete
Northern Paddock 3	05-1-0016	Partial/Complete
Northern Paddock 4	05-1-0017	Partial/Complete
Northern Paddock 5	05-1-0018	Partial/Complete
Northern Paddock 7	05-1-0020	Partial/Complete
Northern Paddock 8	05-1-0021	Partial/Complete
Northern Paddock 9	05-1-0022	Partial/Complete
Northern Paddock 12	05-1-0025	Partial/Complete
Northern Paddock 13	05-1-0026	Partial/Complete
Northern Paddock 14	05-1-0027	Partial/Complete
Northern Paddock 15	05-1-0028	Partial/Complete
Northern Paddock 16	05-1-0029	Partial/Complete
Northern Paddock 17	05-1-0030	Partial/Complete
Northern Paddock 18	05-1-0031	Partial/Complete
Wing Fence North 2	05-1-0049	Partial/Complete
Wing Fence North 3	05-1-0050	Partial/Complete
Wing Fence North 4	05-1-0051	Partial/Complete
Wing Fence North 5	05-1-0052	Partial/Complete
Northern Paddock 6	05-1-0019	Partial/Complete
Northern Paddock 10	05-1-0023	Partial/Complete
Northern Paddock 11	05-1-0024	Partial/Complete
Northern Paddock 20	05-1-0033	Partial/Complete
Wing Fence North 1	05-1-0048	Partial/Complete
Southern Paddock 2	05-10036	Partial/Complete
Southern Paddock 3	05-1-0037	Partial/Complete
Southern Paddock 5	05-1-0039	Partial/Complete
Southern Paddock 6	05-1-0040	Partial
Southern Paddock 7	05-1-0041	Partial
Southern Paddock 8	05-1-0042	Partial
Southern Paddock 13	05-1-0047	Partial
Wing Fence South 1	05-1-0055	Partial
Wing Fence South 2	05-1-0053	Partial
Wing Fence South 3	05-1-0054	Partial
Northern Paddock 19	05-1-0032	Partial

7.3 Description of Measures to Minimise Harm

Where possible the proposed fence and track alignments have been aligned to avoid areas of the landscape that are of higher archaeological potential. This especially includes areas of potential silcrete outcropping where quarry sites may be present. The Aboriginal Community Representatives who participated in the cultural heritage assessment stated that they regard quarry sites as being of high significance. The realignment of the proposed fence lines and access tracks was informed by the predictive model. In addition, grading will only be undertaken when it is absolutely necessary and to a depth no greater than 20 cm.

7.4 Description of Measures to Mitigate Harm

As noted in Section 7.1 harm may potentially occur to all 42 sites recorded during the survey. Where possible the proposed fence and track alignments have been aligned to avoid areas of the landscape that are of higher archaeological potential. Where avoidance or minimisation of harm has not been possible it is proposed that harm be mitigated through the implementation of the salvage (community collection) of artefacts within the 8m corridor of potential disturbance.

7.5 Potential Cumulative Impacts of the Project

The Project will not substantially increase cumulative impacts to Aboriginal heritage in the region. This conclusion is based on the following:

- The nature and scale of previous and ongoing land disturbance processes in the region, predominately due to past pastoral activities which have resulted in extensive disturbance to the archaeological record;
- The nature and extent of identified Aboriginal heritage sites and archaeological potential in the Project area;
- Sturt National Park and WNSW more generally is known to contain an extensive and diverse archaeological record which extends well beyond the boundaries of the present Project Area; and
- The nature and scale of impacts associated with the Project, which are relatively minor vegetation clearing and fence construction resulting in limited disturbance to the ground surface;

In addition, the fence lines have been deliberately sited on areas of pre-existing disturbance to avoid impacting less disturbed areas. Where this has not been possible the fence lines have been aligned to avoid, as far as practicably possible, potentially culturally sensitive areas of the landscape.

7.6 Positive Cultural Heritage Outcomes of the Project

The Aboriginal Representatives involved in the field survey stated that the re-introduction of the locally extinct mammal species comprising the bilby, burrowing bettong, the stick-nest rat, the western barred bandicoot, the golden Bandicoot, the western quoll and the crest-tailed mulgara will enhance the cultural landscape of the Project Area. They believe that the presence of these animals in the area is important and helps to correct legacy of poor ecological management of the past.

8 Recommendations

8.1 General Recommendations

This report has considered the environmental and archaeological context of the study area, developed a predictive model and reported on the results of an archaeological survey of the study area. Forty Aboriginal sites were identified during the survey.

The following recommendations are made on the basis of:

- The results of the investigation as documented in this report; and
- Consideration of the type of development proposed and the nature of proposed impacts.

The following recommendations are provided:

Recommendation 1: No Survey Units have been identified in the proposal area to warrant further archaeological investigation such as subsurface test excavation.

Recommendation 2: None of the Survey Units or Aboriginal heritage sites identified in the Project Area has been assessed to surpass archaeological significance thresholds which would act to entirely preclude proposed impacts

Recommendation 3: The majority of the Aboriginal heritage sites recorded are low density distributions of stone artefacts. Any unrecorded or subsurface Aboriginal stone artefacts are predicted to be present as very low or low density artefact distributions. The archaeological significance of recorded artefact locales and the predicted unrecorded artefact distribution is assessed to be low; accordingly, a management strategy of community collection is considered to be appropriate for all sites that will potentially be impacted by the proposed works.

Recommendation 4: As per the wishes of the Aboriginal Community Representatives who participated in the cultural heritage assessment all artefacts subject to community collection (the salvaged artefacts) are to be retained within Sturt National Park and relocated to areas that will not be impacted by the proposal that are located as close as possible to the location from which the artefacts were collected.

Recommendation 5: It is recommended that the Proponent (University of NSW) apply to OEH for an AHIP to authorise the community collection of all artefacts associated with the 42 sites that may potentially be impacted by the proposed development.

Recommendation 6: It is recommended that ground disturbance impacts associated with the proposal be kept to a minimum and to defined areas (the designated 8 m wide development corridor) so as to ensure as little impact as possible to the Aboriginal objects (stone artefacts) which can be expected to extend in a relatively continuous distribution across the broader landscape encompassed by the proposal.

Recommendation 7: The Aboriginal Representatives who participated in the survey have requested that monitors be engaged to supervise ground disturbance works associated with the grading to ensure that any additional artefacts at the identified sites can be relocated outside of the disturbance corridor.

Recommendations for general management of heritage within the Project Area

The following recommendations should be followed for the general management of heritage within the study area.

Recommendation 8: All relevant staff and contractors should be made aware of their statutory obligations for heritage under NSW NPW Act (1974) and the NSW Heritage Act (1977), which may be implemented as a heritage induction.

Recommendation 9: If additional Aboriginal site/s or non-Indigenous heritage items are identified in the study area pre-construction or during, then works in the area should cease. A suitably qualified archaeologist and the relevant Aboriginal stakeholders should be contacted so that the subject area can be adequately assessed and managed.

Recommendation 10: In the unlikely event that skeletal remains are identified, work must cease immediately in the vicinity of the remains and the area cordoned off. The proponent will need to contact the NSW Police Coroner to determine if the material is of Aboriginal origin. If determined to be Aboriginal, the proponent, must contact OEH.

8.2 Aboriginal Heritage Impact Permit (AHIP)

The report recommends that the Proponent (University of NSW) apply to OEH for an AHIP to authorise the community collection of all artefacts associated with the 42 sites that may potentially be impacted by the

proposed development. The proposed duration of the AHIP is for five years which will allow for the staged development of the infrastructure associated with the Extinct Mammal Reintroduction Area. The proposed start date and end date of the AHIP is 1/08/2017 to 1/08/2022.

The Aboriginal Community Representatives who participated in the cultural heritage assessment have indicated that they would like all artefacts subject to community collection (the salvaged artefacts) to be retained within Sturt National Park and relocated to areas as close as possible to the location from which they were collected. The areas for relocation are required to be outside of the final development corridor (approximately 8 m wide).

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10 Appendices

10.1 Site Gazette

Site Name	AHIMS ID	Survey Unit	Context	Contents	Recording Method	Number of Artefacts Recorded	Comments
Southern Paddock 1	05-1-0035	SP	Scald on base of dune/swale interface	3 silcrete complete flakes	All artefacts recorded	3	Site disturbed by erosion
Southern Paddock 2	05-10036	SP	Scald on base of dune/swale interface	16 silcrete artefacts	1m x 1m sample	2	Site disturbed by erosion
Southern Paddock 3	05-1-0037	SP	Scald at base of sandy rise	7 silcrete artefacts	1m x 1m sample	2	Site disturbed by erosion
Southern Paddock 4	05-1-0038	SP	Scald on base of dune/swale interface	1 silcrete complete flake	All artefacts recorded	1	Site disturbed by erosion
Southern Paddock 5	05-1-0039	SP	Scald on base of dune/swale interface	12 silcrete artefacts	1m x 1m sample	1	Site disturbed by erosion and vehicle track
Southern Paddock 6	05-1-0040	SP	Gravel flat between dunes	Approximately 100 silcrete artefacts spread across scalded surface	1m x 1m sample	3	Site disturbed by erosion
Southern Paddock 7	05-1-0041	SP	Scald at base of sandy rise	Approximately 100 silcrete artefacts spread across scalded surface	1m x 1m sample	10	Site disturbed by vehicle track
Southern Paddock 8	05-1-0042	SP	Scald on base of dune/swale interface	Approximately 100 silcrete artefacts spread across scalded surface	1m x 1m sample	3	Site disturbed by erosion
Southern Paddock 9	05-1-0043	SP	Scald on base of dune/swale interface	1 silcrete complete flake	All artefacts recorded	1	Site disturbed by erosion
Southern Paddock 10	05-1-0044	SP	Lagged surface on crest of dune	1 silcrete complete flake	All artefacts recorded	1	Site disturbed by erosion
Southern Paddock 11	05-1-0045	SP	Scald on base of dune/swale interface	2 silcrete complete flake	All artefacts recorded	2	Site disturbed by erosion
Southern Paddock 12	05-1-0046	SP	Lagged surface on crest of dune	1 silcrete distal flake	All artefacts recorded	1	Site disturbed by erosion
Southern Paddock 13	05-1-0047	SP	Scald on base of dune/swale interface	Approximately 100 silcrete artefacts spread across scalded surface	2m x 2m sample	7	Site disturbed by erosion
North Paddock Laydown Area	05-1-0034	NPLA	Gravel flat between dunes	1 silcrete core	All artefacts recorded	1	Site disturbed by erosion

Wing Fence South 1	05-1-0055	WFS	Scald on base of dune/swale interface	Low density scatter approximately 20 artefacts	10m x 10m sample	1	Site disturbed by vehicle track
Wing Fence South 2	05-1-0053	WFS	Scald on base of dune/swale interface	Low density scatter approximately 20 silcrete artefacts	10m x 10m sample	1	Site disturbed by vehicle track
Wing Fence South 3	05-1-0054	WFS	Scald on base of dune/swale interface	Low density scatter approximately 80 silcrete artefacts	2m x 2m sample	2	Site disturbed by vehicle track
Northern Paddock 1	05-1-0014	NP	Scald on base of dune/swale interface	2 silcrete complete flakes	All artefacts recorded	2	Site disturbed by erosion
Northern Paddock 2	05-1-0015	NP	Gravel flat between dunes	2 silcrete complete flakes and a silcrete core	All artefacts recorded	3	Site disturbed by erosion
Northern Paddock 3	05-1-0016	NP	Scald on base of dune/swale interface	5 silcrete flakes	All artefacts recorded	5	Site disturbed by erosion
Northern Paddock 4	05-1-0017	NP	Scald on base of dune/swale interface	1 silcrete complete flake	All artefacts recorded	1	Site disturbed by erosion
Northern Paddock 5	05-1-0018	NP	Scald on base of dune/swale interface	2 silcrete flakes	All artefacts recorded	2	Site disturbed by erosion
Northern Paddock 6	05-1-0019	NP	Scald on base of dune/swale interface	14 silcrete artefacts	All artefacts recorded	14	Site disturbed by erosion
Northern Paddock 7	05-1-0020	NP	Scald on base of dune/swale interface	7 silcrete artefacts (1 core)	All artefacts recorded	7	Site disturbed by erosion
Northern Paddock 8	05-1-0021	NP	Lagged surface on dune slope	5 silcrete flakes	All artefacts recorded	5	Site disturbed by erosion
Northern Paddock 9	05-1-0022	NP	Crest of dune	4 silcrete artefacts (1 core)	All artefacts recorded	4	Site disturbed by erosion
Northern Paddock 10	05-1-0023	NP	Scald on base of dune/swale interface	19 silcrete artefacts (2 complete tools)	All artefacts recorded	19	Site disturbed by erosion
Northern Paddock 11	05-1-0024	NP	Scald on base of dune/swale interface	13 silcrete artefacts	All artefacts recorded	13	Site disturbed by erosion
Northern Paddock 12	05-1-0025	NP	Scald at base of sandy rise	2 silcrete artefacts (1 complete tool)	All artefacts recorded	2	Site disturbed by erosion
Northern Paddock 13	05-1-0026	NP	Scald on base of dune/swale interface	1 silcrete complete tool	All artefacts recorded	1	Site disturbed by erosion

Northern Paddock 14	05-1-0027	NP	Scald on base of dune/swale interface	1 silcrete distal tool	All artefacts recorded	1	Site disturbed by erosion
Northern Paddock 15	05-1-0028	NP	Scald base of dune/edge of swamp	1 silcrete complete flake	All artefacts recorded	1	Site disturbed by erosion
Northern Paddock 16	05-1-0029	NP	Scald on base of dune/swale interface	9 silcrete flakes	All artefacts recorded	9	Site disturbed by erosion
Northern Paddock 17	05-1-0030	NP	Lagged sandsheet at edge of dune	6 silcrete artefacts (2 complete tools)	All artefacts recorded	6	Site disturbed by erosion
Northern Paddock 18	05-1-0031	NP	Scald on base of dune/swale interface	1 silcrete complete flake	All artefacts recorded	1	Site disturbed by erosion
Northern Paddock 19	05-1-0032	NP	Gravel flat between dunes	9 silcrete artefacts (1 core)	1m x 1m sample	9	Site disturbed by erosion
Northern Paddock 20	05-1-0033	NP	Scald on base of dune/swale interface	12 silcrete artefacts (4 cores and 1 complete tool)	All artefacts recorded	12	Site disturbed by erosion
Wing Fence North 1	05-1-0048	WFN	Scald on base of dune/swale interface	14 silcrete artefacts (1 complete tool)	All artefacts recorded	14	Site disturbed by erosion
Wing Fence North 2	05-1-0049	WFN	Scald on base of dune/swale interface	4 silcrete artefacts	All artefacts recorded	4	Site disturbed by erosion
Wing Fence North 3	05-1-0050	WFN	Lagged sandsheet at edge of dune	2 silcrete artefacts	All artefacts recorded	2	Site disturbed by erosion
Wing Fence North 4	05-1-0051	WFN	Scald on base of dune/swale interface	8 silcrete artefacts	All artefacts recorded	8	Site disturbed by erosion
Wing Fence North 5	05-1-0052	WFN	Scald on base of dune/swale interface	1 silcrete artefact	All artefacts recorded	1	Site disturbed by erosion