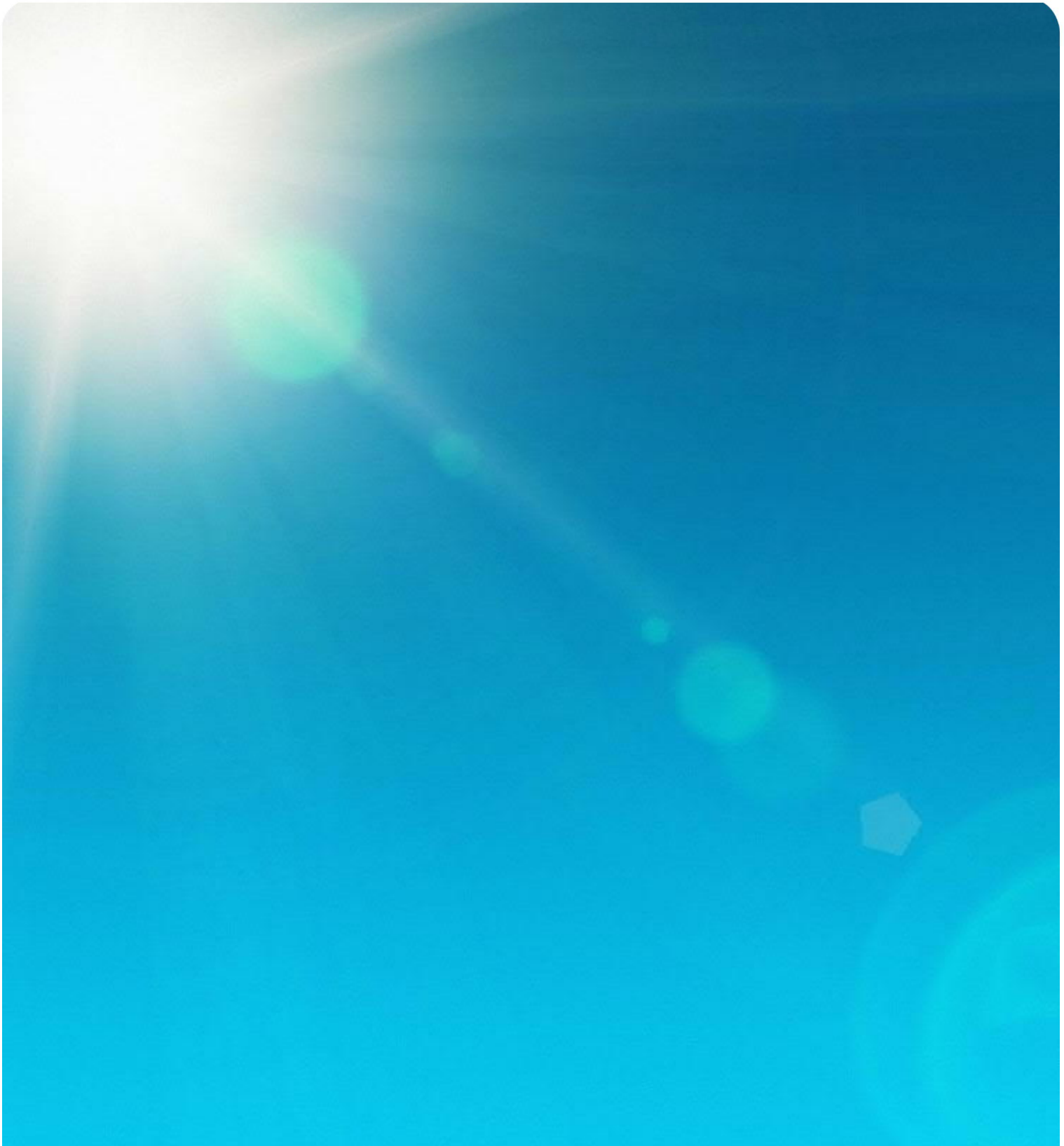


March 2022

# Appendix V – Heritage Impact Assessment – Solar Precinct

Australia-Asia PowerLink Environmental Impact Statement



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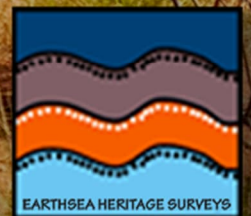
# Cultural Heritage Impact Assessment: Sun Cable Australia-Asia PowerLink, Solar Precinct (Powell Creek Pastoral Lease Proceeding, Native Title Determination Area, NT)

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Prepared for: Sun Cable Pty Ltd



2021  
Earthsea Pty Ltd



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# Cultural Heritage Impact Assessment Sun Cable Australia-Asia PowerLink, Solar Precinct

Powell Creek Pastoral Lease Proceeding, Native Title Determination Area, NT

20 October 2021

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## Table of Contents

<b>1</b>	<b>Introduction</b> .....	<b>5</b>
1.1	Scope of the Study .....	5
1.2	Project Location, Land Tenure & Native Title .....	6
1.2.1	Project Location and Land Tenure.....	6
1.2.2	Native Title.....	8
1.3	Solar Precinct and Ancillary Project Footprints .....	8
1.3.1	Solar Precinct .....	8
1.3.2	Ancillary Infrastructure and Access Roads.....	9
1.3.3	Additional Construction Information .....	10
1.4	Consultation.....	10
1.4.1	Cultural Heritage Field Team .....	11
1.5	Acknowledgements.....	12
1.6	The Authors .....	12
<b>2</b>	<b>Legislative Context</b> .....	<b>13</b>
2.1	Statutory Considerations.....	13
2.1.1	Commonwealth Legislation: .....	13
2.1.2	Northern Territory Legislation: .....	14
2.2	Regulatory Organisations .....	15
2.3	Heritage and Sacred Site Register Searches .....	16
2.3.1	Northern Territory Heritage Registers.....	16
2.3.2	Aboriginal Sacred Sites Register.....	16
2.3.3	Commonwealth Registers.....	16
<b>3</b>	<b>Physical and Environmental Setting</b> .....	<b>17</b>
3.1	Land Systems .....	17
3.2	Climate and Hydrology.....	18
3.2.1	Climate.....	18
3.2.2	Paleoclimate.....	19
3.2.3	Hydrology.....	20
3.3	Geology and Geomorphology.....	21
3.4	Geology and Hydrology Figures .....	23
3.5	Land Disturbance Factors .....	31
<b>4</b>	<b>Archaeological and Historical Background</b> .....	<b>34</b>
4.1	Aboriginal Occupation of Central Australia .....	34
4.2	Archaeological Studies in Arid Zone Australia .....	35
4.3	Historical Background .....	38
4.4	Archaeological Predictive Model .....	44
<b>5</b>	<b>Survey Methodology</b> .....	<b>46</b>
5.1	Heritage Assessment Strategies.....	46
5.2	Desktop Assessment .....	46
5.3	Cultural Heritage Site Definition.....	47

5.4	Identifying stone artefacts.....	50
5.5	Defining Site Boundaries .....	52
5.6	Site Recording and Survey Methodology .....	52
<b>6</b>	<b>Survey Results.....</b>	<b>55</b>
6.1	Survey Gaps and Limitations .....	57
<b>7</b>	<b>Cultural Heritage Significance Assessment.....</b>	<b>66</b>
7.1	Significance Assessment Guidelines.....	66
7.2	Assessment Principles of Scientific and Research Significance .....	67
7.3	Significance of Cultural Heritage Features within the Survey Area .....	68
<b>8</b>	<b>Development Risks and Recommendations .....</b>	<b>73</b>
8.1	Potential Impacts on Aboriginal Archaeological Sites.....	73
8.1.1	Direct Impacts to Cultural Heritage Features .....	73
8.1.2	Indirect Impacts to Cultural Heritage Features.....	74
8.2	Potential for Previously Undetected Aboriginal Cultural Heritage .....	74
8.3	Recommendations .....	79
<b>9</b>	<b>References .....</b>	<b>82</b>
	<b>Appendix 1: Abstract of Records (AAPA), Powell Creek Station.....</b>	<b>88</b>
	<b>Appendix 2: Site Descriptions and Records.....</b>	<b>94</b>

## Table of Figures

Figure 1:	Sun Cable Solar Precinct location and land Tenure .....	7
Figure 2:	Mean monthly rainfall and temperature data for Elliott .....	19
Figure 3:	Solar Precinct Regional Hydrology.....	23
Figure 4:	Solar Precinct Hydrology .....	24
Figure 5:	Solar Precinct Drainage Depression.....	25
Figure 6:	Solar Precinct Access Corridor Hydrology .....	26
Figure 7:	Solar Precinct Geology .....	27
Figure 8:	Solar Precinct Access Corridor Geology .....	28
Figure 9:	1897 map excerpt .....	33
Figure 10:	Walter Kell distributes flour to Tjingili men at Powell Creek, 1902 .....	40
Figure 11:	Powell Creek Telegraph Station 1895 .....	41
Figure 12:	Powell Creek Telegraph Station circa 1901 .....	42
Figure 13:	Powell Creek Telegraph Station circa 1950 .....	42
Figure 14:	Waterhole Powell Creek 1901 .....	42
Figure 15:	Permanent water hole at Powell Creek Station, 2021 .....	43
Figure 16:	Powell Creek Telegraph Station 1942. ....	44
Figure 17:	Solar Precinct Project Area .....	60
Figure 18:	Solar Precinct (North), Heritage Results.....	61
Figure 19:	Solar Precinct (South), Heritage Results.....	62
Figure 20:	Solar Precinct Access Corridor (West), Heritage Results.....	63
Figure 21:	Solar Precinct Access Corridor (Middle), Heritage Results.....	64
Figure 22:	Solar Precinct Access Corridor (East), Heritage Results .....	65

## Tables

Table 1: Solar Precinct Construction Footprint.....	8
Table 2: Solar Precinct Consultation Register .....	10
Table 3: Regional Geological Notations.....	29
Table 4: Summary of Physical Environment .....	46
Table 5: Archaeological Site and Isolated Artefacts Recorded .....	55
Table 6: Cultural Landscape Features Recorded .....	56
Table 7: Cultural Heritage Risk Areas .....	57
Table 8: Individual Site Significance Assessments.....	71
Table 9: Number of cultural heritage features directly impacted .....	73
Table 10: Cultural Heritage Risk Areas and Cultural Heritage Potential.....	76
Table 11: Culturally Significant Features .....	80

# 1 Introduction

Earthsea Pty Ltd (Earthsea) has been engaged by EcOz Environmental Consultants, on behalf of Sun Cable Pty Ltd, to undertake Heritage Impact Assessments (HIA) of their proposed Australia-Asia PowerLink (AAPowerLink) project components in the Northern Territory. The HIA studies form part of the Project's Environmental Impact Statement (EIS), which evaluates all proposed development components located within Australia (including offshore components within the Australian Exclusive Economic Zone (AEEZ)).

The HIA components of the EIS are being approached in the following four separate HIA documents, with each representing primary development zones:

- (1) Powell Creek Solar Precinct (solar farm, ancillary facilities and associated access corridor).
- (2) Overhead Transmission Line (OHTL) from the Solar Precinct to the Livingstone Infrastructure Corridor (OHTL Chainage 0 to 722).
- (3) OHTL Infrastructure Corridor from Livingstone (Chainage 722) to Murrumujuk Beach, including the Darwin Converter Site and Cable Transition Facilities at Murrumujuk.
- (4) Subsea Cable System within the AEEZ.

This report presents the HIA for the Powell Creek Solar Precinct and associated access corridor, located within Powell Creek Pastoral Lease Proceeding, Native Title Determination Area, Northern Territory (referred to as Warlmanpa Country by the Traditional Owner field team). The site is approximately 70km south-west of Elliott and 30km west of the Stuart Highway and adjacent to the Alice Spring to Darwin railway line.

In brief, Sun Cable propose to develop a Solar Precinct comprising large-scale solar arrays and battery storage facilities on the southern boundary of Powell Creek Station, NT Por 2094. The Solar Precinct will also require the development of ancillary infrastructure within Powell Creek Station, including access roads, an airfield and rail sidings.

The Sun Cable AAPowerLink Project has been planned in response to high cost and gas reliant energy generation within Singapore and Darwin. Sun Cable aims to provide a more reliable and renewable electricity supply alternative through generating solar energy in the Northern Territory and exporting this through a 5,000 km long high voltage direct current (HVDC) transmission system. Network connection will also be available for the Northern Territory.

An archaeological field assessment, coupled with a desktop study, was used to inform this HIA of any potential risks to archaeological resources and areas of cultural heritage significance within the proposed AAPowerLink Solar Precinct development areas. Archaeologists Ben Keys and Richard Woolfe undertook the field assessment with the participation of five Warlmanpa site custodians between 2 and 10 June 2021.

## 1.1 Scope of the Study

The AAPowerLink is being assessed by the Northern Territory Environment Protection Authority (NT EPA), as an EIS under the *Environment Protection Act 2019* (EP Act). The NT EPA's Statement of Reasons considered 12 environmental factors as being at risk of the AAPowerLink development,

including Culture and Heritage. The culture and heritage values included sacred sites, Aboriginal archaeological sites and historic sites in the project area as the significance of impacts to these features was uncertain.

This study and report centred on assessing the significance and potential impacts to archaeological sites of Aboriginal origin, historical features associated with the post-contact to modern period and areas which have intangible cultural heritage values. Sacred Sites, mandated as sites of significance in the Aboriginal Tradition by the *Northern Territory Aboriginal Sacred Sites Act 1989*, will be assessed in full by the Aboriginal Areas Protection Authority (AAPA) through an Authority Certificate process prior to development. Notwithstanding this, Warlmanpa Traditional Owners, Dick Foster, Peter Henderson, Rex Collins, Neil Allum and Jason Henderson provided Earthsea consultants with advice on the location of and nature of Sacred Sites within the Project Footprint areas. An AAPA Sacred Sites Abstract of Records of NT Portion 2094 is presented (Appendix 1) which outlines the potential risks to Registered and recorded Sacred Sites within Powell Creek Station.

Sun Cable is also currently negotiating an Indigenous Land Use Agreement (ILUA) with the Native Title Parties and Northern Land Council for the use of the Solar Precinct area.

In brief, the aim of this study was to develop a HIA that identifies cultural heritage risks for the Project and establish management strategies to mitigate impacts on Aboriginal archaeological sites and other heritage places during construction and operation of the Solar Precinct (Solar Farm and associated access corridor). To meet the specific information requirements in relation to Culture and Heritage as outlined in the NTEPA Terms of Reference for the AAPowerLink EIS (NTEPA ToR 5 October 2021, Section 3.11. Culture and Heritage, Table 14), the following objectives were used:

1. Identify archaeological, cultural heritage features and traditional land use areas within or proximal to the Project Footprint areas.
2. Identify and describe any archaeological research gaps relevant to the Project.
3. Identify any archaeological or cultural heritage constraints, potential impacts, and risks within the proposed Project Footprint areas.
4. Consult with the relevant stakeholders throughout the Project, including the Northern Land Council representatives, Traditional Owner site custodians, and Northern Territory Government Heritage Branch<sup>1</sup>.
5. Detail the Cultural and scientific significance of each archaeological feature identified and any agreed mitigation strategies through the HIA process.
6. Develop management strategies and measures to minimise harm to Aboriginal and historic cultural heritage features and other areas of cultural significance.

## 1.2 Project Location, Land Tenure & Native Title

### 1.2.1 Project Location and Land Tenure

The proposed AAPowerLink Solar Precinct is located approximately 70km south-west from the township of Elliott, in the Northern Territory. The Solar Precinct and associated access corridor fall solely within Pastoral Lease 948 (part of NT Portion 2094) Powell Creek Station, which is held by the Consolidated Pastoral Company Pty Ltd (CPC) for cattle production (see Figure 1).

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<sup>1</sup> Principally to establish the location of previously recorded archaeological sites of Aboriginal origin and to access the Heritage Library held by this office.

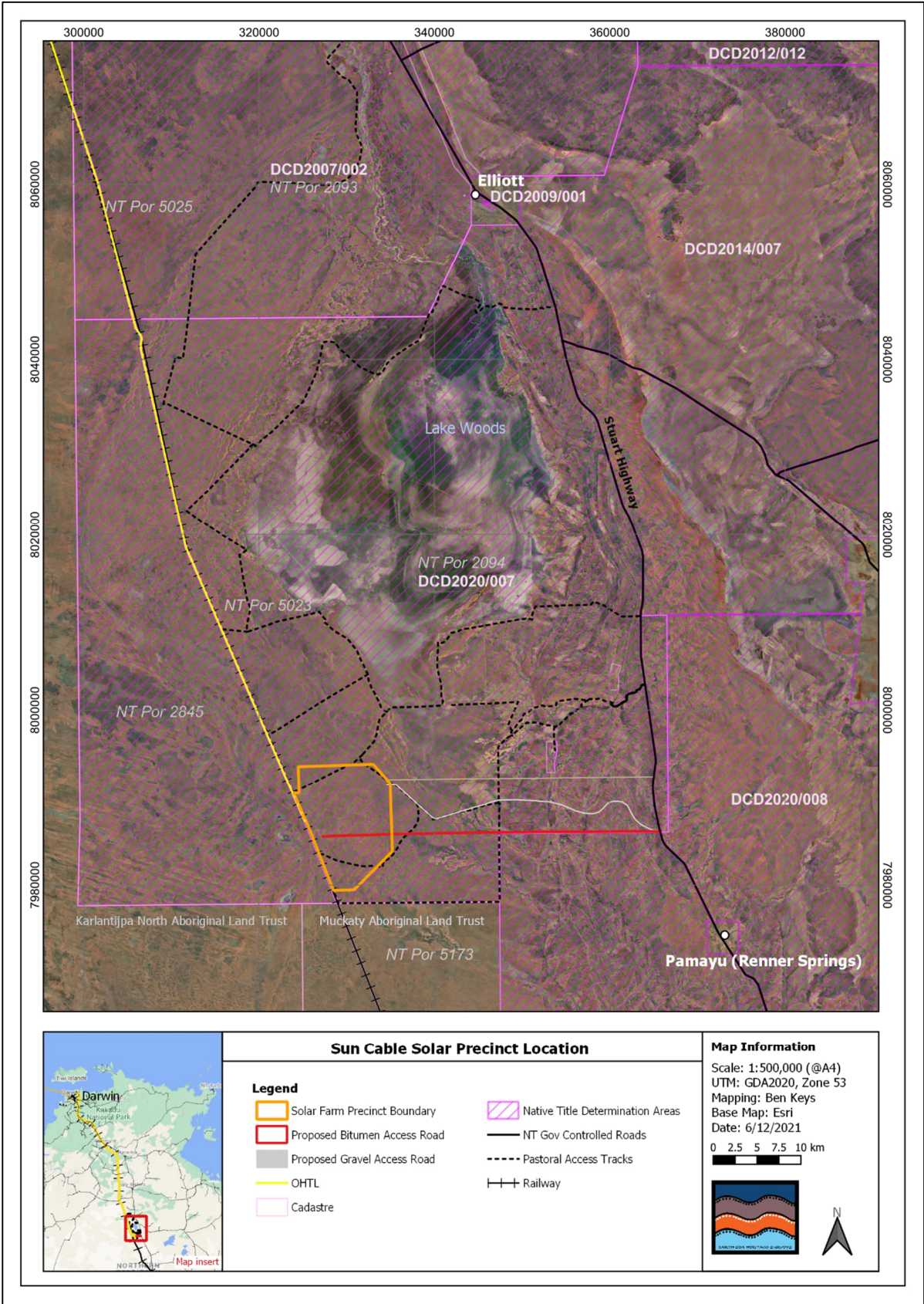


Figure 1: Sun Cable Solar Precinct location and land Tenure

In brief, the proposal footprint consists of a 12,000ha (14km x 9km) Solar Farm precinct which is bound to the west by the Alice Springs to Darwin Railway Corridor and located 1.5km north of the Muckaty Aboriginal Land Trust boundary. An access corridor extends approximately 30km to the east

connecting with the Stuart Highway. The eastern 18.5km of the access corridor is bound to the south by the Helen Springs Pastoral Lease.

The footprint was accessible via existing pastoral tracks, fence lines and cross-country within Powell Creek Station.

### 1.2.2 Native Title

The Solar Precinct, and associated access corridor, fall wholly within the Powell Creek Pastoral Lease Proceeding, Native Title Determination Area (NNTT Number: DCD2020/007) (See Figure 1). Native Title was determined by the Federal Court on 28 October 2020, with the determination name ascribed as: Henderson on behalf of the Bamayu (Wurwanawanji–Yarrayarra), Bamayu (Titirlku), Marlinja, Ngapa Jangirulu, Walanypirri and Wilyuku Groups (Powell Creek Pastoral Lease Proceeding). The land and waters of the Determination Area comprise the whole or part of six estates which are held respectively by the members of the following estate groups:

- (a) the Bamayu (Wurwanawanji-Yarrayarra) estate group;
- (b) the Bamayu (Titirlku) estate group;
- (c) the Marlinja estate group;
- (d) the Ngapa Jangirulu estate group;
- (e) the Walanypirri estate group; and
- (f) the Wilyuku estate group.

Under the determination, rights extend to possession, occupation, use and enjoyment to the exclusion of all others, including the right to access and take for any purpose the resources of those areas. Sun Cable is negotiating an ILUA with the Native Title holders through the Northern Land Council.

## 1.3 Solar Precinct and Ancillary Project Footprints

Construction of the AAPowerLink is projected to commence at Q1 2024 and take four to six years to complete. Network connection availability for the Northern Territory is to occur in 2026, with full supply to Singapore planned to be operational by the end of 2028. The Project will be constructed and commissioned in stages, with the Powell Creek Solar Precinct and ancillary infrastructure being a primary stage of development.

### 1.3.1 Solar Precinct

As outlined in Table 1, the Solar Precinct will occupy approximately 12,000ha of land which encompasses all solar arrays, energy storage systems and ancillary infrastructure, including operations and maintenance facility and personnel camp.

Table 1: Solar Precinct Construction Footprint

Project element & location	Component	Size/capacity (approximate)	Footprint (approximate)
Powell Creek Solar Precinct and ancillary infrastructure Powell Creek Station	Solar arrays, energy storage systems, internal transmission infrastructure, internal access roads and ancillary infrastructure, including operations and maintenance facility, ancillary industries, personnel camp (temporary and	14km x 9km	12,000ha

Project element & location	Component	Size/capacity (approximate)	Footprint (approximate)
	permanent), rail siding/logistics hub and railway station		
	Main access road to Stuart Highway (sealed) and fibre optic link	42km x 10m(w)	42ha (12ha of the road is within the Solar Precinct footprint)
	All-weather unsealed road	30km x 10m(w)	30ha
	OHTL services corridor to Stuart Highway (future)	48km x 22m(w)	106ha
	Airstrip and associated infrastructure	2.5km x 250m	70ha
	Rail siding	2.5km x 50m	12.5ha (within the Solar Precinct footprint)

At the time of HIA, the internal layout of the Solar Precinct was not finalised and the whole 12,000ha site was assessed as being potentially subject to ground disturbing works.

### 1.3.2 Ancillary Infrastructure and Access Roads

Outside of the Solar Precinct, access roads, an airfield and OHTL services corridor connecting the precinct to the Stuart Highway will occupy approximately a further 236ha.

#### Access Roads

Two separate access roads, sealed and unsealed, will be constructed from the Stuart Highway to provide all-weather access to the Solar Precinct. An unsealed gravel access road approximately 30km long will be established to provide access for early site works and construction activities. Sun Cable has selected this access route to avoid major drainage lines by following higher ground, which in turn is aimed to reduce engineering requirements. The route will be retained as a secondary access if and when required.

An all-weather bitumen access road approximately 42km long, approximately 12km of which is within the Solar Precinct footprint, will be constructed as the primary access road during operations. The road will have engineered culverted creek and floodway crossings. The road will be designed with reference to Austroads Road Design Standards.

Borrow materials required for construction of the access road, will be excavated from the Ashburton Ranges between the Stuart Highway and the Solar Precinct. Sun Cable have also indicated that alternate gravel and aggregate supplies may be sourced from local licenced quarries near to the Solar Precinct under commercial arrangements.

For this study the unsealed and bitumen access roads were respectively provided 10m and 200m wide investigation corridors. The location of the gravel borrow pits was not available at the time of writing and were not subject to archaeological surveys.

#### Rail Sidings

Up to two rail sidings are planned for construction to provide rail access to the site for the transport of equipment and materials for the life of the project. Sun Cable have noted the specifications of the

rail sidings will be developed in accordance with relevant industry safety and technical standards, in consultation with the Railway Operator. Approximately 2.4km of siding will be required for each offloading facility, with multiple temporary offloading locations to be considered within the Solar Precinct.

At the time of the HIA, the location of the rail sidings had yet to be determined and were not specifically subject to cultural heritage investigations.

### **Airfield**

An airfield and associated infrastructure are proposed to allow for transport of personnel to and from site during construction and operations, as well as for use by emergency services. The proposed airfield location will be subject to agreement with the Civil Aviation Safety Authority, pastoralists and other relevant parties. As such, the airfield was not considered as part of the HIA investigations.

### **1.3.3 Additional Construction Information**

The Solar Precinct construction works will be undertaken concurrently by multiple works teams on multiple work fronts and will involve the following key activities:

- Pioneering works and access road construction.
- Water supply, water treatment and power supply established.
- Rail sidings established, and rail works completed.
- Borrow pits and gravel supplies developed.
- Airfield and aerodrome facilities established.
- Temporary site demarcation and security established.
- Temporary site camps and support facilities installed.
- Site drainage installed.

An onsite accommodation camp will be established catering for approximately 350 personnel during construction, reducing to approximately 100 personnel during operations.

## **1.4 Consultation**

Sun Cable has an Indigenous engagement and participation approach to developing the AAPowerLink Project, including works within the Solar Precinct. This has also included the internal engagement of an Indigenous Relations Manager, who liaises directly with the Northern Land Council (NLC) and Traditional Owners.

As outlined in Table 2 below, Sun Cable have undertaken regular consultation with the NLC, AAPA and Traditional Owners that have included discussions on the Solar Precinct.

Table 2: Solar Precinct Consultation Register

<b>Date</b>	<b>Meeting Location / Subject</b>	<b>Discussion / Agenda Summary</b>
October 2020	NLC/Darwin	General Project discussions and Native Title. Potential role of cultural monitors to accompany project staff visiting their country.
4 to 6 November 2020	Solar Precinct/Ecological Surveys	Ecological survey with Traditional Owner participation.

Date	Meeting Location / Subject	Discussion / Agenda Summary
March 16 2021	Tennant Creek/ AAPowerLink Information session	Regional employment and opportunities for Traditional Owners. Identification of site custodians and Traditional Owners for Solar Precinct. Sacred Site Protection and avoidance.
March 17 & 18 2021	Elliott & Katherine AAPowerLink Information session	Environmental and health impacts and opportunities for Traditional Owners to participate in environmental management.
April 2021	NLC Darwin/ILUA	Project Elements, ILUA Proposals, NTG & AARC requirements. AAPA/Sacred Sites and planning for site visit.
12 to 13 May 2021	Solar Precinct/ NLC & Traditional Owner Site Visit (2 x Groups)	Solar Precinct site visit with Traditional Owners and NLC (13 vehicle convoy). Discussion held on proposed solar technology, environment, Sacred Sites and site protection. Knowledge shared with SC centred on sand types, historic floods and water movements in the area to determine final area for the solar generation site.
2 to 10 June 2021	Solar Precinct/ Cultural Heritage Survey	Earthsea undertook the cultural heritage assessment of the Solar Precinct and access corridor with the participation of 5 Traditional Owners.
10 August 2021	Solar Precinct/ Preliminary Geotechnical investigations	Traditional Owners assisted with cultural monitoring of geotechnical investigations on site.
July – ongoing 2021	Darwin/AAPA	Discussions on the Sacred Sites assessments and Authority Certificates.
October 2021	Tennant Creek/Information session	Project update and information sessions with Traditional Owners and NLC.

#### 1.4.1 Cultural Heritage Field Team

The cultural heritage survey team representatives were nominated by the NLC in consultation with Traditional Owners. The five monitors included:

- Peter Henderson
- Dick Foster
- Neil Allum
- Rex Collins
- Jason Henderson

In brief, Peter, Dick, Neil and Rex have either worked and/or lived on Powell Creek Station at various times. Notably, Dick was born around 1940 on Powell Creek Station and underwent Law in the same place. Dick is a senior lawman for ceremonies from Tennant Creek to Wave Hill, and like Peter, has an intrinsic knowledge about the traditional movement of people, use of the country and *puwarrija* (Dreaming) connections across the region, including the Solar Precinct. Peter also has a family outstation on Powell Creek Station known as Jangirulu (also known as Jangirurlu, Janguluri, Jangirurly), which is located approximately 20km to the east of the Solar Precinct.

Rex, now retired, was engaged as a senior stockman for Newcastle Waters Station, who also operated Powell Creek Station. Rex managed the stock water bores and mustered cattle throughout the Solar

Precinct and surrounding areas for more than a decade. Similarly, Neil has lived and worked on Powell Creek Station and has a strong understanding for the history of the Country, its people and *puwarrija*. Jason, the youngest member of the survey team, assisted with surveys and importantly, participated in the intergenerational transmission of knowledge.

During their field time, all five Traditional Owners provided cultural heritage significance information under the governance of Traditional Law, language names and advice regarding the appropriate management of cultural heritage features identified during the study.

## 1.5 Acknowledgements

Earthsea would like to acknowledge the assistance of the NT Heritage Branch (Department of Tourism, Sport and Culture) with their assistance in supplying background documents and reports for the AAPowerLink Project.

Earthsea would also like to acknowledge the assistance of Sun Cable and the NLC in facilitating field teams and the CPC for providing site access. Similarly, Earthsea wishes to extend sincere gratitude to the Traditional Owner field team for openly sharing sensitive information to assist in the management of culturally significant features.

Earthsea is also very appreciative of the time taken by linguist, Dr David Nash, who provided translations of our field notes and additional linguistic information. Ben Keys and Richard Woolfe from Earthsea Pty Ltd (Earth Sea Heritage Surveys) co-authored this report. The following is a short description of both Consultant's qualifications and experience.

## 1.6 The Authors

### **Principle Archaeologist:** Ben Keys

Ben holds a Bachelor of Archaeology with Honours from Flinders University, South Australia. He has extensive experience in cultural heritage management and community consultation, coupled with the management of largescale developments such as mining projects in the Northern Territory. Ben also has a professional background in land access management and aspects of environmental management, including compliance. He has been an author of several published academic archaeological journal articles and has been invited to speak at mining industry conferences in the Northern Territory.

### **Principle Archaeologist:** Richard Woolfe

Richard holds a Bachelor of Archaeology from the University of New England, a Grad Dip in GIS and Geomatics from Charles Darwin University and a Masters in Heritage Management and GIS from the University of New England. Richard has 19 years' experience in cultural heritage management consultancy in the Northern Territory and Queensland. Richard also has extensive experience in community consultation with Aboriginal groups and the wider community. Richard conducted the 2002-2003 review of the NT Heritage Conservation Act 1991 and co-drafted the original instructions for the *NT Heritage Act 2011*.

## 2 Legislative Context

### 2.1 Statutory Considerations

Central Australia has a rich Indigenous cultural environment which includes a long history of human occupation and land use spanning at least 35,000 years (Smith 2013) and a recent past of that includes contact with European explorers, miners and pastoralists from the 1860's onwards (Barkly Regional Council 2015). The Solar Precinct and its wider landscape represent the outcome of thousands of years of Warlmanpa management under traditional practices governed by Law.

The significance of this material and cultural record varies substantially, depending upon one or a combination of its aesthetic, historic, scientific, social or spiritual values for past, present or future generations (Australia ICOMOS Burra Charter, 2013). Through time, these values can change or be impacted upon by both natural mechanisms and human intervention. To ensure impacts to the potential cultural heritage values of a place or object are understood, protected or managed accordingly, in addition to Law, a range of Territory and Commonwealth legislation exists.

Legislation has occurred at the state, territory, and national level. This is the result of the evolution of the Australian constitutional framework, particularly the inclusion of new themes, such as Aboriginality, heritage and the environment into an existing regulatory framework. The result of this developmental change is that the Commonwealth retains responsibility for Indigenous issues, while the States and Territories retain control of land use and development approvals. Therefore, both Commonwealth and the Northern Territory Acts may apply in particular circumstances within the Northern Territory.

The following Sections are provided so that there is a robust understanding of the legislative framework which may pertain to the Proposal.

#### 2.1.1 Commonwealth Legislation:

**Aboriginal Land Rights (Northern Territory) Act 1976 (ALRA).** This Act changed Aboriginal reserves within the Northern Territory to freehold title held in trust. The ALRA mandated the formation of Land Councils to act in the interests of Northern Territory Aboriginal people in the areas of land, access to lands, employment and the development of businesses. The ALRA also defined Sacred Sites as 'sites that are sacred, or otherwise significant, in the Aboriginal Tradition'. The ALRA protected these sites from damage, whether accidental or intentional.

The *NT Aboriginal Sacred Sites Act 1989* uses this definition of sacred in its purpose of protecting these sites outside of Land Trust lands. On pastoral lease lands, where the Solar Precinct is located, the general process is for the AAPA to conduct the Sacred Site surveys with the relevant Site Custodians, then issue an Authority Certificate under the *NT Aboriginal Sacred Sites Act 1989*.

**Native Title Act 1993 (NTA).** Native Title is "the communal, group or individual rights and interests of Aboriginal people and Torres Strait Islander people in relation to land and waters, possessed under traditional law and custom, by which those people have a connection with an area which is recognised under Australian law (Section 223 NTA) (National Native Title Tribunal 2016)". The NTA establishes the processes to determine where native title exists, how future acts impacting upon native title land may be undertaken, and to provide compensation where future Acts extinguish or are inconsistent with the existence or exercise of native title (DCP 2016). The NTA gives Indigenous Australians who hold

native title rights and interests (including native title claims) the right to access and use traditional lands, be consulted and, in some cases, to participate in decisions about activities proposed to be undertaken on the land.

The Solar Precinct, and associated access corridor, fall wholly within the Powell Creek Pastoral Lease Proceeding, Native Title Determination Area (NNTT Number: DCD2020/007). Sun Cable are also negotiating an ILUA with the NLC for the use, construction, and operation of the Solar Precinct under the requirements of the NTA.

**Aboriginal and Torres Strait Islander Heritage Protection Act 1984.** This Act is intended as a last resort defence for significant sites, meaning that the Act is meant to provide emergency protection for Aboriginal and Torres Strait Islander heritage sites when all other avenues have been exhausted. Generally, an Aboriginal person or group of persons, must apply to the Minister to have protective covenants placed over an area or site (DEE 2016). The power to provide such protection resides in Section 51 of the Constitution giving the Commonwealth powers on Aboriginal issues. Therefore, this Act may override all State and Territory cultural heritage acts.

To the knowledge of the Consultants, there are no known applications under this Act for any areas or features within the Solar Precinct or associated access corridor.

**The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)** commenced on 16 July 2000 with heritage amendments coming into effect on 1 January 2004. The EPBC provides for a National Heritage List of natural, historic and Indigenous places that are of outstanding significance to the nation. The EPBC also provides for a Commonwealth List that includes natural, historic and Indigenous places of significance that are owned or controlled by the Commonwealth. Ownership or control of these places allows the Commonwealth to protect or manage these places according to the significance of the place.

The Commonwealth Department of Agriculture, Water and the Environment administers the EPBC, including administration of the heritage lists and providing support to the Australian Heritage Council established under the Australian Heritage Council Act 2003. The Department maintains the Australian Heritage Database which includes places on both Commonwealth lists, all places on state registers and other places included in the former Register of the National Estate established in 1976.

### 2.1.2 Northern Territory Legislation:

**Aboriginal Sacred Sites Act 1989.** The *NT Aboriginal Sacred Sites Act 1989* was enacted to complement the ALRA. Like the ALRA, the *Aboriginal Sacred Sites Act* protects sites that are 'sacred and otherwise of significance in the Aboriginal Tradition'. Sacred Sites are protected whether the location of the sites are known or not by any person or company seeking to do work on lands.

The *Aboriginal Sacred Sites Act* is administered by the Aboriginal Areas Protection Authority (AAPA). AAPA can issue an Authority Certificate indemnifying any proponent for an area upon application and payment of a fee. The Authority Certificate will contain conditions limiting or preventing works in and around registered and recorded Sacred Sites. The Authority Certificate will contain maps outlining any restricted work areas in the area of application.

A survey is usually undertaken by a representative of AAPA in order to ascertain the views of the Site Custodians for the subject land. A Site Custodian is an Indigenous person who has special responsibility for an area and may or may not be a local Traditional Owner or Indigenous Elder.

**Heritage Act 2011.** The NT *Heritage Act* came into effect on 1 October 2012. The *Heritage Act* provides protection for the same classes of places as the previous *NT Heritage Conservation Act 1991*, with some changes. As under the previous Act, members of the community can nominate areas, places, sites, buildings, shipwrecks and heritage objects to the register. If the Minister agrees that these features are of special significance to the heritage of the NT, the place is added to the register and receives statutory protection. The *Heritage Act* allows for processes to approve works and maintenance for a heritage place.

The *Heritage Act* provides a ‘blanket’ or ‘presumptive’ protection for Aboriginal and Macassan archaeological places and objects until a decision by the Chief Executive of the Department of Tourism and Culture (or their delegate for smaller sites) is made to either permanently protect these places or permit their disturbance or destruction. This decision-making process is triggered by an *Application to Carry Out Work on a Heritage Place or Object*. A permit will generally only be issued if consultation with the relevant Traditional Owners or Custodians of the sites or their representatives has occurred. There are penalties for accidental or deliberate destruction of these sites.

## 2.2 Regulatory Organisations

**Northern Land Council (NLC).** The NLC is an independent statutory authority of the Commonwealth responsible under the ALRA and *Native Title Act* for assisting Aboriginal peoples in the Top End to acquire and manage their traditional lands and seas. This includes assisting in Land Rights and Native Title Claims, managing traditional lands and protecting sites of significance in the Aboriginal Tradition. The NLC is also responsible for promoting the economic interests of Aboriginal peoples in the Top End. They do this by advocating for Traditional Owners interests in the development of resources on Land Trust and Native Title lands.

The Project footprint is wholly within a Native Title Determination Area administered by the NLC (see Section 1.2.2. above).

**Aboriginal Areas Protection Authority (AAPA).** The AAPA is an independent statutory authority established under the *Northern Territory Aboriginal Sacred Sites Act 1989*. The Authority is responsible for the protection of Aboriginal sacred sites on land and sea across the Northern Territory. The AAPA seeks to implement a practical balance between sacred site protection and economic development.

**Heritage Branch, NT Department of Families, Housing and Communities.** Heritage Branch is the regulatory authority responsible for administering most sections of the NT *Heritage Act 2011*. Heritage Branch is responsible for administering the NT Heritage Register, the NT Archaeological Database and providing logistical support for the NT Heritage Council.

## 2.3 Heritage and Sacred Site Register Searches

### 2.3.1 Northern Territory Heritage Registers

#### **Heritage Register Database**

Powell Creek Telegraph Station, located 26km northeast of the Solar Precinct, was declared a heritage place on 28 November 2000 and gazetted on 20 December 2000. The declaration included NT Portion 5988(A) as delineated by Survey Plan S2000/37. This parcel includes the building structures, the lone grave and stone artefact scatters.

#### **Archaeological Site Databases**

The NT Archaeological Site Database maintained by the Heritage Branch, NT Department of Families, Housing and Communities, records no known archaeological sites within the proposal footprint.

The absence of records on the NT Archaeological Site Database does not necessarily reflect the lack of archaeological sites within the area, but rather a lack of archaeological survey.

### 2.3.2 Aboriginal Sacred Sites Register

An Aboriginal Areas Protection Authority (AAPA) Abstract of Records was provided on 12 October 2020, for NT Portion 2094, Powell Creek Station (See Appendix 1). The Abstract shows a number of Registered and Recorded sacred sites are located within Powell Creek Station, however none lie within the proposal footprint.

It should be noted that an Abstract of Records, is not an exhaustive list of sacred sites in the area. There may be other sacred sites in the parcel of land of which the Authority is not yet aware which would be identified through the Authority Certificate process.

Sun Cable have committed to applying for an AAPA Authority Certificate, covering the Solar Precinct Project Areas.

### 2.3.3 Commonwealth Registers

Powell Creek Telegraph Station, located 26km northeast of the Solar Precinct, is included on the Australian Heritage Database, having been previously registered on the Register of the National Estate (ID: 14934, 15/05/1990). The existence of Powell Creek Telegraph Station on the Register of the National Estate does not in itself create a requirement to protect the place under Commonwealth law. Nevertheless, information in the register may continue to be current and may be relevant to statutory decisions about protection.

### 3 Physical and Environmental Setting

To the Warlmanpa and other Aboriginal groups, the physical environment is regarded as ‘Country’, whose owners were provided with culture, language and knowledge during *puwarrija* (the Dreaming), that continues to link the landscape and its people together under Traditional Aboriginal Law. Understanding the cultural associations and significance of Country is critical for the management of features with tangible and intangible values that may be otherwise impacted by developments.

Archaeologically, understanding the environmental context of a region is also vitally important when analysing past human settlement behaviour through interpreting archaeological features and site patterns. Geomorphology, geology and hydrological variations, coupled with past land use practices can heavily influence the types of archaeological materials found, their condition, distribution patterns and predictability within a given land system.

From a survey methodological perspective, these environmental factors may also obscure the visibility of the archaeological record and thus reduce the effectiveness of the surveyor’s ability to identify a site, its contents or extent.

The following section outlines the environmental and physical background for the proposal footprint and surround areas so as to develop an understanding of the relationship between the environmental setting and archaeological resources recorded during the survey. This in turn may contribute to developing robust archaeological predictive models for the broader area.

#### 3.1 Land Systems

In the broadest sense, the Powell Creek Solar Precinct and access road corridors occur within the Tanami bioregion, which is largely characterised by red sand plains and low dune fields, vegetated with a mixed shrubland of Acacia, Eucalyptus or Hakea over spinifex hummock grasslands (Baker et al. 2005). Some paleo-drainage systems occur within the bioregion, which can include sites of archaeological importance.

Land systems are mapped across the Northern Territory (NT) and are of a finer scale than bioregions; they are mapped at 1:1,000,000 in the proposal footprint (DEPWS 2021). The Solar Precinct occurs within the Redsan land system, which is characterised by level to gently undulating plains with deep red sandy soils, referred to by Warlmanpa People as *lutju* (meaning sandplain/sand ridge country). The access road corridors traverse two other land systems; the Gosse and Ashburton land systems. The Gosse land system is an alluvial floodplain land system, with sandy, silty and clay soils on Quaternary alluvium, and landforms including alluvial floodplains, swamps, drainage depressions and alluvial fans. Parts of this land system are associated with *ngapa* Dreaming (Rain Dreaming). The land system is associated with runoff from watercourses with headwaters in the Ashburton Ranges (e.g. Powell Creek and Bull Creek). The Ashburton land system is characterised as sandstone hills, including low hills, hills and stony plateaux, with sandstone, siltstone, quartzite and conglomerate outcrop with shallow stony soils. The latter is traditionally called *pamarra* (place of stone, rock or rocky prominence).

Vegetation is described with reference to the Solar Precinct, Land Type Mapping Report (EcOz 2021). The Solar Precinct and access roads are mapped as Eucalyptus low open woodland, with mid-open

shrubland over low hummock grassland and low open tussock grassland. The vegetation changes toward the Stuart Highway (within the Ashburton Range) to *Corymbia* Open Woodland, with a tall sparse shrubland, over low hummock grassland. Within Lake Woods or *Jikaya* and the immediate vicinity, the vegetation is described as tussock grassland.

Previous archaeological studies undertaken by the consultants across central Australia have reported a high correlation between water and stone resources and the occurrence of 'open' archaeological site features (selected studies include: Earthsea Pty Ltd, 2019, 2018a, b & c, 2016, 2012, 2010a & b, 2005a & b). The size and type of the sites, in many cases, was reflected by the permanency of water and reliability of water networks. The largest and more significant open sites were recorded where there were reliable water networks often coupled with substantial outcropping stone resources suitable for the manufacture of stone artefacts.

It is also noted that some exceptions to the above observations have also been recorded, such as the location of ceremonial places located away from water and stone resources, incidences of sites proximal to significant environmental resource zones rather than water permanency and reliable water resources in desert areas can have significant lithic scatters despite the general absence of stone resources close by.

Within the Project footprint and surrounds, there is a higher likelihood of archaeological sites close to watercourses and drainage depressions, mostly within the Gosse and Ashburton land systems. Additionally, the quartzite and silcrete rocky outcrops within the Ashburton Range are a well-known source of high-quality stone resources, which are associated with *puwarrija* stories (Dreaming stories) (Dick Foster personal communication, Murgatroyd 1991, Paton 1994 and Shipton et al. 2021).

## 3.2 Climate and Hydrology

### 3.2.1 Climate

The Solar Precinct is located approximately 200km north of Tennant Creek, in a region which experiences a semi-arid climate, with some influence from the tropical region to the north. The climate is characterised by cool winters and hot summers, with low average annual rainfall.

The nearest Bureau of Meteorology (BoM) climate station is located at Elliott, approximately 70 km north-east of the Solar Precinct, station number 015131 (BoM 2021). The long-term average annual rainfall, based on rainfall data from 1949-2021, is 590.5mm, and the average number of rainy days is 34.2 per year. Rainfall can, however, be highly variable from year to year. The majority of rainfall occurs during the summer months, of October to March/April, associated with the monsoon from Northern Australia. Average rainfall and temperature data for Elliott, sourced from BoM climate data, is displayed in Figure 2 below. Within the Solar Precinct it is anticipated that the majority of rainfall is either absorbed by the ground or lost via evaporation and evapotranspiration.

The coolest months are June/July, when the mean maximum temperature is approximately 28.5°C and the mean minimum temperature is approximately 11-12°C. Conversely the summer months are hot, when mean maximum temperatures are in the high 30's and mean minimum temperatures are in the mid-20's. November, for example, has a mean maximum temperature of 39.1°C and a mean minimum temperature of 23.5°C.

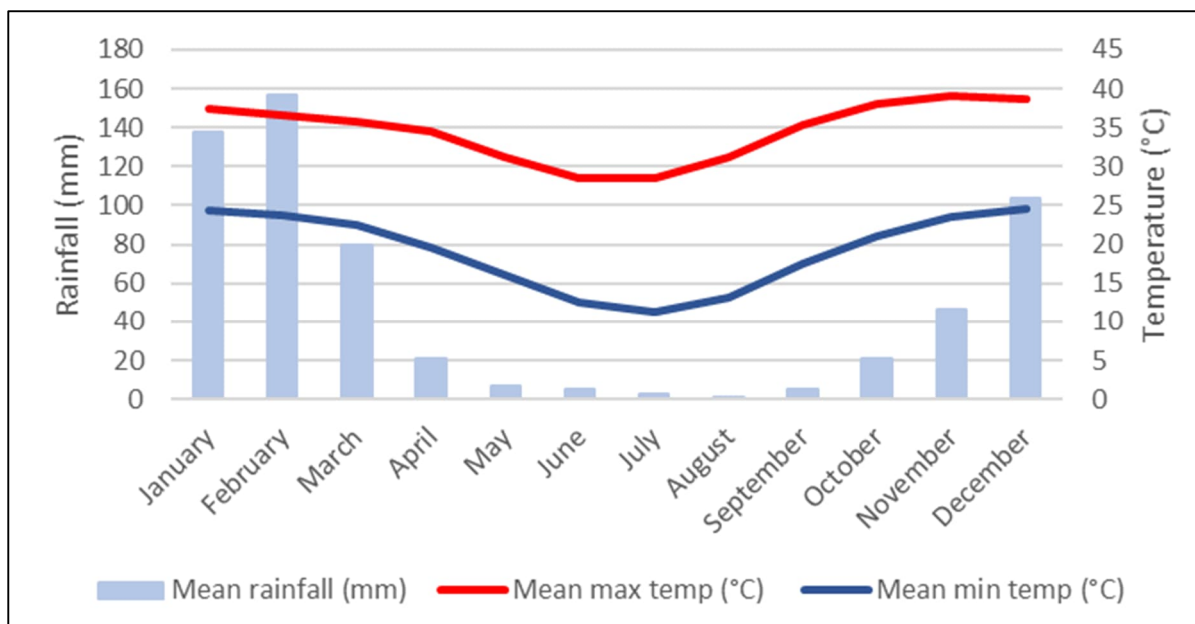


Figure 2: Mean monthly rainfall and temperature data for Elliott

### 3.2.2 Paleoclimate

Local paleoclimate information is sparse, however studies encompassing inland Australia and the Top End (Fitzsimmons et al. 2013; Hiscock & Wallis 2005; Megirian *et al.* 2002; Wyrwoll and Miller 2001; Reeves et al. 2013), and investigations at Lake Woods (Shipton et al. 2021, Bowler et al. 1998, Smith 1986a), 20km to the north of the proposal footprint offer a broad understanding of localised climatic conditions through time. These climate changes and the potential evidence of their remnant environmental influences were interpreted through the land systems information, hydrology, geomorphology, and satellite imagery across the Solar Precinct. The assessment of these palaeoenvironmental features can assist to identify potential past Aboriginal occupation areas and archaeological features which may have persisted in the various land units through time, including those now obscured by sediments.

Fitzsimmons' (et al. 2013; see also Reeves et al. 2013) study, which encompasses some Lake Woods data (Bowler et al. 1998), demonstrates significant climate change over the past 40,000 years, which have likely made the region both wetter and drier than it is today. In brief, these changes have included:

1. ~40 to 30ka: A humid phase, and initiation of cooler conditions. Data also suggests the period was wetter in arid regions than current conditions. Bowler (et al. 1998, p. 205) argues that during this period Lake Woods increased 10 times its size.
2. ~30 to 18ka: Last Glacial Maximum (LGM) aridity. A significant drying of conditions throughout the centre of Australia, including strong evidence of the same at Lake Woods.
3. 18 to 12ka: Deglacial period. A period of significant variability with the reactivation of tropical monsoon.
4. ~12 to 0ka: Holocene period. Fluvial records, including from Lake Woods, potentially indicate an increase in early Holocene discharge, peaking between ~10 and 6 ka. A decrease in fluvial activity and re-activation of dunes indicate drier conditions in the mid-late Holocene. Late Holocene to recent climates had generally shown Lake Woods to be ephemeral, with conditions comparable to today.

### 3.2.3 Hydrology

The hydrology of the Solar Precinct and access corridors reflects the arid climate and unpredictable nature of rainfall patterns. There are no defined drainage lines within the Solar Precinct footprint, however as discussed below, there are a number of ephemeral and episodic watercourses (*juwari* or *wilpa*, meaning creek) which are crossed by the proposed access road corridors (see Section 3.4). These creek systems are culturally significant to the Warlmanpa People and other groups who have connections to that Country, with traditional knowledge regarding their location and reliability being intensively handed down through successive generations.

The watercourses having acted as important resource areas and corridors to cross country in the past and continue to be connected to *puwarrija* (Dreaming) pathways. Gleeson Creek for instance, located 8.5 km east of the Solar Precinct and crossed by the proposed unsealed access road, is an important feature carrying the *ngapa puwarrija* (Rain Dreaming, Dick Foster and Peter Henderson pers comm) (See Figure 4). Similarly, the playa lakes to the west of the railway corridor are strongly associated with *Jinpiya* which is home to the Lightning Dreaming.

Within the Solar Precinct footprint there are a number of dry claypans, and drainage depressions known as *ngulya*, which would hold water for various periods of times following heavy rainfall events, including subsurface (see Figure 5). Subsurface water was traditionally recovered by digging the low points of the drainage depressions with a *kapirli* (digging stick), which could also be used to enhance the size of the soakage hole. Given the ephemeral nature of water resources within the Precinct, it was indicated that the area would have been traditionally considered a high-risk environment to traverse outside heavy rainfall events (Dick Foster and Peter Henderson pers comm). Smith (1989) similarly notes that it was the density of water sources that were accessible that is vital for human occupation, and the resource base which they support. As noted elsewhere, these types of remote ephemeral water sources were also prioritised for foraging following rainfall events, before groups would settle closer to more permanent water resources (Gould 1969, in Bird et al. 2016, p. 11477).

It is also suggested that while permanent wells and water sources were refuges during drought that enabled people to continue living in an area, they would soon exhaust the food supplies in the vicinity of the water (Macfarlane and McConnell 2017).

Notwithstanding this, the *ngulya* were targeted as part of the archaeological surveys as they were the only water resources for some distance and thus, presented as potential areas visited by Aboriginal people in the past traversing that country. These small depressions may have also been part of a larger paleodrainage system associated with the *Jinpiya* playa lakes to the west of the railway corridor, with aeolian sands potentially having infilled any linking surface drainage. The latter could not be confirmed during the surveys, however subtle drainage observed between lineal dune systems suggest it is a possibility.

To the east of the Solar Precinct, the proposed access roads cross a number of defined ephemeral drainage lines, including (from west to east) Hunter Creek, Gleeson Creek, Billy Creek and Bull Creek, and unnamed tributaries of Powell Creek (see Figure 6). These systems are generally high-level streams with the headwaters commencing in the Ashburton Range, flowing to the north, and discharging into the floodplain environment just south of Lake Woods. The majority of watercourses only flow and hold water following rainfall events, although springs (*japiya*) are noted along Powell Creek, 11 km north of the proposed unsealed access road. The permanent spring area adjacent to the

Powell Creek Telegraph Station is referred to as *Pamayu* and remains a highly significant cultural and archaeological place.

*Pamayu* acted as a refuge for Aboriginal people during dry periods and for those displaced following colonisation. It drew people from extensive distances, including from the central and Tanami Deserts, bringing with them artefacts, language and culture (Dick Foster pers comm). Comparable to much of arid Australia, sites like *Pamayu* and semi-permanent water bodies were important (and often highly utilised) resources for water and food for Aboriginal People. Similarly, it was indicated that many of the watercourses traversed by the proposed access roads were used as corridors for the movement of people in and out of the Powell Creek, Lake Woods and the Ashburton Range (Dick Foster and Peter Henderson pers comm).

Lake Woods, known to the Warlmanpa People as *Jikaya*, whilst well outside the proposal footprint is a large ephemeral wetland with the boundary of the Lake Woods Conservation Covenant approximately 12 km north of the Solar Precinct boundary. Lake Woods is a Site of Conservation Significance (SOCS) as it is one of the largest freshwater lakes in the Northern Territory and, during periods of inundation, the area provides diverse wetland habitat for waterbirds and shorebirds (Pavey et al. 2009). During periods of inundation the lake usually covers an area of approximately 350 km<sup>2</sup>, but can cover up to 1,000km<sup>2</sup>, making it contiguous with Newcastle Creek, the main creek which feeds the lake from the north.

Culturally, Lake Woods is also a highly significant feature for the Warlmanpa, Mudburra, Jingili and other groups who visited the site seasonally for ceremony, resources and trading (Dick Foster and Peter Henderson *pers comm*). The lake has been subject to archaeological investigations since the 1960's (Bowler et al. 1998, Murgatroyd 1991, Paton 1994, Shipton et al. 2021, Smith 1986), with evidence of human occupation throughout the Holocene and hints this may extend into the Pleistocene. The archaeological and cultural resources of the lake are discussed further in Section 4 below.

### 3.3 Geology and Geomorphology

Outcropping geology is included in this study as it is a useful indicator of the possible stone raw materials available within the project footprint. Outcrops of fine grained sedimentary and metamorphic rocks with isotropic and conchoidal fracture properties were utilised to manufacture flakes, points and other tools used for a variety of purposes. Fine to medium grained igneous rocks such as basalt and dolerites were used to manufacture flaked and ground edge stone axes. The flat surfaces on sand and siltstones were used to grind foods, sharpen implements and to produce rock art. Sandstone rock shelter surfaces were used for rock art of various types. Therefore, an understanding of the geology of a region is important in predicting the distribution of stone quarries, rock shelters, grinding surfaces and stone artefact scatters.

Whilst a full geological assessment was not undertaken within project footprint, the below interpretations have been derived from field observations, coupled with regional outcropping geological information. The geology of the Solar Precinct is mapped on the South Lake Woods 1:250,000 scale geological map (Smith et al. 1978) (see Figure 7), while the area between the Solar Precinct and the Stuart Highway, traversed by the two access road corridors, is mapped on the Helen Springs 1:250,000 scale geological map (see Figure 8), and described in detail on the accompanying explanatory notes (Hussey et al. 2001).

The Solar Precinct is located within the Wiso Basin geological region and is comprised of quaternary aged aeolian dune deposits of regolith (*Qs*), largely red, silty and clayey fine quartz sand. The area is bound to the west by a ridge dune, which extends north and terminates at Newcastle Waters Creek. This ridge separates the lineal dunes of the Tanami Desert to the west and the Lake Woods basin to the east. The morphology of the dune potentially suggests it is a remnant shoreline of a previous megalake expansion (Bowler et al. 1998), with the proposal footprint falling within the sand apron surrounding the current Lake Woods' extent. Most dunes appeared to be stable as a whole, owing to vegetation cover predominantly of spinifex and turpentine (*acacia monticola* – referred to as *murlurpa* by the field team).

Dune system age or evolution is not clearly defined; however, it is possible they were active following the reactivation of the monsoon at periods from ~14 - 15 ka until the mid-Holocene (Fitzsimmons et al. 2013, p. 84). Excavations at Lake Woods indicated the depth of Holocene sediments, some with evidence of human occupation, ranged from a maximum of ~26cm in the dune ridges (Shipton et al. 2021) to 1.2m within gullies (Bowler et al. 1998, p. 191). No outcropping bedrocks suitable for stone artefact manufacturing is mapped within the Solar Precinct footprint, and none was observed during field surveys.

To the east of the Solar Precinct, within the Helen Springs map sheet area, the proposed access corridors cross more complicated geology, associated with the Ashburton Range. Descriptions of the relevant geological formations are provided in Table 3.

Between the Solar Precinct and the Ashburton Range, the access road corridors cross several geological formations (*Qa, Qas and Qs*), all of which are quaternary aged regolith, of sand, alluvium and colluvium. This area aligns with the Gosse land system (i.e. floodplain). Some transported cobbles of silcrete and quartzite, suitable for the manufacture of stone artefacts were noted in the alluvial material adjacent to Gleeson Ck and in *-Prj* and *Qc* lag deposits covering parts of the land units up to 2.5 kilometres east of the creek line. Deflation of some dune areas east of Gleeson Ck where stone artefacts were exposed, suggested the overlying sedimentary cover is relatively thin (~5-10cm). This appears to be consistent with findings by Shipton *et al.* (2021, p. 9) during excavations of the gully site at Lake Woods.

Within the Ashburton Range, the geological formations are part of the Renner Group, and the dominant formations comprise (from west to east) the Jangirulu Formation (*-Prj*), the Powell Formation (*-Prp*), and the Gleeson Formation (*-Prg*). All are Mesoproterozoic era sedimentary formations within the Tennant Creek geological region (refer to Hussey et al. 2001 for detailed descriptions). Both the Jangirulu and Powell formations are comprised largely of sandstone (mostly quartz arenite), as well as various other lithologies including some raw material sources such as quartzite, cherts and mudstone. The Gleeson Formation is a sandstone and pebbly sandstone formation of terrestrial fluvial (i.e. river) deposited material, which also contains interbedded conglomerate, siltstone, mudstone and shale. There are numerous other geological formations outcropping within the ranges, crossed by, or close to the Project footprint, which are summarised in Table 3.

### 3.4 Geology and Hydrology Figures

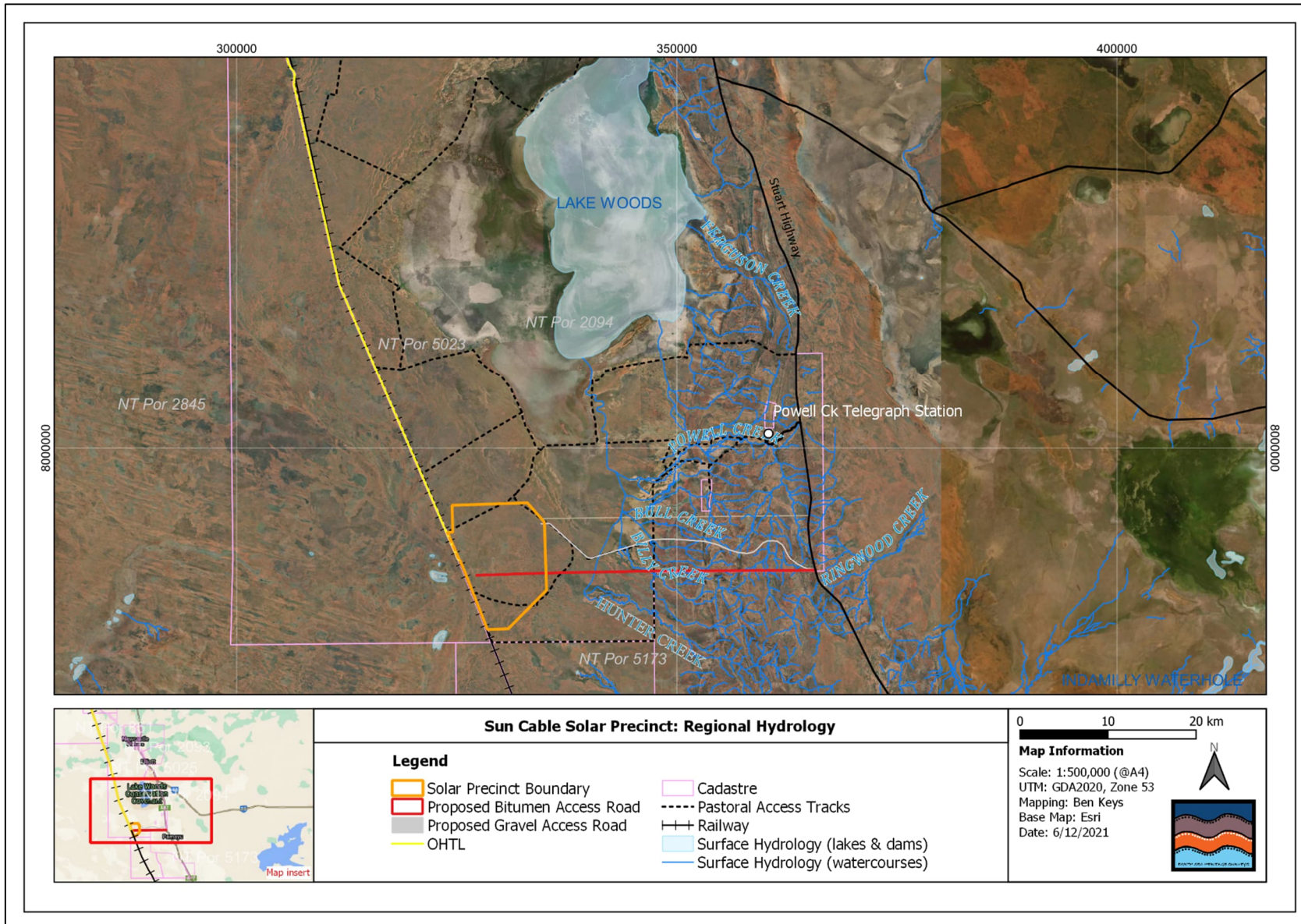


Figure 3: Solar Precinct Regional Hydrology

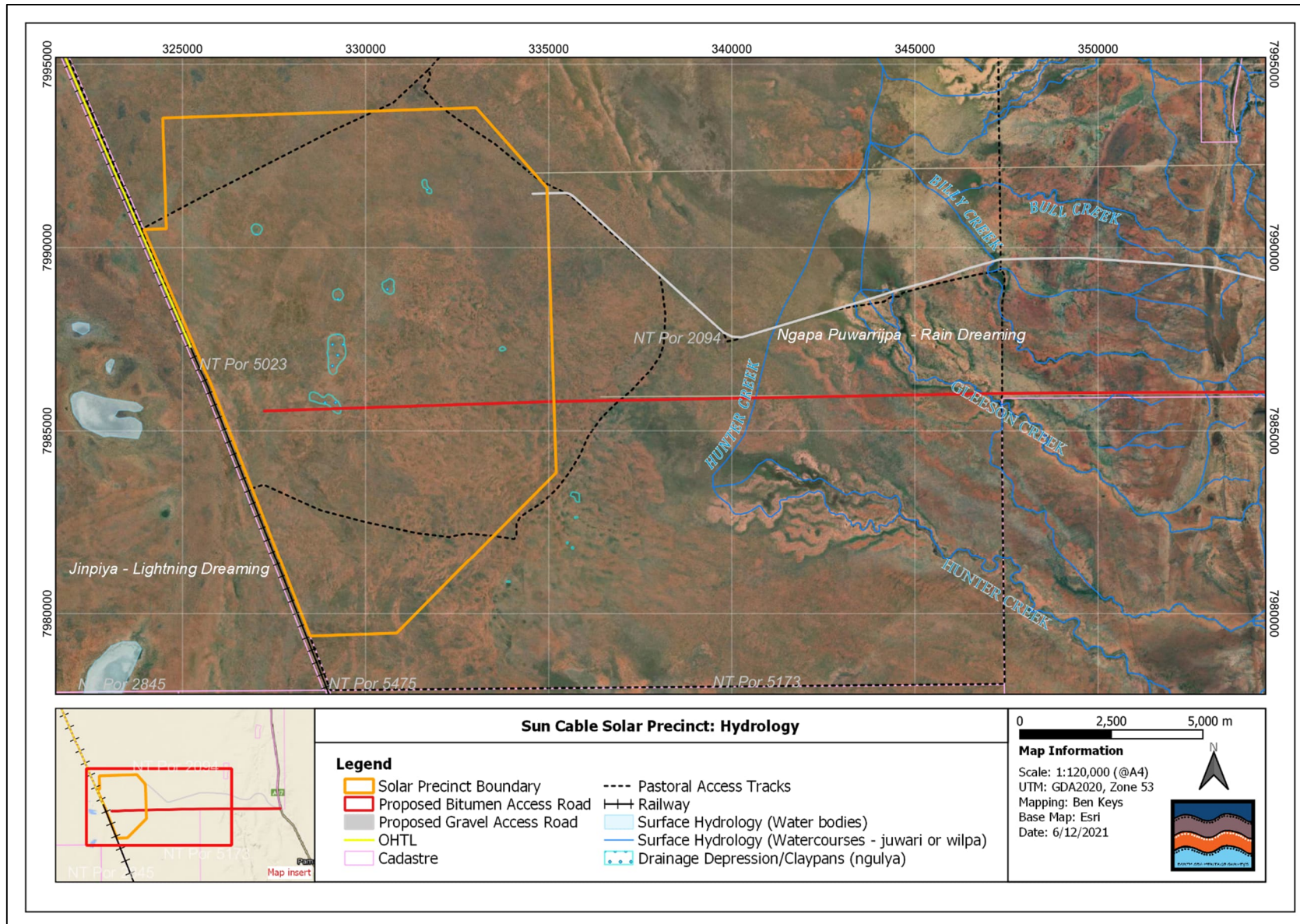


Figure 4: Solar Precinct Hydrology

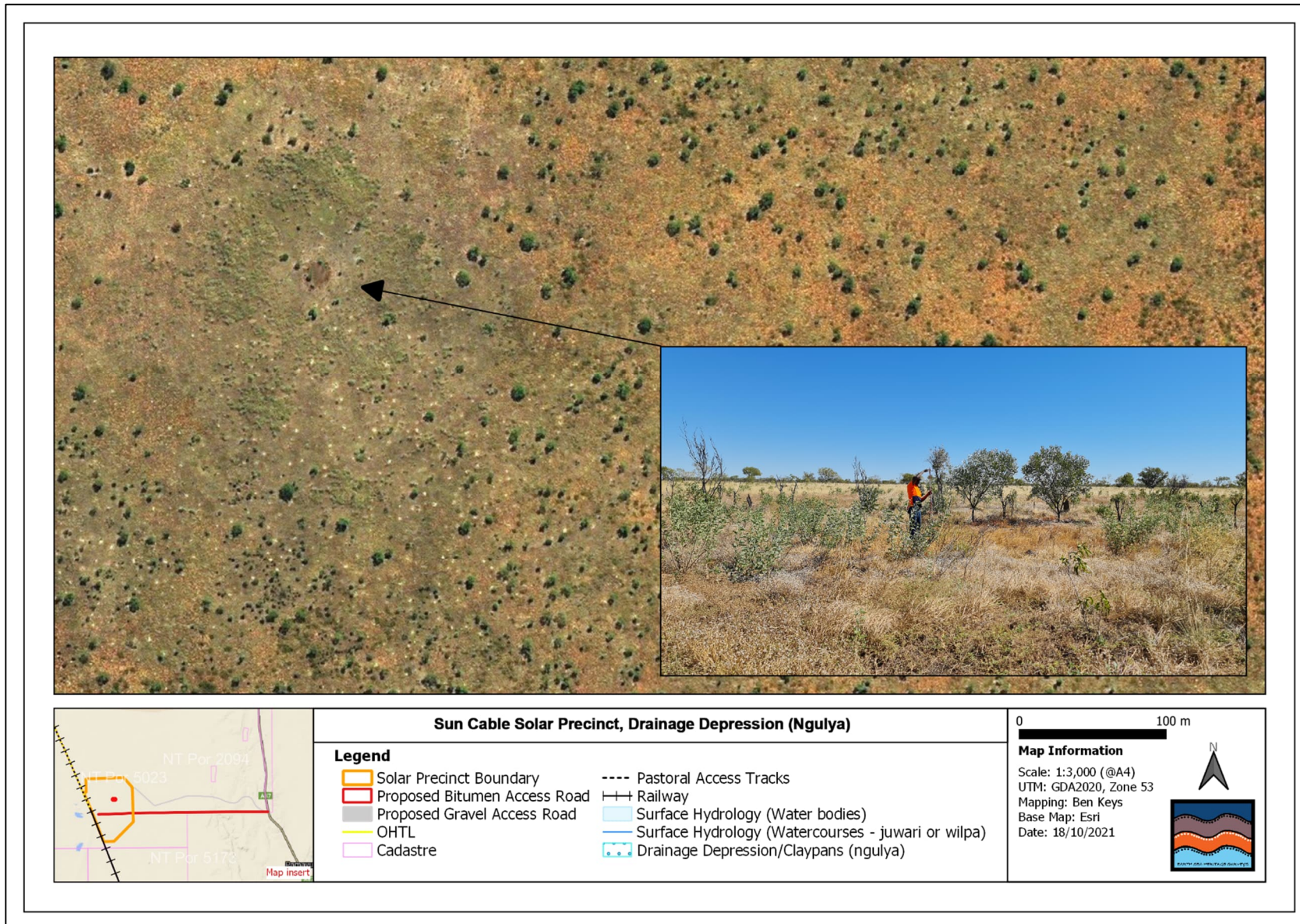


Figure 5: Solar Precinct Drainage Depression

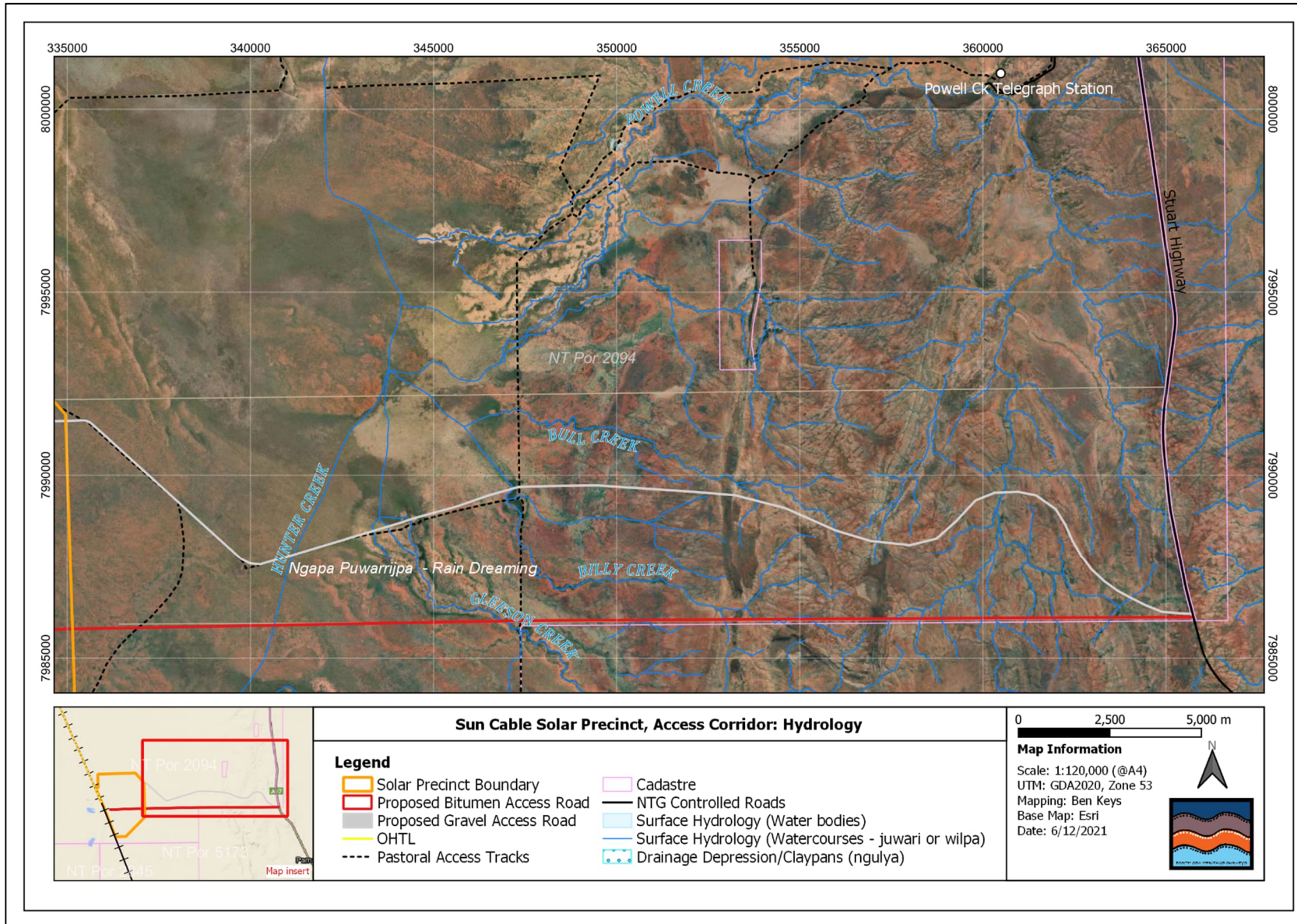


Figure 6: Solar Precinct Access Corridor Hydrology

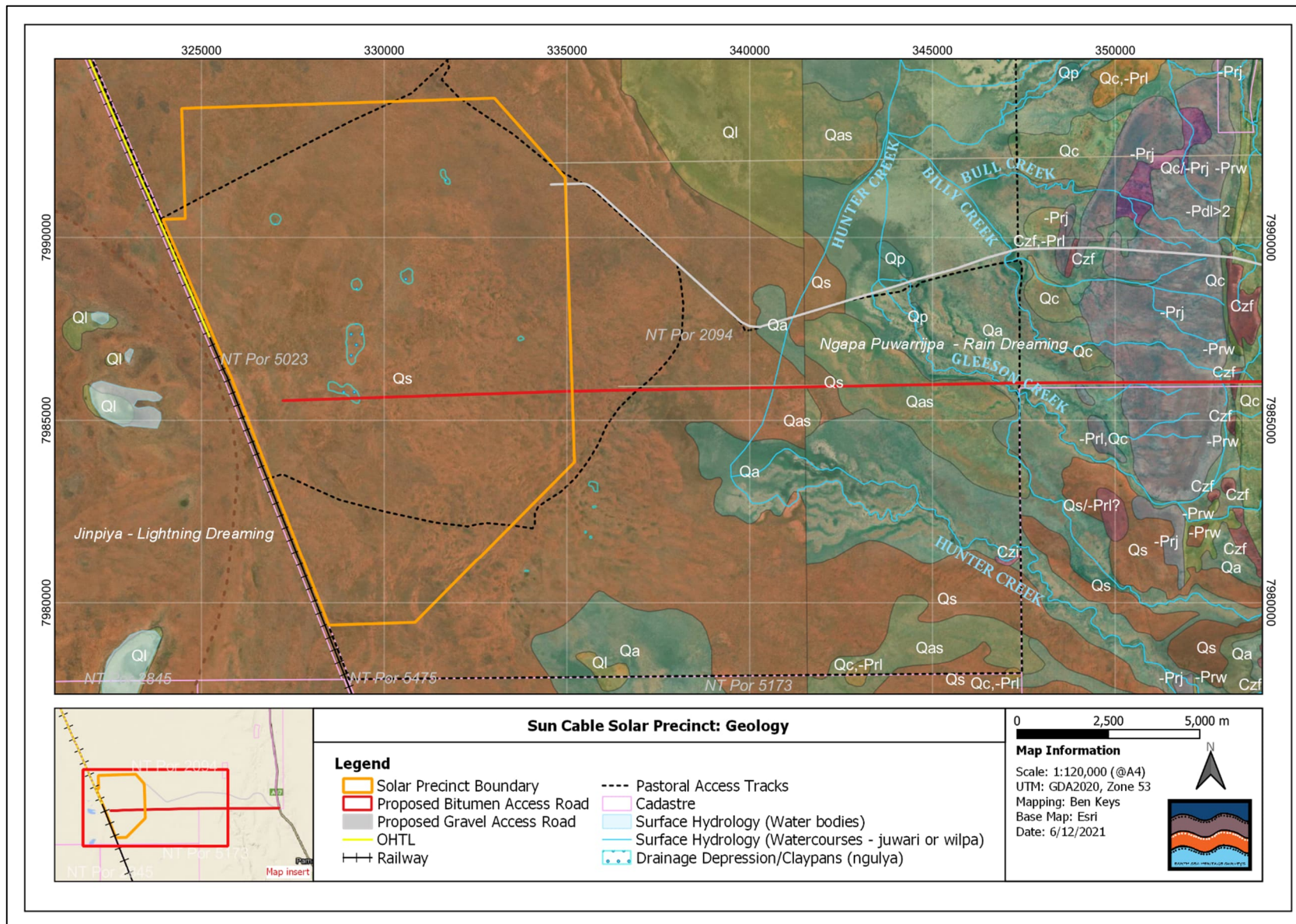


Figure 7: Solar Precinct Geology (refer to Table 3 for Geological Notations)



Table 3: Regional Geological Notations

Map Symbol	Formation	Lithology Summary	Dominant Rock	Rock Type	Age
<b>South Lake Woods</b>					
<b>Solar Precinct footprint</b>					
Qs*	No formal name	Sand – red, silty and clayey fine quartz sand, gypsiferous around salt lakes – aeolian	Unconsolidated sand regolith	Unconsolidated sand regolith	Quaternary
<b>Immediate surrounds</b>					
Qa*	No formal name	Sand, gravel, silt, clay alluvium	Unconsolidated sand regolith	Unconsolidated sand regolith	Quaternary
Ql	No formal name	Sand, silt, clay evaporites; lacustrine	Unconsolidated sand regolith	Unconsolidated sand regolith	Quaternary
<b>Helen Springs</b>					
Access road corridors and immediate surrounds					
Czf	No formal name	Ferricrete and ferruginised rock	Ferricrete	Regolith	Cenozoic
Czf/Kl	No formal name	Czf: Ferricrete and ferruginised rock, and Kl: Undifferentiated: sandstone; pebbly sandstone to conglomerate, mudstone; mesa and bench forming	Ferricrete	Regolith	Cenozoic
Czf,-Pr1	No formal name	Czf: Ferricrete and ferruginised rock -Pr1: Sandstone; dolostone, stromatolitic bioherms, cauliflower chert; granule conglomerate	Ferricrete	Regolith	Cenozoic
Czf/-Prp	No formal name	Czf: Ferricrete and ferruginised rock -Prp: Sandstone; quartz arenite; quartz-rich; micaceous mudstone, rip-up clasts and breccia	Ferricrete	Regolith	Cenozoic
Czi	No formal name	Silcrete and silicified rock	Silcrete	Regolith	Cenozoic
Kl/-Prb	No formal name	Kl: Undifferentiated: sandstone; pebbly sandstone to conglomerate, mudstone; mesa and bench forming, and -Prb: Undifferentiated: sandstone, micaceous; mudstone; conglomerate	Sandstone	Sedimentary	Cretaceous
Qc,-Prb>s	No formal name	Qc: Colluvium; minor alluvium, and -Prb>s: Sandstone; recessive lower intervals and ridge	Colluvium	Regolith	Quaternary
-Prg	Gleeson Formation	Ridge forming conglomerate; lithic to quartz arenite; granular to cobble; micaceous sandstone, pebbly sandstone, lag conglomerate; mudstone	Conglomerate	Sedimentary	Mesoproterozoic
-Prj	Jangirulu Formation	Ridge forming sandstone; quartz arenite; lensing thin to very thick bedded, medium grained to pebbly	Sandstone	Sedimentary	Mesoproterozoic
-Prp	Powell Formation	Sandstone; quartz arenite; lensing, medium to very thick bedded, medium grained to granular; quartz-rich; micaceous mudstone	Sandstone	Sedimentary	Mesoproterozoic

Map Symbol	Formation	Lithology Summary	Dominant Rock	Rock Type	Age
-Prw	Wiernty Formation	Sandstone; lithic to quartz arenite; lensing, very thin to medium bedded, very fine to medium grained; micaceous; mudstone, granule conglomerate; silicified dolomitic mudstone	Sandstone	Sedimentary	Mesoproterozoic
-Pdl>2	No formal name	Dolerite; coarse grained; ferruginised, recessive	Dolerite	Igneous	Mesoproterozoic
-Prb>g	Baralandji Formation	Sandstone; sublithic to quartz arenite; laminated to thick bedded, fine to medium grained; micaceous, glauconitic; mudstone	Sandstone	Sedimentary	Mesoproterozoic
-Prb>s	Baralandji Formation	Sandstone; laminated to very thick bedded, medium to very coarse grained; micaceous; recessive lower intervals and ridge forming	Sandstone	Sedimentary	Mesoproterozoic
-PrI,Qc	Lake Woods beds	PrI: laminated to medium bedded; mudstone; dolostone, stromatolitic bioherms, cauliflower chert; granule conglomerate, and Qc: Colluvium; minor alluvium	Sandstone	Sedimentary	Mesoproterozoic
Qa*	No formal name	Alluvium, some colluvium	Alluvium	Regolith	Quaternary
Qas	No formal name	Relict alluvial deposits; covered by sand and silt	Alluvium	Regolith	Quaternary
Qc	No formal name	Colluvium; minor alluvium	Colluvium	Regolith	Quaternary
Qp	No formal name	Claypans: clay-rich soils developed in depressions	Soil	Regolith	Quaternary
Qs*	No formal name	Aeolian sand and sandy soil; minor colluvium and alluvium	Sand	Regolith	Quaternary
Qc/-Prb>g	No formal name	Qc: Colluvium; minor alluvium, and -Prb>g: Sandstone; sublithic to quartz arenite; laminated to thick bedded, fine to medium grained; micaceous, glauconitic; mudstone	Colluvium	Regolith	Quaternary
Qc/-Prj	No formal name	Qc: Colluvium; minor alluvium, and -Prj: Ridge forming sandstone; quartz arenite; lensing thin to very thick bedded, medium grained to pebbly	Colluvium	Regolith	Quaternary

### 3.5 Land Disturbance Factors

Land disturbance factors in the project footprint have made significant changes to the pre-contact environment, including:

1. Pastoral impacts. In brief, pastoral impacts within the Solar Precinct and access corridor have been significant, with land cleared for property infrastructure, intensive grazing, stock watering infrastructure, fencing, permanent yards and changes to the traditional fire regimes.

Early pastoral activities also had a significant impact on the traditional lifeways of Aboriginal People throughout Australia, including within the Project Area. The earliest map showing grazing runs within the Project footprint is dated 1897, which describes the land applied for by M. J. Lewis for horse breeding (see Figure 9). The area applied encompasses the Solar Precinct and details the location of Hunters Creek, Gleeson Creek and Powell Creek.

Note, that the extent of Hunter Creek is incorrectly scaled in Figure 9 and does not extend into the Solar Precinct area as shown. Similarly, the Gleeson Creek label is the current location of Bull Creek.

Pastoral activities have occurred across the Northern Territory for over 150 years, after John McDouall Stuart's crossing of the country from Adelaide to Point Stuart, near Darwin, in 1861–62 (Stuart 1865). The Barkly Stock Route, established in the early 1880's by Nat Buchanan, commences just north-east of the Project footprint, and links the Stuart Highway to pastoral properties, other roads and stock routes in the eastern portion of the NT, and eventually into Queensland (McLennan, 2020).

2. Road and infrastructure construction and maintenance: The Project footprint is bounded by the Darwin to Alice Springs railway line on the west, and the Stuart Highway to the east. There are also numerous tracks within the project footprint that have been constructed for industry and pastoralism. The construction, maintenance, rerouting and upgrading of tracks and other infrastructure has occurred for an extended period of time. This disturbance tends to destroy or distort the archaeology in road and infrastructure corridors.

The Overland Telegraph Line, from Port Augusta to Darwin, transects the proposed access corridor approximately 1.5km west of the Stuart Highway. The associated historic Powell Creek Telegraph Station is located approximately 26 km northeast of the Solar Precinct, with the closest section of access corridor lying 11 km to the south. The Powell Creek Telegraph Station was constructed between 1872 and 1875 and remained in use until 1955 (see Section 4.1 Historical Background).

In addition to the Telegraph Station, Powell Creek also acted as an Aboriginal ration's depot, which drew significant numbers of Aboriginal People into the area. Some Aboriginal People were likely to have travelled from the west after being displaced from mining, conflicts, and pastoralism in the Tanami Desert, through the Solar Precinct and access corridor into Powell Creek (Dick Foster *pers comm.*).

3. Collectors: Both pastoralists, amateur 'archaeologists' and enthusiasts have sought out to selectively 'collect' components of the archaeological record throughout much of Australia. This has destroyed or skewed the remaining archaeological record in many instances, with items such

as stone axes, grindstones, sacred items, and other tools being removed.

Whilst it is possible some artefacts have been removed from the surveyed areas in the past, the impacts of this are likely to be low given the remoteness of the area.

4. Invasive species such as cattle, horses and pigs disturb watercourses, introduce weed species and induce erosion in native environments. These factors impact on archaeological sites in several ways:
  - a. Watercourses: Site and artefact densities generally increase closer to water bodies. Erosion of creek margins can impact on site integrity. Sub-surface sites are often discovered due to erosion caused by cattle and feral animals.
  - b. Weeds: Change fire regimes and can sometimes change the composition of native vegetation.
  - c. Introduced animals (including cattle) change the landscape by physical impact including wallows, nesting, pads, rooting and destabilisation of creek banks. This in turn promotes erosion and redistribution of sediment along creek lines. These impact on archaeological sites by either erosion or aggrading of artefact horizons making dating and accurate recording of sites difficult.

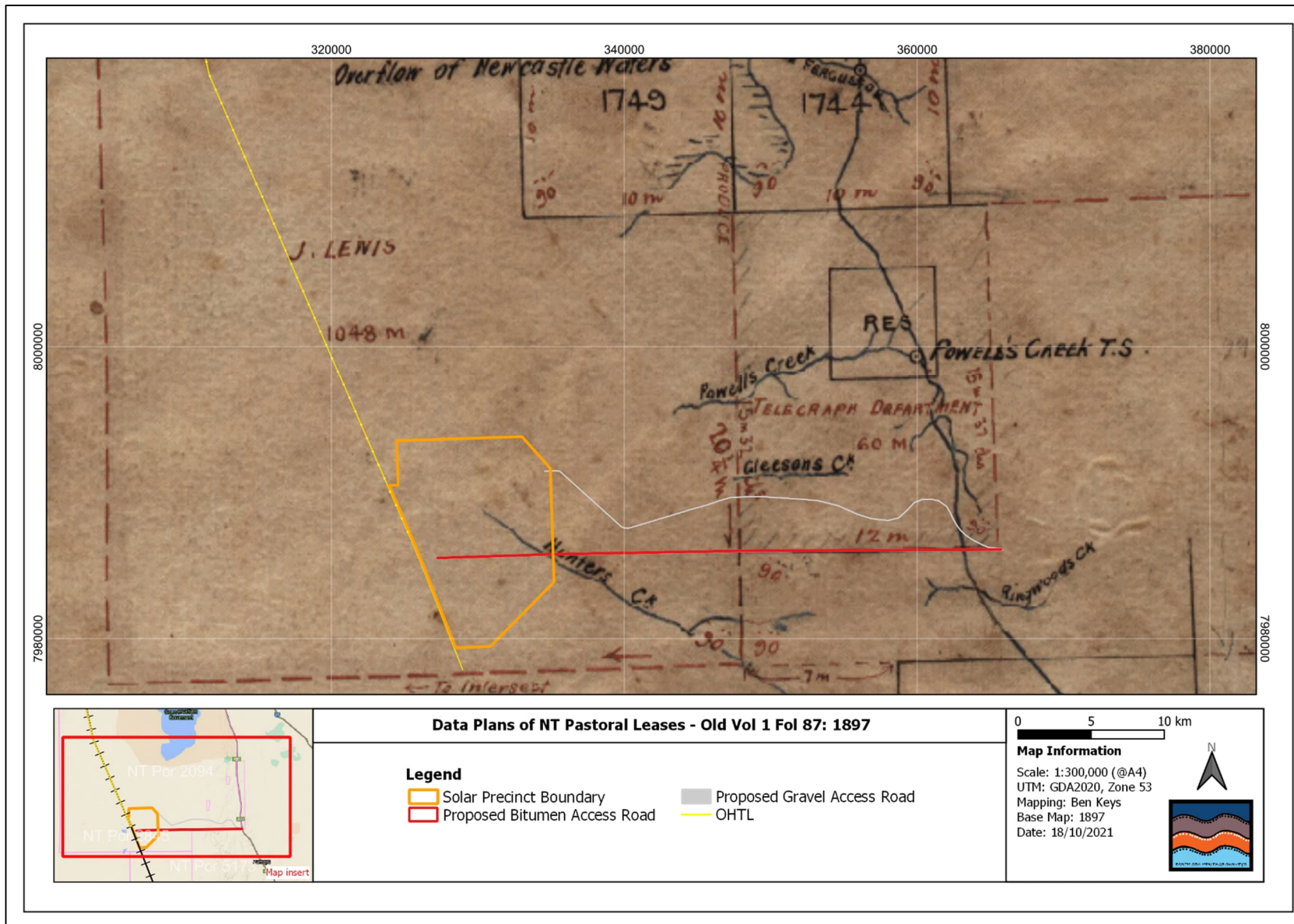


Figure 9: 1897 map excerpt - Data Plans of NT Pastoral Leases - Old Vol 1 Fol 87 - North of Powells Creek (Note, the location of Hunter Creek is incorrectly shown to extend into the Solar Precinct area).

## 4 Archaeological and Historical Background

### 4.1 Aboriginal Occupation of Central Australia

Aboriginal occupation of Central Australia is dated to at least 35,000BP, through age determinations obtained at Puritjarra Rock Shelter in the Cleland Hills, 700km southwest of the Solar Precinct Project Area (Smith *et al.* 2017) and Kulpi Mara Rockshelter (Thorley *et al.* 2011) located 165 km to the east of Puritjarra. Evidence from other archaeological sites in the wider central Australian region suggest Aboriginal groups in the Pleistocene were generally small and highly mobile, using wider territories than used in the Holocene (O'Connor *et al.*, 1998, p. 21; Smith, 1989, Smith *et al.*, 1998; Thorley, 1998, p. 316).

Hiscock and Wallis (2005, p. 35) suggest this phase of colonisation of Central Australia most likely coincides with a period of higher rainfall, resulting in better surface water and greater abundance of resources. This notion is supported by Bowler (*et al.* 1998, p. 205) who suggests Lake Woods was up to 10 times its current size during the same period (see Section 3.2.2 above). Horton (1981) proposed that paleo-drainage systems, comparable to those feeding into Lake Woods, may have acted as critical corridors allowing people to move into drying parts of Australia in the pre-Last Glacial Maximum (LGM) period. To date no Pleistocene occupational areas have been recorded in the surrounding region, however some potential has been noted at Lake Woods (Bowler *et al.* 1998, Shipton *et al.* 2021 and Smith 1986).

Increased aridity during the LGM, 20 kyr to 18 kyr BP, appears to have led to significant changes in residential mobility, territory and regional networks (Smith, 1989, Smith *et al.*, 1998; Smith 2006; Veth, 1989, 1993, 2005b). Smith *et al.* (2017) argue that “over the last 12.0 kyr, there were three discrete phases of site-use at Puntutjarpa, 12.0–9.7 kyr, 8.3–6.2 kyr and ~1.1–0 kyr, each with differences in the nature and intensity of occupation”. General trends across the continent appear show similar occupation patterns, with archaeological evidence also suggesting there was a strong increase in occupation activity between 9 kyr and 6 kyr, including across the arid zone (Williams *et al.* 2015).

During the mid-to late Holocene period of increased occupational activity (5 kyr to 3 kyr), hafted tools such as tula adzes and backed blades, along with a seed grinding economy appeared to develop in Central Australia (Smith 1986). According to Flood (1990, p. 57), more than 70 of the 140 known plant food species in Central Australia were exploited for seeds. Although a time intensive method of gaining food, the exploitation of seeds in this way is far more reliable than hunting game or gathering other plant foods. Archaeological and anthropological evidence indicates that large ceremonial gatherings were made possible because of the intensification of the exploitation of seed gathering.

Studies at Lake Woods indicate a significant seed grind economy also existed, with grindstones being very common throughout most sites recorded (Shipton *et al.* 2021, p. 176). Ethnographic accounts indicate the importance of grass seed procurement and processing also existed at the time of European contact. Accounts by Ashwin (1927, p. 64 see also Shipton *et al.* 2021, p. 176) during his visits to Newcastle Waters, 40km north of the Solar Precinct, noted the abundance of native grass seed production:

*There was a large mia-mia [hut], about seven feet high, in the middle and about 16 feet diameter. It was round and arched off to the ground. There were large bundles of spears stored there, and large wooden dishes four and five feet long filled with grass seed as large as rice with the husk or skin still on the seed. I think it was a species of rice which grows in the flooded country 40 or 50 miles in extent and north of Newcastle Waters. There must have been about a ton of seed stored there in 17 large dishes, full and all covered with paper-bark. The dishes were nearly all five feet long and a foot deep, scooped out of solid wood. There were more weapons and shields.*

Fluctuations in potential site use through time have not been clearly defined at Lake Woods, however in other Australian areas there appears to be a pattern of relatively rapid decline in site use around 3 kyr BP. Smith et al. (2008, p. 396) suggests this decline may represent a marked contraction of settlement and a major population crash. Others (Williams et al. 2015) support this notion, arguing the onset of El Niño - Southern Oscillation (ENSO; 4.5-2ka) may have restricted some food production, triggering population fragmentation, abandonment of marginal areas, and reduction in ranging territory. Whilst most regions recovered quickly, some evidence suggests this didn't occur in Central Australia until 1.5 cal. kyr BP. Notwithstanding a drying environment and seasonal inundations, Aboriginal occupation of Central Australia depended upon consistent access to sources of water, with evidence also suggesting readjustments in local foraging societies, in site use, economy and technology occurred through time (Smith et al. 2017, p. 10).

A number of studies (e.g. Smith 1986, 2006; Thorley 1998; Veth, 1993, 2005) suggest the last 1000 years appears to have been a period of significant change in central Australia, perhaps with shifts towards higher regional populations. Smith (2006, p. 372) and others (Smith, 1988, 1996; Thorley, 1998) have presented evidence of more intensive occupation and substantial increases in the level of site use after 1,500–1,000 B.P.; particularly in the lower reaches of catchments, in sites on sand plain and valley floors.

## 4.2 Archaeological Studies in Arid Zone Australia

There have been a number of academic and consultancy-based studies in Arid Zone Australia, however the Solar Precinct and access corridor footprint has not been subjected to any known archaeological research to date, beyond this assessment. This section summarises the findings of a selection of studies, particularly focusing on the Central Australia region with survey-based assessments of comparable land units<sup>2</sup>. This information, coupled with the environmental and historical backgrounds was used to inform the predictive model presented in Section 4.4 below.

In the immediate surrounding regions, some studies have been undertaken as archaeological research at Lake Woods, 20km northeast of the Solar Precinct (Bowler et al. 1998, Jones and Bowler 1980, Shipton et al. 2021 and Smith 1986), along the railway corridor as regulatory compliance assessments (Pearce 1983, Smith 1984 and Heritage Surveys 1995), and similarly to the east along the Stuart Highway for Main Roads and optic fibre routes (Coates 1991), various listed on the NT Heritage Branch Archaeological Database with no recorded date/author). Ethno-archaeological studies have also been

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<sup>2</sup> Note that many studies completed as due diligence surveys are not generally available to the Consultant. The Consultant used studies that were available online, via the NT Heritage Branch Library and those completed by Earthsea consultants during the last 15 years.

undertaken in the Lake Woods region which focussed on the manufacture, trade and exchange networks of Leilira blades (Murgatroyd 1991; Paton 1994).

35 archaeological sites are noted on the NT Heritage Branch archaeological database within a 50km radius of the Solar Precinct. These features comprised of stone artefacts scatters (19), Quarry sites (11), two of which had rock art petroglyphs, Isolated stone artefacts (3) and a further two rock art petroglyphs sites. Site distribution patterns note a close proximity to watercourses, ephemeral drainage depressions or springs. Quarry sites were largely within geological units with outcropping basalt, silcrete and quartz however some were recorded in quaternary sand units which likely contained small outcrops associated with the adjoining geological units. The rock art sites were all located in sandstone rich units. An understanding of site sizes and artefact densities were not available at the time of writing.

In the wider region, Stockton (1971) recorded some of the largest site complexes in central Australia at Santa Teresa in the Ooraminna Ranges 700km southeast of the Project Area. The “Kurringke” site (Stockton 1971) consisted of extremely dense scatters stone artefacts, including more than 100 grindstones, near a rock hole. The Kurringke archaeological deposit was 35-70 cm deep, which largely consisted of aeolian sand overlain by sterile rubble. Archaeological materials included, bone, ochre, while the greatest quantities were flaked stone artefacts and millstone fragments. A C<sup>14</sup> age determination suggested occupation of the site started approximately 1000 BP.

Smith et al. (1983) undertook research in the Amadeus Basin for Magellan Petroleum and the Museum and Art Gallery of the Northern Territory. This survey, commissioned prior to work on a gas pipeline, investigated two areas near Haast’s Bluff to the north of the Mereenie Loop (720km to the south of the Solar Precinct). Smith investigated two land systems:

- A north-western section dominated by sand dunes and low outcrops of limestone.
- A south-eastern section consisting of a well-defined valley bounded by high sandstone escarpments. The valley included siltstone strike ridges, outwash areas and pediment, localised sand dunes and mounds and a domed sandstone plateau dissected along its northern margin by intermittent watercourses (Smith et al. 1983, p. 4)

This survey located twenty archaeological sites within their area of interest. Sixteen of these sites were associated with rock shelters in the escarpment country. Four sites were classified as ‘open sites’ consisting of grindstones, flaked stone artefacts and manuports. Three of these sites were located between low sand dunes near a water hole, and the last was directly adjacent to a waterhole containing a permanent water supply. Smith’s survey was based on a stratified sampling method identifying escarpments, rock shelters and permanent or near permanent water sources as having high potential for archaeological materials.

Mitchell (1996) surveyed the road reserve from Alice Springs to Hermannsburg in August 1996 for Telstra prior to the installation of an optical fibre cable. This survey located one archaeological site (near Jay Creek) and a number of isolated artefacts. Mitchell (1996, p. 9) commented that the isolated artefact density ranged from 1:1100 m<sup>2</sup> to 1:16,000 m<sup>2</sup> along the section of road reserve surveyed in 1996. Thorley’s survey of the Watarrka Mereenie Road located 35 isolated artefacts. Of these, only one occurred on a sandplain. Thorley (1993, p. 10) noted that the density of isolated artefacts drops sharply away from creek lines.

Thorley's 1991 survey of a number of Central Australian Roads locating approx. 280 archaeological sites and isolated artefacts (Thorley 1991, p. 46). Based on these surveys, Thorley calculated an average artefact or site density of 1: 136,000 m<sup>2</sup> for the region. 72% of these sites and artefacts were within 500 metres of a permanent water source. Of the remaining 28% most were associated with quarry sites; hence the proximity of the raw material source was the main condition for location.

Earthsea Pty Ltd (Richard Woolfe) conducted archaeological surveys for a number of Central Australian road upgrades while consulting for the Northern Territory Road Projects Division (Earthsea 2005-7). These included upgrades and realignments along the Mereenie Loop, along the Stuart Highway, parts of the Kintore Road and along the Plenty Highway (see discussion on this survey below). On the Palmer River south of Alice Springs, the author recorded a total of 12 stone artefact scatters. Eleven of these sites were located along the western side of a sand dune approx. 200 metres from the eastern bank of the Palmer Riverbed. Woolfe suggests while these sites were identified as individual sites for recording purposes, their location and the existence of a background scatter across the western side of the dune indicated that these sites were related. Artefact types included cores, flakes, hammer stones and manuports. Raw materials included sandstone, chert, silcrete and quartz.

Earthsea Pty Ltd undertook extended lineal surveys for two pipelines. One extending 400km across parts of the Tanami Desert north of Alice Springs and the other extending 670km from Tennant Creek through to Mt Isa. Both study areas incorporated significant expanses of desert/arid land units, with the following consistent patterns for the location and types of sites recorded.

- There was a complete absence of any artefactual material in arid land units without water.
- The density and variability of artefact types increased significantly in areas with permanent availability to water.
- The density of artefacts also increased in areas of raw material availability for the manufacture of stone artefacts.
- Sites recorded in the more arid land units away from more permanent water sources were generally small with limited diversity in raw materials and artefact types.
- Site sizes and artefact types increased significantly in areas with greater resource availability and higher annual rainfalls.

Gunn (2006) undertook an archaeological survey of the Nolan's Bore Prospect and recorded several stone artefact scatters and several scarred trees. Gunn (2006) found two minor concentrations of stone artefacts (NB-1 & 2), six stone working areas associated with small quartz outcrops (NB-4 to 9), and a scarred tree (NB-3). Gunn also noted a background scatter of stone artefacts along the eastern margin of Kerosene Camp Creek. The major find in the area was the identification of a low granite/gneiss outcrop, (AP-1), which contains grinding surfaces, petroglyphs (engravings) and a small amount of worked stone.

Stone raw material types in the Nolan's Bore area are dominated by quartz (>70%), with lower densities of chalcedony, quartzite, silcrete, and meta-sandstone. Very few formal tool types were located within the survey area. Formal tool types consisted of lightly retouched quartzite and silcrete flakes and three small fragments of grindstones. Artefact densities varied from >30/m<sup>2</sup> to 0.2/m<sup>2</sup>. The artefact scatters located along Kerosene Camp Creek reflect high density reduction sites of the locally available stone.

Woolfe and Martin-Stone (Earthsea 2012) surveyed additional exploration areas for GHD and Arafura Resources in the same land systems as Gunn and Wesley's previous studies. The 2011-2012 surveys recorded an additional 11 stone artefact and quarry sites dominated by quartz. In addition, minor chalcedony, quartzite, chert and silcrete were recorded. As with the previous studies in this area, there were no recorded flaked tools types, such as tula adzes or points. All sites were considered of low to medium archaeological significance.

Wesley and Richards (2015) surveyed further areas within the Arafura Nolan's Bore Project Area, including re-recording many of the sites from previous years. The 2015 survey recorded an additional 32 Aboriginal archaeological sites and 46 isolated artefacts. Site raw materials largely followed the established pattern of previous surveys, however, the isolated artefacts included a number of retouched and bifacially flaked stone artefacts.

### 4.3 Historical Background

#### **Stuart's Exploration 1860**

The first non-Aboriginal to successfully transit the Northern Territory from south to north was John McDouall Stuart who, after five failed expeditions, reached the Chambers Bay on the coast east of Port Darwin on 24 July 1862 (Stuart 1865). McDouall Stuart's route on the 1862 expedition approximates the route of the Stuart Highway in the modern era.

Stuart's 1861 and 1862 expeditions traversed parts of the Project Area on their route north, after a failed attempt in 1860. In June 1860, Stuart and two others had a confrontation with approximately 30 Warumungu warriors at Attack Creek, 100km south of the Solar Precinct, who attacked the party with boomerangs. Stuart's expedition discharged rifles at the group, but he does not state in his diary if there were any casualties from the skirmish. As a result of the attack, food shortages and poor condition of the party's horses, the expedition turn back toward Adelaide.

During an expedition the following year, Stuart's party camped at Hunter Creek located approx. 20km southeast of the Solar Precinct on May 1, 1861. Hunter Creek he named after Mr Hunter of Messrs. Hunter, Stevenson and Co. of Adelaide. on. Stuart's expedition then explored the extent of Hunter Creek through to where it discharged, which falls 5km east of the Solar Precinct. Stuart notes that the bank of the creek is 'beautifully grassed' however with a 1 mile (1.6km) the country changes to spinifex scrub with sandy soils. Stuart suggests his party transected these surrounding desert areas for 9 miles (14.4km) not finding a creek or any indication of one. The location descriptions noted in Stuart's diary are consistent with those observed within the Solar Precinct.

During the 1861 expedition, Stuart's party on return also camped close to the Project Area at several watercourses and subsequently named them Burke Creek, Gleeson Creek and Powell Creek, noting their abundance of water. "Powell Creek," was named after J. W. Powell, Esq., of Clare and "Gleeson Creek," after E. B. Gleeson, Esq., J.P., of Clare.

Similarly, Stuart's 1862 expedition traversed the near the Solar Precinct, with their party camping at Gleeson Creek on 3 April 1862. The expedition passed to the west of the Powell Creek water holes on 3 or 4 of April 1862 before making a more permanent camp at Newcastle Waters on 5 April (Stuart 1865). On return in September 1862, they highlighted the absence of water in Powell Creek, Gleeson Creek and other watercourses but found some pools in the Hunter Creek.

Although Stuart tried to avoid confrontation with Aboriginal groups, some level of contact was inevitable as the explorers used the same water holes as Aboriginal people (McLaren 1996, p. 250). Stuart recorded a number of his observations of Aboriginal people, including land use practices such as burning and some artefacts used by Aboriginal people in the wider Project Area. Stuart noted, a canoe type vessel for carrying water at Lawson Creek, stone axes, hafted spears, woomeras and boomerangs. Stuart also observed bamboo spears and part of a large seashell being used at Attack Creek, 100km south of the Solar Precinct, which he suggested related to communication with coastal groups.

The result of McDouall Stuart's expedition was the opening up of Central Australia and the Tennant Creek region to future pastoralism, mining and communications infrastructure. The establishment of pastoralism inevitably led to clashes with Aboriginal people over land and resources to the detriment of the Traditional lifeways in the region.

### **Overland Telegraph Line 1870**

In 1870, the British Australia Telegraph proposed to install a submarine telegraph line between Java and Port Darwin, which had been established in 1869 (Powell 2009, p. 67). Following this proposal, Queensland and South Australia battled to win support for a telegraph line to connect Port Darwin with either Port Augusta, or the Queensland town of Burketown. South Australia won, and work commenced late in 1870.

In 1872, the Overland Telegraph Line (OTL) was completed linking the southern states of Australia with London. A number of Telegraph Stations were established to maintain signal strength along the line. The stations were approximately 250km apart and retransmitted all messages and maintained maintenance crews to patrol and repair the line. Several Telegraph Stations remain in the Territory: Darwin, Barrow Creek, Tennant Creek, Alice Springs and Powell Creek near the Solar Precinct.

A temporary timber office and quarters were constructed on Powell Creek in 1872. These structures were replaced in late 1874 by a permanent stone structure. Further buildings were added to the complex in the following years. In the 1880s, the Powell Creek Telegraph Station was staffed by a station master and assistant with five linesmen and labourers.<sup>3</sup> In 1889, a mounted constable with native police assistants established a police station on the site in order to suppress livestock theft on stock routes to Queensland.

An Aboriginal ration depot was established on the site between 1889 and 1912 (Figure 10 below), funded by the South Australian then Commonwealth Governments (SA Protector of Aborigines 1912, p. 5). A Mr J.R.B. Love reported for the Presbyterian Church in 1913 that the Telegraph Station staff were issuing rations to Aboriginal people at the Tennant Creek, Powell Creek and Daly Waters Stations (Love 1915, p. 37). Love also reports that in a good year it is not unusual to find 10-20 Aboriginal people camped at the Telegraph Stations and in a drought year between 100 and 200 people.

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<sup>3</sup> Northern Territory Heritage Register

[http://www.ntlis.nt.gov.au/heritageregister/f?p=103:303::::NO:P303\\_PLACE\\_ID:220#](http://www.ntlis.nt.gov.au/heritageregister/f?p=103:303::::NO:P303_PLACE_ID:220#) extracted 16 Oct 2021.



Figure 10: Walter Kell distributes flour to Tjingili men at Powell Creek, 1902 to. Chronicle November 1902 p.42.

In 1901, Walter Baldwin Spencer, Director of the Melbourne Museum, commenced an anthropological expedition into the Northern Territory with his collaborator, Francis James Gillen. This expedition also included an approx. 10 days stay at Powell Creek Telegraph Station to record Aboriginal culture, language and collected artefacts. The latter included lithics (axes and knives), adzes, human hair, headdresses, spears, spearthrowers, instruments, woven bags, jewellery and ceremonial objects<sup>4</sup>. Gillen also noted the adoption of contact artefacts including, ‘crocodile spears’ that had been adapted by using prongs made from iron nails and the blade of a butcher’s knife (Clark and May 2013). Bamboo tobacco pipes were also noted by Gillen as being used by Aboriginal people at Powell Creek.

Spencer and Gillen also recorded that more than one language group was represented at the time of their visit to Powell Creek. Similarly, Love (1913, p. 40) noted Aboriginal people coming into Powell Creek from the desert areas to the west and Victoria River. Stanner noted in 1934 the existence of two camps at Powell Creek Telegraph Station, representing a number of Aboriginal language groups (Stanner 1934, in Nash 1992). His list of camp occupants included (Nash 1992, p. 3):

Place	Camp	‘Tribe’	Adults	Children Mentioned
Powell Creek	1	Warlmanpa	22	3
Powell Creek	2	Jingili	5	
Powell Creek	2	Mudburra	3	

Senior Site Custodian Dick Foster reported that the Powell Creek Telegraph Station acted as refugee camp for people displaced from mining, pastoralism and conflict in Tanami Desert and surrounding areas. Dick suggests people were drawn to Powell Creek due to the several large spring fed waterholes that never ran dry and the ration depot. He also stated that there were a number of sacred sites nearby where ceremony continued in living memory, including those he had participated in the 1940s or early 1950s. The archaeological results also support this, with a number of large artefact scatters and hearths surrounding the Station (see Section 6 below).

The Powell Creek Telegraph Station was abandoned in 1955 then reoccupied as a pastoral outstation in 1979. The Northern Territory Government Heritage Report noted that there were additions to the

<sup>4</sup> <http://spencerandgillen.net/places/4fac697f023fd704f475b4cf>

buildings after 1979.<sup>5</sup> There is also a lone grave near the Telegraph Station site; a telegraph worker who died on 10 April 1900.

Powell Creek Telegraph Station was declared a heritage place on 28 November 2000 and gazetted on 20 December 2000. The declaration included NT Portion 5988(A) as delineated by Survey Plan S2000/37. This parcel includes the building structures, the lone grave and stone artefact scatters.



Figure 11: Powell Creek Telegraph Station 1895 (Sate Library of South Australia – (B 61434), 2021)



<sup>5</sup> [http://www.ntlis.nt.gov.au/heritageregister/f?p=103:303::::NO:P303\\_PLACE\\_ID:220#](http://www.ntlis.nt.gov.au/heritageregister/f?p=103:303::::NO:P303_PLACE_ID:220#)

Figure 12: Powell Creek Telegraph Station circa 1901 (Spencer and Gillen Collection, Museum Victoria 2021)

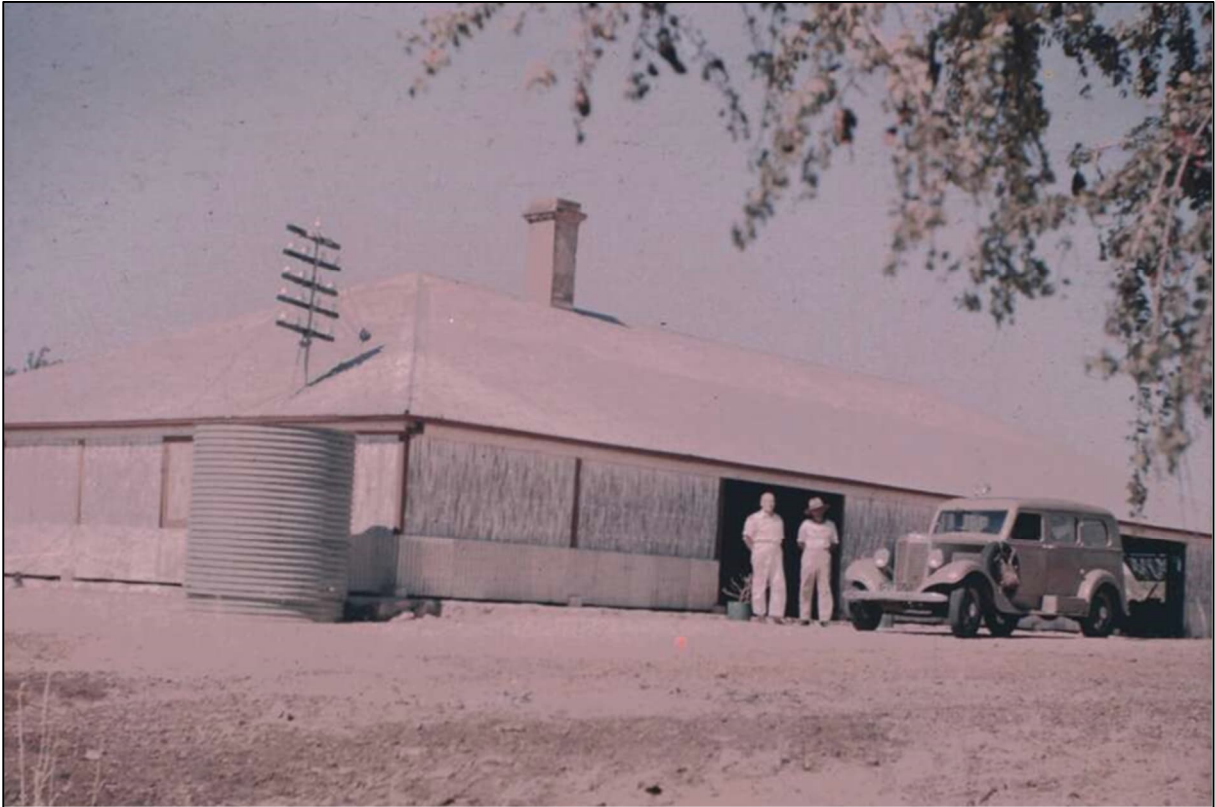


Figure 13: Powell Creek Telegraph Station circa 1950, possibly John Flynn in frame (NLA object 142514644 Trove).



Figure 14: Waterhole Powell Creek 1901 (Spencer and Gillen Collection, Museum Victoria 2021)



Figure 15: Permanent water hole at Powell Creek Station, 2021

## Mining 1872

European interest in the region was sparked by the discovery of gold at the Granites, Tanami Desert, in 1906 (CLC 2012, p. 38). This brought a mini gold rush to the region, with around 500 prospectors heading out into the Tanami. By the 1920s, periods of drought and competition for water resources brought on by the destruction of water holes and wells by cattle led to escalating tensions and violence between Europeans and Aboriginal People in the Tanami, resulting in largescale Government sanctioned massacres in the late 1920s (Elder 1988, p. 141).

Areas around Tennant Creek have been associated with gold prospecting and mining since the 1930s. Stuart had originally commented that the creek he had named after John Tennant, a pastoralist from Port Lincoln who had financed his expeditions, that there is likely to be gold in the area. Small traces of gold were found between 1900 and 1925 by a number of individuals. In 1932, Jack Noble and Ralf Hadlock had found a payable gold deposit (Powell 2009, p. 126). Kaczinski and Bohning had pegged the Peko Mine in 1933. Despite setbacks, by 1935 there were 600 people on the Tennant Creek gold fields. By 1937, production of gold at Tennant Creek amounted to 66% of the total gold produced in the NT (Powell 2009, p. 126). Despite the success of the Tennant Creek fields, official records of early gold exploration in the Powell Creek area are sparse.

## World War II

World War II impacted upon the Powell Creek area primarily through the development of a strategic road network to link the existing road between Alice Springs and Tennant Creek with the North Australian Rail head at Birdum. In 1940, the engineers and workers of the South Australian Highway Board, the Queensland Main Roads Commission and the NSW Department of Main Roads built 490km of gravel road between Larrimah (Birdum) and Tennant Creek in 90 days (Powell 2009, p. 144). The

whole length of the Stuart Highway, from Alice Springs to Birdum was sealed by October 1943. Powell Creek featured in this development by becoming a supply depot for the road construction crews at least during the initial period of construction. When in use, the road between Tennant Creek and Daly Waters had a number of camps including Tennant Creek (major camp), Banka Banka Staging Camp, Elliott Staging Camp and Larrimah Staging Camp.<sup>6</sup>



Figure 16: Lt N.C. Sutcliffe, Adjutant, Darwin Overland Maintenance Force with two Aboriginal children at camp site, Powell Creek Telegraph Station 1942 (AWM 134687, Donated by Major C.N. Sutcliffe).

#### 4.4 Archaeological Predictive Model

Based on the studies outlined above and the experience of the Consultants in Arid Zone archaeology, the following predictive model statements can be made for the Project Area:

1. Artefact typology variability and site densities are higher near fresh water sources, or former fresh water sources (i.e. Salt Lake systems). All water courses or bodies of water have a high potential for sites with archaeological materials, including ephemeral sources.
2. There may also be complete absence of artefactual material in arid land units without water.
3. Sites recorded in the more arid land units away from more permanent water sources are likely to be small with limited diversity in raw materials and artefact types.

<sup>6</sup> <https://www.ozatwar.com/ozatwar/militarycamps.htm>

4. Stone artefact quarries occur where suitable rock is available on the land surface. In Central Australia, and likely in the wider Project Area, raw material such as chalcedony, silcretes, quartzite and quartz were the primary materials used for flaked stone tools. Therefore, any related outcropping geology containing these raw materials should be regarded as having a high potential for lithic scatters, including, quarry sites and secondary reduction sites nearby.
5. Outcropping sedimentary rock, such as sandstones, have been used by Aboriginal people in the past for manufacturing grindstones, painting and engraving (petroglyphs). Both types of rock art have been previously recorded in the wider region. Areas where this stone is present are highly likely to contain some archaeological materials and should be subject to a 100% sample survey.
6. Contact artefacts are likely to persist throughout the Project Areas due to the movement of people into Powell Creek following European contact.

## 5 Survey Methodology

Cultural Heritage management is based on a number of regulatory, cultural, social and economic principles, including the recognition of competing interests in society and the need to attain balanced outcomes. This section outlines a methodological approach to heritage assessments based on the Burra Charter, what constitutes ‘heritage’ and the survey methodology to locate, describe and assess the significance of heritage within the proposal footprint and surrounding areas.

### 5.1 Heritage Assessment Strategies.

This study employed a *heritage assessment* strategy to assess the likelihood of finding archaeological and/or heritage sites within the Solar Precinct and associated access corridor. The *heritage assessment* survey strategy selected representative parts of the proposal footprint based on Traditional Owner consultation, site distribution patterns from regional studies, geophysical and hydrological modelling as outlined Section 3 this report. These areas were then surveyed during June 2021, ensuring that all representative land units and high-risk<sup>7</sup> environments within the proposal footprint were adequately assessed.

Recommendations for appropriate heritage management strategies were then made based on the likelihood and types of sites occurring within a given land system. If, for example, no cultural heritage features were located during the survey of a given Land System and consultation with Site Custodians also supported this notion, the methodology was then extrapolated to suggest there is a very low risk of impacting sites protected under the NT *Heritage Act* 2011.

### 5.2 Desktop Assessment

The desktop assessment section of this Study, as outlined in Section 3 and 4 above, aimed to identify areas likely to hold Aboriginal archaeological sites or historical features, which could then assist the field surveys in prioritising key risk areas. This assessment included mapping and assessment of existing site databases, previous heritage studies, historical mapping, surface geology, hydrology and any pre-existing ground disturbance. The results of this assessment are summarized in Table 4 below.

Table 4: Summary of Physical Environment factors predicting Aboriginal Archaeological Site Distribution

Desktop Assessment Type	Data Summary	Conclusions	Survey Methodology
Existing Site Databases	There are approximately 50 recorded sites within a 50km radius of the proposed proposal footprint.	The existing databases are not comprehensive enough to draw conclusions on artefact densities, artefact types or sub surface potential or predictable distribution patterns within given land systems.	Systematic sampling of all land systems
Land Systems	Land System data is often a very useful tool in analysing the potential for archaeological materials in a Project Area. The	Individual Land Units within Land Systems were identified as having archaeological potential and were define from mapping in	Survey identified Land Units/Forms (i.e. drainage depressions,

<sup>7</sup> *High-risk environments* are those which have a high potential for containing cultural heritage features. These environments are identified following comprehensive background research and consultation.

Desktop Assessment Type	Data Summary	Conclusions	Survey Methodology
	Desktop Study for this project found that there was no real differentiation based on Land Systems across the Solar Precinct and its use was to broadly define areas.	most instances. Individual land Units and Landforms were sometime better identified in the field for survey.	watercourses and topographic highs) at 100%.
Surface Geology	The are no geological units within the Solar Precinct that indicated archaeological potential. However, several geological units that indicate archaeological potential were located within the access corridor footprint. These included lithologies and features such as mudstone, chert, sandstone, quartz, dolerite and claypans.	Based on previous regional studies with similar underlying geology, all units which contain materials suitable for the manufacture of stone arefacts had the potential to contain archaeological features. There was no clear pattern to suggest this could be refined from the desktop study of the Ashburton Ranges geology.	Map rock outcrop units (Formation Data courtesy of the NT Geological Survey Department). Survey 100% of prospective rock outcrop units.
Hydrology	The Solar Precinct encompasses approx. 8 drainage depressions, and the access corridor crosses approx. 13 watercourses, varying in size from small seasonal gutters to the large named creeks such as Gleeson Creek, Billy and Bull Creek.	Past archaeological studies across the arid interior show a strong correlation between water resources and Aboriginal archaeological site distribution.	The surveys should aim to sample every accessible watercourse up to 200m on either side and transect representative drainage depression, identified via satellite imagery with Solar Precinct.
Pre-existing ground disturbance factors	The Solar Precinct was bound by a pastoral access track and several historic tracks were noted from the satellite imagery within. The site also had two recently established bores and watering infrastructure, and the railway corridor to the west. The access corridor was bound to the south by a fence line and intersected a fence line and pipeline. The western 14km of the unsealed access road also runs within an existing pastoral access track.	There is no clear correlation between ground disturbance and the absence of sites, with the potential exception of the unsealed access road crossing Gleeson Ck and Billy Ck. See survey results below.	The western 14km of the unsealed access road surveyed at 100% given its proximity to Gleeson Ck and Billy Ck. All other disturbance areas to be sampled at 5-10% as required.

### 5.3 Cultural Heritage Site Definition

Assessment of the cultural heritage resources within the Solar Precinct and access corridor was approached holistically to include an understanding of both cultural and archaeological contexts.

Culturally, the Warlmanpa People and other Aboriginal groups connected to Powell Creek Station have a wide distribution of sites including Dreamings, campsites, dance grounds, quarries, ceremony places resource sites and areas and travel routes across their traditional lands. The knowledge, location and extent of these features is governed by Traditional Law however the senior Warlmanpa representatives accompanying the surveys reinforced the importance of including this information where possible to ensure its appropriate management.

Notwithstanding this, sacred sites and other sites with intangible cultural significance will be captured during the AAPA Authority Certificate process and further identified during ILUA negotiations. The Authority Certificate and ILUA should be used as the principal documents guiding construction works around these features.

From an archaeological perspective, *the NT Heritage Act 2011* (Division 2, p. 7) defines archaeological features relevant to this study as follows:

## **6 Meaning of *archaeological place* and *Aboriginal or Macassan archaeological place***

- (1) An ***archaeological place*** is a place that:
  - (a) relates to the past human occupation of the Territory; and
  - (b) has been modified by the activity of the occupiers.
- (2) An ***Aboriginal or Macassan archaeological place*** is a place that:
  - (a) relates to the past human occupation of the Territory by Aboriginal or Macassan people; and
  - (b) has been modified by the activity of those people.

## **7 Meaning of *object***

- (1) An ***object*** is a natural or manufactured object that is moveable.
- (2) An ***object*** includes an archaeological object but does not include a place.

## **8 Meaning of *archaeological object* and *Aboriginal or Macassan archaeological object***

- (1) An ***archaeological object*** is a relic that:
  - (a) relates to the past human occupation of the Territory; and
  - (b) is in an archaeological place.
- (2) An ***Aboriginal or Macassan archaeological object*** is a relic that:
  - (a) relates to the past human occupation of the Territory by Aboriginal or Macassan people; and
  - (b) is:
    - (i) in an Aboriginal or Macassan archaeological place; or
    - (ii) stored in a place in accordance with Aboriginal tradition, including, for example, in an Aboriginal keeping place.

## **9 Meaning of *relic***

- (1) A ***relic*** is:
  - (a) an artefact or thing given shape by a person; or
  - (b) human or animal skeletal remains; or
  - (c) something else prescribed by regulation.
- (2) An artefact or thing can be of any material.

*Examples for subsection (2)*

  - 1 *A secret or ceremonial object.*
  - 2 *A log or bark coffin.*
  - 3 *Human remains.*
  - 4 *Rock or wood carvings or engravings.*
  - 5 *Stone tools.*
- (3) However, an artefact or thing made for sale is not a relic.

- (4) In addition, a thing prescribed by regulation is not a relic.

For recording archaeological features and sites, according to McDonald (2005, p. 172), a contiguous landscape approach, where multiple features are present, is current best-practice and represents a progression which recognises archaeological and cultural landscapes as an appropriate management scale. Where there are high densities of cultural materials, according to McDonald (2005, p. 172), there is no choice but to define management units beyond the level of the isolated artefacts and sites. This study interprets this approach as meaning that artefacts, sites, continuous scatters and site complexes are related over the landscape, however definitions of each of these categories are necessary to provide an adequate management system for the archaeology of a survey area.

Following this approach, this study uses the following definitions of site type:

1. **Lithic or stone artefact scatters** containing flaked, ground stone artefacts and possibly hearthstones. Contact sites of Aboriginal origin may also include metals or flaked ceramics used for cutting. Artefact scatters may occur as surface scatters of material or as stratified deposits where there have been repeated occupations. Some lithic scatters are called **camp sites** which are high density lithic scatters with hearths and sometimes grindstones. Therefore, camping is the implied activity indicated by the archaeological record in these places.
2. **Stone Quarry** or primary reduction site. A site where stone for flaked or edge-ground artefacts have been extracted from an outcropping source of stone. This is a broad definition a stone quarry and there are further subdivisions of this site type. According to Hiscock and Mitchell (1993) most surface hard stone quarries have associated reduction sites.
3. **Knapping location**, consisting of one or more knapping floors, are discrete scatters of artefacts, anywhere in the landscape, resulting from stone being worked or reduced at that spot. The criteria for a knapping floor are that the original block of stone can be at least partially reconstructed from scattered flaked stone pieces (Hiscock and Mitchell 1993). A knapping floor can exist as a feature within the context of an open site or archaeological deposit. However, there are certain methodological problems in identifying such features arising from post-depositional processes.
4. **Stone Arrangements** can range from simple cairns to more elaborate arrangements. Some stone arrangements were used in ceremonial activities and represent sacred or totemic sites. Other stone features were constructed by Aboriginal people as route markers, territory markers, and walls of huts, animal traps, hides, or seed traps. Stone arrangements also exist as a result of historical activity, such as mineral tenement markers or isolated grave sites.
5. **Hearths** are a common feature in arid and semi-arid Australia, often comprising a number of stones arranged into a square or round formation. These were used as heat retaining rocks when cooking food. Rocks in hearths will show evidence of heating and are sometimes fragmented. There is often a diversity of raw materials within the hearth. Some, or all, of the rocks may have been brought to the area from a distance.
6. **Rock Art sites** include two main types of rock art, engravings and pounding's where the pattern is one of relief and the pictures were apparently produced by removing material from the rock surface and drawings, stencils and paintings where the material was added to the rock surface. Bees wax designs have also been recorded in the wider region.
7. **Rock shelter occupation sites** contain a deposit of cultural material that has built up over time containing flaked or ground stone artefacts, faunal material and other various items of

Aboriginal material culture including ancestral human skeletal remains, wax designs, rock art, grinding hollows, and caches of material culture objects.

8. **Site complexes** are groups of sites in similar landscapes where the cultural materials are effectively continuous. Bird and Hallam (2006, p. 11) described these as integrated cultural landscapes with which have local variations in artefact densities with artefact distributions being effectively continuous.
9. **Culturally modified trees (CMT)** typically result from a sectional removal of bark (and sometimes timber) from a tree trunk or limb. CMTs range from small (15 x 5cm) lenticular apertures such as those resulting from sugarbag procurement, to large canoe CMTs which can present a scar several meters in length.
10. **Aboriginal Wells** have resulted from water procurement activities. These sites can vary in size and form, from hand dug depressions to natural features such as sink holes or drainage depressions. Sources of water across the arid landscape were vitally important in the seasonal land use patterns of Aboriginal people. As the only water source in some areas, wells were carefully curated, often with rocks placed over the entrance to a well to prevent fouling by animals. Rock art (e.g. petroglyphs), grinding grooves, stone artefact scatters and sometimes burials are often located in association with wells.
11. **Burial** practises differ considerably throughout cultural groups in Northern Australia, and skeletal material can vary from highly fragmented bones to large burial complexes containing many individuals.
12. **Grinding hollows, grooves, and patches** are the physical evidence of grinding and processing materials on basement rock. Grinding hollows and patches were utilised to grind food and plant materials (i.e. wild rice, seeds, nuts, tubers, bulbs), as well as ochre for painting. Grinding patches and grooves may also have been utilised to prepare edge ground axes during production and maintenance.
13. **Historic/Contact sites** include sites of primarily Aboriginal cultural origin that include 'modern' materials to manufacture flaked artefacts. Sites that include foreign materials, such as glass, ceramics or metal that exhibit modification by Aboriginal people are regarded as *contact sites*.

#### 5.4 Identifying stone artefacts

A requirement for successful Aboriginal archaeological heritage assessment involves the accurate identification of archaeological materials. Since the identification of stone artefacts is basic to the accurate recognition and measurement of the archaeological record, it is imperative that people undertaking archaeological surveys be able to differentiate between natural objects and artefacts. Principles of artefact identification employed in this survey follow those recommended by Hiscock (1984), Holdaway and Stern (2004) and Andrefsky (1998).

In summary, each time sufficient force is placed on the surface of an isotropic rock, it will fracture into two pieces. The fragment that has been struck contains the ring-crack, where fracture was initiated, and is called the flake. The flake is usually the smaller of the two pieces of stone. The larger fragment, from which the flake has been removed, is called the core. On both the flake and the core the surface that is struck is called the platform. Flakes are identified by the distinctive surface created when they are removed from the core. The classification of artefacts in this survey was based on identifiable characteristics outlined by Hiscock (1984). For an object to be classed as a flaked artefact, it needed to possess one or more of the following characteristics:

1. A positive or negative ring crack;
2. A distinct positive or negative bulb of percussion;
3. A definite erailure scar in an appropriate position beneath a platform;
4. Remnants of flake scars (dorsal scars and ridges).

These characteristics indicate the application of an external force to a core. Artefact morphologies will be described by using the four types of artefacts as defined by Hiscock (1984, pp. 128-129):

1. **Flake:** Flakes exhibit a set of characteristics that indicate they have been struck from a core. The most indicative characteristics are ring-cracks, which show where the hammer hit the core. The ventral surface may also be deformed in particular ways, for example a bulb or erailure scar.
2. **Core:** A piece of stone with one or more negative flake scars, but no positive flake scars.
3. **Retouched Flake:** A flake that has had flakes removed from it, identified by flake scars on or deriving from the ventral surface.
4. **Flaked Piece:** This is a chipped artefact which cannot be classified as a flake, core, or retouched flake. This category is used only when an artefact was definitely chipped but could not be placed in another group.

Other artefacts and implement types that have been identified in Northern Australia are listed below following characteristics as outlined by McCarthy (1976), Cundy (1989), Kamminga (1982) and Holdaway and Stern (2004):

1. **Unifacial Points** are flakes that have been retouched along the margins from one surface (either dorsal or ventral) to give or enhance its pointed shape. These unifacial points are sometimes symmetrical or leaf shaped.
2. **Bifacial Points and axes** are retouched onto both ventral and dorsal surfaces of a flake to enhance or give the artefact its point shape. These points and axes may have the platform removed and the proximal end rounded. Distribution largely in the Top End and Kimberley. Some bifacially flaked implements extend east to Cloncurry and south into the Central Australia.
3. **Tulas** are a specialised adze like tool common in the arid zones of Central Australia. The tula was a composite tool usually hafted into woomeras or other timber handles. The Tula was characterised a particular reduction sequence and a flake width broader than length. The Tula was resharpened continually until there the remaining blade length was too small for further reuse. At this stage it was commonly replaced in its hafting. The remaining blade is known as a Tula Slug.
4. **Edge ground axes.** Classified primarily by the shaping process of flaking, pecking and polishing. These generally have only one working edge that has been ground to a sharp margin but there are also examples with two leading edges.

5. Grindstones are characterised by a worn and abraded surface(s). The surface may either have a concave depression or a convex surface.
6. Hammerstones show use wear on the surface in the forms of abrasion, pitting and edge fracturing with some negative scarring from the process of producing stone tools.
7. Pounders are artefacts that are used primarily for processing food and plant materials.
8. Anvils are characterised by abraded and peck surfaces that are the result of using the surface to for bipolar reduction of cores.

## 5.5 Defining Site Boundaries

It is necessary to define site boundaries for the description of heritage places and the mitigation of impacts on these places. Boundaries of sites are often based on geographic features, such as rock shelters and shell middens, which are defined by easy to distinguish geographic features. Other sites, such as stone artefact scatters, groups of culturally modified trees, culturally significant areas are more difficult to define.

For the purposes of this study, cultural materials are defined as sites, background scatters and isolated artefacts when the following criteria are met:

1. Sites should have average artefact densities more than five times the average density of the background scatter in the same area and exceed five artefacts in a ten-metre diameter area.
2. A site boundary exists where the artefact densities are diminished sufficiently to be equal to the background density level or an environmental feature defines a boundary, such as a creek bed.
3. A background scatter is an area where the average artefact density is higher than the average background density but does not exceed five artefacts in a ten-metre diameter area. Effectively, a background scatter is small and or low-density scatter that does not constitute a site. This is an arbitrary definition to aid recording in the field, particularly where artefact densities are high enough to make recording individual artefacts impractical but are not high enough to define as a site.
4. Isolated artefacts are single or multiple artefacts that do not satisfy the criteria for a site or a background scatter.
5. The extent and location of culturally significant landscape features was guided by Traditional Owners during the field assessment.

## 5.6 Site Recording and Survey Methodology

The survey employed a pedestrian sampling methodology for the Solar Precinct, which centred on targeting drainage depressions and representative land units. The unsealed access road leading east from the Solar Precinct was surveyed at 50% owing to the lack of access through sections of Ashburton Ranges. Similarly, approximately 60% of the proposed sealed access corridor was surveyed. Areas with geology identified to potentially contain artefact bearing raw materials and watercourses were targeted as priority survey areas.

The employed survey methodology aimed to identify archaeological features and key cultural heritage risk areas which have the potential to contain archaeological features, to minimise impacts on these values for the construction and operation of the Solar Precinct.

Using the methodological approaches outlined above, the following protocols were adopted to adequately record sites and artefacts:

1. The proposed Solar Precinct and access road survey sample areas were mapped using a GIS (using both ArcGIS 10.5 and MapInfo 12.5). Geology and hydrology layers were added to the GIS to indicate areas likely to hold cultural sites/archaeological materials based on the desktop predictive modelling, outcropping geology, and past regional surveys.
2. Consultation with Traditional Owners prior to the survey was also used to further refine target areas.
3. The proposed survey areas were uploaded to a Trimble Nomad unit using GBM Mobile software and an Android Tablet using Fulcrum App software.
4. The sample areas were transacted at approx. 10–20 metre separation by the field team consisting of the following people:
  - Richard Woolfe
  - Ben Keys
  - Peter Henderson
  - Dick Foster
  - Neil Allum
  - Rex Collins
  - Jason Henderson

In some instance, such as the survey of the access corridors and long transect through the centre of the Solar Precinct, the survey participants were reduced to the fittest members of the teams due to safety constraints. The latter generally included one archaeologist and one to two Traditional Owners.

5. All sites, heritage features and isolated artefacts were recorded using a set of standard recording forms linked to the GIS.
6. The location of all sites was recorded using datum GDA2020. The Nomad has been calibrated to 2-3 metre accuracy in open canopy terrain.
7. The tracks of all transects were recorded using the tracking feature on the Nomad, with land characteristics and images recorded using Fulcrum App.
8. Artefacts and historical features were photographed during the course of the survey recording.

The following characteristics are recorded of each site and some isolated artefacts:

1. Location using the UTM coordinate system MGA2020 on Datum GDA2020.

2. Environment: basic details of land unit, geomorphology, vegetation etc.
3. Site boundaries are recorded for each site using the Trimble Nomad and GBM Mobile software. Boundaries beyond the limits of the survey areas not recorded unless they were readily identifiable. In some instance it was likely the site boundaries extended hundreds of meters beyond the boundary of survey areas.
4. Site contents: basic details of types of artefacts, estimated density (1m<sup>2</sup> sample counts), raw materials etc.
5. Ethnographic origin: Aboriginal, European historical, etc.
6. Cultural and archaeological significance.
7. Disturbance factors, such as animal activity, erosion or road works.
8. Site visibility: estimate of how much of the ground surface was visible on site and in the surrounding area.
9. Estimation of the potential for sub-surface artefacts.
10. Site and artefact images. Images of artefacts in larger sites are a representative sample.

The results of this survey, along with a map of transects completed are presented in the next section.

## 6 Survey Results

The following discussions outline the results of the field investigations undertaken between 2 June 2021 and 10 June 2021, along with general descriptions of the anthropological and archaeological sites identified during the survey. The proposal footprint included the area of interest for the Solar Precinct (12,000ha), coupled with the sealed and unsealed access corridors being 30km and 42kms respectively. Detailed Project footprint information is presented in Section 1.3 above.

A survey of the whole footprint was not considered necessary or practical given the lack of archaeological potential in several land systems and access and safety constraints arising from the remoteness of the area. As noted in Section 5 above, the survey was based on a stratified sampling strategy that included all accessible land units and systems, creek crossings, geological outcrops and representative drainage depressions identified through satellite imagery.

The results of the survey included the recording of 13 archaeological sites and 26 isolated artefacts (see Table 5). The complete description of each archaeological site, images and maps are presented in Appendix 2. In addition, several landscape features of cultural significance to the Traditional Owners were also recorded during the surveys, which included: three watercourses and related drainage features, intersected at 12 separate locations by the proposed access roads and a geological feature (see Table 6). Refer to Figures 16 to 20 for location maps.

Table 5: Archaeological Site and Isolated Artefacts Recorded

Name	Site Type	Site Size	Artefact Types	Raw Material
PC001	Minor lithic scatter	7 artefacts total	Flakes, flake fragments, tula slug	Chalcedony
PC002	Minor lithic scatter	Approx. 100 artefacts	Flakes, flake fragments, retouched flakes, tula slug, portable grindstones, metal billy can	Quartzite, silcrete, metals, cherts
PC003	Minor quarry	Approx. 50 artefacts	Flakes, broken flakes, flaked pieces, cores,debitage	Quartzite
PC004	Minor lithic scatter (Associated with PC005)	Approx. 30 artefacts	Flakes, flake fragments, portable grindstone fragments	Chert, sandstone
PC005	Drainage Depression/Soak	NA	Potentially a traditionally maintained soak	NA
PC006	Minor lithic scatter and Drainage Depression/Soak	Approx. 100 artefacts	Flakes, flake fragments, portable grindstone fragments	Chert, sandstone, quartzite, chalcedony
PC007	Minor lithic scatter	10 artefacts recorded	Flakes, flake fragments	Chert, quartzite
PC008	Minor lithic scatter	8 artefacts recorded	Flakes and cores	Chert, quartzite
PC009	Quarry or Flaking Floor	>100 artefacts	Flakes and cores	Quartzite
PC010	Quarry or Flaking Floor	>100 artefacts	Flakes and cores	Quartzite
PC011	Well or diggings	5m x 5m	NA	NA
PC012	Cultural Landscape – Powell Creek Telegraph Station	>100000	Historic, Contact, Lithic Scatters, Ceremonial and Natural	NA

Name	Site Type	Site Size	Artefact Types	Raw Material
PC013	Drainage Depression/Soak	NA	NA	NA
ISO001	Isolated Artefact	1 Artefact	Flake	Chert
ISO002	Isolated Artefact	1 Artefact	Whole Flake	Silcrete
ISO003	Isolated Artefact	1 Artefact	Whole Flake	Quartzite
ISO004	Isolated Artefact	1 Artefact	Whole Flake	Quartzite
ISO005	Isolated Artefact	1 Artefact	Whole Flake (retouched one margin)	Quartzite
ISO006	Isolated Artefact	1 Artefact	Whole Flake	Silcrete
ISO007	Isolated Artefact	1 Artefact	Whole Flake	Other
ISO008	Isolated Artefact	1 Artefact	Whole Flake	Quartzite
ISO009	Isolated Artefact	1 Artefact	Whole Flake	Quartzite
ISO010	Isolated Artefact	1 Artefact	Grinding stone fragment	Sandstone
ISO011	Isolated Artefact	1 Artefact	Flake	Quartzite
ISO012	Isolated Artefact	1 Artefact	Flake (retouched on two margins)	Quartzite
ISO013	Isolated Artefact	1 Artefact	Flake (retouched on two margins)	Quartzite
ISO014	Isolated Artefact	1 Artefact	Contact	Metal
ISO015	Isolated Artefact	1 Artefact	Flake	Silcrete
ISO016	Isolated Artefact	1 Artefact	Contact	Metal
ISO017	Isolated Artefact	1 Artefact	Flake (retouched on two margins)	Quartzite
ISO018	Isolated Artefact	1 Artefact	Flake Fragment	Chert
ISO019	Isolated Artefact	1 Artefact	Single Platform Core	Silcrete
ISO020	Isolated Artefact	1 Artefact	Flake Fragment	Quartzite
ISO021	Isolated Artefact	1 Artefact	Flake Fragment	Quartzite
ISO022	Isolated Artefact	1 Artefact	Whole Flake	Chert
ISO023	Isolated Artefact	1 Artefact	Flake Fragment	Chert
ISO024	Isolated Artefact	1 Artefact	Whole Flake	Quartzite
ISO025	Isolated Artefact	1 Artefact	Flake Fragment	Quartzite
ISO026	Isolated Artefact	1 Artefact	Grindstone	Quartzite

Table 6: Cultural Landscape Features Recorded

Name	Landscape Feature	Cultural Value	
AC-GHR06	Powell Ck Access Road Crossing	Rain Dreaming ( <i>ngapa puwarrija</i> ) association.	
AC-GHR07	Powell Ck Access Road Crossing		
AC-BA07	Powell Ck Access Road Crossing		
AC-BA08	Powell Ck Access Road Crossing		
AC-BA09	Powell Ck Access Road Crossing		
AC-BA01	Gleeson Ck Access Road Crossing		
AC-BA02	Gleeson Ck Access Road Crossing		
AC-BA03	Gleeson Ck Access Road Crossing		
AC-GHR01	Gleeson Ck Access Road Crossing		
AC-GHR09	Billy Ck Access Road Crossing		
AC-BA04	Billy Ck Claypan Access Road Crossing		
AC-BA05	Billy Ck Access Road Crossing		
AC-BA010	Boulders near Access Road		Cultural name was not recalled at the time.

With the exception of PC011, all archaeological sites were of Aboriginal origin, including minor lithic scatters (6 sites), minor stone quarry (3 sites), drainage depression/soaks (3 sites) and Powell Creek Telegraph Station. The Powell Creek Telegraph Station, located 26 km northeast of the Solar Precinct, was classified as a Significant Cultural Landscape, as it included several potential sacred sites, the

Powell Creek Telegraph Station (a declared heritage place), grave sites and three substantial stone artefact scatters that included contact era materials such as metals and glass. PC011 was noted by the Traditional Owner field team as potentially being a Chinese well or prospecting diggings.

As a whole, the surveyed area contained a site distribution pattern analogous to those identified in other areas of the arid interior of Australia and the consultants understanding of past land use patterns within arid regions (see Section 4). There was a clear correlation between archaeological features, raw material sources and their proximity to watercourses. Conversely, there was a distinct absence of archaeological materials across Land Systems without water and/or raw materials suitable for the manufacture of stone artefacts.

Flakes stone artefacts dominated the archaeological site assemblages with 10 sites containing flaked stone materials and/or grindstones. In common with other parts of arid Australia, tula slugs were represented in two of the 13 sites (see Holdaway *et. al.* 2004, p. 253 for a description of tula adzes and tula slugs).

Stone artefact raw materials present included chalcedony, quartzite, silcrete, chert and sandstone. Quartzite and chalcedony were the most common raw material types. Some of the raw materials sources were likely within Ashburton Ranges to the east of the Solar Precinct, however without further study at a regional level it would be difficult to assess the origin of all materials. The stone tool assemblages around the Powell Creek Telegraph Station mirrored the raw materials identified in sites further to the west, albeit in far greater numbers. The presence of knapped glass and ceramics indicates that stone tool manufacture continued into the 20<sup>th</sup> Century when people camped around the Telegraph Station (see Section 4.3).

## 6.1 Survey Gaps and Limitations

Following the results of the surveys, 38 Cultural Heritage Risk Areas were identified (see Table 7). These locations are classified as potentially risk areas on the basis that they have not been subject to sufficient investigations to confidently identify all archaeological features or were not included in the sampling strategy but have subsequently been identified as areas which have a higher potential for containing archaeological features.

Survey limitations at these locations included, poor ground surface visibility, their remoteness limiting survey time and/or very limited access and safety risks. Some sections of the unsealed access road would have required 20km survey transects across challenging terrain; consequently, these areas could not be assessed. It was also not possible to access large portions of the Solar Precinct in vehicles due to the vegetation and high likelihood of vehicle damage and/or flat tyres. Vehicles were used to access open areas where possible, to shorten survey transects to areas of higher archaeological potential.

Table 7: Cultural Heritage Risk Areas

Area ID	Feature	CH Potential
AC-BA01	Gleeson Ck	Area has high cultural significance. High potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA010	Boulders	Large granite boulders within creek are culturally significant features

Area ID	Feature	CH Potential
AC-BA02	Gleeson Ck drainage	Area has high cultural significance. High potential for isolated artefacts and low-density scatters within outcropping rock/drainage area. Some potential for shallow subsurface along watercourse banks.
AC-BA03	Gleeson Ck	Area has high cultural significance. High potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA04	Billy Ck Claypan	High potential for isolated artefacts and low-density scatters around claypan. Risk decreasing in land units >100m away from claypan. Some potential for shallow subsurface deposits around claypan bank.
AC-BA05	Billy Ck	Billy Ck is a culturally significant watercourse.
AC-BA06	Sand plain	High potential for isolated artefacts and low-density scatters along sand plain margin. Some potential for shallow subsurface deposits.
AC-BA07	Powell Ck	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA08	Powell Ck	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA09	Powell Ck	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA11	Powell Creek	High potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA12	Black soil	High potential for isolated stone artefacts, contact artefact and OHTL artefacts. Black soil section was a regular travelling corridor to Powell Creek Station springs pre and post contact. OHTL also runs through area.
AC-GHR01	Gleeson Ck	Area has high cultural significance. High potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-GHR02	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
AC-GHR03	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
AC-GHR04	Outcropping rock	High potential for isolated artefacts and low-density scatters along sand plain margin and rock outcrops. Some potential for shallow subsurface deposits.
AC-GHR05	Bull Ck	Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-GHR06	Powell Creek	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-GHR07	Powell Ck	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-GHR08	Black soil	High potential for isolated stone artefacts, contact artefact and OHTL artefacts. Black soil section was a regular travelling corridor to Powell Creek Station springs pre and post contact. OHTL also runs through area.

Area ID	Feature	CH Potential
AC-GHR09	Billy Ck	Billy Ck is a culturally significant watercourse. High potential for isolated artefacts and low-density scatters adjacent to the creek line. Risk decreasing in land units >100m away from the watercourse. Some potential for shallow subsurface deposits along the watercourse bank.
SF-01	Claypan	High potential for isolated artefacts and low-density scatters around claypan soak. Risk decreasing in land units >50m away from claypan. Some potential for shallow subsurface deposits around soak area.
SF-02	Claypan	High potential for isolated artefacts and low-density scatters around claypan soak. Risk decreasing in land units >50m away from claypan. Some potential for shallow subsurface deposits around soak area.
SF-03	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-04	Claypan	High potential for isolated artefacts and low-density scatters around claypan soak. Risk decreasing in land units >50m away from claypan. Some potential for shallow subsurface deposits around soak area.
SF-05	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-06	Claypan	High potential for isolated artefacts and low-density scatters around claypan soak. Risk decreasing in land units >100m away from claypan. Some potential for shallow subsurface deposits around soak areas.
SF-07	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-08	Claypan	Moderate potential for isolated artefacts and low-density scatters across claypan area. Risk decreasing in land units >50m away from claypan. Some potential for shallow subsurface deposits around soak areas.
SF-09	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-10	Claypan/ Hunter Ck Catchment	Moderate to low potential for isolated artefacts and low-density scatters across headwater drainage area.
SF-11	Claypan/ Hunter Ck Catchment	Moderate to low potential for isolated artefacts and low-density scatters across headwater drainage area.
SF-12	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-13	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-14	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-15	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-16	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-17	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-18	Claypan	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.

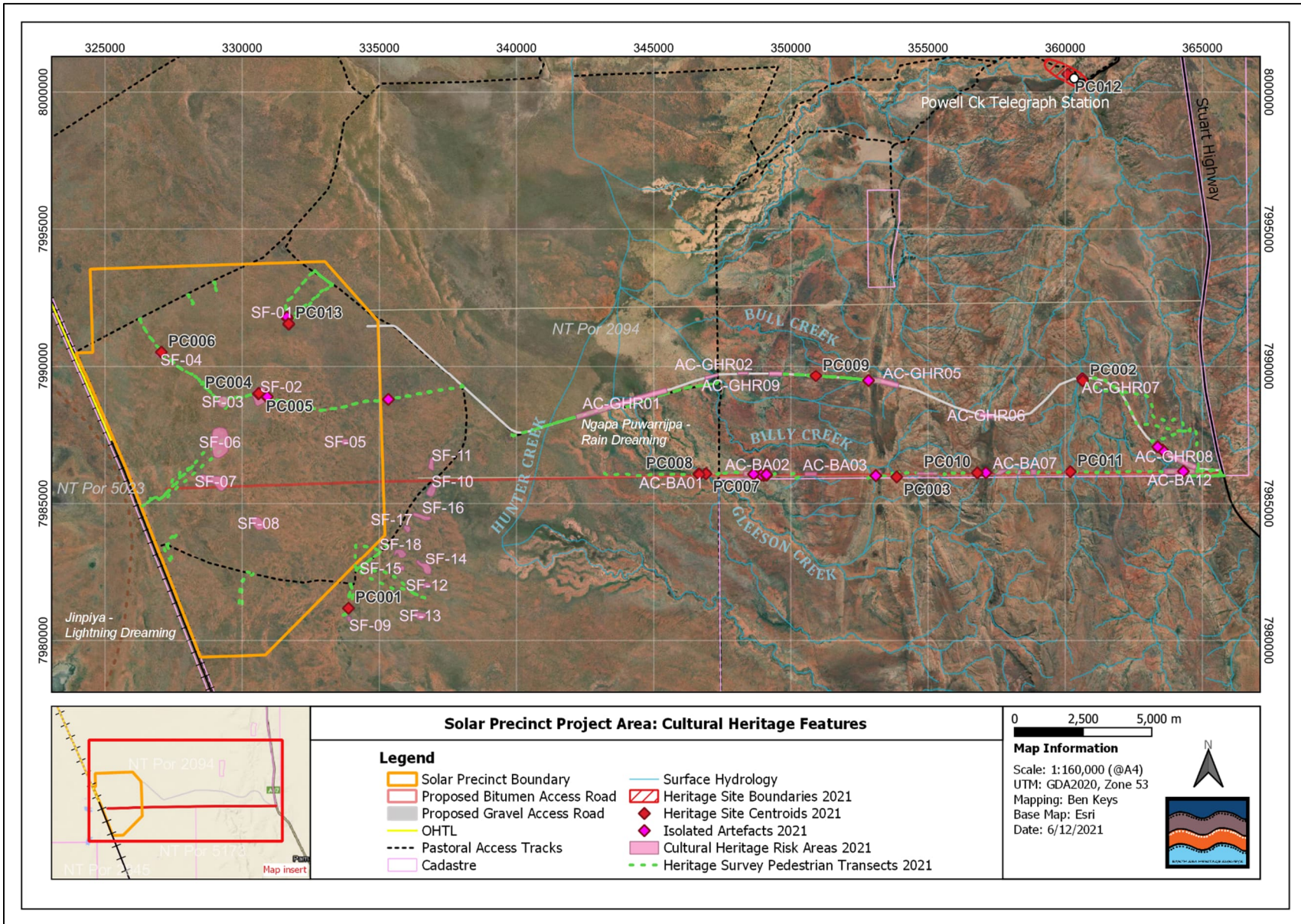


Figure 17: Solar Precinct Project Area – Heritage Assessment Results

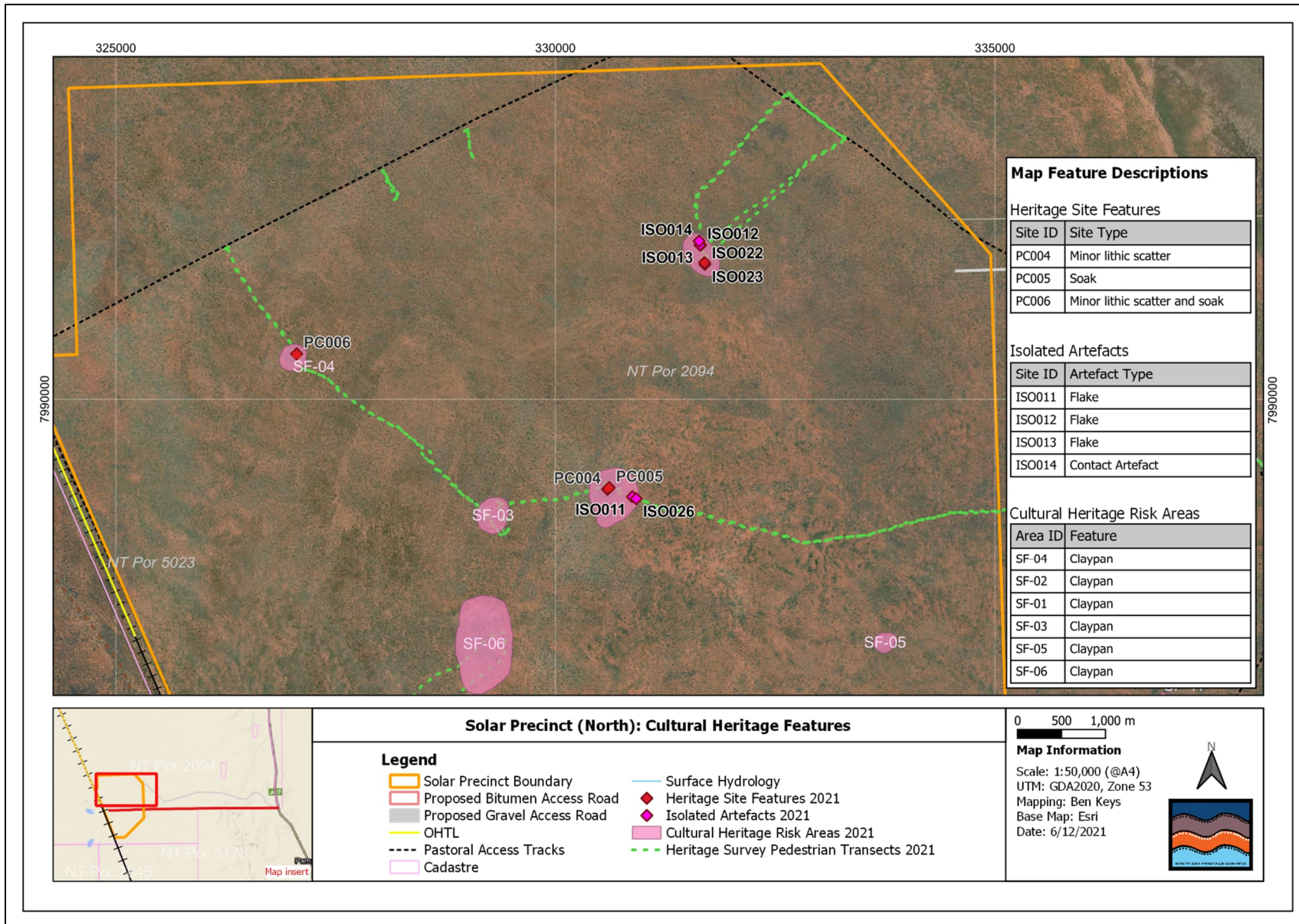


Figure 18: Solar Precinct (North), Heritage Results

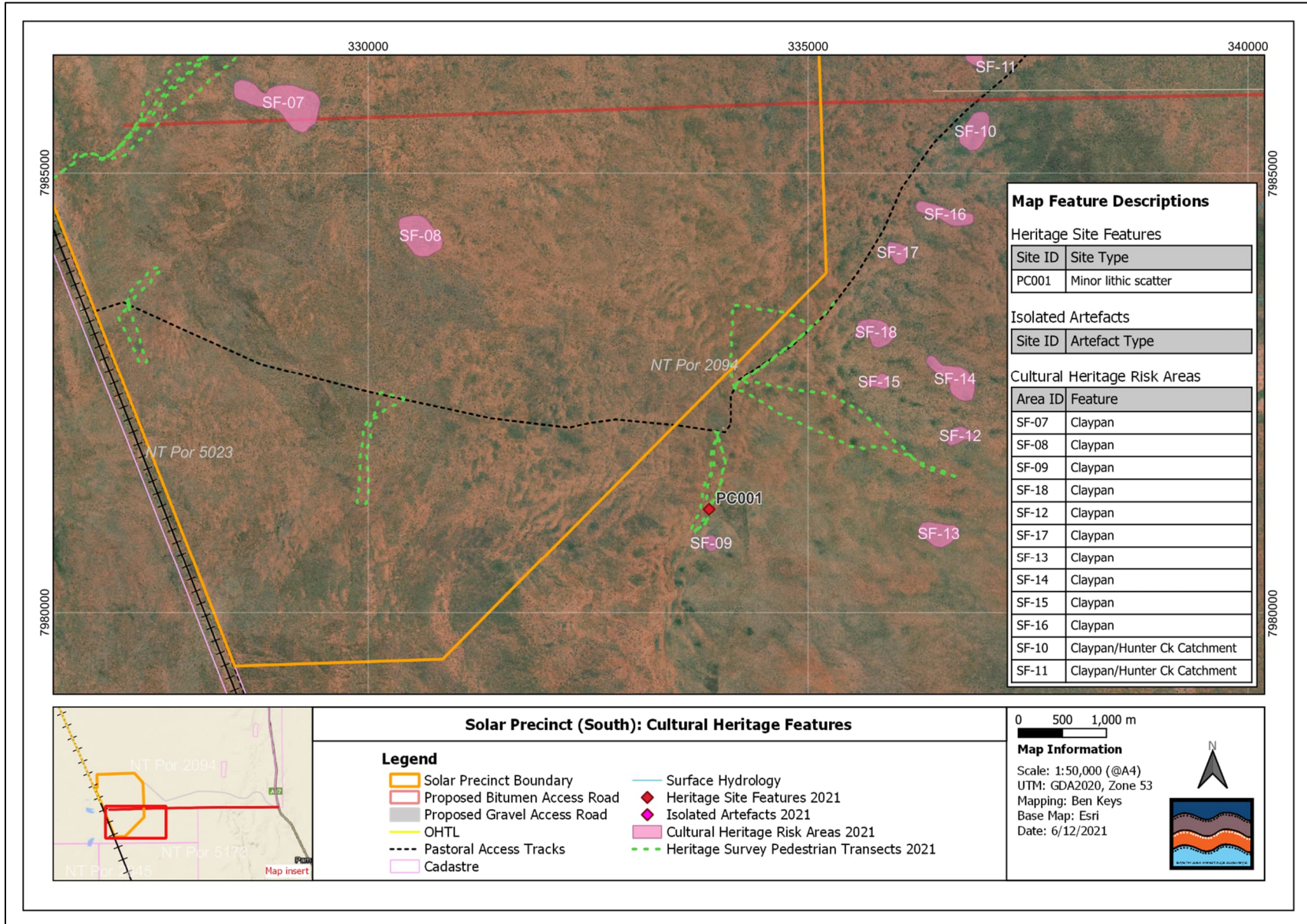


Figure 19: Solar Precinct (South), Heritage Results

Cultural Heritage Impact Assessment. Sun Cable: Solar Precinct 2021 (Earthsea Pty Ltd)

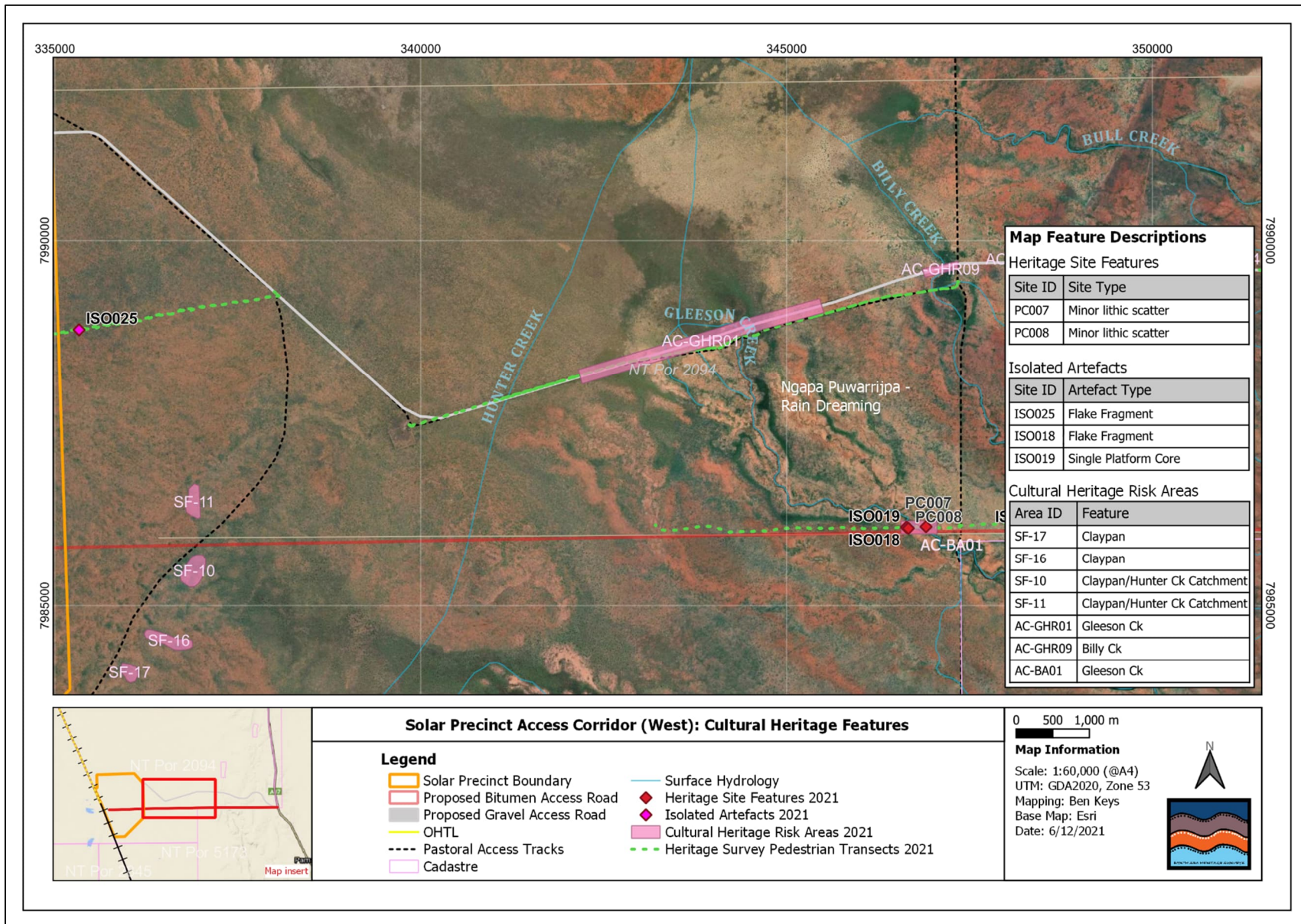


Figure 20: Solar Precinct Access Corridor (West), Heritage Results

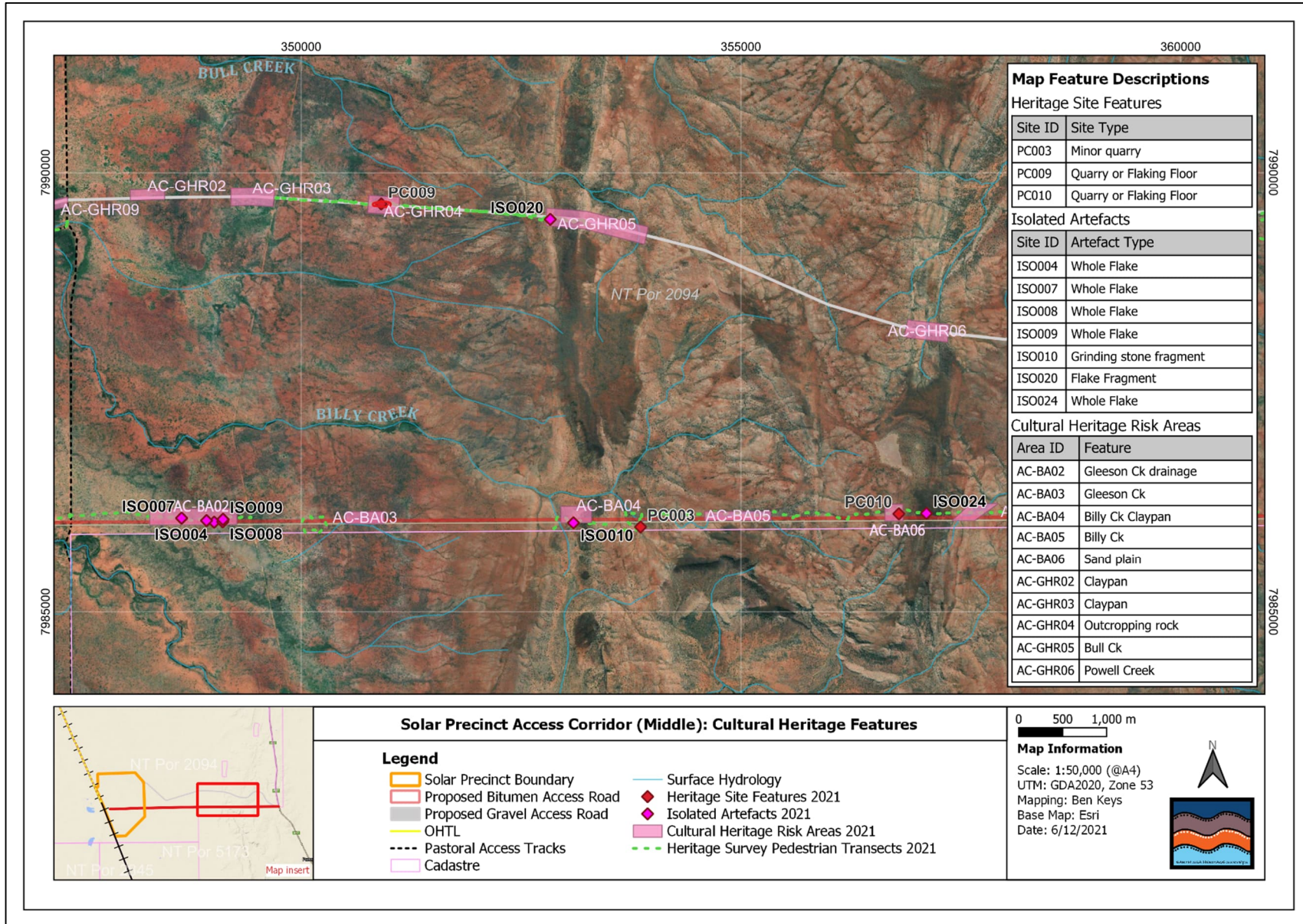


Figure 21: Solar Precinct Access Corridor (Middle), Heritage Results

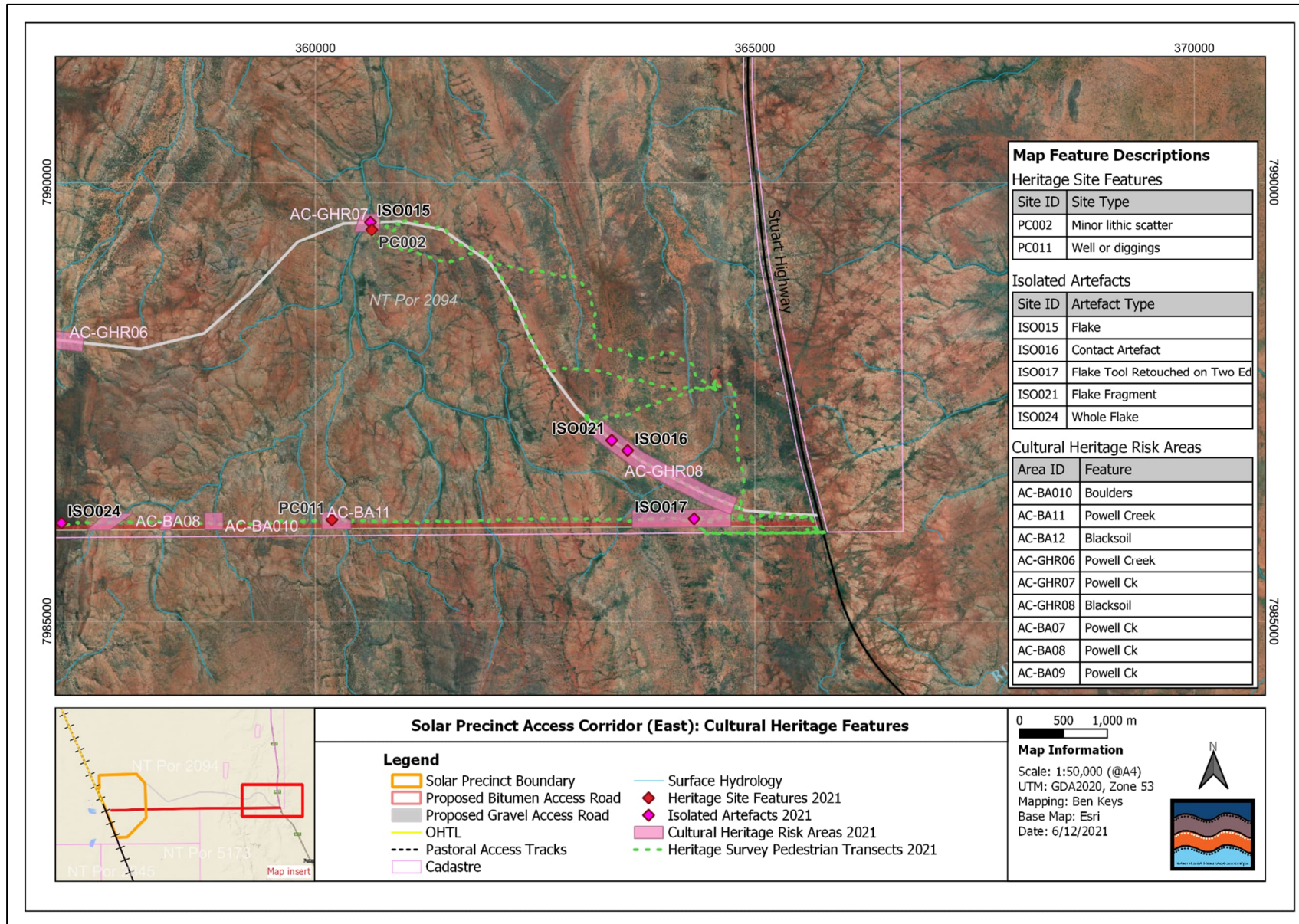


Figure 22: Solar Precinct Access Corridor (East), Heritage Results

## 7 Cultural Heritage Significance Assessment

The significance assessments provided in this section were undertaken on recorded sites in accordance with the accepted guidelines and principles described below.

### 7.1 Significance Assessment Guidelines

Cultural heritage management in Australia is underpinned by legislation, coupled with the ethics and principles established by heritage management practice. In addition to statutory law, several guidelines have been developed to support the protection and management of Indigenous heritage places on Commonwealth land. These include but are not limited to:

- Ask First, A guide to respecting Indigenous heritage places and values (2002).
- Engage Early, Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (2016).
- Practice Notes for the Australian ICOMOS Burra Charter 2013 (hereafter referred to as the “Burra Charter”).

Legislative basis for the protection and conservation of Indigenous archaeological places and objects within the study is discussed in Section 2.

The cultural heritage values of sites and objects recorded during the survey followed key Indigenous heritage management and significance assessment principles from the Burra Charter Practice Note, ‘The Burra Charter and Indigenous Cultural Heritage Management, 2013’ (see also The Burra Charter and Archaeological Practice, 2013). These are summarised below for reference:

<b>Place</b>	<i>Includes locations that embody spiritual value (such as Dreaming places, sacred landscapes and stone arrangements), social and historical value (such as massacre sites), as well as scientific value (such as archaeological sites). In fact, one place may be all of these things or may embody all of these values at the same time.</i>
<b>Cultural Significance</b>	<i>Is very broadly defined to include ‘aesthetic, historical, scientific, social or spiritual value for past, present or future generations’. This definition captures places of cultural significance to Indigenous cultures. It also includes places that provide a physical location that is integral to the existence, observation and practice of intangible heritage. The Burra Charter definition of cultural significance encompasses all forms of spirituality, regardless of the culture from which it emanates. Similarly, aesthetic value is not limited to a ‘western’ perception of aesthetics.</i>
<b>Knowledge and expertise of Indigenous peoples</b>	<i>It is critical that assessments of cultural significance for Indigenous heritage places reflect the views and input of the relevant Indigenous knowledge-holders.</i>
<b>Precise Assessments</b>	<i>Practitioners must define the location and form of a place, and the values that it embodies, with sufficient clarity to inform an assessment or the development of policy.</i>
<b>Changing Values</b>	<i>Assessments of significance need to be responsive to the dynamic nature of Indigenous cultures.</i>

<b>Defining Site Boundaries</b>	<i>Assessments of significance that concentrate on the visual characteristics of a place and use those characteristics to establish a 'boundary' for the place, may fail to appreciate its broader cultural or spiritual setting.</i>
	<i>Importantly, heritage practitioners must not inappropriately privilege tangible places and objects over the intangible aspects of heritage.</i>
<b>Maintenance, preservation, restoration, reconstruction and appropriate 'change' can be culture dependent</b>	<i>Practitioners may identify conservation needs and responses that are at odds with those identified by the traditional owners of a place, with the potential for misunderstanding and conflict.</i>

These principles outlined in the Burra Charter are generally those by which most cultural heritage practices in Australia are determined, including the assessment of significance of individual heritage places and objects.

In summary, cultural heritage landscapes, places, sites and objects can be significant in a number of ways:

1. Significant to a group or many groups of people due to their connection to the past.
2. Significant to a specific group of people because they have religious or spiritual significance to those people (Sacred Sites, Dreaming Sites or Story Places for example),
3. Significant to a group or many groups due to the relationship of place in the wider context of an ecological and cultural landscape.
4. Significant because of their research potential: their importance of the site in answering questions about past and in some instance's current human behaviour.
5. Significant due to their representativeness or uniqueness: sites or places that are rare or unique and are therefore conserved as a representative example.

Following the assessment of significance, the future conservation of a heritage place is decided by weighing up the level of assigned significance against the practicality of conserving the place. In terms of Indigenous site, these decisions should be made in direct consultation with Traditional Owners and guided by their views and input. To assess the practicality of conserving a heritage site, regulatory mechanisms are usually used to assess the condition of the place (whether it will survive for much longer) and the economic implications of deciding to apply permanent heritage protection.

## 7.2 Assessment Principles of Scientific and Research Significance

Scientific and research significance, including archaeological significance, is determined by assessing the ability of an object, site or area to add to the scientific knowledge of history or pre-history. This scientific knowledge for example, may include the ability of an object, site or area to provide an insight into past social patterns (e.g. trade and exchange networks), technologies, substance patterns, timings of occupation, and/or paleoenvironmental conditions.

Accordingly, in general the more information an object, site or area can add to understanding the past, the higher its scientific significance. Notwithstanding this, some sites or object may also have higher levels of scientific significance due to its aesthetics, rarity and representativeness rather than an ability to inform greater details about the past. Areas or sites so judged are often recorded in detail or conserved *in situ* because they may add to our understanding of the past. It also may involve

conserving a place until all practical scientific observations can be made, for example, in the salvage of artefact scatters before a development commences.

Outside of research significance, Cultural sites such as stone artefact scatters, camp sites and quarries can also have an educational role in helping non-Indigenous people understand some aspects of traditional Aboriginal lifeways.

### 7.3 Significance of Cultural Heritage Features within the Survey Area

A total of 12 archaeological sites and 26 isolated artefacts were recorded as being very close to or within the Solar Precinct and access corridor (see Section 8.1). In addition, several landscape features of cultural significance to the Traditional Owners were also recorded during the surveys, which included: three watercourses and related drainage features, intersected at 12 separate locations by the proposed access roads and a geological feature. Powell Creek Telegraph Station, located 26km northeast of the Solar Precinct, was also recorded, given its high archaeological and cultural significance and proximity to the current pastoral access track to the site.

In general, the recording of the archaeological features was relatively brief but aimed to capture sufficient information to understand and assess the archaeological and cultural significance of the features within the footprint areas. Information recorded for each feature included: locational data, brief site descriptions, artefact sample counts, geomorphic and environmental contexts, condition, Traditional Owner comments and a photographic record. This information has been used to provide a significance rating for each archaeological site. Individual site significance assessments are presented in Table 8 (see also Appendix 2.)

Warlmanpa Country as a whole should be considered as a significant cultural landscape, given the spiritual importance to Warlmanpa People and other Aboriginal groups who have a long history with the region. This relationship with Country is demonstrated by the density of sacred sites and Dreaming pathways through and around the Project Area, as well as its limitless archaeological research potential across the wider region.

Underpinning this notion, the significance assessment advice provided by senior Traditional Owners indicated that most sites recorded during this study were held with medium to high cultural significance due to their connection to Old People and Dreamings. The only exception to this was PC011, a non-Aboriginal well/digging, was regarded as low significance by the Traditional Owner field team. Notwithstanding these assessments, from an archaeological perspective, the majority of individual sites recorded were assessed as low to medium significance, with only Powell Creek Telegraph Station, located 26km northeast of the Solar Precinct, being considered as high significance.

All isolated finds were considered of low archaeological and cultural significance due to their abundance in the landscape and understanding that minimal scientific information would be lost if they were salvaged from their current in-situ locations.

Comparable to much of regional Australia, some substantial impacts to the significance of the sites were evident due to high bioturbation levels from a long history of cattle grazing, pastoral and civil infrastructure development across the region. Secondly, the erodible nature of the sandy sediments adjacent to watercourses have also had some impact to the retained archaeological significance of several sites. Although bioturbation and natural impacts were commonly observed, it was noted that

discrete napping and artefact reduction areas were clearly visible within some site complexes within the upland areas of the Ashburton Ranges. This suggests that some lateral and vertical integrity also remains in parts of the archaeological record in these areas.

Seven sites were assessed as having medium and one as holding high levels of archaeological significance due to their rarity and potential ability to provide valuable information on the past human occupation of the area (including potentially historical information in the case of Powell Creek Telegraph Station).

All sites have archaeological significance ratings largely reflective of their scientific values, with those given a higher rating based on their ability to better inform the past and/or are more representative of a particular site type. It is also possible that the significance rating of these sites could change to a lower or higher rating following additional investigations such as targeted archaeological excavations, and detailed recordings of whole site complexes or wider regional studies (see Section 8.3.2).

In general, the significance assessments drew on the abovementioned Burra Charter guides and criteria outlined in the *NT Heritage Act*, which included the following considerations:

1. Whether the place or object is important to the course or pattern of the Northern Territory's cultural or natural history.
2. Whether the place or object possesses uncommon, rare, or endangered aspects of the Northern Territory's cultural or natural history.
3. Whether the place or object has potential to yield information that will contribute to an understanding of the Territory's cultural or natural history.
4. Whether the place or object is important in demonstrating the principal characteristics of a class of cultural or natural places or environments.
5. Whether it is important in exhibiting particular aesthetic characteristics.
6. Whether it is important in demonstrating a high degree of creative or technical achievement during a particular period.
7. Whether it has a strong or special association with a particular community or cultural group for social, cultural, or spiritual reasons, including the significance of the place to the Aboriginal people as part of their continuing and developing cultural traditions.
8. Whether it has a special association to the life or works of a person or group of persons, of importance to the Northern Territory's history.

All Indigenous archaeological sites were also assessed as having varying levels of potential attributes to provide information on a combination of the following key research areas:

1. Whether the site could contribute to understanding settlement patterns of Aboriginal people across the region. For example:
  - a. Why were certain locations selected or favoured?
    - i. Were there economies associated with certain resources in certain areas, as noted at Lake Woods?
    - ii. Were certain locations significant due to environmental subsistence needs or other pressures?

- iii. Were there different technological or raw material requirements of different settlement areas?
- 2. The connectedness of individual sites and/or land systems.
- 3. Are the contents of sites part of a complex or related sites or land systems?
- 4. Were the drainage depressions/soaks within the Solar Precinct associated with localised subsistence practices or watering points for traversing Country?
- 5. Provenance of stone raw materials used in artefact manufacture.
  - a. Was any stone raw material traded outward from this area and were any artefacts present made from raw materials that do not naturally occur in the region? It is noted that significant trade and exchanges networks existed to the north and Lake Woods.
- 6. Lithic technologies.
  - a. Were the same lithic technologies used throughout the region, as it was noted that some intersite variability was present and some sites adjacent to Lake Woods show similar variability?
- 7. Temporality of human occupation and palaeoenvironmental conditions (primarily relevant to drainage depressions within the Solar Precinct).
  - a. Do any parts of the drainage depression sites have stratified sedimentary deposits?
    - i. What is the temporality of human occupation in the region?
    - ii. Were certain areas used more or less through time?
    - iii. What were the palaeoenvironmental conditions through time?
    - iv. Did artefact raw material types & sources change through time?

Table 8: Individual Site Significance Assessments

Name	Site Type	Site Size	Archaeological Significance	Aboriginal Significance	Site Condition	Distance to proposal footprint
PC001	Minor lithic scatter	7 artefacts total	Low	High	Good	0.9km south of proposed Solar Precinct
PC002	Minor lithic scatter	Approx. 100 artefacts	Medium	Medium	Poor to medium	75m south of proposed gravel access road corridor
PC003	Minor quarry	Approx. 50 artefacts	Low	Medium	Good	Within proposed bitumen access road corridor
PC004	Minor lithic scatter	Approx. 30 artefacts	Medium	High	Medium	Within proposed Solar Precinct
PC005	Drainage depression/soak	NA	Medium	High	Medium	Within proposed Solar Precinct
PC006	Minor lithic scatter and soak	Approx. 100 artefacts	Medium	High	Medium	Within proposed Solar Precinct
PC007	Minor lithic scatter	10 artefacts recorded	Low	Medium	Poor to medium	Within proposed bitumen access road corridor
PC008	Minor lithic scatter	8 artefacts recorded	Low	Medium	Poor to medium	Within proposed bitumen access road corridor
PC009	Quarry or Flaking Floor	>100 artefacts	Medium	High	Good	Within proposed gravel access road corridor
PC010	Quarry or Flaking Floor	>100 artefacts	Medium	High	Good	Within proposed bitumen access road corridor
PC011	Well or diggings	NA	Low	Low	Good	Within proposed bitumen access road corridor
PC012	Cultural Landscape	>100000	High	High	Poor to Good	26km northeast of Solar Precinct
PC013	Drainage depression/soak	NA	Medium	High	Medium	Within proposed Solar Precinct
AC-GHR01	Landscape feature - Gleeson Ck Access Road Crossing	NA	NA	High	Existing track	Intersected by proposed gravel access road corridor
AC-GHR06	Landscape feature - Powell Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed gravel access road corridor
AC-GHR07	Landscape feature - Powell Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed gravel access road corridor
AC-GHR09	Landscape feature - Billy Ck Access Road Crossing	NA	NA	High	Existing track	Intersected by proposed gravel access road corridor
AC-BA07	Landscape feature - Powell Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed bitumen access road corridor

Name	Site Type	Site Size	Archaeological Significance	Aboriginal Significance	Site Condition	Distance to proposal footprint
AC-BA08	Landscape feature - Powell Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed bitumen access road corridor
AC-BA09	Landscape feature - Powell Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed bitumen access road corridor
AC-BA01	Landscape feature - Gleeson Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed bitumen access road corridor
AC-BA02	Landscape feature - Gleeson Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed bitumen access road corridor
AC-BA03	Landscape feature - Gleeson Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed bitumen access road corridor
AC-BA010	Landscape feature -Boulders near Access Road	NA	NA	High	Good	Intersected by proposed bitumen access road corridor
AC-BA04	Landscape feature - Billy Ck Claypan Access Road Crossing	NA	NA	High	Good	Intersected by proposed bitumen access road corridor
AC-BA05	Landscape feature - Billy Ck Access Road Crossing	NA	NA	High	Good	Intersected by proposed bitumen access road corridor

## 8 Development Risks and Recommendations

The following section outlines the potential impacts that may be produced by the Solar Precinct and associated access tracks on archaeological and culturally significant features during the construction and operational phases of the Project. These impacts are limited to the proposed Project works set out in Section 1.3 above and exclude unsurveyed infrastructure such as the proposed airfield and rail sidings. The location of the latter infrastructure was not determined at the time of writing.

Recommendations are then presented that will assist in the protection and management of archaeological and culturally significant sites, including the mitigation of any impacts to ensure that Sun Cable carries out activities in compliance with the *NT Heritage Act 2011* and *NT Aboriginal Sacred Sites Act 1989* and within the expectation of Traditional Owners.

### 8.1 Potential Impacts on Aboriginal Archaeological Sites

#### 8.1.1 Direct Impacts to Cultural Heritage Features

The proposal to construct the AAPowerLink Solar Precinct and associated access roads will require substantial ground disturbing activities as outlined in Section 1.3 above, which will include clear and grade, excavation, construction and environmental drainage works across an approx. 12, 000ha Project footprint. Post construction and during operation, the Project will also require ongoing maintenance for its anticipated 70-year lifespan (including construction); the regularity or intensity of this work is unknown.

Accordingly, as presented in Table 9 below, within the current alignments, the Solar Precinct and proposed access roads have the potential to directly impact 11 archaeological sites and 25 isolated artefacts. In addition to these archaeological sites, thirteen culturally significant landscape features will be intersected by the road corridors and 29 Cultural Heritage Risk Areas will be disturbed overall.

**Table 9: Number of cultural heritage features directly impacted by proposed Solar Precinct activities**

<b>Project component</b>	<b>Archaeological Sites</b>	<b>Isolated Artefacts</b>	<b>Culturally Significant Landscape Features</b>	<b>Cultural Heritage Risk Areas</b>
Solar Precinct	4	7	0	8
Sealed Access Road	5	14	9	12
Unsealed Access Road	2	4	4	9

During the course of Project consultation (See Section 1.4) and negotiation with Traditional Owners undertaken by Sun Cable, there were several footprint location refinements to avoid areas of cultural significance. The current Solar Precinct alignment was agreed by Senior Traditional Owners as offering the least impact to culturally significant and cultural resource areas overall.

From an archaeological perspective, based on the predictive model, survey results and other regional studies, it is highly likely that further archaeological sites would be intersected if any attempt was made to realign the current footprint to avoid existing features. Notwithstanding, Sun Cable has indicated that some realignments of the access corridors may be possible to avoid discrete cultural heritage features. Recommendations for these localised realignments are presented in the following section.

In general, the potential direct impacts of the Solar Precinct and associated access tracks on the cultural heritage resources within the Project Area include, but are not limited to:

1. The clearing of surface archaeological remains especially lithic material.
2. Destroying the integrity of a site complex when only a portion of the site has been surveyed and understood.
3. The unexpected revealing and/or destruction of subsurface material culture or human remains.
4. Removal of culturally significant artefacts by contractors, visitors and staff working on the Project.

### 8.1.2 Indirect Impacts to Cultural Heritage Features

Whilst this Report largely centres on the Solar Precinct's development components, which have the potential to physically impact the cultural resources within its footprint, it should be noted that other indirect factors resulting from the Project's success may also risk further degradation to the area's cultural value. The potential indirect impacts of the Solar Precinct and associated access tracks on the archaeological and cultural heritage resources within the Project Area include, but are not limited to:

1. Increased access to culturally sensitive landscapes by public using the new road systems generated by the Project and wider public awareness of the Project Area.
2. Intergenerational impacts to the perception of a place's cultural value once it has been altered (both from within the underlying Estate Groups and neighbouring groups who share common cultural beliefs and ties).
3. Incremental destruction of places through increased development opportunities resulting from the Project.
4. Development variations to the Project Area due to changes in technologies or maintenance processes.
5. The construction design and method resulting in post-construction erosion of significant archaeological sites and cultural heritage features.
6. The submersion of significant surface archaeological remains by dust and sediments generated during construction.

## 8.2 Potential for Previously Undetected Aboriginal Cultural Heritage

All representative land units within the Solar Precinct were sampled as part of the archaeological assessment. This subsampling was coupled with additional targeted surveys of the accessible drainage depressions within the Solar Precinct, major watercourse crossings and areas with geology identified to potentially contain artefact bearing raw materials. Based on the results of this survey and the predictive modelling, it is likely unrecorded archaeological features remain in some unsurveyed land units throughout the Project Areas. It is also possible some undetected archaeological features may have been obscured by vegetation or sediment within the survey transects, however, these would be largely restricted to additional isolated finds or concentrations of stone artefacts.

Additionally, there is a high potential for undetected buried archaeological features within the drainage depression areas of the Solar Precinct and adjacent to major watercourses along the access corridor given the incidences of archaeological features recorded in these land units and an understanding of depositional environments from other regional studies outlined in Section 4.

38 areas were assessed as potentially containing undetected archaeological features, with 10 of these (i.e. SF-09 to SF-18) now falling outside the proposed Project Footprint. These areas, as presented in Table 10 (see also Figures 17 to 21 above), have been categorised as Cultural Heritage Risk Areas, with varying risk potential from low to high. The associated risk management recommendations are also presented. The cultural heritage risks these areas pose will be minimised once their applicable management recommendations have been implemented.

Conversely, in areas away from water resources or suitable outcropping geology there is considered to be a very low residual risk of unrecorded/unidentified archaeological features. These areas, as indicated by the field team, fall within low resource zones; in particular there is an absence of reliable surface water and outcropping stone that may have drawn Aboriginal people to these areas in the past, beyond brief visits.

**Table 10: Cultural Heritage Risk Areas and Cultural Heritage Potential**

Area ID	Feature	CH Risk	CH Potential
AC-BA01	Gleeson Ck	High	Area has high cultural significance. High potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA02	Gleeson Ck drainage	High	Area has high cultural significance. High potential for isolated artefacts and low-density scatters within outcropping rock/drainage area. Some potential for shallow subsurface along watercourse banks.
AC-BA03	Gleeson Ck	High	Area has high cultural significance. High potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA04	Billy Ck Claypan	High	High potential for isolated artefacts and low-density scatters around claypan. Risk decreasing in land units >100m away from claypan. Some potential for shallow subsurface deposits around claypan bank.
AC-BA05	Billy Ck	High	Billy Ck is a culturally significant watercourse.
AC-BA06	Sand plain	High	High potential for isolated artefacts and low-density scatters along sand plain margin. Some potential for shallow subsurface deposits.
AC-BA07	Powell Ck	Moderate	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA08	Powell Ck	Moderate	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA09	Powell Ck	Moderate	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA10	Boulders	High	Large granite boulders within creek are culturally significant features
AC-BA11	Powell Creek	Moderate/ High	High potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-BA12	Black soil	Moderate/ High	High potential for isolated stone artefacts, contact artefact and OHTL artefacts. Black soil section was a regular travelling corridor to Powell Creek Station springs pre and post contact. OHTL also runs through area.
AC-GHR01	Gleeson Ck	Moderate	Area has high cultural significance. High potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-GHR02	Claypan	Low/ Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
AC-GHR03	Claypan	Low/ Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.

Area ID	Feature	CH Risk	CH Potential
AC-GHR04	Outcropping rock	High	High potential for isolated artefacts and low-density scatters along sand plain margin and rock outcrops. Some potential for shallow subsurface deposits.
AC-GHR05	Bull Ck	Moderate	Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-GHR06	Powell Creek	Moderate	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-GHR07	Powell Ck	High	Area has high cultural significance. Moderate potential for isolated artefacts and low-density scatters along watercourse margin. Risk decreasing in land units >100m away from watercourse. Some potential for shallow subsurface along watercourse banks.
AC-GHR08	Black soil	Moderate/High	High potential for isolated stone artefacts, contact artefact and OHTL artefacts. Black soil section was a regular travelling corridor to Powell Creek Station springs pre and post contact. OHTL also runs through area.
AC-GHR09	Billy Ck	High	Billy Ck is a culturally significant watercourse. High potential for isolated artefacts and low-density scatters adjacent to the creek line. Risk decreasing in land units >100m away from the watercourse. Some potential for shallow subsurface deposits along the watercourse bank.
SF-01	Claypan	High	High potential for isolated artefacts and low-density scatters around claypan soak. Risk decreasing in land units >50m away from claypan. Some potential for shallow subsurface deposits around soak area.
SF-02	Claypan	High	High potential for isolated artefacts and low-density scatters around claypan soak. Risk decreasing in land units >50m away from claypan. Some potential for shallow subsurface deposits around soak area.
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SF-08	Claypan	Low/Moderate	Moderate potential for isolated artefacts and low-density scatters across claypan area. Risk decreasing in land units >50m away from claypan. Some potential for shallow subsurface deposits around soak areas.
SF-09	Claypan	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-10	Claypan/Hunter Ck Catchment	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across headwater drainage area.
SF-11	Claypan/Hunter Ck Catchment	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across headwater drainage area.
SF-12	Claypan	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-13	Claypan	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-14	Claypan	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.

Area ID	Feature	CH Risk	CH Potential
SF-15	Claypan	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-16	Claypan	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-17	Claypan	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.
SF-18	Claypan	Low/Moderate	Moderate to low potential for isolated artefacts and low-density scatters across claypan area.

### 8.3 Recommendations

This report makes recommendations on the cultural heritage recorded in this study according to its significance to Traditional Owners, its archaeological significance, the risk of impacts during construction of the Solar Precinct and the condition of the site at the time of survey (see Cultural Heritage Significance Assessments Section 7).

This report makes the following general recommendations:

1. Sun Cable should develop and implement a Cultural Heritage Management Plan (CHMP) in consultation with the Traditional Owners for the Project, prior to commencement of any ground disturbing activities (it is noted that Sun Cable have agreed to implementing a CHMP). This plan should include, but not be limited to:
  - a. An outline of the Project Areas to which the CHMP applies.
  - b. A summary of the cultural heritage features identified in this report, AAPA Authority Certificates (including Conditions) and any other relevant features identified by Sun Cable during consultation with Traditional Owners.
  - c. Measures to protect and manage individual heritage places, during and post construction phases of the Project.
    - i. Ensuring site mitigation and management strategies consider best industry practice, drawing on the archaeological and cultural values of each feature.
  - d. Measures to protect, manage and report inadvertent discoveries of cultural heritage finds, such as:
    - i. Discovery of Aboriginal archaeological sites and objects, and
    - ii. Discovery of human remains.
  - e. Defined responsibilities for the protection and monitoring of cultural heritage features, including for areas that have been identified as Cultural Heritage Risk Areas and any other areas identified by Sun Cable during consultation with Traditional Owners.
  - f. Traditional Owner liaison/consultation requirements regarding cultural heritage management and reporting of incidents.
  - g. Protocols for Traditional Owners to access any areas immediately outside the Project Area during the construction phase of the Project, and the right to access cultural heritage features and areas of significance within the Project Area post construction (within the constraints of Occupational Health & Safety risks of the Project).
  - h. A process for the management and availability of Cultural Heritage information (taking into consideration the confidentiality of culturally sensitive areas and any cultural protocols).
  - i. Processes for Breach Investigation & Dispute Resolution, including timeframes for responses.

- j. Outline the requirements for additional cultural heritage assessments of any new development areas or Project Footprint realignments prior to ground disturbance.
  - k. A review schedule for the Cultural Heritage Management Plan.
2. Sun Cable should aim to avoid impacts to heritage places, protected by the *NT Heritage Act* where practicable.
    - a. Where impacts to heritage places are unavoidable, Sun Cable should seek for an approval to carry out work on a heritage place or object (a work approval) under 72 of the *Heritage Act* and in accordance with the conditions set out in the CHMP.
    - b. All site mitigation works should be undertaken well in advance of construction activities.
  3. Sun Cable should implement workforce training and inductions, which include:
    - a. Cultural awareness.
    - b. Cultural heritage protection.
    - c. Protocols for the management of Aboriginal archaeological Sites.
    - d. Identification of Aboriginal archaeological Sites.
    - e. Personnel responsibilities.
  4. Sun Cable should ensure Traditional Owners/Site Custodians are engaged in heritage management decision making.
  5. To minimise potential impacts to Sacred Sites, it is recommended that Sun Cable apply for a Sacred Sites Authority Certificate under the *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)* prior to construction activities.
    - a. The location of Restricted Works Areas and their conditions should be made available to all authorised personnel to ensure compliance with the Certificate.
  6. Sun Cable should undertake clearance surveys of all Cultural Heritage Risk Areas outlined in Table 10 above, to ensure each area has been adequately inspected prior to construction.
    - a. Clearance surveys should be undertaken well in advance of the construction phase to allow for appropriate mitigation strategies to be implemented.
  7. Sun Cable should also undertake further consultation with Traditional Owners through the ILUA process to determine the most appropriate site protection measures for cultural significant areas which may not be protected under the *Heritage Act 2011* or *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)*.

These sites include but may not be limited to those outlined in Table 11 below (see also Section 7.3 above):

**Table 11: Culturally Significant Features**

Name	Site Type	Distance to proposal footprint
AC-GHR01	Landscape feature - Gleeson Ck Access Road Crossing	Intersected by proposed gravel access road corridor
AC-GHR06	Landscape feature - Powell Ck Access Road Crossing	Intersected by proposed gravel access road corridor
AC-GHR07	Landscape feature - Powell Ck Access Road Crossing	Intersected by proposed gravel access road corridor

<b>Name</b>	<b>Site Type</b>	<b>Distance to proposal footprint</b>
AC-GHR09	Landscape feature - Billy Ck Access Road Crossing	Intersected by proposed gravel access road corridor
AC-BA07	Landscape feature - Powell Ck Access Road Crossing	Intersected by proposed bitumen access road corridor
AC-BA08	Landscape feature - Powell Ck Access Road Crossing	Intersected by proposed bitumen access road corridor
AC-BA09	Landscape feature - Powell Ck Access Road Crossing	Intersected by proposed bitumen access road corridor
AC-BA01	Landscape feature - Gleeson Ck Access Road Crossing	Intersected by proposed bitumen access road corridor
AC-BA02	Landscape feature - Gleeson Ck Access Road Crossing	Intersected by proposed bitumen access road corridor
AC-BA03	Landscape feature - Gleeson Ck Access Road Crossing	Intersected by proposed bitumen access road corridor
AC-BA010	Landscape feature -Boulders near Access Road	Intersected by proposed bitumen access road corridor
AC-BA04	Landscape feature - Billy Ck Claypan Access Road Crossing	Intersected by proposed bitumen access road corridor
AC-BA05	Landscape feature - Billy Ck Access Road Crossing	Intersected by proposed bitumen access road corridor

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## Appendix 1: Abstract of Records (AAPA), Powell Creek Station



**Aboriginal Areas  
Protection Authority**  
protecting sacred sites across the territory

**Our File:** RI2020/582  
**In Reply Please Quote:** 202012211

Sun Cable Pty Ltd  
PO Box 1836  
PALMERSTON, NT, 0830

**ATTENTION:** Jeni Young

**RE:** Abstract of Records - NT Portion 2094 - Powell Creek Station - 202012211

On 12th October 2020 the Aboriginal Areas Protection Authority (the **Authority**) received your application for an abstract of records under regulation 7 of the *Northern Territory Aboriginal Sacred Sites Regulations 2004* (NT) (the **Regulations**).

The contents of this letter and the enclosed map comprise the abstract which is hereby provided to you for the purposes of regulation 7(3). I advise, in accordance with regulation 7(3)(a), that for the parcel of land the subject of this abstract:

- i. there are registered sacred sites located on the parcel of land;
- ii. there are recorded sacred sites located on the parcel of land;
- iii. there are restricted work areas in the parcel of land which are provided for in a previously issued Authority Certificate;

The map enclosed provides an overview of any registered or recorded sacred sites and restricted work areas described above. The information provided to you in this abstract is for information purposes only and cannot be relied upon as an exhaustive list of sacred sites in the area. There may be other sacred sites in the parcel of land of which the Authority is not yet aware.

A person is only permitted to enter and remain on a sacred site, carry out works on a sacred site, or make use of a sacred site in accordance with an Authority Certificate granted by the Authority (refer ss22 and 25 of the Act, also see ss34 and 35). Should you desire to do any of these things please make an application for an Authority Certificate. Further information about this process can be found here – <https://www.ntlis.nt.gov.au/aapa-online/auth/login>. Undertaking any of these acts without an Authority Certificate puts you at risk of prosecution under the Act (refer ss33-35). This abstract does not protect you in any way for your acts and is not an Authority Certificate.

The current Act and Regulations can be found online here - <https://legislation.nt.gov.au/>. Please ensure you are familiar with the legislation, particularly the offences in relation to sacred sites and the processes involved for obtaining an Authority Certificate if and when you require one.

Further information concerning abstracts and requests for information from the Authority can be found in the frequently asked questions (**FAQs**) which can be found online here – <https://www.aapant.org.au/our-services/request-information-0#faq1>.

The cost of providing the information set out in this letter and the attached map is \$27 (GST inclusive if applicable) and an invoice will be issued to you by the Department of Corporate and Information Services.

If you have any queries, please do not hesitate to contact the Registrar via email through [enquiries.aapa@nt.gov.au](mailto:enquiries.aapa@nt.gov.au) or (08) 8999 4356.

Yours sincerely,

Wendy Forscutt  
ACTING REGISTRAR  
12th October 2020






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## Frequently Asked Questions

In these FAQs, a reference to:

- "the Act" is a reference to the *Northern Territory Aboriginal Sacred Sites Act 1989* (NT); and
- "the Regulations" is a reference to the *Northern Territory Aboriginal Sacred Sites Regulations 2004* (NT).  
The Act and Regulations can be found here - <https://legislation.nt.gov.au/>.

Question	Answer
<b>What is a sacred site?</b>	The term "sacred site" is defined in s3 of the Act by reference to its meaning in the <i>Aboriginal Land Rights (Northern Territory) Act 1976</i> (Cth) which provides a sacred site is "a site that is sacred to Aboriginals or is otherwise of significance according to Aboriginal tradition, and includes any land that, under a law of the Northern Territory, is declared to be sacred to Aboriginals or of significance according to Aboriginal tradition".
<b>What is a registered sacred site?</b>	<p>A registered sacred site is indicated on the map by this symbol: </p> <p>The site number is indicated on the map by a number in the following format XXXX-XX.</p> <p>A registered sacred site is a site that has been added to the Register of Sacred Sites maintained by the Authority following the process set out in Part III Division 2 of the Act.</p> <p>The effect of registering a sacred site is set out in s45 of the Act.</p> <p>The extent of a registered site is the red hatched area: </p>
<b>What is a recorded sacred site?</b>	<p>A recorded sacred site is a site that is known to the Authority but has not been registered and includes recorded sacred burial sites. The Authority may hold the information required to register the site should this become the wishes of the custodians. Alternatively, a recorded sacred site may still require further research in order to obtain all necessary information. The recorded coordinate point for a sacred site is a reference point only and does not necessarily indicate the location or extent of any specific site feature.</p> <p>A recorded sacred site point is indicated on the map by this symbol: </p> <p>A recorded sacred burial site is indicated on the map by this symbol: </p> <p>Note that recorded sites have not gone through the registration process set out in s28 of the Act. As such, the full extent of the sacred site may change upon registration. The extent of a recorded sacred site is the green hatched area. </p>
<b>The map shows that there are no registered or recorded sites in the area of interest. Does this mean I can proceed with my works?</b>	<p>Whether you proceed with your works is a decision for you however you should carefully consider the area concerned and the provisions of the Act (particularly those that address the protections an Authority Certificate provides and the punishments prescribed for the offences set out in Part IV of the Act).</p> <p>If there is no record of an Authority Certificate being issued over the area concerned, it is possible that there may be sacred sites that are not currently known to the Authority.</p>
<b>How long does it take to get an Authority Certificate?</b>	The Authority takes an average of three months to produce an Authority Certificate. The timeframe will vary depending on various factors including the complexity of the proposed works, availability of custodians, remoteness, and access to land.

Question	Answer
<p><b>How much does an Authority Certificate cost?</b></p>	<p>Division 1A and Division 1 of Part III of the Act set out the procedures for applications for Authority Certificates.</p> <p>The cost of an Authority Certificate differs depending on whether it is a "standard application" or a "non-standard application". The classification of an application is determined by the Authority in accordance with the guidelines prescribed by Regulation 3 and set out at Schedule 1 to the Regulations.</p> <p>Standard applications will incur a fee in accordance with Schedule 4 of the Regulations.</p> <p>Non-standard applications are subject to charges which will depend on the nature of the application and the work required by the Authority. These charges are calculated by the Authority in accordance with Regulation 6 of the Regulations. If you submit an application that is determined to be a non-standard application, the Authority will provide you with an estimate of charges for your consideration and approval.</p>
<p><b>What information is on the Register of Sacred Sites?</b></p>	<p>The information on the Register of Sacred Sites differs due to the information available and the information permitted by the custodians of the sacred site to be recorded. Please refer to section 29 of the Act for further information. However, generally the Register of Sacred Sites may include the following types of information in relation to a sacred site:</p> <ul style="list-style-type: none"> <li>• the coordinate point of the site (nb: the coordinate point for a sacred site is a reference point only and does not necessarily indicate the location or extent of any specific site feature);</li> <li>• features of the site;</li> <li>• geographic description;</li> <li>• custodian group details; and</li> <li>• Aboriginal traditions associated with the site.</li> </ul>
<p><b>How do I inspect the Register of Sacred Sites?</b></p>	<p>Section 48 of the Act allows a person to apply to the Authority to inspect the Register of Sacred Sites. The viewing will take place in the Authority's offices, which are located in Darwin and Alice Springs. No hard or soft copies of the Register will be provided and photographs of the Register are prohibited.</p> <p>Information that is of a sensitive commercial nature or relates to matters required to be kept secret according to Aboriginal tradition will not be provided.</p> <p>To view the Register of Sacred Sites please apply online. You must specify the sites or certificates that you would like to view (see the map for the relevant numbers). A staff member will then contact you to organise an inspection time in either our Darwin or Alice Springs office.</p> <p>In accordance with regulation 8 and with reference to item 2 of Schedule 4 to the Regulations, the fee payable to inspect the Register of Sacred Sites is 23 revenue units per sacred site.</p>
<p><b>Authority Certificate Records are available for Public Inspection in the area of interest. What does this mean?</b></p>	<p>Areas over which the Authority has previously issued an Authority Certificate are indicated on the map by this hatching: </p> <p>In an abstract provided by the Authority pursuant to regulation 7(3) of the Regulations, areas over which the Authority has previously issued an Authority Certificate are indicated on the map.</p> <p>For these areas, the Authority has consulted custodians for the area in the past about prior works. There may be conditions in the Authority Certificate. These conditions will relate to the works covered by that certificate only.</p> <p>You cannot rely on an Authority Certificate that was issued to another person.</p> <p>If there is a record of an Authority Certificate being issued over the area concerned, that certificate only applies to those prior works and will not provide any protection for your works.</p>

Question	Answer
<p><b>There are restricted work areas in the area of interest. What does this mean?</b></p>	<p>In an abstract provided by the Authority pursuant to regulation 7(3) of the Regulations, a restricted work area will be indicated on the map by this hatching: </p> <p>A restricted work area relates to an area identified in an issued Authority Certificate. It is an area that had restrictions on the kind of activities that were permitted (or not permitted) in the area.</p>
<p><b>Can I see the Authority Certificate records that are available for public inspection over the area of interest?</b></p>	<p>Yes. The Authority will provide access to information on prior Authority Certificates that have been issued in the area of interest. An application may be made pursuant to section 48.</p> <p>You will be provided with a list of Authority Certificates granted or refused over the area of interest, including the conditions for any works that may have been proposed for that area. The conditions listed in a prior Authority Certificate are for the works stated in that particular Certificate. Restrictions on works can vary. Sometimes an Authority Certificate will prohibit any work in the area or will prevent certain activities, such as ground disturbing work, damage to trees, or the removal of sand or gravel. The conditions in a certificate are specific to each application and depend on the works proposed.</p> <p>The viewing will take place in the Authority's offices, which are located in Darwin and Alice Springs. No hard or soft copies of the Register will be provided and photographs of the Register are prohibited.</p> <p>Information that is of a sensitive commercial nature or relates to matters required to be kept secret according to Aboriginal tradition will not be provided.</p> <p>To view Authority Certificates that have been previously issued or refused in your area of interest, please apply online. You must specify the sites or certificates that you would like to view. The map contained in this letter will contain relevant record reference numbers. A staff member will then contact you to organise an inspection time in either our Darwin or Alice Springs office.</p> <p>In accordance with regulation 8 and with reference to item 3 of Schedule 4 to the Regulations, the fee payable to inspect the Register of Sacred Sites is 23 revenue units per inspection of Authority Certificate application and related Certificate or refusal.</p>
<p><b>No Authority Certificates have been issued in the area of interest. What does this mean?</b></p>	<p>Areas where the Authority has not issued an Authority Certificate are indicated on the map by this shading: </p> <p>In an abstract provided by the Authority pursuant to regulation 7(3) of the Regulations, areas where the Authority has not issued an Authority Certificate are indicated on the map. These are areas where the Authority has not undertaken anthropological research. The Authority may not have records of the sacred sites in this area. It means that there may be sites in the area and work should only proceed with an Authority Certificate, which will be issued after the Authority has spoken with custodians in the area.</p>
<p><b>There are "other sites" in the area of interest. What does this mean?</b></p>	<p>Other sites are shown on the map by this symbol: </p> <p>In an abstract provided by the Authority pursuant to regulation 7(3) of the Regulations, other sites (where known) are shown on the map. Other sites include archaeological places or sacred objects. These places and objects are protected under the <i>Heritage Act 2011</i> (NT).</p>
<p><b>There is a burial sites in the area of interest. What does this mean?</b></p>	<p>Burial sites are shown on the map by this symbol: </p> <p>In an abstract provided by the Authority pursuant to regulation 7(3) of the Regulations, burial sites (where known) are shown on the map.</p> <p>Under the <i>Criminal Code Act 1983</i> (NT) it is an offence to interfere with remains of a deceased person. It is also an offence contrary to the <i>Heritage Act 2011</i> to interfere with the remains of a deceased Aboriginal person without authorisation under that Act. In the event that any skeletal remains are unearthed it is your responsibility to stop works and immediately report such disturbance to the NT Police and the Director Heritage Branch, Department of Tourism and Culture.</p> <p>For further information please contact the Director Heritage Branch, Department of Tourism and Culture on (08) 8999 5051 or email <a href="mailto:heritage.nretas@nt.gov.au">heritage.nretas@nt.gov.au</a>.</p>

Question	Answer
<p><b>I know the custodians of the sites in the area of interest. Do I still need an Authority Certificate?</b></p>	<p>Yes. An Authority Certificate provides a defence against prosecution under the Act as long as the conditions of the Certificate are adhered to. The Authority can only issue an Authority Certificate if it is satisfied of the matters set out in s22 of the Act.</p>
<p><b>I own the land that is the area of interest. Do I still need an Authority Certificate?</b></p>	<p>The rights of land owners are preserved under s44(1) of the Act. Ownership of the land, however, will not defend you against a prosecution under the Act in the event a sacred site is damaged. Only an Authority Certificate can do this. Owners of land that may include sacred sites should ensure they consider the Act and whether they may require an Authority Certificate for their use of the land.</p>
<p><b>Can I share my abstract of records with other people?</b></p>	<p>No. It is an offence under s38 of the Act to permit access to, or furnish a document produced for a purpose of the Act without permission of the Authority.</p> <p>The abstract of records has been provided to you by the Authority for the limited purpose of your consideration. Should you wish to share the abstract, you should write to the Authority seeking permission under s38(1) of the Act. You should detail the purpose of sharing the abstract of records.</p>
<p><b>Can I publish the abstract of records?</b></p>	<p>No. It is an offence under s38 of the Act to permit access to, or furnish a document produced for a purpose of the Act without permission of the Authority.</p> <p>The abstract of records has been provided to you by the Authority for the limited purpose of your consideration. Should you wish to publish the abstract, you should write to the Authority seeking permission under s38(1) of the Act. You should detail the purpose of publishing the abstract of records.</p>

This figure has been removed to respect and protect the cultural sensitivities of the area following consultation with Traditional Owners.

## Appendix 2: Site Descriptions and Records

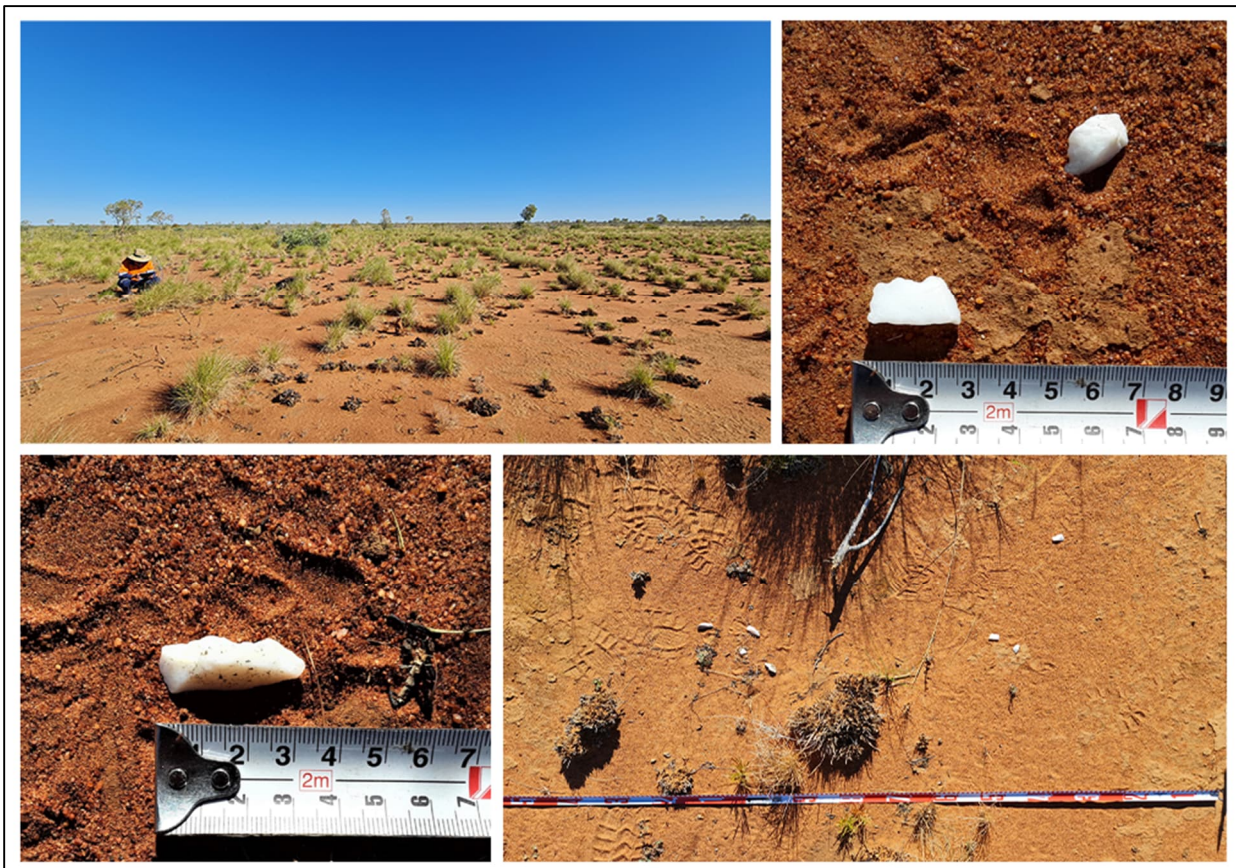
Map figures and location coordinate information has been removed from the following site tables to respect and protect the cultural sensitivities of the areas following consultation with Traditional Owners.

**Site Name: PC001**

Site Location	
Property: Powell Creek Station	Date: 8 June 2021
Archaeological Description	
Site Type: Minor lithic scatter	
Site Description: Minor lithic scatter likely representing a single event. Dick Foster indicated the site relates to people travelling into the area from desert country to the west. Chalcedony materila supports this view.	
Area (m <sup>2</sup> ): 2	
Artefact Types: Flakes, flake fragments, tula slug	
Raw Materials: Chalcedony	
Maximum Artefact Density: 7	Average Artefact Density: 4
Estimated total number of artefacts: 7	
Ground Surface Visibility: 90%	
Condition: Good	Disturbance Factors: Nil observed

Physical Context
Site Context: Open site on sand plain with no immediate proximity to water possibly. Located 400m north of shallow drainage depression (Cultural Heritage Risk Areas SF09). Likely a single cultural event.
Bioregion: Tanami
Land System: Redsan. Level to gently undulating plains with deep red sandy soils.
Vegetation: Silver leaf box, bauhinia low open woodland with hummock/ tussock grassland understory.
Outcropping Geology: No visible surface geology

Significance Assessment
Cultural Significance: High
Archaeological Significance: Low



**Site Name: PC002**

Site Location	
Property: Powell Creek Station	Date: 8 June 2021

Archaeological Description	
Site Type: Minor lithic scatter	
Site Description: Low density scatter over large area on eastern side of Powell Creek tributary. Site may extend with breaks along the margins of the water course to the south. Site includes contact artefacts.	
Area (m <sup>2</sup> ): 2000m <sup>2</sup> (may extend further to the south)	
Artefact Types: Flakes, flake fragments, retouched flakes, tula slug, portable grindstones, metal billy can	
Raw Materials: Quartzite, silcrete, metals, cherts	
Maximum Artefact Density: 3	Average Artefact Density: 3
Estimated total number of artefacts: Approx. 100 artefacts	
Ground Surface Visibility: 90%	
Condition: Poor to medium	Disturbance Factors: Cattle, flood waters

Physical Context	
Site Context: Creek margin, sandy gravelly bed and banks.	
Bioregion: Davenport Murchison Ranges	
Land System: Ashburton. Low hills, hills and stony plateau on sandstone, siltstone, quartzite and conglomerate deeply weathered in places, outcrop with shallow sandy soils.	
Vegetation: Variable barked bloodwood open woodland with soft spinifex hummock grassland understory.	
Outcropping Geology: Baralandji Formation: Sandstone, sub lithic to quartz arenite; laminated to thick bedding, fine to medium grained; micaceous, glauconitic; mudstone. Sediments in valley and creek margins.	

Significance Assessment	
Cultural Significance: Medium	
Archaeological Significance: Medium	



**Site Name: PC003**

Site Location	
Property: Powell Creek Station	Date: 3 June 2021

Archaeological Description	
Site Type: Minor quarry	
Site Description: Small quarry on deflated area on southern bank of Billy Creek	
Area (m <sup>2</sup> ): 400m <sup>2</sup>	
Artefact Types: Flakes, broken flakes, flaked pieces, cores, debitage	
Raw Materials: Quartzite	
Maximum Artefact Density: 6	Average Artefact Density: 6
Estimated total number of artefacts: Approx 50 artefacts	
Ground Surface Visibility: 90%	
Condition: Good	Disturbance Factors: Erosion

Physical Context	
Site Context: Located on level ground, exposed in areas of deflation on southern bank of Billy Creek.	
Bioregion: Davenport Murchison Ranges	
Land System: Ashburton. Low hills, hills and stony plateau on sandstone, siltstone, quartzite and conglomerate deeply weathered in places, outcrop with shallow sandy soils.	
Vegetation: Variable barked bloodwood open woodland with soft spinafex hummock grassland understory.	
Outcropping Geology: Jangirulu Formation: Ridge forming sandstone, quartz arenite, lensing thin to very thick bedded, medium grained to pebbly. Regolith. Observation: Sandstone and quartzite.	

Significance Assessment	
Cultural Significance: Medium	
Archaeological Significance: Low	



**Site Name: PC004**

Site Location	
Property: Powell Creek	Date: 6 June 2021

Archaeological Description	
Site Type: Minor lithic scatter (PC004) and soak (PC005)	
Site Description: Low density scatter located on southern end of drainage depression. Two types of sandstone portable grindstones. Poor ground surface visibility at the time of survey. Potential for subsurface deposits and size of site to extend.	
Area (m <sup>2</sup> ): TBC once ground surface visibility has improved	
Artefact Types: Flakes, flake fragments, portable grindstone fragments	
Raw Materials: Chert, sandstone	
Maximum Artefact Density: 2	Average Artefact Density: 2
Estimated total number of artefacts: Approx 30 artefacts	
Ground Surface Visibility: 10%	
Condition: Medium	Disturbance Factors: Cattle

Physical Context	
Site Context: Site is located on the southern edge of a degraded drainage depression. Sub-surface potential.	
Bioregion: Tanami	
Land System: Redsans. Level to gently undulating plains with deep red sandy soils.	
Vegetation: Silver leaf box, bauhinia low open woodland with hummock/ tussock grassland understory.	
Outcropping Geology: No outcropping geology visible	

Significance Assessment	
Cultural Significance: High	
Archaeological Significance: Medium	



## Site Name: PC005

Site Location	
Property: Powell Creek	Date: 6 June 2021

Archaeological Description	
Site Type: Soak	
Site Description: Natural drainage depression which has likely been enhanced and maintained. Site has a distinct depression area approximately 5m wide	
Area (m <sup>2</sup> ): TBC once ground surface visibility has improved	
Artefact Types: NA	
Raw Materials: NA	
Maximum Artefact Density: NA	Average Artefact Density: NA
Estimated total number of artefacts: NA	
Ground Surface Visibility: 10%	
Condition: Medium	Disturbance Factors: Cattle

Physical Context	
Site Context: Disturbance by cattle has degraded this soak so it no longer holds water except during rain.	
Bioregion: Tanami	
Land System: Redsan. Level to gently undulating plains with deep red sandy soils.	
Vegetation: Silver leaf box, bauhinia low open woodland with hummock/ tussock grassland understory.	
Outcropping Geology: No outcrop rock noted in the area.	

Significance Assessment	
Cultural Significance: High	
Archaeological Significance: Medium	



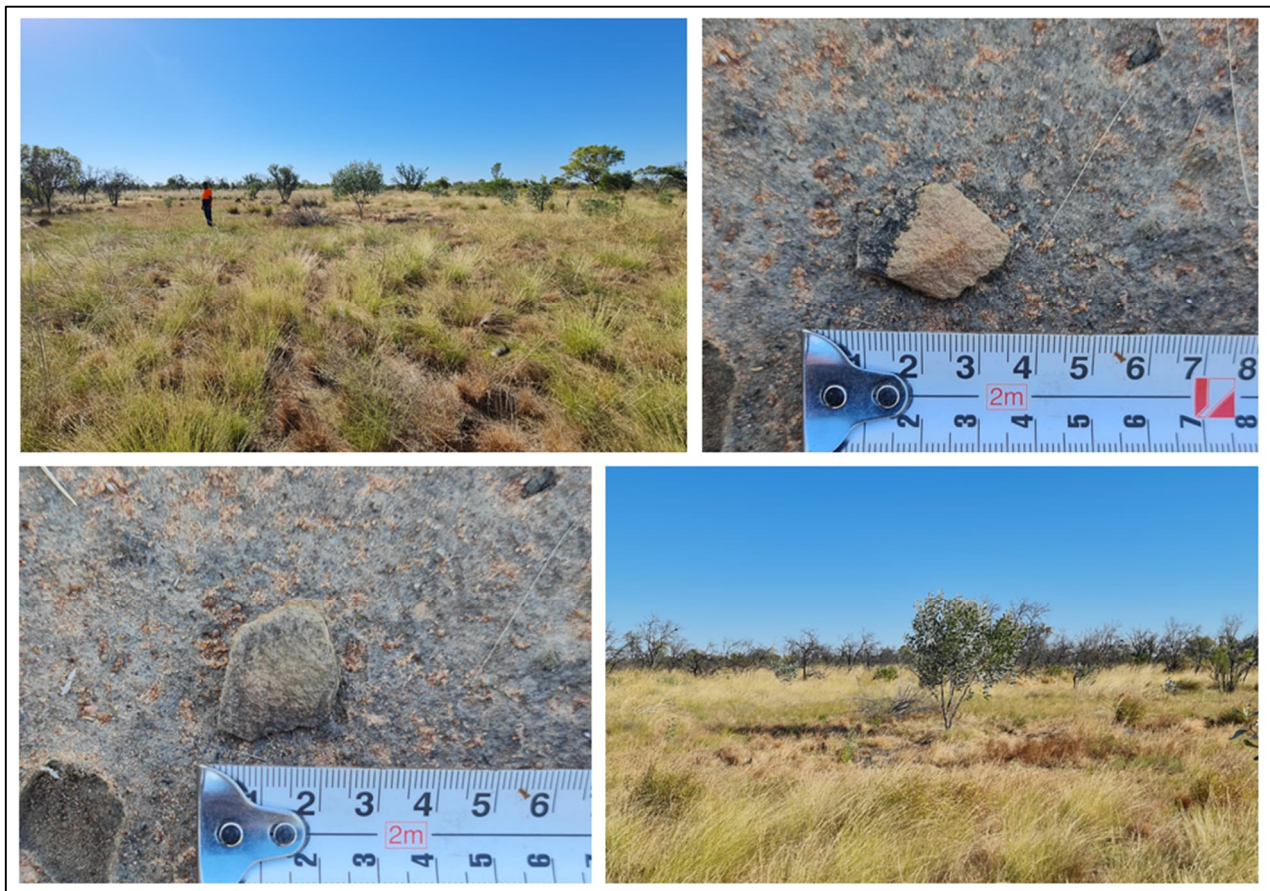
**Site Name: PC006**

Site Location	
Property: Powell Creek	Date: June 2021

Archaeological Description	
Site Type: Minor lithic scatter adjacent to drainage depression.	
Site Description: Low density scatter adjacent to soak/drainage depression. Likely more arefacts within area but constrained by poor ground surface visibility. Maybe potentila for subsurface deposits.	
Area (m <sup>2</sup> ): TBC once ground surface visibility has improved	
Artefact Types: Flakes, flake fragments, portable grindstone fragments	
Raw Materials: Chert, sandstone, quartzite, chalcedony	
Maximum Artefact Density: 4	Average Artefact Density: 4
Estimated total number of artefacts: Approx 100 artefacts	
Ground Surface Visibility: 10%	
Condition: Medium	Disturbance Factors: Cattle

Physical Context	
Site Context: Soak/ claypan	
Bioregion: Tanami	
Land System: Redsan. Level to gently undulating plains with deep red sandy soils.	
Vegetation: Silver leaf box, bauhinia low open woodland with hummock/ tussock grassland understory.	
Outcropping Geology: No visible outcropping geology	

Significance Assessment	
Cultural Significance: High	
Archaeological Significance: Medium	



## Site Name: PC007

Site Location	
Property: Powell Creek	Date: June 2021
Archaeological Description	
Site Type: Minor lithic scatter	
Site Description: Low density scatter deflating from sand dune east of Gleeson Creek.	
Area (m <sup>2</sup> ): 175m2	
Artefact Types: Flakes, flake fragments	
Raw Materials: Chert, quartzite	
Maximum Artefact Density: 2	Average Artefact Density: 2
Estimated total number of artefacts: 10 artefacts recorded	
Ground Surface Visibility: 90%	
Condition: Poor to medium	Disturbance Factors: Cattle
Physical Context	
Site Context: Sand dune	
Bioregion: Davenport Murchison Ranges	
Land System: Redsan. Level to gently undulating plains with deep red sandy soils.	
Vegetation: Silver leaf box, bauhinia low open woodland with hummock/ tussock grassland understory.	
Outcropping Geology: NR	
Significance Assessment	
Cultural Significance: Medium	
Archaeological Significance: Low	



**Site Name: PC008**

Site Location	
Property: Powell Creek	Date: June 2021

Archaeological Description	
Site Type: Minor lithic scatter	
Site Description: Low density scatter on gravel lag deposit. Site likely extends along margins of Gleeson Creek	
Area (m <sup>2</sup> ): Likely extends along Gleeson Creek	
Artefact Types: Flakes and cores	
Raw Materials: Chert, quartzite	
Maximum Artefact Density: 3	Average Artefact Density: 3
Estimated total number of artefacts: 8 artefacts recorded but likely extends further along margins of creek	
Ground Surface Visibility: 90%	
Condition: Poor to medium	Disturbance Factors: Cattle and erosion

Physical Context	
Site Context: Proximity to seasonal water course and sand dunes	
Bioregion: Davenport Murchison Ranges	
Land System: Redsan. Level to gently undulating plains with deep red sandy soils.	
Vegetation: Silver leaf box, bauhinia low open woodland with hummock/ tussock grassland understory.	
Outcropping Geology: NR	

Significance Assessment	
Cultural Significance: Medium	
Archaeological Significance: Low	



**Site Name: PC009**

Site Location	
Property: Powell Creek Station	Date: June 2021

Archaeological Description	
Site Type: Quarry or Flaking Floor	
Site Description: Large quartzite quarry on top of ridge. Exploitation of outcropping quartzite. More than 30/m <sup>2</sup> in places. Move proposed access track 50m to north outside of site boundary	
Area (m <sup>2</sup> ): >10,000m <sup>2</sup>	
Artefact Types: Flakes and cores	
Raw Materials: Quartzite	
Maximum Artefact Density: 30	Average Artefact Density: 30
Estimated total number of artefacts: >100 artefacts	
Ground Surface Visibility: 75%	
Condition: Good	Disturbance Factors: Cattle

Physical Context	
Site Context: Ridge line	
Bioregion: Davenport Murchison Ranges	
Land System: Ashburton. Low hills, hills and stony plateau on sandstone, siltstone, quartzite and conglomerate deeply weathered in places, outcrop with shallow sandy soils.	
Vegetation: Variable barked bloodwood open woodland with soft spinifex hummock grassland understory.	
Outcropping Geology: Sandstone	

Significance Assessment	
Cultural Significance: High	
Archaeological Significance: Medium	



**Site Name: PC010**

Site Location	
Property: Powell Creek Station	Date: June 2021

Archaeological Description	
Site Type: Quarry or Knapping Floor	
Site Description: Quartzite quarry on sandy margin on top of elevated area. Exploitation of outcropping quartzite. More than 20/m <sup>2</sup> in places.	
Area (m <sup>2</sup> ): 300m <sup>2</sup>	
Artefact Types: Flakes and cores	
Raw Materials: Quartzite	
Maximum Artefact Density: 20	Average Artefact Density: 20
Estimated total number of artefacts: >100 artefacts	
Ground Surface Visibility: 75%	
Condition: Good	Disturbance Factors: Nil noted

Physical Context	
Site Context: Sandstone and quartzite low rolling hills, ridgeline	
Bioregion: Davenport Murchison Ranges	
Land System: Ashburton. Low hills, hills and stony plateau on sandstone, siltstone, quartzite and conglomerate deeply weathered in places, outcrop with shallow sandy soils.	
Vegetation: Variable barked bloodwood open woodland with soft spinifex hummock grassland understory.	
Outcropping Geology: Sandstone, quartzite	

Significance Assessment	
Cultural Significance: High	
Archaeological Significance: Medium	



**Site Name: PC011**

Site Location	
Property: Powell Creek Station	Date: June 202
Archaeological Description	
Site Type: Well or diggings	
Site Description: Hand dug rock well or exploration workings. Potential late 1800s gold prospecting workings. No Aboriginal artefacts noted but within a high risk zone.	
Area (m <sup>2</sup> ): 25m2	
Artefact Types: NA	
Raw Materials: NA	
Maximum Artefact Density: NA	Average Artefact Density: NA
Estimated total number of artefacts: NA	
Ground Surface Visibility: 50%	
Condition: Good	Disturbance Factors:

Physical Context
Site Context: Seasonal creek margins in deeply incised sandstone valley.
Bioregion: Davenport Murchison Ranges
Land System: Ashburton. Low hills, hills and stony plateau on sandstone, siltstone, quartzite and conglomerate deeply weathered in places, outcrop with shallow sandy soils.
Vegetation: Variable barked bloodwood open woodland with soft spinifex hummock grassland understory.
Outcropping Geology: Low rolling hills sandstone and quartzite

Significance Assessment
Cultural Significance: Low
Archaeological Significance: Low



**Site Name: PC012**

Site Location	
Property: Powell Creek Station	Date: June 2021

Archaeological Description	
Site Type: Cultural Landscape	
Site Description: Powell Ck Homestead and surrounds	
Area (m <sup>2</sup> ):	
Artefact Types: Historic, Contact, Lithic Scatters, Ceremonial and Natural	
Raw Materials: NA	
Maximum Artefact Density: NR	Average Artefact Density: NR
Estimated total number of artefacts: >100000	
Ground Surface Visibility: 0	
Condition: Poor to Good	Disturbance Factors:

Physical Context	
Site Context: Large permanent waterholes feed by spring. Dick Foster stated that these springs never run dry. Location of a heritage buildings associated with Powell Creek Telegraph Station, sacred sites in the area, large Aboriginal archaeological sites evidence of camping in historical period.	
Bioregion: Davenport Murchison Ranges	
Land System: Ashburton. Low hills, hills and stony plateau on sandstone, siltstone, quartzite and conglomerate deeply weathered in places, outcrop with shallow sandy soils.	
Vegetation: Variable barked bloodwood open woodland with soft spinifex hummock grassland understory.	
Outcropping Geology: Sandstone, quartzite hills and ridgelines	

Significance Assessment	
Cultural Significance: High	
Archaeological Significance: High	





**Site Name: PC013**

Site Location	
Property: Powell Creek Station	Date: June 2021

Archaeological Description	
Site Type: Soak	
Site Description: Artefact scatter located on southern boundary of drainage depression. A number of isolated artefacts extend 200m to north. Some potential for subsurface deposits around drainage depression	
Area (m <sup>2</sup> ): TBC once ground surface visibility has improved	
Artefact Types: Frakes and retouched flakes	
Raw Materials: Chert	
Maximum Artefact Density: 2m2	Average Artefact Density: NA
Estimated total number of artefacts: 30, but may extend with better ground surface visibility	
Ground Surface Visibility: 20	
Condition: Medium	Disturbance Factors: NR

Physical Context	
Site Context: Natural drainage depression	
Bioregion: Tanami	
Land System: Redsan. Level to gently undulating plains with deep red sandy soils.	
Vegetation: Silver leaf box, bauhinia low open woodland with hummock/ tussock grassland understory.	
Outcropping Geology: No outcrop noted	

Significance Assessment	
Cultural Significance: High	
Archaeological Significance: Medium	

