Wilcannia Weir Replacement

Aboriginal Cultural Heritage Assessment Report

Final

05 July 2022

Water Infrastructure NSW

Wilcannia Weir Replacement

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Executive summary

Water Infrastructure NSW proposes to replace the existing Wilcannia Weir on the Darling River (Baaka[1]) with a new weir located about five river kilometres downstream of the existing weir (the proposal). This would provide a more reliable long-term town water supply for Wilcannia to meet community needs. The existing weir would also be partially removed and decommissioned as part of the proposal. The proposal is located in the Central Darling local government area.

The proposal is declared State significant infrastructure under section 2.13 and Schedule 3 of the *State Environmental Planning Policy (Planning Systems) 2021*. The proposal is subject to assessment in accordance with Part 5 Division 5.2 of the *Environmental Planning and Assessment Act 1979* and the environmental assessment requirements of the Secretary of the NSW Department of Planning and Environment (the SEARs) (SSI-10050), dated 28 August 2020.

This Aboriginal cultural heritage assessment report has been prepared on behalf of Water Infrastructure NSW to assess the potential impacts to Aboriginal cultural heritage from constructing and operating the proposal in accordance with the SEARs and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (Department of Environment and Climate Change 2010) and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (Office of Environment and Heritage 2011). It includes a description of the existing environment with reference to potential for Aboriginal cultural heritage, provides a summary of the archaeological survey conducted to inform the assessment, including significance assessments, assesses the impacts of constructing and operating the proposal on Aboriginal cultural heritage objects and places and recommends measures to mitigate and manage the impacts identified.

Aboriginal stakeholder consultation, specified as a requirement in the SEARs, has been completed in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (Department of Environment, Climate Change and Water 2010a).

Key features of the existing environment

The proposal is located within the Darling Riverine Plains Bioregion, which lies in the semi-arid climatic zone and is hot and persistently dry. The present-day climate is likely to be similar to the climate in the immediate pre-contact period, and the region in which the proposal sits is likely to have been similarly semi-arid.

Within the Wilcannia Plains sub region, the geology consists of extensive plains on overlapping low angle alluvial fans of several rivers. Sandy soils are found in linear belts along the older stream channels, sometimes with local source dunes on their border. The Wilcannia area itself, being close to the Darling River (Baaka), is made up of quaternary sediments that have mostly been alluvially deposited, with some sediments having been secondarily reworked and deposited as low aeolian dunes on top of old floodplain deposits.

The major watercourse in the region is the Darling River (Baaka). The river flows through a deep incised channel, with ephemeral flood-runners, lakes, and oxbow lakes bordering it. The river and its associated alluvial features would certainly have been foci for Aboriginal occupation in the area in the past (as it continues to be today).

The Wilcannia Mission Camps and Cultural Places Aboriginal Place is located along the Darling River (Baaka) from Wilcannia to the area of the proposed new weir, and downstream of the proposed new weir. The Aboriginal Place encompasses the river and areas of ground on both sides of the river and holds high cultural value for the tangible and intangible cultural heritage connected with it. The Union Bend Ngatji site, which is of particular cultural significance, lies within the Aboriginal Place.

[1] Multiple different ways of spelling are used by the community. This spelling has been adopted for the proposal.

Archaeological survey

An archaeological survey was undertaken of the proposed development footprint and riverbanks between the existing and proposed new Wilcannia weirs. These areas are collectively referred to as the 'study area'. The survey covered all areas that have archaeological potential and lie within the study area. The survey did not extend outside the study area. The survey was undertaken by Jacobs archaeologists and representatives from the registered Aboriginal parties (RAPs).

The archaeological survey for the proposal recorded an extensive and diverse site complex consisting of large numbers of stone artefacts, hearths (fireplaces) of varying size and purpose and culturally modified trees. These newly recorded sites complement those sites recorded previously in the local area, which include an additional number of similar sites, but also human burials, ethnographic/mythological sites, fish traps, an Aboriginal mound, and locations of historic importance to the local Aboriginal community. Collectively, these sites and objects provide a picture of a vibrant, extensive cultural landscape well connected to the Barkandji people of Wilcannia. The archaeological places and objects recorded during this and prior surveys are evidence of the unbroken connection of Barkandji people to this place. In the most prominent example, this short stretch of river exhibits examples of canoe scars ranging from the last few months, through to hundreds of years ago, following the life cycles of ancient River Red Gums. Numerous canoe scars remain that are associated with the people who made them, notably a canoe cut about 100 years ago by 'Granny Moysey' (d.1976), an important Barkandji Elder.

The archaeological survey recorded:

- 30 new culturally modified trees
- 12 open archaeological sites, containing stone artefacts, hearths and shell middens. In total, these sites included:
  - 36 hearths (including two 'emu ovens')
  - 517 stone artefacts
  - five mussel shell clusters, interpreted as middens.

Aboriginal cultural significance was assessed from consultation with the Wilcannia Aboriginal community during consultation sessions and during and following field assessments. It should be noted that Aboriginal significance assessed in this manner may not reflect the views of all members of the community.

The significance assessment concluded that while there are some potentially impacted sites with higher significance, individually most would be regarded as having moderate significance. Nonetheless, when examined as a suite of sites the significance of the Wilcannia Aboriginal site complex is high. In a relatively short length of river there exists a site complex of remarkable diversity with considerable potential to contribute knowledge to current understanding of both pre-contact Australia and of Aboriginal society during the post-contact period. The site complex possesses considerable educational value. While further survey upstream and downstream would undoubtedly extend the recording of a number of sites within the range of types recorded for this proposal, the density of sites with personal connections would likely diminish with distance from the township. This makes the site complex around Wilcannia to be one of high significance with regard to depth of connection to place, of high significance to the local Aboriginal community and of considerable archaeological and anthropological research value.

Assessment of impacts

Due to the acknowledged importance of the Wilcannia area, and in particular the Darling River (Baaka), careful consideration of Aboriginal cultural heritage constraints and issues was a core component of the development of the design for the proposal.

The development of the proposal footprint, particularly the proposed location of construction activities, has incorporated careful consideration of Aboriginal cultural sites and values to avoid known sites where possible.

The impact assessment identifies the following sites would be impacted by the proposal:

- 24-5-161 Rocky Crossing/Fish Trap – Resource gathering site
- 24-5-162 Springs and Ochre Site – Resource gathering site
- 24-5-163 Springs and Stony Bank – Resource gathering site
- 24-5-167 Wilcannia Weir Fish Trap – Resource gathering site
- 24-5-208 Union Bend Canoe Tree 7 – Culturally modified tree
- 24-5-176 Wilcannia New Weir 1 – Artefact scatter with hearths
- 24-5-177 Wilcannia New Weir 2 – Artefact scatter with hearths
- 24-5-210 Union Bend Coolamon Tree 1 – Culturally modified tree
- 24-5-160 Union Bend Canoe Tree 3 – Culturally modified tree
- 24-5-180 Wilcannia Mission AP 4 – Artefact scatter.

Mitigation and management measures

Where direct impact to sites is unavoidable, the assessment has identified a range of mitigation and management measures. These have been developed in consultation with the RAPs and have been made with consideration of the likely potential impact (direct or indirect) to each site, and the assessed significance of each site.

Key measures include:

- Preparation of a methodology for collection of surface artefacts, and for archaeological excavations, by a suitably qualified archaeologist in consultation with the RAPs in accordance with the requirements of the *National Parks and Wildlife Act 1974*
- Surface collection of directly impacted items within the construction footprint
- Archaeological excavations of directly impacted hearths to examine their subsurface structure and contents and to recover dateable material (e.g. charcoal)
- Archaeological excavations of representative sites across the construction footprint to assess the potential for undiscovered subsurface archaeological material to be disturbed
- 3D scanning of Union Bend Canoe Tree 7 (24-5-208) to create a digital record
- Trimming of Union Bend Coolamon Tree 1 (24-5-210) to facilitate the safe operation of a construction crane
- Preparation of an Aboriginal cultural heritage management plan in consultation with the RAPs
- Monitoring of preliminary ground disturbing works by the RAPs
- Protective exclusion fencing to be placed around all culturally modified trees in the vicinity of the construction footprint.

Glossary of terms and abbreviations

Acronym/term	Definition
ACHAR	Aboriginal cultural heritage assessment report
ACHCRP	*Aboriginal Cultural Heritage Consultation Requirements for Proponents* (Department of Environment, Climate Change and Water 2010a)
AFG	Aboriginal focus group
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal heritage impact permit
ALR Act	*Aboriginal Land Rights Act 1983* (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW) (former)
DPC	Department of Premier and Cabinet (NSW)
DPE	Department of Planning and Environment (NSW)
DPIE	Department of Planning, Industry and Environment (NSW) (former)
DRPB	Darling Riverine Plains Bioregion
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ICOMOS	International Council on Monuments and Sites
Jacobs	Jacobs Group (Australia) Pty Ltd
LALC	Local Aboriginal land council
Left and right	Reference to left and right (of the river) is with respect to the view in the downstream direction, in accordance with industry practice
m, m^2	Metres, square metres
km, km^2	Kilometres, square kilometres
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NPWS	National Parks and Wildlife Service (NSW)
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW) (former)
PAD	Potential archaeological deposit
The proposal	The Wilcannia Weir Replacement Project
RAP	Registered Aboriginal party
River kilometre	Distance along the centreline of a river (i.e. not in a straight line), measured in kilometres
SEARs	Secretary's environmental assessment requirements
WINSW	Water Infrastructure NSW

1. Introduction

Water Infrastructure NSW (WINSW) proposes to replace the existing Wilcannia Weir on the Darling River (Baaka) with a new weir located about five river kilometres downstream of the existing weir (the proposal) (refer to **Figure 1-1**). The existing weir would also be partially removed and decommissioned as part of the proposal. The proposal is located in the Central Darling local government area and would provide a more reliable long-term town water supply for Wilcannia to meet community needs. The proposal is funded by a $30 million commitment from both the NSW and Commonwealth governments.

1.1 Approval and assessment requirements

The proposal is declared State significant infrastructure under section 2.13 and Schedule 3 of the State Environmental Planning Policy (Planning Systems) 2021. The proposal is subject to assessment in accordance with Part 5 Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the environmental assessment requirements of the Secretary of the NSW Department of Planning and Environment (DPE) (the SEARs) (SSI-10050), dated 28 August 2020.

The Minister for Planning approves State significant infrastructure projects in accordance with section 5.14 of the EP&A Act.

During planning for the proposal, approval as critical State significant infrastructure in accordance with Schedule 3 of the *Water Supply (Critical Needs) Act 2019* was proposed, however the expiry of this Act on 21 November 2021 means that this is no longer a viable planning approval pathway. WINSW has advised the DPE of this change to the planning approval pathway for the proposal and its intention to submit a State significant infrastructure application.

The proposal is also determined to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and requires approval from the Australian Minister for the Environment.

This Aboriginal cultural heritage assessment report (ACHAR) has been prepared by Jacobs Group (Australia) Pty Ltd (Jacobs) as part of the environmental impact statement for the proposal. The environmental impact statement has been prepared to support the application for approval of the proposal and address the SEARs. This ACHAR addresses SEAR number 5 (refer to **Table 1-1**).

The proposal was originally proposed by WaterNSW as the proponent. The proposal's proponent changed to WINSW as of 1 September 2021. This report includes the work undertaken for the proposal by WaterNSW prior to this change, that informs the preparation of this document.

1.2 Proposal description

The proposed new weir would be located about two kilometres south of the Wilcannia township, and about five river kilometres downstream of the existing weir. The key design features of the proposal are shown in **Figure** 1-2 and include:

- A new weir with storage capacity of about 7,832 megalitres of water when the weir gates and fishway gates are closed
- A fixed crest portion of the weir about five metres high and 21.5 metres wide, next to the left bank (southern side) of the river
- A fishway about 120 metres long and 10.5 metres wide, next to the right bank (northern side) of the river to provide fish passage past the weir

- Remotely operated weir gates (with a manual function) to manage the storage, release and quality of water within the weir pool
- A small recreation area, known as a community river place, at Union Bend
- An upgraded unsealed access track about three kilometres long, between the Barrier Highway and the left side of the new weir (southern side)
- A new unsealed access track about 270 metres long, between Union Bend Road and the right side of the new weir (northern side)
- A permanent maintenance access track about 120 metres long, from the top of the right riverbank extending along the length of the fishway
- An electricity easement about 360 metres long and 20 metres wide, from the existing overhead powerlines on Union Bend Road to a new substation on the right side of the new weir. The substation would connect to a main switchboard installed within a prefabricated concrete switch room at the top of the right riverbank near the weir gates
- Conversion of an existing flow gauging station, located between the new and existing weirs, into a weir pool height gauging station
- Partial removal and decommissioning of the existing weir on the Darling River (Baaka) in the Wilcannia township, situated between Victory Park Caravan Park (left riverbank) and Field Street (right riverbank).

The existing weir pool extends about 61.79 river kilometres along the Darling River (Baaka) upstream from the existing weir when at the existing full supply level of 65.71 metres Australian Height Datum (AHD). Construction of the new weir would create a new section of weir pool of about 4.92 river kilometres between the new and existing weirs, which is referred to as the 'new town pool'. The new town pool would extend the total weir pool to about 66.71 river kilometres when the new weir is at the existing full supply level.

The new weir would have dual modes of operation: a normal operation mode when the weir would operate at the existing full supply level (65.71 metres AHD), and a drought security operation mode, when it would operate at a new full supply level of 66.71 metres AHD. This temporary increase in the full supply level of one metre would result in the weir pool being one metre deeper and extending about 18.81 river kilometres further upstream than the existing weir pool, to create a weir pool that is about 85.52 river kilometres long (refer to **Figure 1-1**).

In addition to the proposal features described above, the following temporary construction features would be required:

- Construction compounds and materials laydown areas on both sides of the river near the new weir
- A staging area on the left side of the river near the existing weir
- Access tracks down to the bed of the river from both sides of the river at the new weir
- An access track down to the bed of the river from the southern side of the river at the existing weir site (within the Victory Park Caravan Park)
- Cofferdams to create dry work areas within the river channel.

The key construction features proposed at the new weir and existing weir are shown in **Figure 1-3** and **Figure 1-4** respectively.

Construction would commence once all necessary approvals are obtained, and the detailed design is complete. It is anticipated that construction would start in early 2023 and take about 12 to 18 months to complete, weather permitting. Partial removal and decommissioning of the existing weir would take about 10 weeks and would occur after construction of the new weir is completed.

1.3 Study area

Ground disturbing activities associated with the construction of the proposal would be concentrated in two areas: the new weir site and associated access tracks, and the existing weir which is to be demolished. The construction footprint, or impact zone of the proposal, within these areas is shown in **Figure 1-3** and **Figure 1-4**. The section in between the new and existing weirs would contain a new weir pool within the riverbanks, where currently there is flowing water during times of higher flow in the Darling River (Baaka) when the existing weir overtops. The archaeological survey covered all areas within the proposal's construction footprint, as well as the riverbanks between the existing weir and the proposed new weir site (see below). The areas surveyed are collectively referred to in this ACHAR as the 'study area'.

Specifically, the study area **included** the following proposal elements (refer to **Figure 1-3** and **Figure 1-4**):

- Proposed construction areas near the site of the new weir. These include access tracks from the north (connecting to Union Bend Road) and south (connecting to the Barrier Highway), the weir, fishway, and associated construction areas, site compounds and laydown yards
- Proposed construction area around the existing weir. This includes an access track from the south, and the construction footprint required for partially removing and decommissioning the existing weir
- The riverbanks between the existing weir and the new weir. This stretch of the river is not inundated by the existing weir pool, as it is downstream of the existing weir. As a consequence, this stretch would see the greatest difference in water level after construction of the new weir. The possibility of erosion impacts to this previously unimpacted stretch of river necessitate a survey of a narrow corridor along each bank, including the channel edges and the crest of the riverbank.

The study area **excluded** the following areas:

- The inundation zone of the weir pool upstream of the existing weir. The majority of this area is part of the existing inundation zone created by the existing weir. As explained in **Section 1.2**, when the new weir is in drought security operation mode there would be an increase in the full supply level of the weir pool of up to one metre and, as a result, the weir pool would extend for an additional 18.81 kilometres upstream of the current upstream extent of the existing weir pool. It is anticipated that no substantial erosion of the riverbanks would result from either the increase in the full supply level of the weir pool or its extension upstream. The additional inundation zone would occur entirely within the channel of the river, an area unlikely to contain any Aboriginal objects due to impacts from past flood events. The new weir would transition between normal operation mode and drought security operation mode in a filling phase that would be managed to avoid a sudden reduction in river flows and water levels downstream of the new weir. and the new weir would transition from drought security operation mode to normal operation mode in a reset phase. The actions taken in the reset phase would depend on the headwater level when the reset phase is triggered:
    - If the reset phase is triggered when the headwater level is below the normal full supply level, then refilling of the storage to the normal full supply level would occur. Once the headwater level reaches the normal full supply level the weir would start normal operation mode
    - If the reset phase is triggered when the headwater level is above the normal full supply level, then the fishway gates would be lowered and the weir gates managed so that the maximum overtopping is 0.5 metres. During the reset phase lowering of the gate crest would be limited to 100 millimetres per day.

  As a consequence, it is anticipated that no substantial erosion of the riverbanks would result across this area due to raising and lowering of the weir gates.

  The potential salinity impacts of the proposal are assessed in Section 9.6.2 of the environmental impact statement. Groundwater mounding in the new town pool is likely to occur up to 100 metres away from the riverbanks in this section of the Darling River (Baaka). Long-term groundwater salinisation in low-lying

areas next to the new town pool would be similar to that which already occurs upstream of the existing weir in low-lying areas.

The decision to exclude this area from the archaeological survey was proposed at the first Aboriginal focus group (AFG) meeting (refer to **Section 3.1**) and was supported by the meeting attendees.

- Union Bend Road. WINSW prepared a separate environmental impact assessment of the proposed upgrade of Union Bend Road. An Aboriginal heritage due diligence investigation report was prepared to inform the environmental impact assessment. WINSW will carry out the upgrade of Union Bend Road as a separate project to the proposal, with work on the upgrade starting in December 2021
- The proposed community river place at the southern end of Union Bend Road next to Union Bend. At the time of the archaeological survey, the community river place was planned to be located next to the proposed new weir. The community river place was subsequently moved to the Crown reserve at the southern end of Union Bend Road. An additional archaeological survey was carried out to enable the assessment of any Aboriginal objects and sites in these areas. The results of the survey of the proposed community river place at Union Bend were written into an addendum to this report, which is provided in Appendix D.

1.4 Purpose and scope of this report

The purpose of this report is to assess the potential impacts to Aboriginal cultural heritage from constructing and operating the proposal. The report:

- Addresses SEAR number 5 as shown in **Table 1-1**
- Describes the existing environment with reference to potential for Aboriginal cultural heritage
- Assesses the potential impacts of constructing and operating the proposal on Aboriginal cultural heritage objects and places
- Recommends measures to mitigate and manage the impacts identified.

Table 1-1 How this assessment addresses SEAR number 5

Requirements	Where addressed in this report
5. Aboriginal heritage	
Identify and describe the Aboriginal cultural heritage values that exist across the site and any other area which the project could directly or indirectly impact in an ACHAR.	**Section 4.1, Section 4.2**
The ACHAR must: ▪ be prepared in consultation with the local Aboriginal community and other relevant stakeholders, having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (Office of Environment and Heritage (OEH) 2010);	**Section 3.1**
▪ document the significance of cultural heritage values for Aboriginal people who have a cultural association with the land;	**Section 4.2, Section 5, Section 8.3, Section 9.4.1**
▪ demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes;	**Section 9.1**
▪ where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts;	**Section 10**

Requirements	Where addressed in this report
▪ include reported cultural heritage sites known to the Barkandji, including the Falling Star, Billilla rocks, Union Bend Ngatji site and Steamers Point with the aim to:	**Section 9.3**
- Document and assess whether there is likely to be a direct or indirect threat to each site from the construction of the weir	**Section 9.2**
- Assess the significance of harm (scientifically and culturally) through archival documentation and through seeking information from the registered Aboriginal parties (RAPs), with reference to intergenerational equity, cumulative harm and consideration of social and economic factors	**Section 9.4**
- Determine if the project will impact on the proposed Barkandji Aboriginal Place nomination located near the weir.	**Section 9.3.5**
Relevant Policies and Guidelines: ▪ *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) ▪ *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) ▪ *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*	**Section 2.1**

1.5 Report structure

The structure of this report is outlined below:

- **Section 1** provides an introduction to the report
- **Section 2** outlines the legislative and policy framework relevant to the investigation and assessment of Aboriginal heritage in NSW
- **Section 3** presents an overview of consultation undertaken with the Aboriginal community in relation to the proposal. Consultation was carried out in accordance with the *Aboriginal Cultural Heritage Requirements for Proponents 2010* (DECCW 2010a)
- **Section 4** presents background information relevant to the proposal, including environmental information (geology, soils, climate and vegetation) as well as a discussion of ethnographic data
- **Section 5** presents a summary of the identified Aboriginal cultural values associated with the study area. This information has been sourced directly from the RAPs
- **Section 6** describes the method of the Aboriginal archaeological assessment of the study area. This includes the archaeological research, fieldwork and analysis that have been conducted in support of this report
- **Section 7** sets out the results of the Aboriginal archaeological survey of the study area
- **Section 8** assesses the heritage significance of the Aboriginal sites in the study area
- **Section 9** assesses the proposal's direct and indirect impact on identified Aboriginal sites and potential archaeological deposits (PADs) and the significance of these impacts. The section includes a discussion of the proposal's potential impact to sites identified in SEAR number 5
- **Section 10** recommends measures to manage and mitigate the impact of the proposal on Aboriginal sites and associated cultural values.

1.6 Authorship

The report was authored by:

- Doug Williams (Principal Archaeologist, Jacobs). Doug holds a Graduate Diploma of Applied Science (Cultural Heritage Management) from the University of Canberra and a Bachelor of Arts (Honours) from Australian National University. He has 29 years' experience as an archaeologist and is a full international member of the International Council on Monuments and Sites (ICOMOS)
- Oliver Macgregor (Senior Archaeologist, Jacobs). Oliver holds a PhD in archaeology and palaeoanthropology from the Australian National University and has over ten years' experience as an archaeologist
- Andy Roberts (Senior Archaeologist, Jacobs). Andy holds a Master of Letters and Diploma of Education from the University of New England and has over 25 years' experience as an archaeologist and cultural heritage consultant.

The report was reviewed by:

- Fran Scully (Principal Archaeologist, Jacobs). Fran holds an MSc in archaeological geophysics from the University of Bradford and has over 28 years' experience as a field archaeologist, consultant archaeologist, cultural heritage advisor, heritage regulator and policy advisor.

Mapping was prepared by:

- Sam Prater (GIS Analyst, Jacobs)
- James Paull (Team Leader Geospatial Solutions, Jacobs)
- Hannah M^{c}Inerney (Senior Spatial Analyst, Jacobs)
- Lyalee Tiongson (Spatial Analyst, Jacobs).

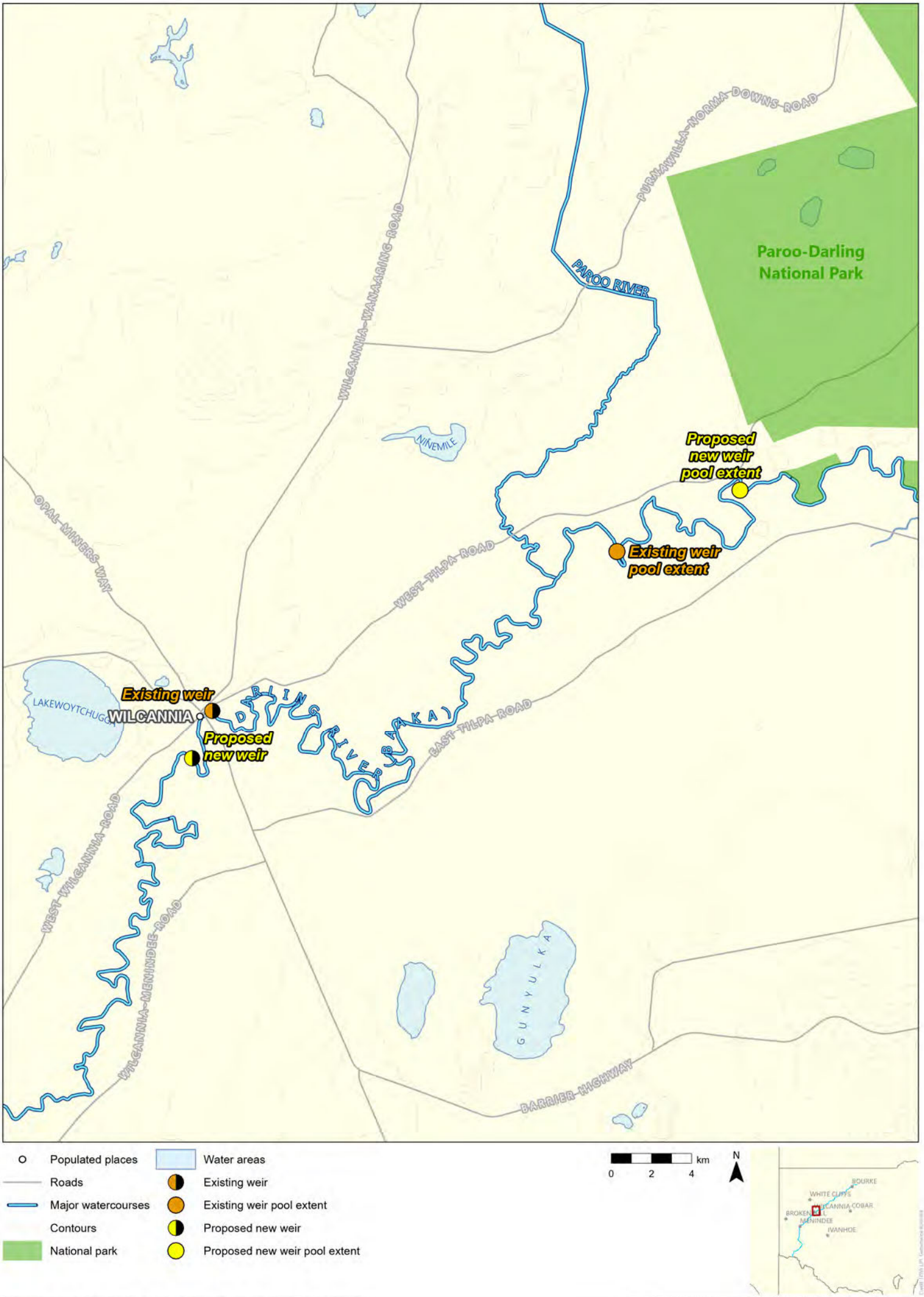

Figure 1-1: Proposal location and regional context

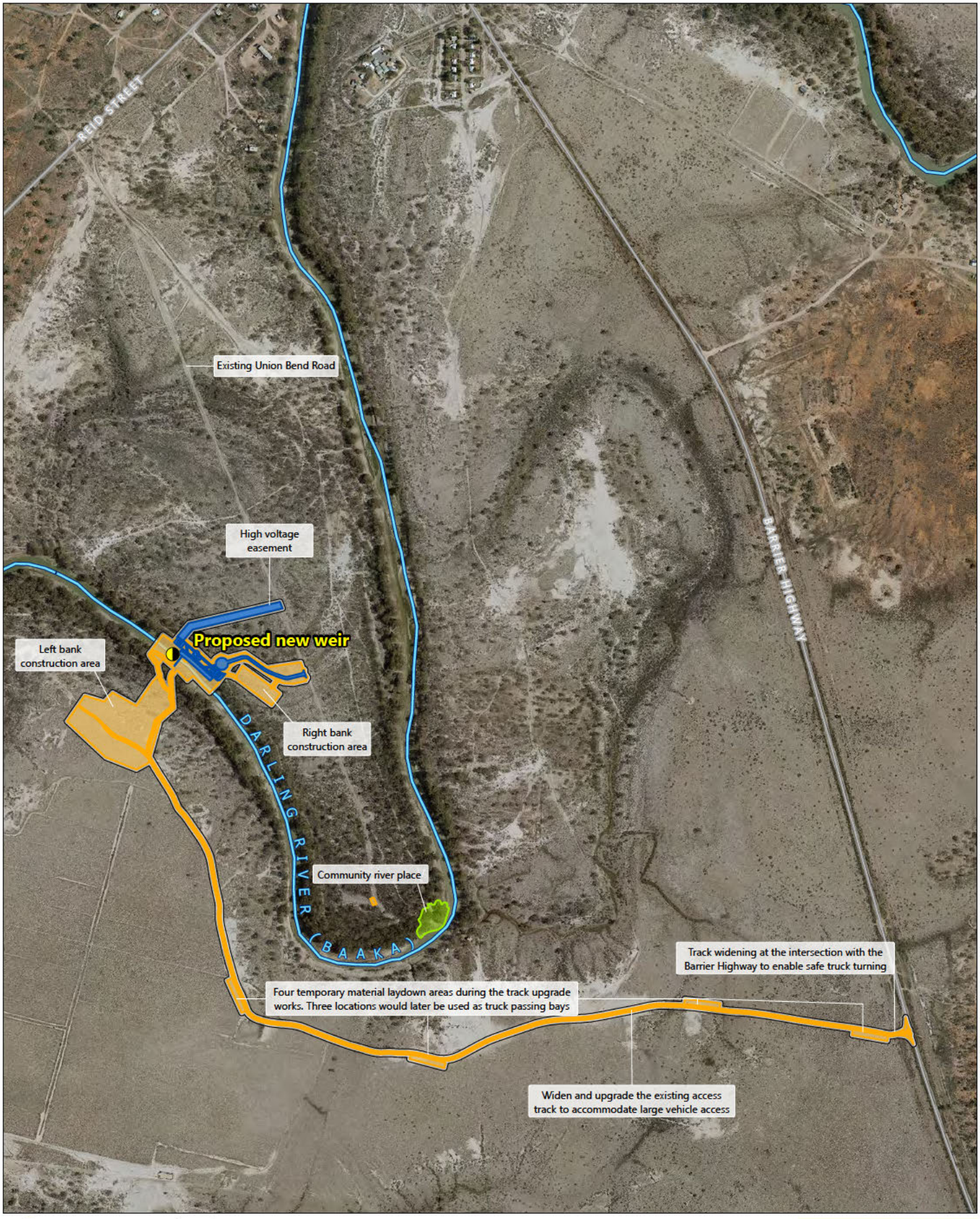

Figure 1-2: Key design features of the proposal – new weir site (overview)

Figure 1-3: Key construction features – new weir site (detail)

Figure 1-4: Key construction features - existing weir site

2. Legislative and policy framework

2.1 NSW legislation

2.1.1 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides for the protection of Aboriginal objects and Aboriginal places in NSW.

An Aboriginal object is defined in section 5 of the NPW Act as:

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

An Aboriginal place is defined as an area that has been declared by the Minister administering the NPW Act as a place of special significance for Aboriginal culture. It may or may not contain Aboriginal objects.

Under section 86 of the NPW Act, it is an offence to harm or desecrate an Aboriginal object or Aboriginal place, without the prior written consent from the Chief Executive. Penalties of up to $550,000 for individuals and $1,100,000 for corporations apply when a person harms or desecrates an object that they know to be an Aboriginal object (called a 'knowing offence'). However, a 'strict liability' offence still applies if a person harms an Aboriginal object or harms or desecrates and Aboriginal place regardless of whether the person knew it to be an Aboriginal object or Aboriginal place.

Causing harm to an object or place is defined in section 5 of the NPW Act as any act or omission that:

(a) destroys, defaces or damages the object or place, or

(b) in relation to an object—moves the object from the land on which it had been situated, or

(c) is specified by the regulations, or

(d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c),

but does not include any act or omission that:

(e) desecrates the object or place, or

(f) is trivial or negligible, or

(g) is excluded from this definition by the regulations.

Section 87(1) of the NPW Act provides that it is a defence to a prosecution for an offence under section 86(1) (2) or (4) if the harm or desecration concerned was authorised by an Aboriginal heritage impact permit (AHIP) and the conditions to which that AHIP was subject were not contravened. Section 90 of the NPW Act outlines the conditions where an AHIP may be issued.

However, under section 5.23(d) of the EP&A Act, an AHIP under section 90 of the NPW Act is not required for approved State significant infrastructure projects.

Under section 89A of the NPW Act it is a requirement to notify Heritage NSW of the location of an Aboriginal object. Identified Aboriginal objects and sites are registered on the Aboriginal Heritage Information Management System (AHIMS) maintained by Heritage NSW. Procedures that accompany the NPW Act include the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (ACHCRP), the *Code of*

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

2.1.1.1 Aboriginal Cultural Heritage Consultation Requirements for Proponents

The ACHCRP establishes the requirements for consultation (under Part 6 of the NPW Act) with Aboriginal stakeholders as part of the heritage assessment process to determine potential impacts of proposed activities on Aboriginal objects and places and to inform decision making for any application for an AHIP. The process comprises four stages with associated timeframes which must be adhered to:

- Stage 1 – Notification of the proposal and registration of interest (14 days from date letter sent to register as a RAP)
- Stage 2 – Presentation of information about the proposal (set up AFG meetings, prepare info etc.)
- Stage 3 – Gathering information about cultural significance (28 days for RAPs to provide a review and feedback on consultant's methodology)
- Stage 4 – Review of draft ACHAR (RAPs have 28 days from sending of the report to make a submissions).

2.1.1.2 Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW

The *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) sets out the detailed requirements for archaeological investigations of Aboriginal objects in NSW for activities that require assessment under Part 4 or Part 5 of the EP&A Act. An AHIP to undertake test excavation is not required if complying with this Code, as test excavations complying with this Code are excluded from the definition of harm to an Aboriginal object. The Code sets out in detail:

- Minimum qualifications for anyone undertaking archaeological investigation under the Code in NSW
- Assessment steps required to be undertaken for all archaeological investigation
- Assessment steps that may be required to be undertaken to adequately characterise the Aboriginal objects being investigated.

2.1.1.3 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW

The *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011a) provides guidelines for the investigation and assessment of Aboriginal cultural heritage (under Part 6 of the NPW Act) to explore the harm of a proposed activity on Aboriginal objects and declared Aboriginal places and to clearly set out which impacts are avoidable, and which are not. It identifies DPE's requirements for the preparation of an ACHAR.

2.1.2 Environmental Planning and Assessment Act 1979

The EP&A Act regulates environmental planning and assessment for NSW. Land use planning requires that environmental impacts are considered as part of the assessment of development, including impacts on Aboriginal cultural heritage.

The EP&A Act includes the requirement for environmental impacts to be considered prior to development approval including the requirement for impacts or likely impacts upon Aboriginal cultural heritage to be assessed as part of a project's environmental approval.

As identified in **Section 1.1**, the proposal has been declared State significant infrastructure, and is subject to assessment in accordance with Part 5 Division 5.2 of the EP&A Act and the SEARs.

2.1.3 Native Title (New South Wales) Act 1994

The *Native Title (New South Wales) Act 1994* was introduced to ensure that the laws of NSW are consistent with the Commonwealth *Native Title Act 1994*. It validates past and intermediate acts which may have been invalidated because of the existence of native title.

Native title (non-exclusive) is held over a portion of the study area (NCD2015/001 - Barkandji[2] Traditional Owners #8 Part A), including the existing weir, the Victory Park Caravan Park, the length of the Darling River (Baaka) affected by the proposal, and the area at the new weir on the right riverbank and inclusive of Union Bend Road.

Native title (exclusive) is held over a portion of the study area (NCD2017/001 – Barkandji Traditional Owners #8 Part B), including the embankments on the left riverbank at the new weir location, and the access track connecting the new weir site to the Barrier Highway. The same area is subject to the Barkandji Weinteriga and Yobel Station Indigenous Land Use Agreement registered on 13 July 2018 (NI2018/003).

The Barkandji Native Title Group Aboriginal Corporation is the recognised representative for these lands.

Native title provides rights over land and water according to traditional laws and customs. WINSW has presented on the project at a Native Title board meeting in Wentworth in October 2020 and continue to co-ordinate opportunities for consultation.

2.1.4 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) establishes the NSW Aboriginal Land Council and local Aboriginal land councils (LALCs). The Act requires these bodies to:

- Take action to protect the culture and heritage of Aboriginal persons in the council's area, subject to any other law
- Promote awareness in the community of the culture and heritage of Aboriginal persons in the council's area.

The preamble of the Act states that land was traditionally owned and occupied by Aboriginal people and accepts that as a result of past government decisions, the amount of land set aside for Aboriginal people was reduced without compensation. To redress the loss of land, Aboriginal land councils can claim Crown land which, if granted, is transferred as freehold title. 'Claimable Crown lands' includes Crown lands that are not lawfully used or occupied and that are not needed, nor likely to be needed, for an essential public purpose.

Under Part 2 of the ALR Act, claimable Crown lands do not include lands that are the subject of an approved determination of native title.

2.1.5 Ecologically sustainable development

An objective of the NPW Act is the "conservation of objects, places or features...of cultural value within the landscape, including ... places, objects and features of significance to Aboriginal people ..." s.2A(1(b)(i)). The principles of ecologically sustainable development function to protect places and objects of cultural heritage value from unnecessary or avoidable harm, and to ensure that progressive development does not excessively deplete a given region's cultural heritage resource.

Ecologically sustainable development is defined in section 6 of the *Protection of the Environment Administration Act 1991* (NSW) as requiring the effective integration of social, economic and environmental considerations (including cultural heritage) in the decision-making process. In essence, a consideration of ecologically sustainable development in relation to cultural heritage involves an evaluation of the benefits of any given development project against the negative effects that the project would have to cultural heritage.

[2] Note several spellings are commonly used, including Baakandji, Barkindji, Baakinji, Paakantyi. This report uses the spelling 'Barkandji', as this spelling was used in Native title documents. Use of this spelling in this document should not be taken as implying elevated legitimacy or correctness of this spelling over others.

Any assessment involving Aboriginal cultural heritage is required to consider the principles of ecologically sustainable development, in particular the precautionary principle and the principle of inter-generational equity (OEH 2011a:12).

Intergenerational equity

Intergenerational equity is the principle whereby the present generation should ensure the health, diversity and productivity of the environment for the benefit of future generations (OEH 2011a: 12). A consideration of intergenerational equity in relation to a development project involves assessing the project's cumulative impact and considering whether this cumulative impact is at an acceptably low level.

Assessing cumulative impacts involves the consideration of the proposed impact in the context of existing developments and past destruction of heritage sites, as well as the population of heritage sites that still exist in the region of interest (Godwin 2011). The concept of assessing cumulative impacts aims to avoid discussing the impact of a development in isolation and aims to assess the impact in terms of the overall past and future degradation of a region's heritage resource. In essence, an assessment of cumulative impacts aims to ensure that a project would not result in the reduction of a region's remaining cultural heritage resource to an unacceptably low level.

> *In terms of Aboriginal heritage, intergenerational equity can be considered in terms of the cumulative impacts to Aboriginal objects and places in a region. If few Aboriginal objects and places remain in a region (for example, because of impacts under previous AHIPs), fewer opportunities remain for future generations of Aboriginal people to enjoy the cultural benefits of those Aboriginal objects and places* (OEH 2011b: 23).
>
> *Information about the significance of Aboriginal cultural heritage values associated with the Aboriginal objects and places proposed to be harmed will be relevant to the consideration of intergenerational equity and an understanding of the cumulative impacts of a proposal. Where there is uncertainty, the precautionary principle should also be followed* (OEH 2011b: 23).

The cumulative impacts of the proposal are considered in **Section 9.4**.

Precautionary principle

The precautionary principle states that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation (OEH 2011a: 12).

In applying the precautionary principle, decisions should be guided by:

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

The development of management and mitigation measures (**Section 10**) has adopted the precautionary principle where appropriate. The precautionary principle is of particular relevance to measures protecting sites near the proposal's construction footprint from inadvertent (indirect) impact. The precautionary principle was also the driver of measures that have been taken to avoid and minimise impacts wherever possible – these avoidance and minimisation measures are detailed in **Section 9.1**.

2.2 Commonwealth legislation

2.2.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides for the protection of the environment, especially in Matters of National Environmental Significance. Under the EPBC Act, a person must not take an action that has, will have, or is likely to have a significant impact on any of the Matters of National Environmental Significance without approval from the Commonwealth Minister for the Environment. The definition of the environment under the EPBC Act includes

both natural and cultural elements. Under the EPBC Act, heritage items can be listed on the National Heritage List (for items of National heritage significance) or the Commonwealth Heritage List (for items of heritage significance on land owned or managed by the Commonwealth).

There are no National Heritage or Commonwealth Heritage items within the study area.

2.2.2 Native Title Act 1993

The *Native Title Act 1993* seeks to recognise and protect native title. A successful native title determination results in the recognition of the rights, interests or uses claimed by the registered party, and any actions by government on that land must be consistent with the claim. The *Native Title Act 1993* provides a framework for the determination of native title claims and for negotiations and decision making regarding the use and management of native title lands and waters. Exclusive rights to land are only available on certain unallocated or vacant Crown lands.

In accordance with section 234KA of the *Native Title Act 1993*, WINSW has notified the Barkandji Traditional Owners Corp #8 of the intent to construct the proposal on lands covered by native title and commenced negotiations to meet their obligations under this Act.

3. Aboriginal community consultation

Aboriginal stakeholder engagement and involvement is important for the identification of Aboriginal cultural heritage values within the study area. Aboriginal stakeholder consultation, specified as a requirement in the SEARs, has been completed in accordance with the ACHCRP.

The consultation procedures outlined in the ACHCRP were designed to aid compliance with the NPW Act, which acknowledges that Aboriginal people:

- Should have the right to maintain culture, language and identity
- Should have the right to directly participate in matters that may affect their heritage
- Are the primary determinants of the cultural significance of their heritage.

The requirements include a process of community consultation with Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) and the opportunity to participate in decision making regarding the management of their cultural heritage by providing proponents with information regarding cultural significance and providing input into management options.

A consultation log for this proposal is located in **Appendix B**. This section details the consultation process undertaken to inform the environmental impact statement.

3.1 The consultation process

Consultation undertaken to date in relation to the proposal is in accordance with the procedures outlined in the ACHCRP. Seven actions were carried out across the four stages of consultation set out in the ACHCRP, which are described in the following sections.

These stages allow for the identification of key Aboriginal stakeholders for the proposal, from which a list of RAPs can be developed. They provide a method of ensuring RAPs are given information about the proposal and for an iterative development of the assessment methodology, as well as a process for pertinent cultural information to be gathered and documented. They also ensure that RAPs have an appropriate timeframe to review all documentation and provide input into the development of management options.

3.1.1 Stage 1 – Identification of key stakeholders

Stage 1 of the ACHCRP outlines a number of steps that must be taken to identify Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and in the area of the proposal. It provides an approach for areas where native title determinations have been made and one for areas where native title determinations do not exist.

As detailed in **Section 2.1.3**, a search of the National Native Title Tribunal's registers of native title, native title claims, and Indigenous land use agreements was undertaken on 16 October 2020. There are two current native title determinations in the study area: Barkandji Traditional Owners #8 Part A determination (Federal Court file number NSD6084/1998, NNTT file number NCD2015/001), which was registered on 16 June 2015, and Barkandji Traditional Owners #8 Part B determination (Federal Court file number NSD6084/1998, NNTT file number NCD2017/001), which was registered on 22 August 2017. These claims cover the entire study area (**Figure** 3-1).

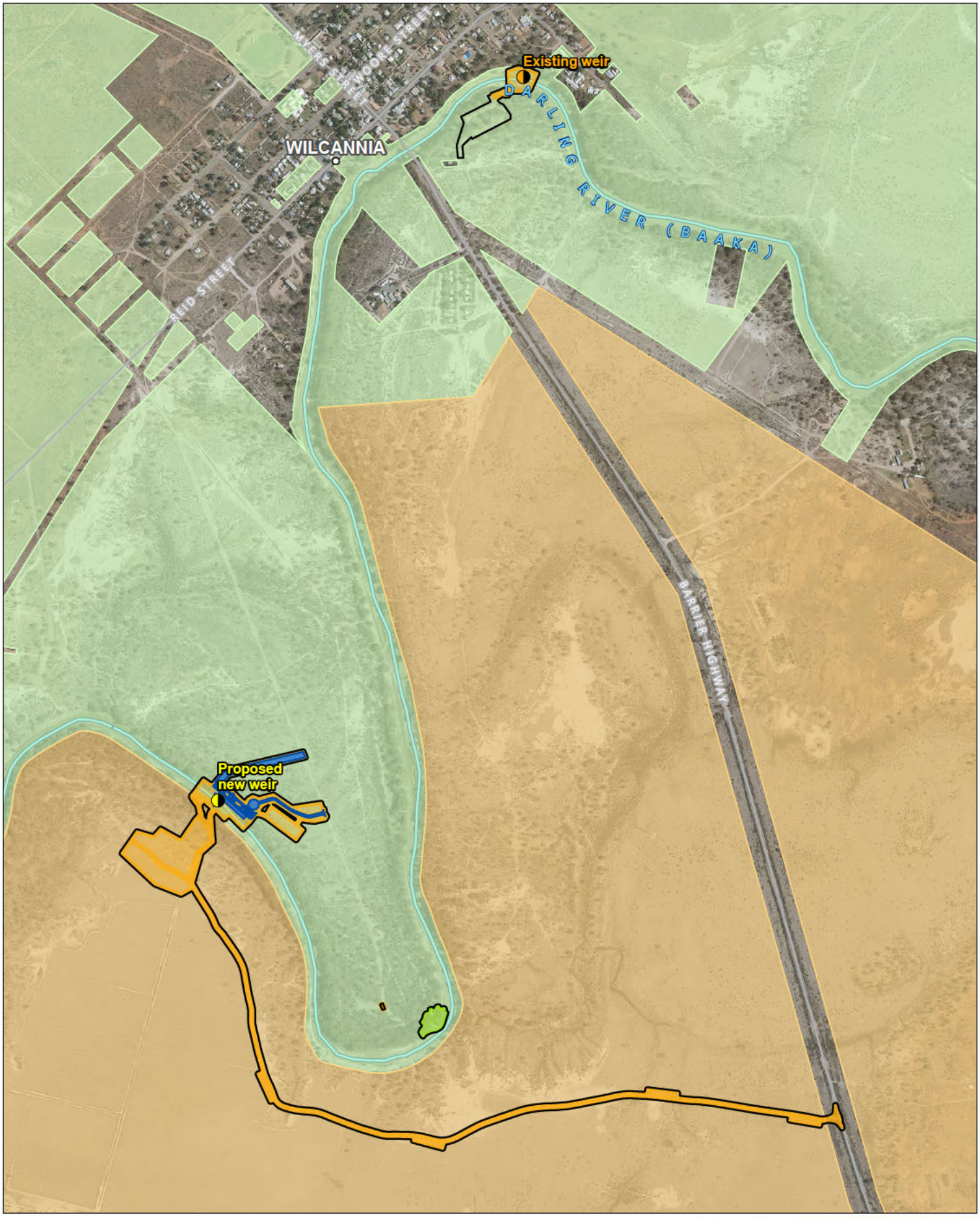

Figure 3-1: Native title determination areas relevant to the proposal's investigation study area

The Australian Institute of Aboriginal and Torres Strait Islander Studies 1996 map of indigenous language groups identifies the study area as being situated within the traditional language, nation or social areas of the Danggali, Barkandji and Barundji people (https://aiatsis.gov.au/explore/articles/aiatsis-map-indigenous-australia, accessed 16 October 2020). Additionally, the Malyangapa people are recognised native title holders with the Barkandji Traditional Owners.

It is noted that LALCs are statutory organisations established by the NSW Government under the ALR Act to assist their respective members living within each LALC boundary. The study area is situated within the boundary of the Wilcannia LALC.

Notification was initiated on 10 September 2020 to all relevant organisations listed under Section 4.1.2 of the ACHCRP. These organisations are listed in **Table 3-1.**

Table 3-1 List of contacted organisations (Stage 1 consultation)

Name of organisation	Date of notification	Date of response received
Heritage NSW (Northern office)	10 September 2020	8 October 2020 Provided list of RAPs
National Native Title Tribunal	10 September 2020	None received
Wilcannia LALC	25 September 2020	23 October 2020
Native Title Services Corporation Limited (NTSCorp)	10 September 2020	None received
Office of the Registrar, Aboriginal Land Rights Act	10 September 2020	None received
Central Darling Shire Council	14 September 2020	None received

In accordance with Section 4.1.3 of the ACHCRP, a notice in the local newspaper circulating in the general location of the proposal must be completed, with information explaining the proposal and its exact location. Notices were placed in the Koori Mail on 23 September 2020, and in the Wilcannia News on 15 September and 22 September 2020. Copies of all advertisements are included in **Appendix B**.

Notifications of the proposal were sent to groups and individuals identified as a result of the above consultation process. These notifications included an invitation for the recipient to register as a RAP. A total of five groups and two individuals without a stated group affiliation registered as RAPs (**Table 3-2**). Copies of registration documents are included in **Appendix B**.

Table 3-2 RAPs identified through Stage 1 consultation

Name	Organisation represented
Badger Bates	Barkandji Elder
Cyril Hunter	Barkandji Elder
Michael Kennedy	Wilcannia LALC
Leslie Harris	Wilcannia LALC
Jennifer Thwaites	Wilcannia LALC
Kevin Bates	Wilcannia LALC
Steven Harris	Wilcannia LALC
Monica Kerwin	Wilcannia Community Working Party
Owen Whyman Snr	Barkandji Community Representative
Owen Whyman Jnr	Barkandji young person (being mentored by elders)
Bama Johnson	Barkandji young person (being mentored by elders)

Following Section 4.1.6 of Stage 1 of the ACHCRP, a list of RAPs for the proposal and copies of the notifications from Section 4.1.3 were submitted to Heritage NSW and Wilcannia LALC.

3.1.2 Stage 2 – Presentation of information about the proposal

Stage 2 of the consultation process provides RAPs with information about the scope of the proposal and the proposed cultural heritage assessment process.

Doug Williams (Principal Archaeologist, Jacobs), Oliver Macgregor (Senior Archaeologist, Jacobs), Felicity Rooney (WINSW), Tracey Willingham (WINSW), and Ray Hanrahan (WINSW) attended an AFG meeting in Wilcannia on 5 November 2020. The nature of the proposal, and the locations likely to be impacted and at risk of inadvertent impacts from construction of the proposal were discussed. The proposed method for the Aboriginal archaeological assessment was presented in detail. Representatives from the RAPs present at the AFG expressed support for the proposed assessment method.

3.1.3 Stage 3 – Gathering information about cultural significance

Stage 3 of the consultation process is to facilitate a means whereby RAPs can contribute culturally appropriate information, provide information that will enable the cultural significance of Aboriginal objects and/or places in the study area to be determined, and have input into the development of any cultural heritage management options.

RAPs were invited to submit information relevant to the cultural significance of the study area and any areas and objects within it, at all stages of the consultation and fieldwork process.

Doug Williams (Jacobs) along with Brendan O'Neill, Mina Suh and Felicity Rooney (WINSW) attended a second AFG in Wilcannia on 9 December 2020. The results of the archaeological survey, the expected impacts to Aboriginal cultural heritage that would result from the proposal, and preliminary draft recommended management and mitigation measures were discussed. Input on the significance of identified Aboriginal objects, as well as the broader cultural significance of places relevant to the proposal, was sought from attendees at this AFG.

Following the presentation of the preliminary draft findings of the ACHAR, the team, including the RAPs, travelled to the proposed new weir site to discuss the findings and preliminary draft recommended management and mitigation measures in context.

Discussions during this AFG and site visit presented the opportunity for the RAPs to provide:

- Further comments on the cultural significance of any Aboriginal cultural heritage sites identified during the survey and in the preliminary draft ACHAR
- Comment on the preliminary draft recommended management and mitigation measures, including recommendations for further assessment.

As a consequence of this consultation, the management and mitigation measures included in this report have been expanded and refined.

Information on cultural heritage significance was sought from, and provided by, RAPs during the initial AFG on 05 November 2020 (refer to **Section 3.1.2**); during the archaeological survey; and at the AFG on 09 December 2020. A draft version of this report was provided to the RAPs (refer to **Section 3.1.4**) for review and comment, a process which provided further opportunity for RAPs to contribute information on cultural heritage significance.

3.1.4 Stage 4 – Review of draft ACHAR

A draft of this ACHAR was provided to all RAPs on 3 May 2021. A period of 28 days was provided to RAPs to review the draft ACHAR and provide feedback and input. An additional three weeks were provided following a request by the RAPs for more time to review the draft ACHAR.

Following this review, the draft ACHAR was revised to include a change in the design of the proposal to partially remove the existing weir instead of entirely removing the existing weir to reduce impacts to the fish traps at this location. A draft addendum report was also appended to the revised draft ACHAR detailing the results of the survey of the new community river place (refer to **Appendix D**). The revised draft ACHAR was issued to RAPs on 27 April 2022. A period of 28 days was provided to RAPs to review the revised draft ACHAR and provide feedback and input.

3.1.5 Sensitive cultural information and management protocol

RAPs were supplied with the following advice to consider in the event that they wished to submit sensitive cultural information to which access might need to be restricted:

> *In the event that such information is supplied, the RAP supplying the information should state to Jacobs how they wish that information to be treated, and how access to the information should be restricted.*
>
> *Jacobs will follow the stated wishes provided by the RAP group in question when managing and using the information provided to Jacobs. All stated restrictions of access, communication and publication of the information will be followed. These might include:*
>
> - *Restrictions on reproducing the information (in whole or in part) in reports*
> - *Restrictions on reproducing the information in reports provided to different audiences (for example, the versions provided to WINSW, DPE and Heritage NSW)*
> - *Restrictions on communication of the information in other ways*
> - *Restrictions on where the information is stored*
> - *Other required processes relating to handling the information*
> - *Any names and contact details of persons authorised within the relevant Aboriginal group to make decisions concerning the information, and their degree of authorisation*

- *Any details of any consent given in accordance with customary law*
- *Any restrictions on access to and use of the information by RAPs.*

The above list should be considered when providing a statement of requirements regarding any culturally sensitive information.

No information identified by RAPs as sensitive cultural information was provided to Jacobs staff during this assessment.

3.1.6 Future consultation

WINSW would seek to continue engaging with the RAPs and local Aboriginal community as the proposal progresses through the planning approval process.

3.2 Consultation log

A log summarising all consultation carried out during preparation of the ACHAR is provided in **Appendix B**.

4. Background information

4.1 Environmental context

The proposal is located within the Darling Riverine Plains Bioregion (DRPB). This bioregion extends from Queensland into NSW along a long, narrow riverine corridor that runs southwest along the Darling River (Baaka). The main body of the bioregion extends from east of Boggabilla to Weilmoringle on the Queensland border, south almost to Peak Hill and west to Nyngan and Bourke. The Darling River (Baaka) corridor extends from Bourke almost to the southern edge of the Menindee Lakes, and south through the Murray Darling Depression Bioregion to the Victorian border where the Darling (Baaka) joins the Murray River. The proposal is in one of the sub-regions of the DRPB, the Wilcannia Plains sub-region, the eastern extent of which incorporates the township of Wilcannia.

The DRPB is examined in the following sections in relation to its climate, geography, soils, hydrology, landform, and biodiversity. An assessment of these factors enables the archaeological context of the proposal to be understood in more depth. The majority of information in this section was obtained directly from the NSW government documentation available online (Department of Planning, Industry and Environment (DPIE) 2016; NSW National Parks and Wildlife Service 2003).

4.1.1 Darling Riverine Plains Bioregion

4.1.1.1 Climate

The DRPB lies in the semi-arid climatic zone, which is hot and persistently dry (Stern *et al.* 2000). This semi-arid area occupies most of the western arm of the bioregion, accompanied by very small patches of both arid and warm semi-arid climate. The bioregion also contains minor patches of subtropical climate in the east with sub-humid areas in the southeast.

On average, the eastern portion of the bioregion receives higher and more reliable rainfall, with flooding occurring mainly in summer, while irregular cyclonic depressions can occur to the north of the bioregion (Morgan and Terrey 1992).

The present-day climate is likely to be broadly similar to the climate in the pre-contact period, and the region in which the study area sits is likely to have been similarly semi-arid. The hydrology of the region would have been quite different (**Section 4.1.1.3**), and it is this variable which would have played a much more important role in the resources available in the landscape. In broad terms, however, the semi-arid climate would be expected to lead to a concentration of Aboriginal occupation (and consequently archaeological sites) around watercourses and lakes.

4.1.1.2 Geology and soils

The main waterways contributing water and sediment to the alluvial fans of the DRPB are the Bogan, Macquarie, Castlereagh, Namoi, Gwydir, Macintyre, Narran, Bokhara and Culgoa rivers. Tributaries downstream of Bourke are ephemeral and contribute little water or sediment to the Darling River (Baaka). Sheets of alluvium up to 100 metres thick have been deposited on older sedimentary rocks and contain marine sediments of an inland sea of Cretaceous age (DPIE 2016).

Almost all bedrock features have been buried in this sedimentary basin, with only a few high points of basement rocks such as Mt Foster (northeast of Nyngan) rising above the plain, and more extensive areas of the Cretaceous sandstones forming low rises around Lightning Ridge and in the Collarenebri interfluve.

Sandy soils are found in linear belts along the older waterway channels, sometimes with local source dunes on their border. Texture contrast soils, often badly eroded, are found marginal to channels of all ages, and most of the plains are dominated by deposits of heavy dark-coloured clays.

Many clay areas have gilgai micro-relief patterns, most crack extensively, and others are more or less permanently wet in swamplands (DPIE 2016; NSW National Parks and Wildlife Service 2003).

The sandy soils have low nutrient levels and drain rapidly. The clay soils vary more depending on source rocks in the catchment, but all have only a limited amount of free water available to plants. Most soils contain high levels of calcium carbonate, and some are saline (DPIE 2016; NSW National Parks and Wildlife Service 2003).

Within the Wilcannia Plains sub region, the geology consists of alluvial plains of the mid-Darling valley, confined between the Cobar peneplain and Mulga lands bioregions. Shallow quaternary alluvial sediments over bedrock are the most usual regolith type (i.e. type of soil or sediment at the ground surface) across the region. The soils consist of grey clays from channels to backplains and on lake beds. Red soils and patchy sands probably represent alluvial terraces (DPIE 2016).

The study area, being close to the Darling River (Baaka), is made up of quaternary sediments that have mostly been alluvially deposited, with some sediments having been secondarily reworked and deposited as low aeolian dunes on top of old floodplain deposits.

Sediments are relatively mobile in the landscape, being subject to movement through alluvial processes during floods, and through aeolian (wind-blown) movement. The mobility of sediments would be expected to result in highly localised patterning of erosion and aggradation, meaning that some landforms will have the potential to contain buried archaeological objects, while other landforms will be erosional and lack the potential to contain subsurface material.

The available information on the region's geology and soils does not enable any predictive statements to be made relating to sources of stone (either for production of flaked artefacts, or for grinding/hammering tools). Outcrops of stone could occur irregularly and unpredictably within the landscape immediately surrounding the study area.

4.1.1.3 Hydrology

The DRPB occupies most of the upper catchments of the Darling (Baaka) and Barwon rivers in northern NSW and southern Queensland and includes the channels and floodplains of the lower reaches of these catchments. The bioregion falls entirely in the Murray-Darling Basin and includes the Macintyre-Dumaresq, Culgoa, Narran, Warrego, Paroo, Moonie, Barwon, Gwydir, Namoi, Macquarie, Yanda, Castlereagh and Darling (Baaka) catchments. The upper catchment landscape is a series of overlapping, low gradient alluvial fans. The lower tract of the Darling River (Baaka) is a narrow floodplain confined between bedrock landscapes, or by extensive sandplains and dune fields (OEH 2018). Discharge from past and present waterways control patterns of sediment deposition, soils, landscapes and vegetation. Much of the geology and geomorphology of the region is similar to that of the Riverina Bioregion (DPIE 2016).

The Darling River (Baaka) flows through a deep incised channel, with ephemeral flood-runners, lakes, and oxbow lakes bordering it. The river and its associated alluvial features would certainly have been foci for Aboriginal occupation in the area in the past (as it continues to be today). These areas would have acted as sources of water in the semi-arid landscape surrounding them, as well as a range of plant and animal resources for use as food and materials for building, clothing, and other applications.

The morphology of the Darling River (Baaka) today is different from the pre-contact period. Increased water usage for upstream irrigation and town water supply has resulted in lower water levels and more frequent drying-up of stretches of the river. This change in water flow has had severe effects on the plants and animals living in the river, with a decrease in overall biomass and diversity of species having been observed even within the living memory of Aboriginal people living in the area today (this information was repeatedly communicated to Jacobs' archaeologists by the majority of representatives from the RAPs taking part in the archaeological survey and attending the AFG meetings). The ecology of the study area today is consequently not similar to the ecology which would have been present and available to Aboriginal people in the pre-contact past.

4.1.1.4 Landforms

Landforms in the Wilcannia Plains sub region consist mainly of river channel and floodplain features. Anabranches are present and these feed lakes on the margins of the valley. The sub region has limited areas of dunes and sandplains.

Landforms within the study area itself consist entirely of the Darling River (Baaka) channel and the channels of small feeder streams, the river's built-up alluvial levee banks, and floodplains adjacent to the main river channel. The floodplains contain dry channels of ephemeral flood-runners, some of which could be remnants of older river channels, flat plains of alluvial flood deposit, and some low aeolian dunes. The entire study area lies close enough to the river that Aboriginal groups camping in any part of the study area could easily reach the river and utilise its resources. Consequently, any part of the study area could well contain archaeological material deposited by groups living near and utilising the Darling River (Baaka) and its associated streams and lakes.

4.1.1.5 Biodiversity

River channels in the DRPB support River Red Gum (*Eucalyptus camaldulensis*) and River Cooba (*Acacia stenophylla*) communities, with some areas of River Paperbark (*Melaleuca trichostachya*), especially along the tributaries of the Barwon. These species grow on the channel margin in the annual flood zone.

Vegetation directly reflects past patterns of sedimentation and today's flooding regime, with some variation in plant species across the region relating to summer or winter rainfall dominance. Only the hardiest trees can survive the heavy clays of the backplains. These species include Myall (*Acacia pendula*), Poplar Box (*Eucalyptus populnea*) and Belah (*Casuarina cristata*) on the Bogan and Macquarie, and Coolabah (*Eucalyptus coolabah*) and Grey Box (*Eucalyptus microcarpa*) on northern waterways. Many plains are treeless, supporting only shrubs and grasses such as Old Man Saltbush (*Atriplex nummularia*), Bladder Saltbush (*Atriplex vesicaria*) and Mitchell Grass (*Astrebla sp*.) (DPIE 2016).

Landscapes closer to the hills support western plains woodlands, which consist of Grey Box (*Eucalyptus microcarpa*), Blakely's Red Gum (*Eucalyptus blakelyi*), Silver-leaf Ironbark (*Eucalyptus melanophloia*), Poplar Box (*Eucalyptus populnea*), Wilga (*Geijera parviflora*), Rosewood (*Heterodendrum oleifolium*), Belah (*Casuarina cristata*), Kurrajong (*Brachychiton populneum*), White Cypress Pine (*Callitris glaucophulla*), Yarran (*Acacia homalophylla*), some Brigalow (*Acacia harpophylla*) and several other species of Acacia.

Sandy soils on levees of old channels and dunes often have stands of White Cypress Pine (*Callitris columellaris*). Lake beds may be bare or covered by clumped Lignum (*Muehlenbeckia cunninghamii*) with a fringe of Black Box (*Eucalyptus largiflorens*). Lunettes support stands of Belah (*Casuarina cristata*), some Mallee, Eastern White Pine (*Pinus strobus*), Prickly Wattle (*Acacia victoriae*), Black Bluebush (*Maireana pyramidata*), and Sandhill Canegrass (*Zygochloa paradoxa*).

Within the Wilcannia Plains sub region, the vegetation typically comprises Coolabah (*Eucalyptus coolabah*), River Red Gum (*Eucalyptus camaldulensis*), River Cooba (*Acacia stenophylla*) and some Black Box (*Eucalyptus largiflorens*) along the river channel. Sandhill Canegrass (*Zygochloa paradoxa*) and Lignum (*Muehlenbeckia cunninghamii*) are present in depressions, with saltbush, Black Bluebush (*Maireana pyramidata*) and grasses on backplains. Poplar Box (*Eucalyptus populnea*), Rosewood (*Heterodendrum oleifolium*) and some Black Box (*Eucalyptus largiflorens*) are typically found on red soils and at the valley margins (DPIE 2016).

The bioregion is currently home to 25 amphibian species, 104 reptile species, 319 bird species and 58 mammal species (DPIE 2016).

As noted in **Section 4.1.1.3**, the ecology of the region in the past was certainly richer – both in the overall biomass of plants and animals living in the landscape, and in the diversity of species present – than it is today. Nonetheless, the region's present-day ecology demonstrates the richness of the Darling River (Baaka) environment and indicates the range of plant and animal resources that would have been available to Aboriginal people living in the area.

4.1.2 Historic land-use and disturbance

This section explores the nature of land use from the earliest days of European exploration through to the present in the DRPB. The principal change in land use however came about with the exclusion of Aboriginal people from their traditional lands since the mid nineteenth century and the subsequent changes in the ecology that resulted from this exclusion largely due to the discontinuance of land use practices such as the use of fire to manage forests and grasslands (Bickford 1980).

4.1.2.1 Exploration

Following Oxley's early prediction of an inland sea to which the rivers of NSW drained (Oxley 1820), Captain Charles Sturt explored the Darling, Murrumbidgee and Murray rives in 1829 and 1830 expeditions (Sturt 1833). Sturt named the river 'Darling' in 1829 and noted:

> *The natives of the Darling are a clean-limbed, well-conditioned race, generally speaking. They seemingly occupy permanent huts, but their tribe did not bear any proportion to the size or number of their habitations. It was evident their population had been thinned... They lacerate their bodies, but do not extract the front teeth. We saw but few cloaks among them, since the opossum does not inhabit the interior. Those that were noticed, were made of the red kangaroo skin. …Both* [men and women] *go perfectly naked, if I except the former, who* [sometimes] *wear nets over the loins and across the forehead, and bones through the cartilages of the nose. Their chief food is fish, of which they have great supplies in the river; still they have their seasons for hunting their emus and kangaroos. The nets they use for this purpose, as well as for fishing, are of great length, and are made upon large frames* (Sturt 1833)

Mitchell's southward expedition on the Darling was less peaceful than Sturt's earlier journey, recording:

> *Some natives followed us …, shouting, and at length came boldly up to the head of the column. They were very greedy, coveting everything they saw; and holding out their hands, uttering constantly, in an authoritative tone, the word occa! which undoubtedly means give! ... I left them at last disgusted with their greediness; and I determined henceforward to admit no more such specimens of wild men to any familiarity with my clothes, pockets, or accoutrements* (Mitchell 1839).

4.1.2.2 Pastoralism

The land covering the study area was once taken up by squattages; large pastoral properties "squatted" on by entrepreneurial landholders operating outside of the limits of the nineteen counties that made up the colony of New South Wales. Government land grants were made within those nineteen counties, while grants were not made in the remainder of the country, owing to the inability of the early government to provide services such as police and post (High Ground Consulting 2009).

Nonetheless, large landowners and former convicts alike began grazing large flocks and herds outside of the nineteen counties. Some squattages went on to become large pastoral properties that gave their names to their localities; some were large but only operated by one or two people (High Ground Consulting 2009).

For the next twenty years squatters leased enormous parcels of land, leaving little for smaller farmers. By the 1860s, a series of reforms designed to break the squatters' hold on land were introduced, most notably with the introduction of the Crown Lands Alienation Act 1861 and the Crown Lands Occupation Act 1861, known informally as the Robertson Land Acts. These acts allowed the free selection of Crown land on certain conditions, such as the requirement that selectors live on the land selected for at least three years, and to make improvements to the value of no less than £1 per acre. The legislation spelt the end of the domination of land tenure by the squatters (High Ground Consulting 2009).

4.2 Ethnohistorical background

Ethnographic information relating to Aboriginal peoples' occupation of the area is derived from publications and other surviving forms of documentation which were compiled by early non-Aboriginal explorers, settlers, missionaries and government officials who went to the region during the mid to late 19th century. Problems encountered with these sources of information are well documented and include language barriers, cultural bias and ethnocentricism. The following information was compiled from a number of written sources based on language research and ethno-historic observations. It should be noted that the information provided here does not necessarily reflect the beliefs of the RAPs regarding their tribal affiliations and boundaries.

Ethnographic accounts do however provide first-hand information on language, social organisation, religion, lifestyle patterns and the material culture in use at the time of European settlement. Combined with archaeological data from prehistoric sites, these accounts provide the best sources of documentation for making predictions about Aboriginal site localities, site types and the types of cultural material likely to be found within the study area.

The area around the central reaches of the Darling was occupied by several related tribes of the Paakantyi language group. These groups are now known collectively as the Barkandji, after the name given to the Darling River, the Baaka (also spelled Barka)[3] (Hardy 1976). In 1835 the earliest European official to the region, Major Thomas Mitchell referred to people living near Wilcannia as the Occa, likely to have been Paakantyi language speakers.

The European settlement of the Murray-Darling began in the 1840s, when the importance of the area as a central trading route became established. As the number of overlanding parties increased, so did conflict ensue as recorded in oral testimony:

> *I am a descendant of the Barkandji, a Nation of Darling River Indigenous Australians. The end began for the Darling River Indigenous Australians when explorers came. In 1836 Mitchell, believing a corroboree was a prelude to an attack, decided to attack first, killing many Barkandji. My people were also often killed for stealing or killing cattle and sheep from travellers. After several conflicts troops were brought in and the Barkandji were treated cruelly. Over the years of 1845 to 1865 the settlers who moved to the area were mostly inflexible and racist. In spite of the inequality produced by the superiority of guns, the Barkandji fought back. The most successful technique was the rushing and slaughter of cattle and sheep. Around the mid 1850's the next colonial dispossession tactic was the native police. By the mid 1850's the native police had killed dozens of Barkandji. From 1845 to 1865 my people conceded defeat, languishing in drunkenness and disease, relying on white handouts. It became accepted that the Barkandji were there to be exploited. They were meagrely paid to remove snags from the river for the paddle steam companies and to care for the sheep. My people lost their land, food supply, culture and basic human rights. Any uprising resulted in massacres and they no longer had the heart to fight back* (Elder 1988: 55-62).

Small groups of Aboriginal people attempted to continue using their traditional subsistence methods in the sandhill and mallee country, while others are thought to have moved downstream to missions at Swan Hill, Mannum and Pt McLeay (Hardy 1976; Martin 1996: 10). Employment as stations hands and police trackers was also sought as a means of survival, but with the introduction of artesian bores in the 1880s allowing for more land to be put to use, the total displacement of the Barkandji people was effected. Despite the establishment of further missions and Aboriginal reserves severe decreases in population were noted, due to starvation and the introduction of European diseases.

[3] Historically, many different spellings have been used to refer to the Barkandji group and their language. These include Barkindji, Baakandji, and Paakantyi. Various spellings remain in use. In this document, unless quoting earlier texts, the spelling 'Barkandji" has been used as this is the spelling used on the Barkandji Native title determination.

Fortunately, statements such as 'almost all trace of the tribal imprint on the land was obliterated' (Hardy 1976: 222) need reassessment in light of more recent development in reviving Barkandji language and culture.

4.2.1 Traditional subsistence

Ethnographic accounts provide details of the subsistence and material culture of the Aboriginal people living in the Murray-Darling junction area can be used to gain an understanding of the foods and resources available in the study area. The economy of the Barkandji was based on the riverine resources available during different seasons of the year, dependent on fluctuations in the flow of the rivers and the surrounding environment (Allen 1974: 311). Peaks in discharge, known as freshes, occurred along the Darling River (Baaka) in summer and early spring; when freshes or floods occurred, the abundance of resources, including shellfish, fish, waterfowl, freshwater crustaceans and aquatic plants increased (Allen 1974: 311). Certain plant species, such as the bulrush (*Typha sp.*) and ephemeral grass require summer floods or inundation to germinate, and consequently die back during the periods of low discharge. The other resources available in wetter periods also decreased in availability, with waterfowl leaving the area, and frogs, reptiles and crayfish retreating into semi-hibernation (Allen 1974: 311).

Allen (1974: 312) has hypothesised that periods of wetter conditions resulted in an increase in the population of people utilising the resources of the river banks and waterways. During the dryer months, the population would split into smaller groups and spread out across the extent of Barkandji territory, making use of the river banks as well as the back country, where standing water supplies existed. During this time, plant seeds were collected from species such as saltbushes (*Chenopodium sp.*) and flax (*Linum sp.*), as well as tubers and fruits (Allen 1974: 312). Native millet (*Panicum decompositumi*) produces seeds in the summer months, but the explorer Major Mitchell recorded the sun drying or roasting of millet seeds in July (Mitchell 1839), demonstrating that the seeds collected in summer were stored for later use (Allen 1974-314). Sometimes the millet was left in the large drying piles that Mitchell observed, but in other areas it was stored in kangaroo skin bags (Allen 1974: 314).

Balme (1990: 221) argued that the utilisation of plant fibre for netting used to hunt fish, birds, and mammals may have been the crucial element of the technology that allowed the colonisation of Greater Australia and it's surrounds for at least 40,000 years. Fibre nets were often used to hunt small birds, emus, and kangaroos, with weight and mesh size determined by the size of the targeted animal. Nets were strung across creeks and rivers to capture birds, while emus were herded into larger nets measuring up to about 90 m long. Nets were also used on the Darling River (Baaka) to catch fish, although spears, lines and weirs were also used (Kreft 1865; Mitchell 1839; Morey n.d.; Tindale 1930-52).

Fishing, Balme (1990) argues, was the principal adaptation to the Murray Darling lacustrine and riverine environments. Allen (1974) however provides evidence that fish and shellfish were later replaced by large mammal and emu meat, with the red kangaroo (*Macropus rufus*) following a similar pattern by occupying the river banks in wetter months and moving onto the plains and ranges in winter (Allen 1974).

The explorer Edward Eyre noted that nets were constructed using the common rush (*Juncus sp.*), which was cut then scraped with a shell before being soaked in water. The fibres were then twisted to produce a thin cord. Reeds and wood were used to make fishing spears, which measured about 1.5 m long (Bonhomme *et al.* 2001, 31).

Shellfish were also collected, with dense scatters being located on the major waterways and swamps. Canoes were also employed to catch fish, with Eyre recounting the use of fires in canoes to attract fish to the surface, where they were speared (Bonhomme *et al.* 2001: 31).

4.2.2 Social organisation

Peterson (1976) describes Aboriginal society as being comprised of a hierarchy of organisational levels and groups with fluid boundaries between them. The smallest group in the hierarchy is the family, which comprises a man with one or more wives, their children and some of their parents. The second level of the hierarchy consists of bands which are small groups consisting of members of several nuclear families who conduct hunting and

gathering tasks together for most of the year. The third level of the hierarchy consists of regional networks or clans, comprising a large number of bands. Members of these regional networks usually share beliefs in a common language dialect and assemble for specific ceremonies. The tribe is the next highest unit which is recognised as a linguistic unit with flexible territorial boundaries. The highest level of the hierarchy is the 'cultural area', which consists of groups who share certain cultural characteristics, such as initiation ceremonies and closely related languages.

Kinship was an integral part of Aboriginal society, and created complex relationships between individuals, which governed the foods people consumed, and the land they used. The kinship network extended social links beyond the band and even the language territory, resulting in economic ties outside the core group. As such, other territories could be visited; social gatherings promoted and maintained these extended rights and ties. Inter-clan and inter-tribal participation were also known to occur for ceremonies, such as initiation rites, and trade was a physical expression of these inter-tribal and clan networks (Brayshaw 1987).

The Barkandji language is part of a linguistic and cultural group spanning the length of the Darling River (Baaka) (Hardy 1976; Tindale 1974) with subgroups evident in different local areas. Throughout this area, it is spoken in different dialects by individual, or sub-groups (Pardoe 1995).

The Barkandji social organisation operated on a 'binary matrilineal moiety system' consisting of moieties called '*Kilparra*' (crow totem) and '*Makwarra*' (Eaglehawk totem) (Cameron 1885: 347; Hercus 1993). Barkandji people could only marry a person from the opposite moiety.

4.2.2.1 Aboriginal identity and the natural environment

Aboriginal cultural identity and heritage is inherently linked with the natural environment. The land and its flora and fauna are deeply significant and form a fundamental component of Aboriginal identity. Maintenance of intimate relationships with the natural world is extremely important to Aboriginal people, and from these relationships comes much of the oral history and traditions of their culture. The persistence and utilisation of the natural resources left in the bioregions are important to Aboriginal people trying to maintain cultural identity. Sensitive incorporation of values and criteria for cultural heritage as it relates to the natural environment, including culturally significant natural resources and archaeological / historical places are recognised by regional planning instruments as warranting attention.

4.2.2.2 European and Aboriginal interaction

Captain Charles Sturt was the first European to map the Murrumbidgee River and the Murray River to its mouth in 1830. In 1835 Major Thomas Mitchell followed the Bogan and Darling River (Baaka) down to Menindee. He named Mt Murchison on the Darling. Settlement commenced prior to 1850 along the Darling, but it was 1855 before the Central Darling runs were consolidated. Captain Francis Cadell's Steamer Albury entered the Darling on 27 January 1859 and reached Mt Murchison in 8 days. Later the name was changed to Wilcannia meaning 'a gap in the bank where flood waters escape'.

The township of Wilcannia was notified on 26 June 1866. In 1880 it had a population of 3000 with 13 hotels and was known as 'The Queen City of the West'. Wilcannia became one of the major ports of the Murray Darling system and the paddle steamer trade flourished for 70 years. In 1887, 218 steamers and their barges unloaded stores weighing 36,170 tons, and 222 loaded wool and other produce weighing 26,552 tons at the port of Wilcannia. At one time there were 30 steamers loading or unloading. There were 90 steamers plying the Darling River (Baaka) in 1890. The total distance from Wilcannia to Goolwa at the mouth of the Murray is 1110 river miles. Eventually rail and road transport killed the river boats and Wilcannia, not being located on a railway line, was no longer an important centre of trade. Many fine buildings from the era remain in good condition making Wilcannia one of the best-preserved historic towns in Australia.

During the early days of European settlement local Aboriginal people were subjected to violence, disease and sexual exploitation and populations of local tribal groups suffered as a consequence. Traditional affiliations with endemic species were broken by the changes that took place such as widespread clearing to 'improve' pasture

and thus the fecundity of the many species of animal that Aboriginal people relied upon was affected. Similarly changes to the traditional fire regimes used by Aboriginal people to manage their estates caused widespread changes to the distribution of flora and fauna (Gammage 2012).

The conditions that had allowed dual occupation to occur in the past had now ceased. As a result, Aboriginal communities were driven from their homelands and onto reserves on the outskirts of towns. This served to alienate the Aboriginal community who could now no longer use the land as they had traditionally, due both to their limited access to the land and its changing ecology under agricultural production (NPWS 2000a)(Forsyth and Gavranovic 2018).

A documentation and discussion of the full history of European and Aboriginal interaction in the Wilcannia region, and its impacts on Aboriginal people, is beyond the scope of this report. It is important to note, however, that negative impacts of this interaction have continued to within the living memory of the people living in Wilcannia today. The tragedy of the Stolen Generations process, to pick one example, is captured in this submission from Aunty Phyllo Whyman:

> *…we was living at the Mission, and then we came here to the riverbank [of the Baaka]. At the Mission, there's not much I can remember about that cause I was too young, but they took Mooey, Adrian, and Blue Eye away from us there. It was heartbreaking. Sort of like when Mum had Robbo Young and them here, I remember we was down here living on the River, and then the welfare came looking for Robbo Young, and he run down the bank and he was dodging 'em along the river bank and they had to chase him up and down the riverbank. And we just all stood there crying, you know. They took him, took him and his brothers away.* (Phyllo Whyman, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 43)

4.3 AHIMS search results

A search of AHIMS was carried out by Andy Roberts (Senior Archaeologist, Jacobs) on October 15, 2020. The search area was rectangular, extending from -31.701, 143.154 to -31.4127, 143.6112 (latitude, longitude) with a 1000 metre buffer added to this area.

One hundred and twelve previously recorded Aboriginal sites are present within this search area, with the proportion of varying recorded sites summarised in **Table 4-1** and illustrated in **Figure 4-1**. A map of the proposal area and its immediate surrounds, showing previously recorded sites, is provided in **Figure 4-2.**

Table 4-1 Previously recorded sites in the AHIMS search area

Site type	Number
Artefact scatters	59
Burials	20
Culturally modified trees	14
Resource and gathering	3
Mounds	2
Habitation structures	4
Fish traps	3
Quarries	3
Mythological	3
Restricted	1
Total	**112**

An additional search of AHIMS was caried out by Oliver Macgregor (Senior Archaeologist, Jacobs) on September 14, 2021, to check if any additional sites had been registered following the initial search. The search area was rectangular, extending between Eastings 724174-733028 and Northings 6502146-6509488.

No additional previously recorded sites had been registered on AHIMS between the October 2020 and September 2021 searches.

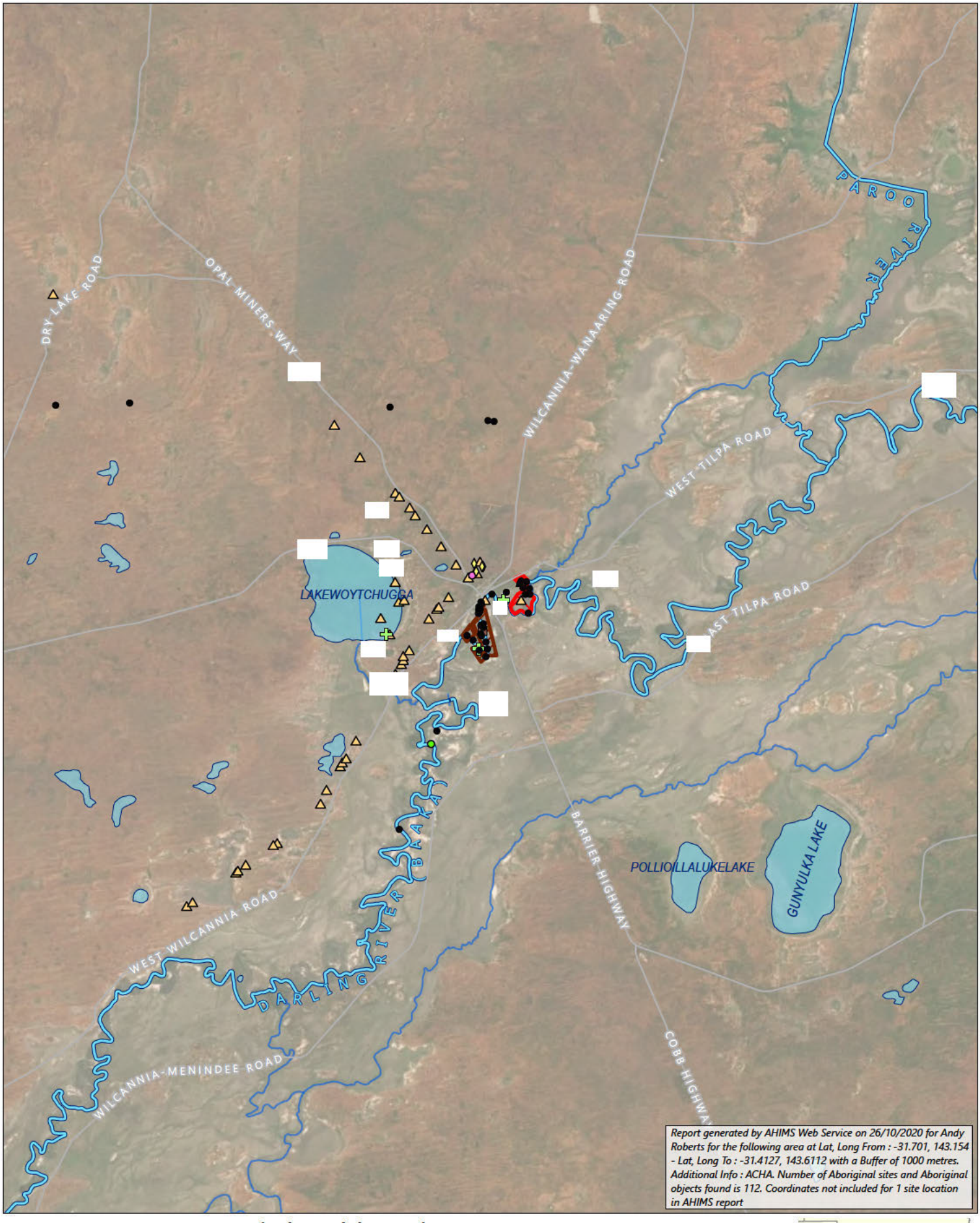

Figure 4-1: Previously recorded archaeological sites in the AHIMS search area.

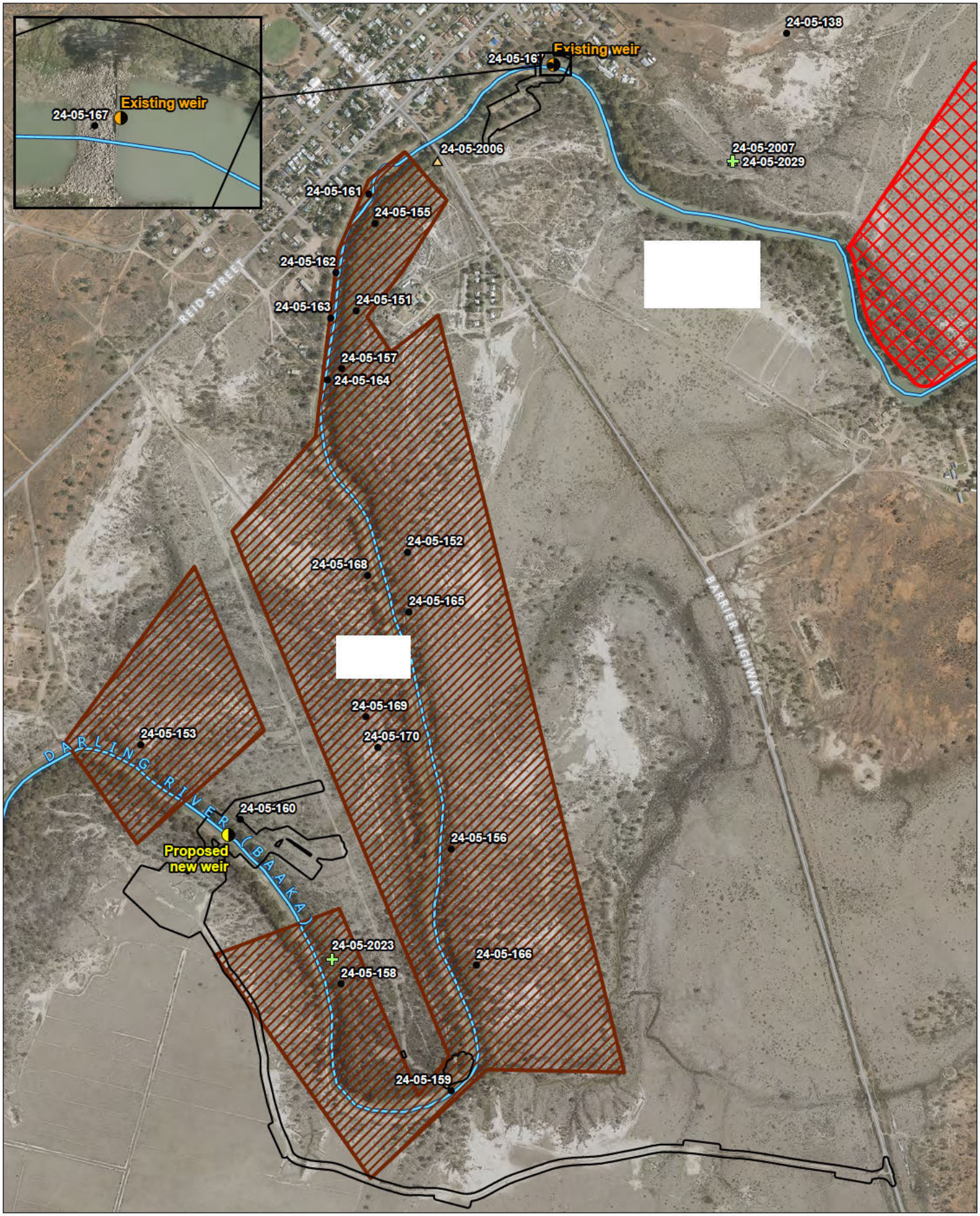

Figure 4-2: Previously recorded archaeological sites around the proposal area

4.4 Previous archaeological studies

The far west of NSW has long been a location of archaeological research. The earliest research was focussed mainly on the Willandra Lakes (Allen 1972; Bowler *et al.* 1970), Menindee Lakes (Tedford 1967; Tindale 1955) and the Darling River (Baaka) corridor (Allen 1972). More recent efforts have moved the focus onto open site archaeology in areas such as Peery and Sturt National Parks (Holdaway *et al.* 2005; Holdaway *et al.* 2002; Holdaway *et al.* 2004) and addressing issues of palimpsests of stone artefact scatters and Aboriginal hearths. Very recent work around Wilcannia has brought a distinctly social element to the local archaeology (Central Darling Shire and Wilcannia Local Aboriginal Land Council 2018, Department of Premier and Cabinet (DPC) 2020).

Archaeological sites have been recorded in the Wilcannia region over recent decades, mostly as individual finds recorded by National Parks and Wildlife Service (NPWS) staff and by locally based archaeologists. Many of the sites have been recorded by NPWS Sites Officers Badger Bates and Mark Sutton, and by local archaeologists Sarah Martin, Peter Thompson, and Edna Hunter (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 3).

A large-scale and systematic survey of the area around Wilcannia, which included most or all of this assessment's study area, was carried out for the *Wilcannia Aboriginal Community Heritage Study* (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018; DPC 2020). This survey recorded archaeological sites, and also oral histories and stories related by the Aboriginal community relating to a range of sites and places. Some of the sites associated with oral history are archaeological sites, with tangible objects such as scarred trees, surface artefacts, and the remnants of historical huts. Other places associated with oral history have no archaeological material. An example of a site associated with oral history but without archaeological material is the Union Bend Ngatji Site (refer to **Section 9.3.3**).

The archaeological sites recorded and documented in the *Wilcannia Aboriginal Community Heritage Study* consist of burials, stone arrangements, culturally modified trees, stone quarries, hearths (also known as ovens), middens; stone artefact scatters, fish traps, and Aboriginal sites from the historical (post European contact) period. The historical sites consist mostly of the remains of huts along the river, which are associated with a rich oral history (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018). These historical Aboriginal sites, and the oral history and intangible cultural heritage to which they are connected, were one of the main drivers behind the nomination and declaration of the Wilcannia Mission Camps and Cultural Places Aboriginal Place (DPC 2020). The Aboriginal Place, and its cultural heritage significance, are discussed in **Section 9.3.5**.

Rock art sites and stone arrangements have been recorded in the wider region but have not been recorded within the study area or similar landscapes. They are generally restricted to hilly terrain with exposed rock outcrops, away from the river. The exception to this is a cluster of stone mounds recorded near Steamers Point, upstream from the study area (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 9).

Culturally modified trees are a common site in the region. Scarred trees can possess scars of varying size: the largest scars were probably the result of harvesting bark for canoes. Smaller scars are probably the result of harvesting bark for shields or coolamons (dishes). The smallest scars are the remnants of holes cut to extract honey, possums or other tree-dwelling animals. Small scars could also have been cut to provide toe-holds for climbing the tree, or as marks cut on the tree for symbolic or communication functions (for example, to mark specific locations in the landscape). European surveyors also cut marks into trees, though these are usually recognisable for containing chiselled letters or numbers identifying the survey mark (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 9-11).

Stone quarries are an infrequently recorded type of site in the region. The low number of recorded quarries is likely to be the result of survey effort, as these sites are most likely to occur in hilly or elevated areas with exposed outcrops of stone, rather than in the alluvial sediment landscape along the course of the Darling River (Baaka), where the majority of previous archaeological effort has been invested. The only quarry site recorded

near the river is a silcrete quarry recorded near Steamers Point (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 11)

Stone fish traps, which consist of low lines or walls of stone arranged on the beds of rivers, have been recorded in the Wilcannia region, but are infrequent in the landscape. These sites are likely to have exhibited a low rate of survival during the historical period, as many were likely to have been destroyed or dismantled to clear the river for paddle steamer traffic (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 11).

Hearths are one of the most frequent site types recorded in the region. These structures are constructed to retain the heat of fires, usually for cooking plant and animal foods. In the Wilcannia region, the material used in their construction is usually clay or clay-rich sediments, though hearths made from stone are found in areas away from the river where stone is more common and more easily procured. Hearths are found in all landscapes in the region, and the construction and use of hearths is a practice has been in continuous use by the Aboriginal community up to the present day (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 12).

Middens, which consist of cohesive mounds or diffuse scatters of shellfish and animal bones, have been frequently recorded in the region, along the edges of the Darling River (Baaka) and its associated lakes and flood channels. These sites are prone to destruction during floods, and consequently generally only survive on elevated banks, river terraces, or sandhills. Middens around Wilcannia are generally dominated by shellfish remains, with the most common species being freshwater mussel and freshwater snail. Bones of fish, birds, and mammals, and fragments of turtle shell, can also be present (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 12-13).

Stone artefacts are the most frequently found Aboriginal object in the Wilcannia region, and scatters of stone artefacts are one of the most frequently recorded site types. Artefacts found in the region include flaked artefacts (flakes, cores, retouched flakes and a variety of implements including backed artefacts and pirri points). Ground artefacts, including grinding dishes and topstones, are also found – though in lower frequencies than flaked artefacts, probably due to the longer use-life of a grindstone. A variety of materials have been used by Aboriginal people in the region for the production of stone artefacts, including sandstone, quartzite, and silcrete for grindstones and hammerstones, and chert, quartz, and silcrete for flaked artefacts. The more fine-grained silcretes are more commonly used for the production of small delicate artefacts such as backed artefacts and small blades, while coarse-grained silcretes a more commonly used in the production of large robust flakes (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 13).

Burials have been recorded in the Wilcannia region. Mounded burials were noted by early European explorers in the region (Bonney 1883; Mitchell 1839). The mounded shape of burials is likely to degrade over time and might well be indistinguishable from the surrounding landscape's topography in their present context. Burials have been recorded archaeologically in a number of locations around Wilcannia, including within the town itself, at Union Bend, and near the golf club at the town's eastern edge. Burials previously recorded in the region have generally been located on elevated ground, within sandy sediments, near to the river (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 7).

4.5 Previously identified Aboriginal sites

4.5.1 Site 24-5-141 (Steamers Point Scarred Tree 3)

This site is a culturally modified (scarred) River Red Gum. The tree was alive and in good condition at the time of original recording. It is located on the left bank of the river, around the crest of the river bank and well above the water line.

This site (24-5-141) is located within the Steamers Point Aboriginal Place. (refer to **Section 9.3.4**)

Steamers Point is mentioned in the SEARs as a significant site (refer to **Section 1.4**). A response to the SEARs requirement that this assessment consider the heritage significance of the Steamers Point Aboriginal Place, and any impact the proposal would have to the Aboriginal Place, the heritage significance of this site and the effects and impacts the proposal would have on the site are discussed in detail in **Section 9.3.4**.

4.5.2 Site 24-5-145 (Steamers Point – Where the Ngatji Sunk the Steamer)

This site is a site of intangible cultural heritage, relating to the story of the Ngatji and the Paddle Steamer. The story relates an event in which a paddle steamer sank in the river near Steamers Point, due to disturbing and awakening the Ngatji, which then dragged the boat and its cargo barge under. The Aboriginal people in the area assisted in the task of salvaging the paddle steamer and its cargo. Realising that the Ngatji had been the cause of the wreck, and that the Ngatji needed to be subdued before people could enter the river, Clever People sang songs to lull the Ngatji to sleep, enabling people to salvage sunken bales of wool and enabling an Aboriginal Clever Man to dive into the waterhole and retrieve the body of a person who had sunk with the paddle steamer and drowned. (Butcher 2011; Kennedy pers. comm.; Martin pers. comm.; Whyman pers. comm.).

The site is located within the Steamers Point Aboriginal Place. Its boundaries are not defined but is taken to encompass the river channel as the river curves around Steamers Point.

Steamers Point is mentioned in the SEARs as a significant site (refer to **Section 1.4**). In response to the SEARs requirement that this assessment consider the impact of the proposal on the Steamers Point site, the heritage significance of this site and the effects and impacts the proposal would have on the site are discussed in detail in **Section 9.3.4**. A response to the SEARs requirement that this assessment consider the heritage significance of the Steamers Point Aboriginal Place, and any impact the proposal would have to the Aboriginal Place, is provided in detail in **Section 9.3.4**.

4.5.3 Site 24-5-146 (Steamers Point Island Fishtrap)

An island near Steamers Point and the confluence of Paroo Channel and the Darling River (Baaka) is recorded as a fish trap and swimming place (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 15). It has been documented through oral history work that although the AHIMS lists this site as being located within the Steamers Point Aboriginal Place, it is actually about one kilometre further upstream (near the confluence with the Paroo Channel) and consequently outside the Aboriginal Place (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018).

This site is located within the river channel.

4.5.4 Other sites within the Steamers Point Aboriginal Place

In addition to the sites listed above (24-5-141, 24-5-145, and 24-5-146) there are a number of other registered AHIMS sites within the Steamers Point Aboriginal Place. The Aboriginal Place was gazetted in June 2014 (New South Wales Government Gazette 2014)These include several Aboriginal camps from the post-European contact period: 24-5-146 (Steamer Point, Karl Leppard's Camp); 24-5-148 (Granny Moysey Camp 2); and 24-5-147 (Granny Moysey Camp 1).

Also present are open artefact scatters: 24-5-008 (Wilcannia 03); and 24-5-009 (Wilcannia 04).

A resource and gathering site is also recorded: 24-5-150 (Steamer Point Mukirili Tree).

Finally, a stone quarry and stone arrangement (24-5-0144) has been recorded just outside the boundaries of the Aboriginal Place. It has been recommended that the boundary of the Aboriginal Place should be altered to include this site (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 65), but at the time of writing this has not occurred.

All these sites are located well away from the course of the Darling River (Baaka) (the closest site, Karl Leppard's Camp, is 30 metres from the water's edge) and consequently outside the proposal's impact zone, which in this area would involve a rise in water level of about one metre when the proposed new weir is in drought security operation mode (refer to **Section 9.3.4**).

4.5.5 Site 24-5-160 (Union Bend Canoe 3)

This tree is a living tree with a well-defined south facing scar. The tree itself is a large River Red Gum with broadly spreading foliage, on the edge of the forested strip running along the river's right bank.

It is located adjacent to the proposed location of the new weir about 30 metres northwest of the river bank (refer also to **Section 7.4**, this site was re-recorded during the archaeological survey).

The site is located near the proposed construction areas adjacent to the proposed new weir (refer to **Figure 4-1** and **Section 7**).

4.5.6 Site 24-5-161 (The Rocks, or Rocky Crossing/Fish Trap)

This site is a platform of bedrock outcrop lying in the bed of the river and extending into the lower flank of its right bank. The bedrock has been smoothed and eroded by water, with rounded boulders that have separated from the platform lying in the river bed around it. The rocks are documented to be a crossing place from the town to the Aboriginal camps and mission on the river's left bank. The area is also used as a playing and swimming area. The area is also speculated as having been utilised as a fish trap (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 35).

The entirety of the site is within the river bed, between the river's banks.

4.5.7 Site 24-5-162 (Springs and Ochre Site)

This site has been recorded as a resource gathering area, where water, ochre, and water weeds were procured. A patch of outcropping bedrock in the river's bank, just above the river bed itself, functioned as a spring where subterranean water seeped out. As a consequence, this spot could have provided drinking water during times when the water level in the river was low and its water quality was poor.

4.5.8 Site 24-5-163 (Springs and Stony Bank)

This site has been recorded as a resource gathering area, where water and water weeds were procured. Patches of exposed bedrock in the river's right bank functioned as a spring where subterranean water seeped out. This spot could provide drinking water during times when the water level in the river was low and its water quality was poor.

4.5.9 Site 24-5-164 (Boblo's Hole Fishing Place)

Boblo's Hole Fishing Place is a deep section in the bed of the river, to the south of the rock outcrop making up site 24-5-161 (The Rocks). Due to its depth, this area contained almost permanent water during the area's

recent (post-European contact) past and was consequently an important resource and gathering area for the Aboriginal community.

The site is named after Boblo Johnson, who had a camp on the river bank on the east side of the waterhole (i.e. on the left bank of the river).

The site is documented through oral history work as an important area for procuring fish such as yellow belly, perch (kunparli), black bream, and bony break (nhaampa), It was also used as a swimming area, and was an important area for procuring water, particularly during dry times when shallower parts of the river weren't flowing. Oral history states that the site is currently suffering from lack of water flows and poor water quality over recent years due to over-allocation of water upstream (Martin 2019).

Documentation of the oral history associated with Boblo's Hole is illustrative of the use of the site, and of the general importance of the Darling River (Baaka) to the Aboriginal community:

> *At Boblo's Hole, on the river near our old hut, we always used to go fishing, good fishing spot right along there. We call it Boblo's Hole. Boblo and Sister Girl used to live down here in caravan here. We still always come here fishing too you know. That tree then – that's where my brother Les went down there, for a swim. He dived in and took a fit and never came up, my younger brother, I was the youngest and he was next to me… old Bogeye Barraclough found him way down, caught up in a limb that fell into the river. A while ago I came down with the school, with all the little tiny ones from the Mission school. We bought em down here and had a picnic.* (Aunty Phyllo Whyman, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 43)

The entirety of this site is within the river bed, between the river's banks.

4.5.10 Site 24-5-159 (Union Bend Ngatji Waterhole)

The Union Bend Ngatji Waterhole site is a place connected with intangible cultural heritage, known by the Barkandji people as an area in which the Ngatji lived. The concept of the Ngatji and stories relating to the Ngatji, are connected to the physical landscape of Union Bend, in particular the morphology of the river itself. The relatively deep water as the river travels around Union Bend is an important aspect of this connection, as this deep water is viewed as a refuge for the Ngatji. Union Bend is one of a number of deep waterholes in the river upstream that are linked to stories of the Ngatji (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018).

The site is also documented as a resource-gathering area for the Aboriginal community. The waterhole has been used as a place to procure water and fish, and as a swimming and meeting place (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 27).

This site does not have specific spatial boundaries, but is taken to encompass the width of the river channel and the crests of the river bank. The general morphology of the river (including the river's course, the shape of the river channel and banks, and the water level) constitutes the main physical feature of the site.

The site is within the Wilcannia Mission Camps and Cultural Places Aboriginal Place, gazetted in 2020 (New South Wales Government 2020). The Aboriginal Place in general, and the Union Bend Ngatji Site itself, are both mentioned in the SEARs as significant sites (refer to **Section 1.4**). In response to the SEARs requirement that this assessment consider the impact of the proposal on the Union Bend Ngatji site, the heritage significance of this site and the effects and impacts the proposal would have on the site are discussed in detail in **Section 9.3.3**.

4.5.11 Site 24-5-167 (Wilcannia Weir Fishtrap)

The existing Wilcannia Weir (**Figure 4-3**) is recorded as an Aboriginal site, mainly due to its use by the Aboriginal community after its construction. The weir was constructed by a workforce that included members of the Aboriginal community, some of whom are still living in the area today. Cyril Hunter, a RAP representative who

participated in the survey fieldwork, vividly recalls being a worker during the weir's construction (Hunter pers. comm.)

Figure 4-3 24-5-167 (Wilcannia Weir Fishtrap) viewed from the southwest

Wilcannia Weir has, since its construction, been continuously used by the Aboriginal community as a fishing and swimming place. The deep pool immediately behind the weir is suited to both purposes. In addition, the rocks of the weir have been periodically moved and repositioned to construct fish traps. A photograph recording one occasion where rocks have been used to construct fish traps is provided in **Figure 4-4**. The location and design of these traps is changed to suit the water level and water conditions (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018). The use of rocks from the weir in this way is an interesting example of a structure dating from the post-European contact period being repurposed to enable the continuing practice and preservation of a traditional Aboriginal hunting practice.

Figure 4-4 24-5-167 (Wilcannia Weir Fishtrap) viewed from the north, showing constructed fishtraps (Courtesy: Dr Sarah Martin)

The importance of the existing weir as a focal spot for the community through its use as a fishing and swimming place means that it holds considerable cultural value to the Aboriginal community of Wilcannia. The stories and memories associated with the weir's construction also add to its cultural value. In his comments on the draft of this report, Badger Bates summed up his thoughts on the weir's value: "This is a very important site for Wilcannia people and shows how our culture continues to be handed down. It seems you [WINSW] are going to destroy it, but this is all the more reason to discuss its importance and loss to the community. I believe the old weir should be kept so young people can continue to use it as a fish trap when a medium flow comes down the river after a dry period" (Bates pers. comm.).

4.5.12 Historical period Aboriginal sites

Around Wilcannia, there is no logical hard dividing line between pre-contact archaeological sites, historical (post-European contact) archaeological sites, and sites with oral histories that might or might not also contain archaeological material. The continuous and continuing life of the large Aboriginal community in the region, and the continuity of cultural activities and land use between the pre- and post-European contact past blur these boundaries. A large number of sites with oral history from the recent historical period have been recorded around Wilcannia, many of which fall within the proposal area. Although these sites are reviewed here under the heading 'historical period Aboriginal sites', it is probable that the use of many of these sites, and the cultural activities they are associated with, stretches back into the pre-European contact period.

Most historical period Aboriginal sites occur outside the impact zone of the proposal, being located outside the banks of the river channel itself and consequently outside the area of inundation of the proposed weir pool. For this reason, and because the large number of sites have been comprehensively documented in the publicly accessible Wilcannia Aboriginal Community Heritage Study (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018), this report does not attempt to document every historical Aboriginal site in and around the proposal area. Instead, a representative sample of sites are discussed here, and general themes around the historical Aboriginal archaeological record, the cultural values associated with historical sites, and the cultural values connected with the general landscape these sites sit within, will be discussed.

4.5.12.1 Site 24-5-158 (Granny Moysey Canoe Tree)

Granny Moysey's Canoe Tree is a remarkable site demonstrating both the continuity of traditional practices into the post-European contact period, and also the longevity and preservation of scarred trees in the Darling River (Baaka) landscape.

The site is a large tree scar on a living River Red Gum. The scar, more than two metres in length, is close to ground level on the trunk of the tree, which has grown a large secondary trunk from underneath the scar. It is unclear whether this secondary trunk existed when the scar was created, or if it is epicormic growth that post-dates the scar and is possibly a reaction to its creation (refer to **Figure 7-32**).

The history of the creation of the scar is remarkably well preserved in the oral history of the Aboriginal community. The scar was created by Granny Moysey, an important elder in the Wilcannia region, for the production of a canoe. It was created around 1922, based on the fact that this was observed by Nhunni Hunter, born in 1914, when she was about eight years old (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 24). The subsequent use of the canoe produced from the tree is also recorded in the Aboriginal community's oral history:

> *…I recorded this tree in 1983 when I first started with National Parks. We stopped at this tree and Aunty Nhunni said "Badger. Old Mumma cut this tree", Old Granny Moysey, that's her Mumma, cut this tree. Cut it to cut that canoe out there see, and then they rode this canoe right down to Pooncarie… and when they got to Pooncarie, this one was done then when they got down there, and then they cut another one and they brought it back, a big long one.* (Badger Bates, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 24)

Both the tree and the scar are in good condition, their only threat being decay resulting from the build-up of leaf litter at the base of the scar, where the tree's primary and secondary trunks meet. During our visit to this site during the archaeological survey (refer to **Section 7.6**). RAP representatives cleared away the built-up leaf litter and indicated that this maintenance task is carried out regularly to preserve the scar.

Scarred trees of this age are a rare archaeological site, and the site's associated oral history add to its rarity and significance. The site holds a high cultural significance to the Aboriginal community, a fact communicated to us by various RAP representatives in the field, and also documented elsewhere (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018 - 24).

The tree is located on the right riverbank, about five metres away from the river bank's crest. It would consequently be clear of the inundation zone of the proposed weir pool (refer to **Section 9.3.5**). It is located within the Wilcannia Mission Aboriginal Camps and Cultural Places Aboriginal Place.

4.5.12.2 Aboriginal camps

A large number of Aboriginal camps adjacent to the river between the existing weir and the proposed new weir have been identified through oral history recording work. Most of these camps lie on the river's left bank (opposite the town) though some are located on the right (town side) bank. These camps are adjacent to the stretch of river that would see the largest increase in water level resulting from the creation of the proposed new weir, as this stretch would be a new stretch of weir pool (refer to **Section 9.3.5**).

The camps largely date to the period when Aboriginal people were excluded from living in Wilcannia town itself (Forsyth and Gavranovic 2018) and developed as fringe camps adjacent to the town and to the Wilcannia Aboriginal Reserve (The Mission). The occupants of these camps were forced to move away from the river by large flood events in 1950, 1951, and 1956 (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 39) and 1974 (Forsyth and Gavranovic 2018).

Most of the camps were located to be close to the river, for ease of procuring water, fish, and other riverine resources. They were also positioned in the shade provided by the wooded strip of trees along the river bank.

People positioned their camps to be close to others in their family group, with distance maintained between the camps of separate family groups (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018, 41).

Individual camp sites have specific stories and bodies of history associated with them. The oral history accounts of life in the camps, recorded in the Wilcannia Aboriginal Community Heritage Study (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018) overwhelmingly give the impression that life in the camps was one of considerable material poverty, involving long hours of work for survival and maintaining basic necessities, but also a period of great social cohesion, summed up in several submissions such as the following:

> *We was used to our freedom here, at least we had our freedom when we lived in a tin hut… People used to sit down and talk to one another.* (Maureen O'Donnell, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 40 - 41)

> *Well we didn't have luxury but our luxury was being happy and you know living on the river bank.* (Aunty Phyllo Whyman, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 44)

Today, visible material traces remain of most or all of the camp sites. These include fragments of sheet metal, 44 gallon drums, some car parts, and abundant small fragments of glass, ceramic, metal, and in some cases freshwater mussel shell. Few large structures remain, as housing materials were salvaged when the population relocated to other parts of the region following the large floods (Cyril Hunter, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 45).

The camps were located close to the river, but beyond the river bank crest. Some camp components would have extended into the river channel itself (windlasses and other equipment for gathering water, for example) but these have been deconstructed or destroyed by subsequent flooding, and today no visible material traces of the camps remain within the channel between the river banks.

Most of the recorded Aboriginal camps are located within the Aboriginal Mission Camps and Cultural Places Aboriginal Place. The project's impacts on the Aboriginal Place, and sites within it, are discussed further in **Section 9.3.5**.

4.5.13 The Darling River (Baaka) and its ecology

Although this section has discussed previously recorded sites (archaeological sites and sites associated with oral history), the river itself and its immediately surrounding riverine environment constitutes a landscape of cultural significance. The archaeology of the Wilcannia region, in common with other arid environments, is focused on and densest around areas of permanent water – the Darling River (Baaka) and surrounding lakes being chief among these. The archaeological record alone indicates the great importance of the Darling River (Baaka) to the Aboriginal people in this region. Added to this archaeological signature, the stories, oral history, and recorded history of the Aboriginal people of Wilcannia unambiguously state the importance of the river to Aboriginal life, and consequently the cultural significance of the river and its environment to Aboriginal people today.

The oral histories recorded in the Wilcannia Aboriginal Community Heritage Study (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018) contain many accounts from informants who lived in the Mission and the fringe camps along the river banks that discuss the various resources that could be obtained from the riverine environment. A sample of these are:

> *We used to get lots of them [freshwater mussels] at that time year. We used to live on them, we'd go fishing and if we didn't get any fish well they'd take the mussels home with them there… Don't see many around now they all gone!! They gone now. People used to like them in the river days… We used to eat the shrimps if we couldn't get the yabbies… Nothing there now the old river's gone. Very dry. Nothing coming down at all now. Nothing at all.* (Nanna Ngearie Cattermole, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 28)

It was good livin' around here when I was small, we mightn't have had much to eat, but there was fish, mussels, we used to eat mussels if we got real hungry. (Unidentified source, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 22)

We mostly lived on fish, yabbies and turtles from the river and One Mile Billabong… Sometimes we went walking for miles and miles back from the river hunting emu, kangaroo, echidna, goanna or rabbits for meat to feed everyone. On weekends my cousins William Bates, Norman O'Donnell, Bruce Harris, Cyril Hunter and Christopher Payne would come across from the Mission and the camps on the river near the Mission School and stay with us, and we would go fishing and yabbying or hunting with Granny. (Badger Bates and Muriel Riley, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 22)

We used to go home, make a fire, then we'd cook our supper on the old grid iron… In those days you'd have a little fire going all the time in the little tin shack, and your water was always boiled, and you had everything to eat. We used to eat a lot of things, there was goannas in the hole, go to the river, never be short of food. (Betty Williams, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 21)

We had the windlass down there on the river, we made a windlass, for the water. I was with Johnny Bates. He swum in the river with a steel peg, he swum under the water and he hammered it into the bank. Tied the wire, threw it up, and we had a little thing running down onto it. We used to send a bucket down, pull it up. (Cyril Hunter, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 44-45)

Johnny [Bates] used to live with us see, where we went he was with us. He used to be our climber on any tree for bird's eggs and all, nest, he used to get the white cocky and all for us… height didn't worry him, he'd just straight up – like a goanna. (Badger Bates, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 48 - 49)

…cause we're losing all the animals what looked after the river see, we're losing all those, the goannas and that, you don't see now. I had to go way further off the river there to have a look to see if I could find a goanna, see where they're getting their water from. They are getting sick with the water we've got in our river, from the chemicals off the cotton…how important the water was to those real people, see, us, and we still here… So what's going to happen with the river? Sad aye. It's very hard aye how they fall now, it's very cruel. (Waddie Harris, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 58 - 59)

The river, it's changed a lot. They getting it and taking it out up that way. This river used to be never empty, it used to be running all the time, one time when we was kids, yeah running all the time. Plenty of fish was in the river and all, plenty of water, but since they built that up there, that Cubbie years ago, that's where all the water's pumping out. See not only there, down around Moree and all them, cotton, all them there they pumping it out too. (Colin Harris, quoted in Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 52)

These quotes, among others, illustrate the richness of the landscape and some of the ways in which it was utilised by Aboriginal people within living memory. Many comments in the Wilcannia Aboriginal Community Heritage Study poignantly draw attention to the health of the river around the mid-20th century with its degraded state today. Reduced water levels, more frequent drying up of the river, and weaker flows are mentioned, along with a consequently impoverished resource of fish and other riverine life. Dismay at the current state of the river was also communicated during this assessment, with many RAP representatives describing how populations of fish, mussels, turtles, and birds have declined (and in some cases disappeared) within recent living memory (refer also to **Section 5.2**). This sentiment was conveyed through multiple conversations in the field and during discussion at the AFG on 5 November 2020 (immediately preceding the archaeological survey).

The Darling River (Baaka), and the health of the riverine environment and its ecology, hold clear and strong cultural value to the Aboriginal community in Wilcannia. The cultural value of the river and its associated environment are discussed further in **Section 5.2** (which deals with cultural values). These entities are also worth mentioning here, however, as the river landscape (and its associated ecology) is a 'site' that has been comprehensively recorded as part of the cultural heritage of Wilcannia's Aboriginal people.

4.6 Archaeological predictive model

The following predictive model is used to identify areas of archaeological sensitivity. The model is based on a 'land system' or 'archaeological landscape' model of site location. This type of model predicts site location based on known patterns of site distribution in similar landscapes, and across landform types.

The predictive model is based on:

- The interpretation of the distribution of known sites in and around the study area
- A review of previous impacts to the proposal area and the potential effects of these impacts on the archaeological record.

The following specific predictive points are noted for the landscape the study area sits within:

- Elevated landforms adjacent to watercourses have high archaeological potential
- Landforms adjacent to permanent watercourses have a higher archaeological potential than those adjacent to ephemeral watercourses
- Landforms with thick soil or sediment profiles in alluvial or aeolian sands will have high archaeological potential
- Areas of remnant vegetation close to waterways will contain culturally modified trees if of sufficient age
- Areas of PAD are likely to be present close to water, in areas with surface soil or sediments and also areas on the edge of the Darling floodplain
- The most common archaeological site types will be isolated stone artefacts, clusters of stone artefacts, freshwater mussel middens, modified trees, hearths (as evidenced by clusters of baked clay/termite heat retainers, resource/gathering sites (for example Quandong trees) and burials
- Burials have the highest potential to occur within elevated sandy deposits near the river
- Stone artefacts, middens and hearths can be present on the ground surface or buried in subsurface soils and sediments.

A number of post-depositional processes can result in disturbance or destruction of archaeological sites. Identifying areas of high disturbance is an important factor in the predictive model. Disturbance can alter the patterns of site location expected from the points above. The following general predictive points relate to the effects of site disturbance:

- Landforms which have been subject to frequent high-energy flooding events will have reduced archaeological potential. High energy flooding is likely to be restricted to river channels, with floodwaters outside riverbanks typically being slow-moving
- European land-use practices can have a range of impacts to sites. Areas that have been excavated, inundated, or buried under fill or stockpiled materials will have low archaeological potential.

Many post-depositional processes result in the movement of Aboriginal objects away from their original location and context, without resulting in damage or destruction to the objects themselves. Some post-depositional processes will result in the destruction of some, but not all, artefacts within a site. Only severe processes will destroy or remove all Aboriginal objects from a landform. Factoring post-depositional disturbance into the assessment of a landform's archaeological potential should consequently take a precautionary approach. A

landform should be assumed to retain archaeological potential unless there is compelling evidence for severe disturbance that can be confidently inferred to have removed all sites from the landform.

5. Aboriginal cultural values

5.1 Method of obtaining information

Input and feedback were provided by RAPs throughout the assessment process. Specific input and feedback from RAPs were obtained (following proceedures outlined in DECCW 2010a):

- During Stage 2 – Initial presentation of information about the proposal
- During Stage 3 – Provided RAPs with the draft proposed methodology. RAPs were invited to provide feedback on the proposed methodology, and to identify cultural heritage values associated with the study area
- During Stage 3 – input on cultural values during fieldwork
- During Stage 4 – Provided RAPs with the draft ACHAR. RAPs were invited to provide feedback on the report, and to identify any further information they wish to be included.

5.2 Identified cultural heritage values relevant to study area

The Darling River (Baaka) itself holds considerable cultural value to the Barkandji people. The river has been a focal point of Aboriginal occupation of the region during both the historic (post European contact) and pre-contact periods. The river and its associated lakes and ephemeral channels possess a higher biomass and diversity of plant and animal species than the surrounding arid and semi-arid environments, as well as possessing permanent fresh water. As a straightforward consequence of this, the riverine environment offered Aboriginal people a much greater quantity and diversity of resources which they could utilise (refer to **Section 4.1.1.4**). Aboriginal groups spent most of their time living near to the river, with forays away from the river probably being brief by comparison. The richness of the landscape around the river also meant that Aboriginal people could live together in large groups, enabling different 'clan' groups to coalesce together and carry out social activities such as corroborees, trading, and marriages.

The important role of the river in Aboriginal life is evidenced by the fact that the geographical range through which Barkandji language speakers live extends along the river from Bourke to Wentworth (Central Darling Shire Council and Wilcannia LALC 2018: 10). This demonstrates that the river and its surrounding environment created a corridor in which Aboriginal groups could successfully live, travel, and interact with other groups frequently enough that their shared language remained and did not fragment into separate languages over time through lack of contact. The name 'Barkandji' derives from the name of the river (the Baaka/Barka) and means people belonging to the Baaka (Central Darling Shire Council and Wilcannia LALC 2018: 10). The rich riverine corridor, stretching as it does through generally arid landscapes with scarce resources, has created a deep connection between the Barkandji people and the river.

Descriptions of Aboriginal people in the region written by early European explorers, settlers, and ethnographers focus almost exclusively on Aboriginal interaction with the river and utilisation of its resources. Accounts depict Aboriginal people hunting for fish and waterbirds using nets and spears, from the bank or from canoes in the water (Kreft 1865; Mitchell 1839; Morey n.d.; Tindale 1930-52). Immense time and effort were invested into the making of nets, from fibres extracted from river plants such as rushes (Brock. 1844; Morey n.d.). River plants also provided food – rushes in particular, which were pounded and ground up to make into cakes (Sturt 1849).

The Aboriginal community has lived continuously around Wilcannia since first European contact, and the oral history of the community focuses on the people's connection to and relationship with the river in the recent past. Aboriginal camps (mostly on the south bank of the river, due to exclusion of Aboriginal people from the town itself) were mostly built on or near the bank of the river (DPC 2020). The stories and memories recorded in the *Wilcannia Aboriginal Community Heritage Study* (Central Darling Shire Council and Wilcannia LALC 2018) frequently focus on people's use of the river: swimming, fishing, catching prawns and yabbies, and procuring resources such as tree bark and birds' eggs from the river banks.

The importance of the river and the resources it provided has resulted in the river and its surrounding landscape possessing considerable intangible cultural value. The Aboriginal community view the river as having been created by the Ngatji (Rainbow Serpent), and the river – in particular, deep waterholes – is viewed as still being home to the Ngatji (refer to **Sections 9.3.3** and **9.3.4**) (Central Darling Shire Council and Wilcannia LALC 2018: 27), Stories relating to the Ngatji include at least one from the post-contact period, involving the Ngatji being responsible for the wreck of a paddle steamer (discussed in more detail in **Section 9.3.4**), attesting to the continued importance of stories involving the Ngatji, and its power and control of the river, to the modern Aboriginal community. The believe that the Ngatji lives in or sleeps in waterholes and deep stretches of the river demonstrates that as well as being associated with the river in general, the intangible cultural heritage of the Ngatji and stories relating to it is connected with specific features of the river's morphology.

The river and the land immediately adjacent to it is of particular significance around Wilcannia, due to the concentration of Aboriginal occupation in this area in the recent (post European contact) past, and the rich oral history and memories that the Aboriginal community in Wilcannia has of their ancestors' recent life in and use of the area. Until low-lying areas along the river were flooded in 1956, the Aboriginal community lived in these camps. The strong connection within families and within the community in general during this period is strongly remembered in the recorded oral history (Central Darling Shire and Wilcannia LALC 2018). Tangible remnants of these camps are present in the current landscape, and natural landmarks such as large trees have also enabled older members of the community to identify where their families' homes were (refer to **Section 4.5.12.2**).

The strength of the community within the camps, and the positive consequences this had for people's lives, have led to the area being intrinsically connected with this intangible cultural heritage. The area along the river's banks is associated with a traditional Aboriginal way of life, centred on the family unit and inter-familial bonds. The intangible cultural heritage values of the area is one of the reasons for the nomination (and ratification) of the Wilcannia Mission Camps and Cultural Places Aboriginal Place (DPC 2020) (see also **Section 4.5.12.2**, **Section 9.3.5**). The Aboriginal place extends along both banks of the river, from Wilcannia township to just downstream of the study area's western end (i.e. downstream of the site of the proposed new weir). The designation of this area as an Aboriginal place demonstrates the high level of cultural value (both through tangible archaeological sites, and through its association with intangible cultural heritage) assigned to the river and the land along the river banks in this region.

Information conveyed verbally from RAP representatives who attended the two AFG meetings, and who participated in the archaeological survey, reinforce the high level of cultural value assigned to the landscape in and around the study area. It was repeatedly stated to Jacobs' archaeologists that the river itself is of critical importance to the Aboriginal community, and central to their whole way of live. Consequently, the river is strongly connected to their continuation of cultural practices. These include (but are not restricted to) swimming, fishing, collecting traditional foods such as fish, yabbies and mussels, and preserving traditional practices such as manufacturing bark canoes and wooden artefacts.

In short, the Aboriginal community is strongly connected to and invested in the welfare of all features of the region's landscape and natural environment, due to its connection to their families in the recent past, to traditional cultural practices, and to their life in the Wilcannia area today. The entirety of the study area and its surrounds can be taken as possessing high cultural value.

6. Archaeological survey methods

6.1 Aims

The archaeological survey aimed to:

- Determine whether any Aboriginal objects are present within the impact zone of the proposal.
- Identify any areas with a likelihood of Aboriginal objects being buried beneath the surface, and which should be regarded as areas of PAD.
- Gather and record information on any sites associated with intangible cultural heritage that are present within or near to the study area.

The purpose of the archaeological survey was to gather information on the nature of Aboriginal objects present in the study area and the archaeological 'site' or 'sites' they make up. This information has been used as a basis for a significance assessment of each site and its contents and recommendations for heritage management mitigation to be taken.

The survey assessed whether any areas have a high potential to contain buried Aboriginal objects and should consequently be designated as areas of PAD. The decision to designate areas of PAD was made in consultation with Aboriginal representatives from the RAPs present on the site.

The archaeological survey adhered to the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b).

6.2 Survey area

For a description of the area covered by the archaeological survey, referred to in this document as the 'study area' refer to **Section 1.3**.

6.3 Archaeological survey procedure

The field survey systematically investigated areas with the potential to contain Aboriginal sites within the study area (refer to **Section 6.2**).

The field survey was aimed at locating Aboriginal objects, Aboriginal sites (including places associated with intangible cultural heritage) and PADs.

Where archaeological sites or areas of PAD were encountered, the following attributes were recorded:

- Site location (single point for isolated artefacts, or as a boundary drawn around larger sites such as artefact clusters or middens)
- Site type
- Landform context
- Vegetation type
- Land use
- Categories of features and artefacts present on the site
- Orientation/aspect of the site
- Observations on individual cultural features (e.g. stone artefacts**)**

- Observations on culturally modified trees: living status of tree; condition of tree; condition of scar; tree species; length and width of scar; height above ground; presence of regrowth; depth of scar (height of regrowth); shape of scar; orientation of scar; presence/absence of axe marks. Culturally modified trees are trees with any evidence of past intentional modification by humans and include scarred and carved trees.
- Observations of other specific site types (burials, ceremonial sites) following the requirements of Heritage NSW site recording forms
- Photographs of the site and individual site features/artefacts judged necessary by the field team
- Any other comments or information as judged relevant by the field team.

Where sites were associated with intangible cultural heritage, information provided by RAPs in the field was recorded. Previously recorded sites within the study area were identified and investigated during the survey.

The survey also recorded land disturbance, survey coverage variables (ground exposure and archaeological visibility) and landform types across the study area.

Data was captured using a GPS enabled tablet computer running the GISella recording platform. Standard measuring tools such as tape measures and callipers were used where required.

Seven representatives from the RAPs participated in the archaeological survey (refer to **Table 6-1**). The survey was carried out from 05 November to 10 November 2020 and was conducted on foot.

Table 6-1 Participants in the Aboriginal archaeological survey, November 5 – 10, 2020

Name	Organisation represented
RAPs representatives	
Badger Bates	Barkandji Elder
Cyril Hunter	Barkandji Elder
Michael Kennedy	Wilcannia Local Aboriginal Land Council
Monica Kerwin	Wilcannia Community Working Party
Owen Whyman Snr	Barkandji community representative
Owen Whyman Jnr	Barkandji young person (being mentored by elders)
Bama Johnson	Barkandji young person (being mentored by elders)
WINSW representatives	
Felicity Rooney	WINSW
Tracey Willingham	WINSW
Ray Hanrahan	WINSW
Jacobs staff	
Doug Williams	Jacobs
Oliver Macgregor	Jacobs

An additional survey was undertaken on 17 February 2021 to examine an additional area of proposed construction laydown footprint on the left bank of the river. The participants in this small additional survey were Doug Williams (Jacobs), Michael Kennedy (Wilcannia LALC) and Owen Whyman (Barkandji community representative). The survey was conducted on foot. The purpose of this survey was to confirm if this is a suitable

area for construction laydown, to reduce the footprint in other parts where objects (such as hearths and stone artefacts) are located, and which could be avoided with the identification of a more suitable area with less impact.

7. Archaeological survey results

7.1 Introduction

The study area comprised about 20.74 hectares. Key features of the proposal are shown in **Figure 1-2, Figure 1-3, and Figure 1-4**. Key components of the proposal that are relevant to the survey are presented in **Table 7-1**.

Table 7-1 Study area components

Survey unit	Topography	Survey area (m^2)	Notes
New weir riparian corridor south/left bank	River bank +20m	4,000	At the new weir location, the immediate river bank and about 20 m out.
Contractors staging south	First river terrace	6,000	About 40m x 50m actual constructed area, but surveyed surrounds for buffer and potential for movement.
Construction compound south	First river terrace	39,270	About 100 m x 75 m planned but surveyed surrounds for buffer and potential for movement.
Access track south	Floodplain	27,000	2.7 km x about 10 m wide corridor, 5 m either side of approximate mid-point of existing track.
New weir riparian corridor north/right bank (incl. fishway)	River bank +20m	3,650	At the new weir location, the immediate river bank and about 20 m out.
Contractors laydown north	Floodplain	7,000	Irregular area surrounding access track.
Access track north	Floodplain	24,300	Irregular area surrounding and north of the canoe tree near the new weir site. Access track connects to Union Bend Road.
Existing weir bank survey (Mission side/left bank)	Riparian corridor	47,800	Immediate river bank +10 m.
Existing weir bank survey (town side/right bank)	Riparian corridor	48,350	Immediate river bank +10 m.
Total		**207,370**	**20.74 ha**

7.2 Survey coverage and visibility

The effectiveness of archaeological survey for cultural material on or under the ground (for example stone artefacts, shell middens, hearths) is greatly affected by ground cover. Any form of ground cover such as pasture, leaf litter or imported overburden will impede the ability to see such cultural material. The subject area had variable surface visibility due to the area containing a mixture of relatively undisturbed riverside vegetation in places (trees, shrubs, herbage and thick leaf litter), through to graded well used tracks in others. An assessment of effective survey coverage, although an approximation, can assist in determining archaeological potential of development areas.

The following photos (**Figure 7-1** to **Figure 7-3**) illustrate the levels of ground cover encountered during the survey. Effective survey coverage throughout the study area is detailed in **Table 7-2**.

Figure 7-1 General visibility conditions, floodplain adjacent to right bank of the river near the new weir site, hearth in foreground

Figure 7-2 General visibility conditions, south side of Union Bend, view west

Figure 7-3 General visibility conditions, southern access track adjacent to Wilcannia Mission Camps and Cultural Places Aboriginal Place

The area of the various survey components is summarised in **Table 7-1**. **Table 7-2** records the assessment of effective coverage for the study area components.

Of the about 20.84-hectare total study area, **Table 7-2** shows that about 171,470 m^2 (17.14 ha, or 82.29 per cent) was examined. This illustrates the relatively intensive examination of the study area that was undertaken. Of that, 46,152 m^2 (4.62 ha, 22.15 per cent) was effectively covered, the reduction being due to visibility constraints. Nonetheless, this final figure of effective coverage is high in relation to most surface archaeological surveys with effective coverage figures regularly being less than 10 per cent.

Table 7-2 Effective coverage

Survey unit	Survey area (m^2)	Transect length (m)	Transect width (m)	Area surveyed (m^2)	% Unit examined	% Surface visibility	m^2 effectively covered	Unit effective coverage %	Study area effective coverage (%)	Notes
New weir riparian corridor south	4,000	165	14	2,310	57.75	1	23	0.58	0.01	Survey transects @2m wide x 7 people
Contractors staging south	6,000	300	14	4,200	70.00	60	1,981	33.02	0.96	Survey transects @2m wide x 7 people, 4 x 75m long passes each person
Construction compound south 1	11,500	500	14	7,000	60.86	60	4,200	36.52	2.03	Original survey area - transects @2m wide x 7 people, 5 x 100m long passes each person
Construction compound south 2	13,000	800	6	4,800	36.92	30	1,440	11.00	0.69	Additional survey transects immediately west of original area, north of graded access track. Transects @2m wide x 3 people x 100m long.
Construction compound south 3	15,770	1,000	6	6,000	38.05	30	1,800	11.41	0.87	Additional survey transects south and west of original area, south of graded access track. Transects @2m wide x 3 people x 200m long.
Access track south	27,000	27,000	10	27,000	100.00	85	22,950	85.00	11.28	Entirety of road corridor covered by 5 people
New weir riparian corridor north (incl. fishway)	3,650	165	14	2,310	63.29	1	23	0.63	0.01	Survey transects @2m wide x 7 people
Contractors laydown north	7,000	300	14	4,200	60.00	30	1,260	18.00	0.61	Survey transects @2m wide x 7 people, 4 x 75m long passes each person

Survey unit	Survey area (m^2)	Transect length (m)	Transect width (m)	Area surveyed (m^2)	% Unit examined	% Surface visibility	m^2 effectively covered	Unit effective coverage %	Study area effective coverage (%)	Notes
Access track north	24,300	1,250	14	17,500	72.02	30	5,250	21.60	2.53	Survey transects @2m wide x 7 people, 5 x 250m long passes each person
Bank survey (Mission side)	47,800	4,780	10	47,800	100	5	2,390	5.00	1.15	Survey traverse of entire length x 7 people @ 2m wide field view of surface
Bank survey (Town side)	48,350	4,835	10	48,350	100	10	4,835	10.00	2.11	Survey traverse of entire length x 7 people @ 2m wide field view of surface
TOTAL	**208,370**			**171,470**	**82.29**		**46,152**		**22.15**	

7.3 Summary of results

During the field survey the following archaeological sites were recorded:

- 30 new culturally modified trees
- 12 open archaeological sites, containing stone artefacts, hearths (fireplaces) and shell middens, which in total included:
  - 36 hearths (including two 'emu ovens')
  - 517 stone artefacts
  - five mussel shell clusters, interpreted as middens.

Site record forms were filled out for each site and submitted to the AHIMS. AHIMS site record forms of all new sites recorded are supplied in **Appendix C**.

Additional scarred trees were observed and recorded upstream of the existing Wilcannia Weir and have been registered with AHIMS, but as they lay outside of the study area of this report and will not be affected by the proposal they are not further considered here.

The survey team was shown a number of previously recorded culturally modified trees in and near the study area by the RAPs.

Sites recorded during the survey, which include newly recorded sites and new recordings of previously identified sites, are shown in **Figure 7-4**.

These results are discussed in more detail in the following sections.

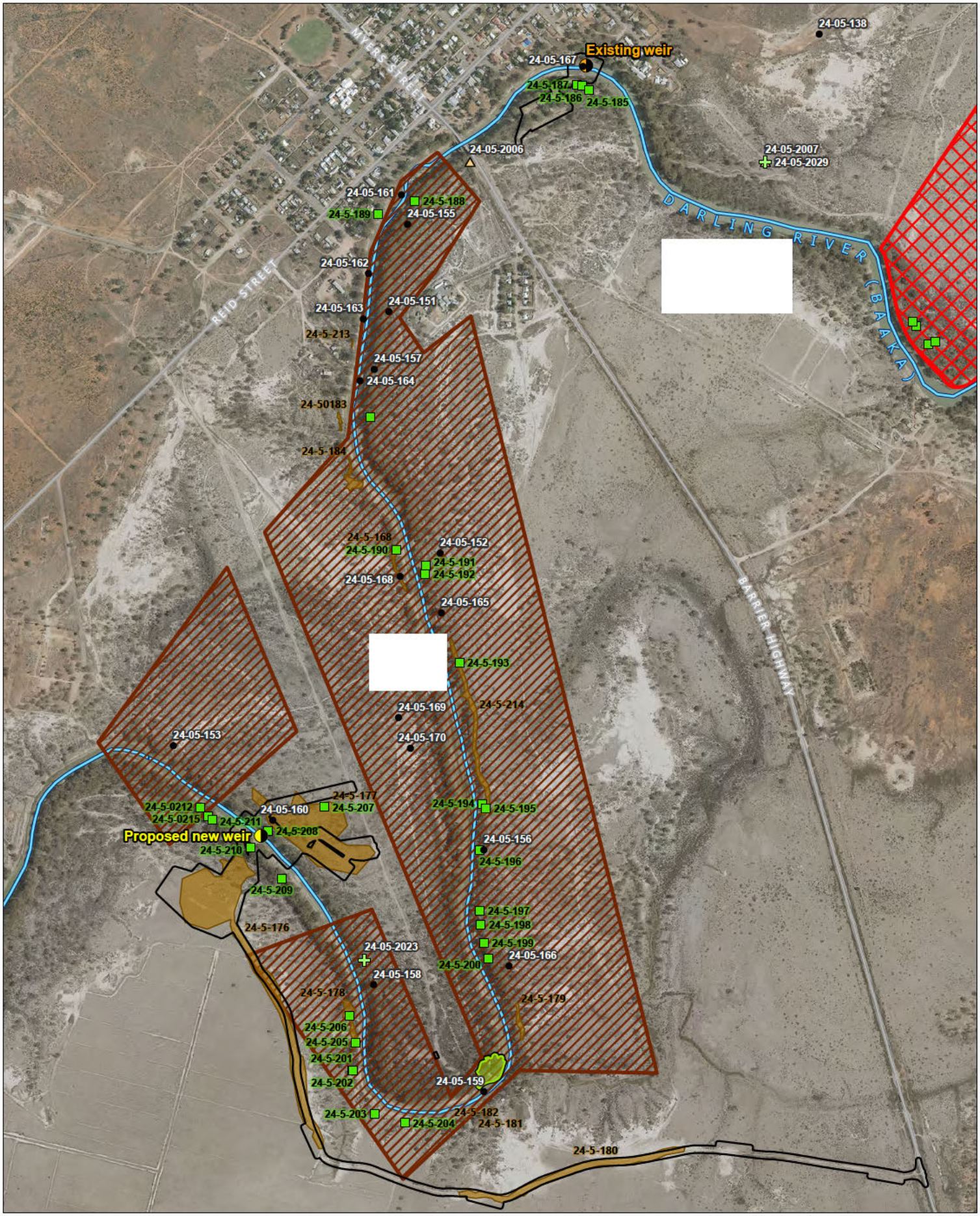

Figure 7-4: Archaeological survey results, showing all recorded sites

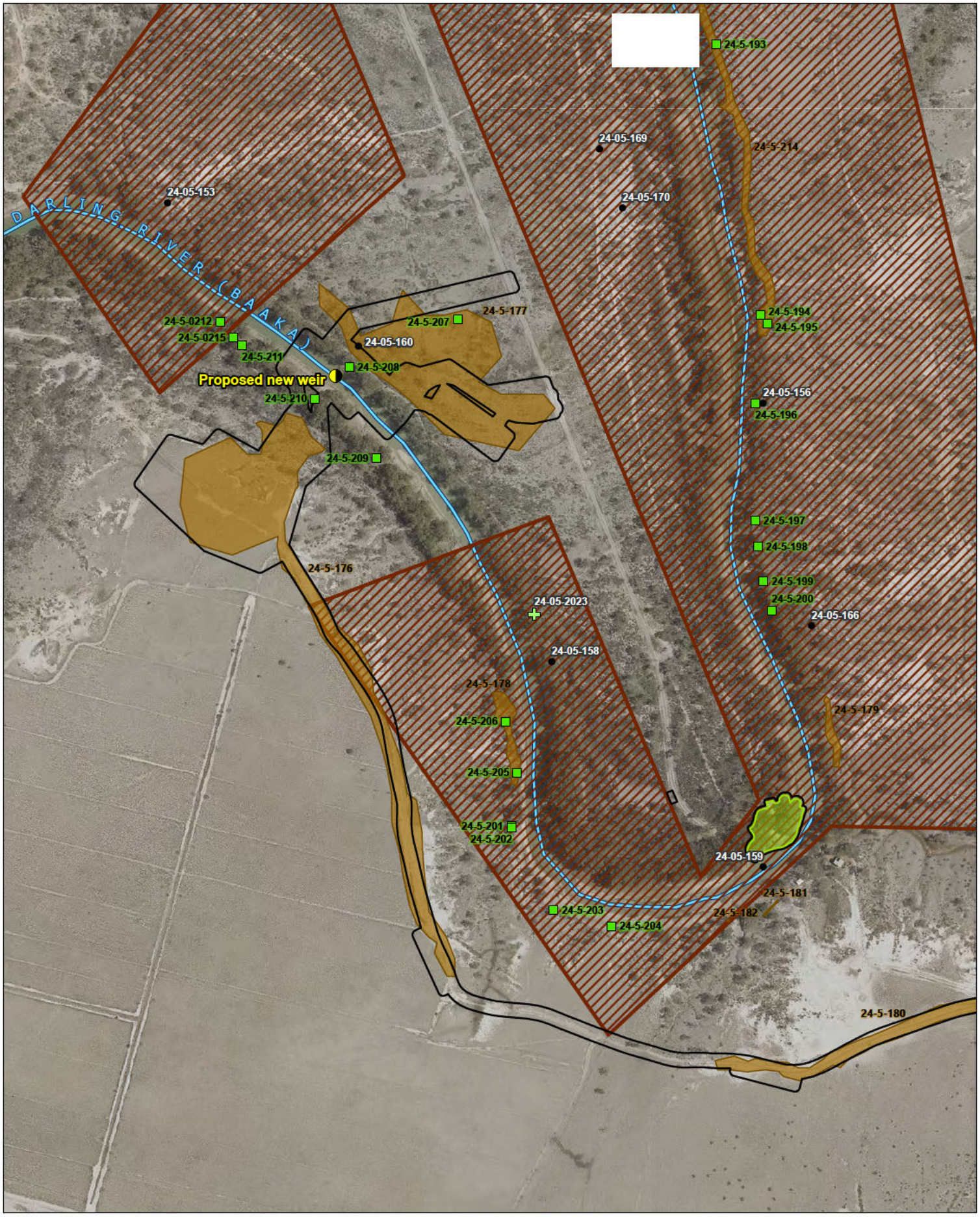

Figure 7-4: Archaeological survey results, showing all recorded sites

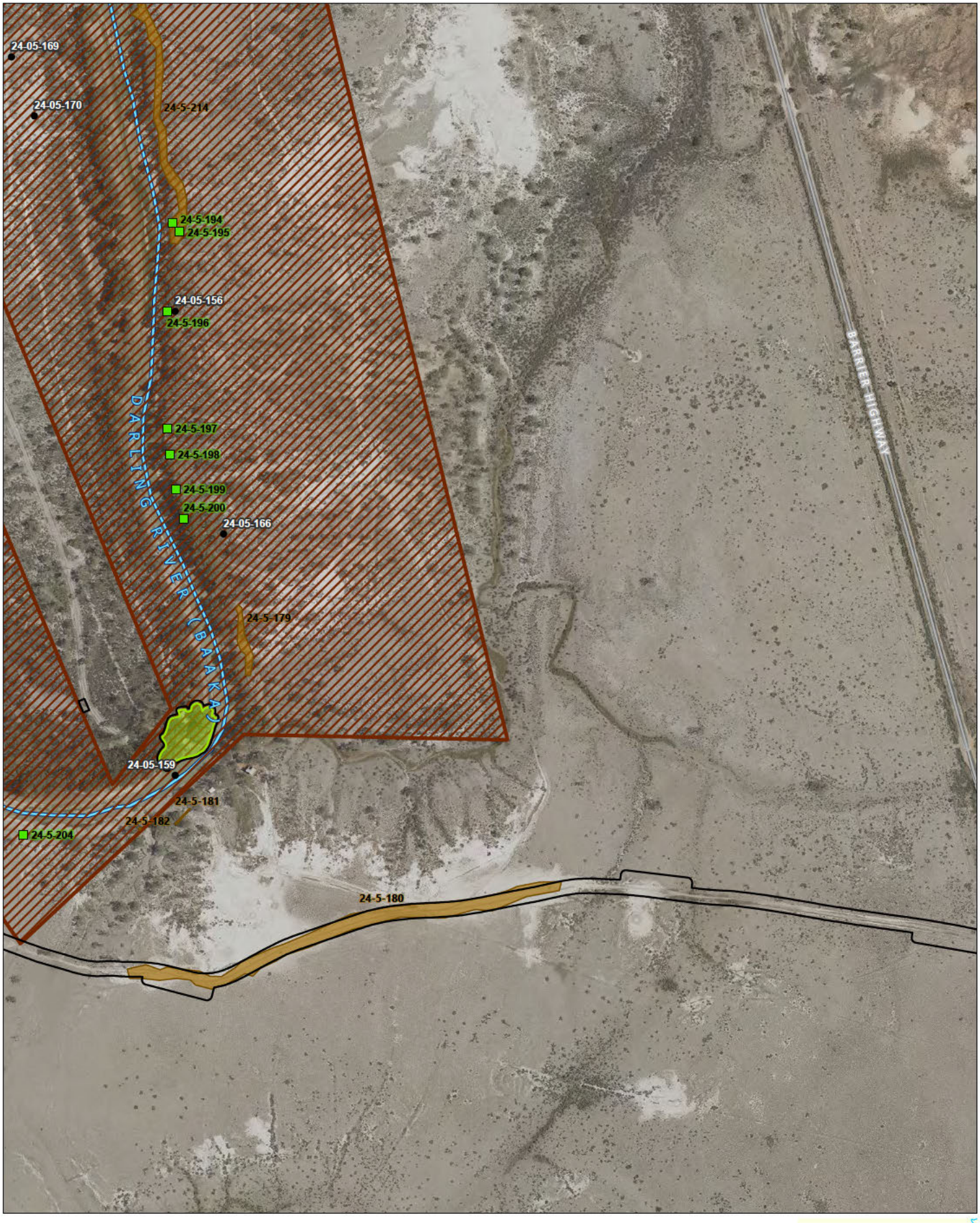

Figure 7-4: Archaeological survey results, showing all recorded sites

7.4 Culturally modified trees

The culturally modified trees recorded during site survey for the proposal fall into a number of categories, however all involved the removal of bark for a cultural use. Some also exhibited ingress into the heartwood or central hollow of the trunk or branch. The three categories that have been identified are:

- Canoe scars – bark removed to make a vessel to traverse the river
- Coolamon scars – bark removed to make a container
- Toehold scars – bark removed to allow a trunk or branch to be climbed.

Designation of canoe scars compared to coolamon scars was completed in field at the time of recording, and involved a degree of intuition, taking into account the size of the scar at the time of recording, but also the visible extent of any regrowth to estimate the original size of the bark sheet removed. In the event multiple scars were present on a tree the largest was used for recording of primary measurements.

Some trees exhibited composite uses, for example a container scar and toeholds.

Two scars exhibited European letters and numbers carved into the surface of the scar. These were recorded as coolamon scars, but it is unclear whether the scars were created during land surveys (a common practice), or an existing Aboriginal scar was used by a surveyor for convenience.

Table 7-3 summarises the characteristics of the culturally modified trees recorded during the proposal.

Table 7-3 Culturally modified trees in the study area

Note: Culturally modified trees with potential to be directly affected by the proposal are shaded. The remainder are peripheral to the proposed works and weir pool and are not further considered in detail.

AHIMS No	Site name	Tree species	Tree Health	Tree Position	No of scars	Original scar L (mm)	Original scar W (mm)	Top regrowth (mm)	Bottom regrowth (mm)	Side regrowth (mm)	Notes
24-5-185	Old Wilcannia Weir Canoe Tree 3	Redgum	Alive	Standing	1	2700	700	1000	600	400	
24-5-186	Old Wilcannia Weir Canoe Tree 2	Redgum	Alive	Standing	1	2950	630	650	500	450	
24-5-187	Old Wilcannia Weir Canoe Tree 1	Redgum	Dead	Standing	1	1720	900	520	300	550	
24-5-188	Wilcannia Coolamon Tree 1	Redgum	Alive	Standing	1	1200	700	200	0	300	Steel axe marks in scar. Tree 10m from creek bank crest.
24-5-189	Wilcannia Canoe Tree 1	Redgum	Alive	Standing	1	1850	700	350	550	400	
24-5-190	Union Bend Coolamon Tree 15	Redgum	Alive	Standing	1	730	260	150	180	150	
24-5-191	Union Bend Coolamon Tree 14	Redgum	Alive	Standing		365	180	150	150	150	Toe holds cut into a dead branch of same tree. Tree is on the bank edge, roots exposed by erosion.
24-5-192	Union Bend Coolamon Tree 13	Redgum	Alive	Standing	4	1200	850	250	400	300	Multiple small scars on trunk and branches. Tree on bank crest.
24-5-193	Union Bend Toehold Tree 1	Box	Dead	Standing	4	180	220	40	40	40	

AHIMS No	Site name	Tree species	Tree Health	Tree Position	No of scars	Original scar L (mm)	Original scar W (mm)	Top regrowth (mm)	Bottom regrowth (mm)	Side regrowth (mm)	Notes
24-5-194	Union Bend Canoe Tree 10	Coolibah	Alive	Standing	1	2300	500	800	200	200	
24-5-195	Union Bend Coolamon Tree 12	Coolibah	Alive	Standing	1	850	400	150	200	150	Survey marks chiselled into scar. 'WL8 296'.
24-5-196	Union Bend Coolamon Tree 11	Redgum	Alive	Standing	1	1200	600	300	300	400	
24-5-197	Union Bend Coolamon Tree 10	Redgum	Alive	Standing	1	1050	1400	150	200	200	Straight axe marks on heartwood in scar - steel axe.
24-5-198	Union Bend Coolamon Tree 9	Redgum	Dead	Standing	1	1250	350	300	200	200	
24-5-199	Union Bend Canoe Tree 9	Redgum	Alive	Standing	1	2100	1120	500	600	800	
24-5-200	Union Bend Canoe Tree 8	Redgum	Alive	Leaning	1	2000	1150	400	No recording possible	400	Scar close to base, bottom obscured by colluvial wash.
24-5-201	Union Bend Coolamon Tree 5	Black Box	Alive	Standing	2	630	230	200	200	150	Probably for access to animal. Scar 2. 500 x 100 x 150. Top regrowth =200mm, bottom regrowth =200, side regrowth = 150. Height above ground= 2880. Branch circumference 900.

AHIMS No	Site name	Tree species	Tree Health	Tree Position	No of scars	Original scar L (mm)	Original scar W (mm)	Top regrowth (mm)	Bottom regrowth (mm)	Side regrowth (mm)	Notes
24-5-202	Union Bend Coolamon Tree 6	Coolibah	Alive	Standing	1	1065	625	360	420	600	
24-5-203	Union Bend Coolamon Tree 7	Coolibah	Alive	Standing	1	870	400	250	270	250	Probably survey scar. Nail hammered to top of scar, lightly carved letters numerals in scar face. L at mid left of scar, 44 at base.
24-5-204	Union Bend Coolamon Tree 8	Box	Alive	Leaning	1	460	250	150	150	150	Tree is on eroded bend, now leaning into river - was originally upright. As tree is on outer bend, natural river evolution will cause it to fall in due course. Higher water / wave action may exacerbate.
24-5-205	Union Bend Coolamon Tree 4	Coolibah	Alive	Standing	1	1270	315	200	290	190	
24-5-206	Union Bend Coolamon Tree 3	Coolibah	Alive	Standing	1	655	400	130	135	100	4 steel axe marks.
24-5-207	Union Bend Coolamon Tree 2	Box	Alive	Standing	1	1290	390	390	300	250	
24-5-208	Union Bend Canoe Tree 7	Redgum	Dead	Fallen	1	2450	1100	450	500	500	Dead River Red Gum fallen against bank, roots closest to river.
24-5-209	Union Bend Canoe Tree 6	Redgum	Alive	Standing	1	2500	950	800	No recording possible	800	

AHIMS No	Site name	Tree species	Tree Health	Tree Position	No of scars	Original scar L (mm)	Original scar W (mm)	Top regrowth (mm)	Bottom regrowth (mm)	Side regrowth (mm)	Notes
24-5-210	Union Bend Coolamon Tree 1	Redgum	Alive	Standing	1	1950	630	600	700	450	
24-5-211	Union Bend Canoe Tree 5	Redgum	Alive	Standing	1	2900	1260	400	400	400	
24-5-212	Union Bend Canoe Tree 4	Redgum	Alive	Standing	1	5400	1600	600	100	500	Cut hole on scar, triangular with flat cut marks. Cut by a steel axe.
24-5-215	Union Bend Canoe Tree 11	Redgum	Alive	Standing	1	3800	1500	100	100	1300	Cut hole on scar, triangular with flat cut marks. Cut by a steel axe.
24-5-216	Union Bend Coolamon Tree 16	Redgum	Alive	Standing	1	950	460	450	300	450	Scar wholly closed, outline relatively clear.

Measurements of scars from bark removal indicate two population sizes (**Figure 7-5**) support the designation of two main uses of bark removed from trees in the study area. A single data point of overlap would suggest an incorrect field designation of site 24-5-210 as a coolamon scar when in fact its original dimensions suggest it was sufficient to be a canoe scar. Other than this site there is 500mm difference between the length of the longest coolamon scar and the length of the shortest canoe scar.

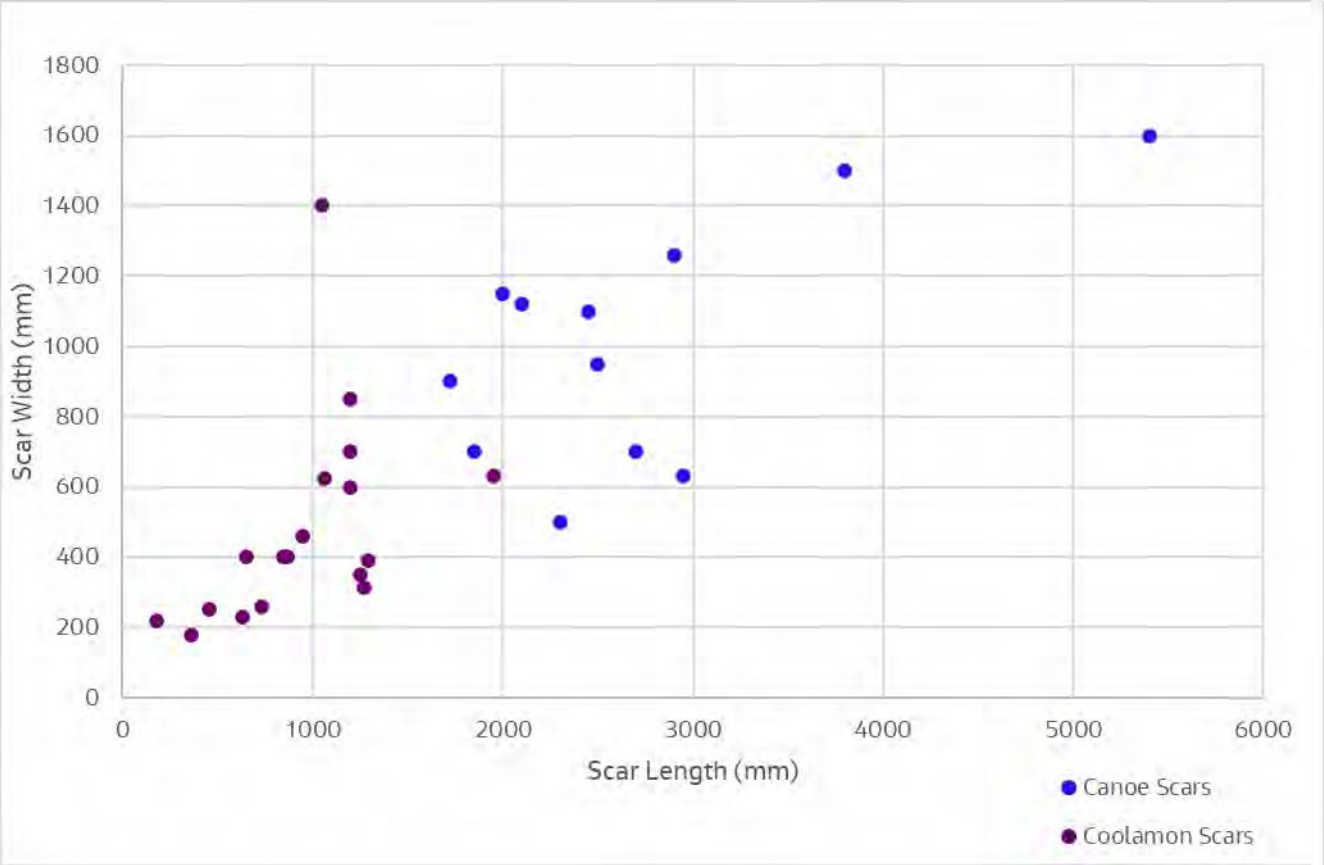

Figure 7-5 Original length and width of scars recorded in the study area

Sites 24-5-185, 186 and 187 are culturally modified trees in the vicinity of the existing Wilcannia Weir (refer to **Figure 7-6** and **Table 7-4**).

Figure 7-6: Culturally modified trees adjacent to the existing Wilcannia Weir

Table 7-4 Culturally modified trees near the existing Wilcannia Weir

AHIMS Site	Site name	Notes	Image
24-5-185	Old Wilcannia Weir Canoe Tree 3	This tree is a living tree with a well-defined south facing scar. It is located about 50 m south east of the south end of the Wilcannia Weir wall. The dimensions of the scar at the time of recording were 1100mm long, 300mm wide and 150mm deep. Significant regrowth has occurred.	
24-5-186	Old Wilcannia Weir Canoe Tree 2	This tree is living but in poor health with a moderately defined, largely overgrown south east facing scar. It is located about 35 m directly south of the south end of the Wilcannia Weir wall. The dimensions of the scar at the time of recording were 1800mm long, 180mm wide and 200mm deep. Significant regrowth has occurred.	
24-5-187	Old Wilcannia Weir Canoe Tree 1	This tree is a dead tree with a well-defined northwest facing scar. It is located about 35 m south-southwest of the south end of the Wilcannia Weir wall. The dimensions of the scar at the time of recording were 900 mm long, 350 mm wide and 250 mm deep. Significant regrowth has occurred.	

Culturally modified trees 24-5-191 and 24-5-204 do not occur in areas to be directly impacted by the proposal (refer to **Table 7-5**). Potential impacts to these sites may however occur through modification to the weir pool as these trees have roots significantly undercut by bank erosion and will at some point fall into the river. It is as yet unknown what effect a permanent weir pool will affect the progress (or otherwise) of bank erosion.

Table 7-5 Culturally modified trees near with potential to be undercut by water action

AHIMS Site	Site Name	Notes	Image
24-5-191	Union Bend Coolamon Tree 14	This tree is a living tree with a well-defined south facing scar, and toe holds cut into the trunk. It is located about mid-way between the existing weir and the southern-most extent of Union Bend, on the east bank of the river. The dimensions of the main scar at the time of recording were 650 mm long, 300 mm wide and 70 mm deep. The scar has about 150 mm of regrowth.	
24-5-204	Union Bend Coolamon Tree 8	This tree is a living tree with a small well-defined west facing scar on a horizontal branch of the tree. It is located about 950 m south east (upstream) of the proposed new weir location on the south bank of the river. The dimensions of the main scar at the time of recording were 160 mm long, 100 mm wide and 90mm deep. The scar has about 150 mm of regrowth.	

Three culturally modified trees occur within the construction footprint of the proposed new Wilcannia Weir. These include 24-5-208, and 24-5-210. 24-5-209 is located near the proposal's construction footprint, on the south bank of the river. Additionally, previously recorded site 24-5-160 occurs in the immediate periphery of the northern bank development area. These sites are further described in **Table 7-6**, and their location shown in **Figure 7-7**.

Table 7-6: Culturally modified trees near proposed new weir

AHIMS Site	Site name	Notes	Image
24-5-160	Union Bend Canoe Tree 3	This tree is a living tree with a well-defined south facing scar. It is located adjacent to proposed location of the new weir about 30m northwest of the river bank.	
24-5-208	Union Bend Canoe Tree 7	This tree is dead, has fallen and currently rests on the sloping bank of the river. It is in poor condition having undergone significant decomposition. The dimensions of the main scar at the time of recording were 1500mm long, 600mm wide and 140mm deep. The scar has substantial regrowth at the time of the tree's death. It is considered likely to be the oldest of the culturally modified trees recorded in this survey. It is located directly in a zone proposed for disturbance by the	

AHIMS Site	Site name	Notes	Image
		proposed new weir construction.	
24-5-209	Union Bend Canoe Tree 6	This tree is alive and exhibits a moderately defined south east facing scar that is substantially overgrown. The scar dimensions at recording were 1700 mm long, 150 mm wide and 300 mm deep. The tree is located about 125 m south east of the proposed new weir location, beyond the furthest extent clearing.	
24-5-210	Union Bend Canoe Tree 1	This tree is alive and exhibits a small but well-defined west facing scar that is substantially overgrown. The dimensions of the scar are 650 mm long, 180 mm wide and 250 mm deep. The tree is located within the construction footprint of the proposed new weir and its presence would impede use of a crane to lift materials into position.	

Figure 7-7: Culturally modified trees in the vicinity of the proposed new weir

7.5 Open sites

Characteristics of the 12 open sites identified in the study area during the archaeological survey are summarised in **Table 7-7**, and their locations and extents are shown in **Figure 7-4**.

Table 7-7 identifies that only sites 24-5-176, 24-5-177 and 24-5-180 would be affected by the proposal and as such the remaining sites, now registered with AHIMS, will not be further considered here. Inventories of artefacts recorded sites 24-5-176, 24-5-177 and 24-5-180 are provided in **Appendix A**.

Table 7-7 Open sites recorded during this study

AHIMS	Site name	Type	Number of artefacts	Number of hearths	Midden	Affected by proposal
24-5-168	Union Bend Midden and Brown Family Hut	Artefact scatter	17			No
24-5-175	Wilcannia Mission AP IF1	Isolated artefact	1			No
24-5-176	Wilcannia New Weir 1	Artefact scatter with hearths	283	11		Yes
24-5-177	Wilcannia New Weir 2	Artefact scatter with hearths	14	19		Yes
24-5-178	Wilcannia Mission AP 1	Artefact scatter with hearth	5	1	Yes	No
24-5-179	Wilcannia Mission AP 5	Artefact scatter with hearth	4	2		No
24-5-180	Wilcannia Mission AP 4	Artefact scatter	38			Yes
24-5-181	Wilcannia Mission AP 3	Artefact scatter	2			No
24-5-182	Wilcannia Mission AP 3	Shell midden with artefact	1		Yes	No
24-5-183	Wilcannia Mission AP 2	Artefact scatter	11			No
24-5-184	Union Bend Brick Clamp	Artefact scatter	91			No
24-5-213	South Wilcannia 2	Artefact scatter	2			No
24-5-214	Wilcannia Mission AP 6	Artefact scatter with hearth	34	1		No

7.5.1 Site 24-5-176 – Wilcannia New Weir 1

Site 24-5-176 is an extensive scatter of stone artefacts over an about 900m x 50m area with a cluster of hearths at its northern extent, closer to the river (refer to **Figure 7-8**). The majority of artefacts are spread along the existing access track through 'Yeoval' and the Wilcannia Mission Camps and Cultural Places Aboriginal Place (refer to **Figure 7-3**). The extent of the site is determined to a large degree by visibility conditions with the graded track providing a shallowly excavated, deflated, devegetated window into the immediate subsurface, but also partly due to the limited extent of the study area. The linear site is aligned parallel to the river for most of its length, at an average of about 200m west of the western bank, converging towards the river at its northern extent. Overall, the artefact density of the site is about 0.006/m^2, but contains clusters up to 0.15/m^2 (one artefact per 6.5 square metres).

The 11 hearths recorded at this site were all identified on the basis of clustered baked clay nodules (refer to **Figure 7-10**). All were recorded as being surface scatters of material, suggesting that they occur in deflated contexts that may not have a subsurface extent. The hearths at this site had a mean surface area of 0.69 m^2 although this mean is increased by two large scatters of baked clay fragments, both deflated and dispersed clusters. Removing these two dispersed features from the calculation shows the majority of the hearths returned an average surface area of 0.25 m^2.

The recorded site extent of 24-5-176 overlaps to a significant extent with the proposal on the western side of Union Bend, with most of this site lying within the proposal's construction footprint.

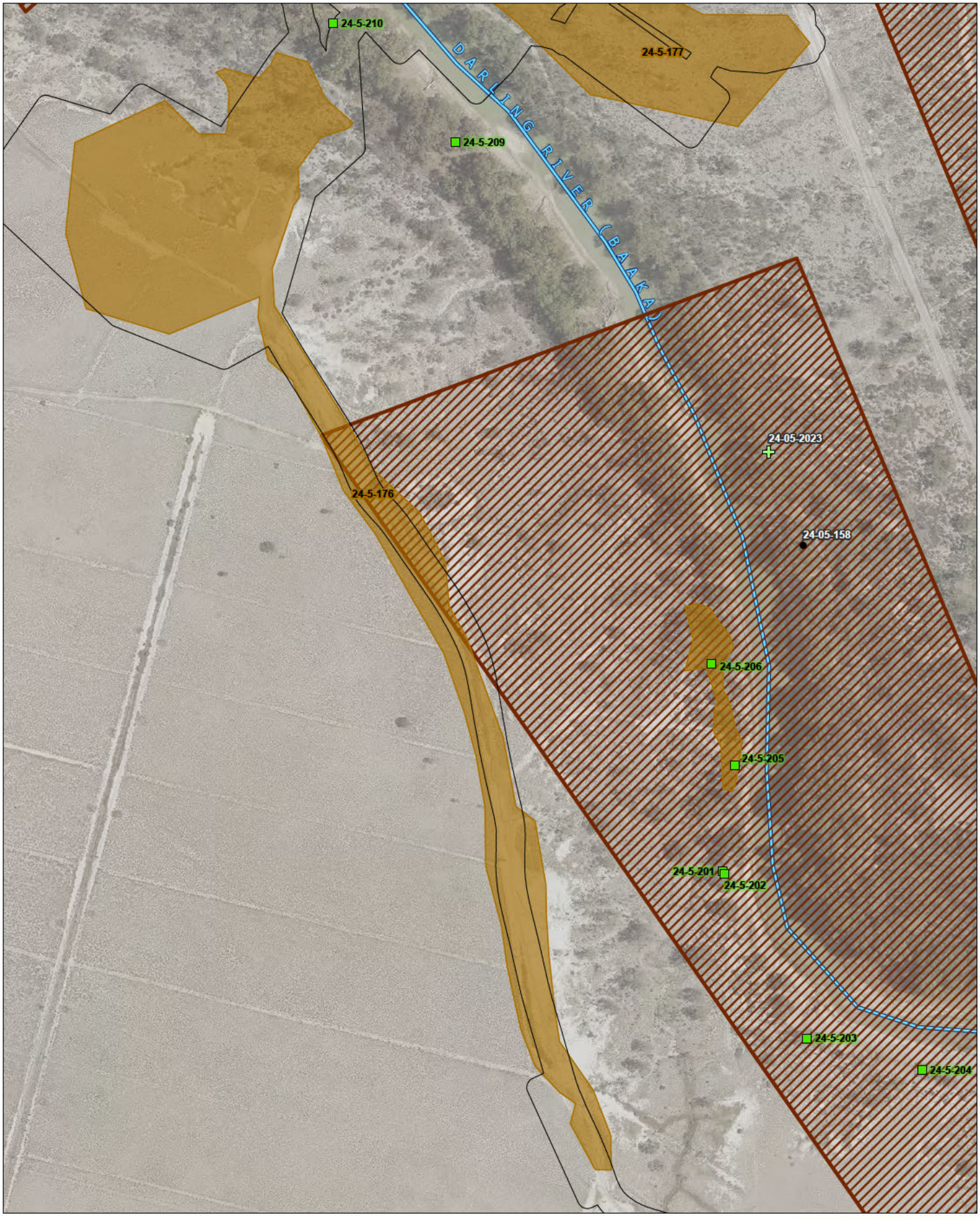

Figure 7-8: 24-5-176, Wilcannia New Weir 1

Figure 7-9 24-5-176, view south from north end of site

Figure 7-10 Example of hearth at 24-5-176

A total of 283 artefacts were recorded at Wilcannia New Weir 1, most of which (210) are unretouched flakes or fragments thereof (refer to **Figure 7-11**). Other artefacts recorded at the site consist of 30 flaked pieces, 19 retouched flakes, 15 cores, one grindstone (bottom) and one hammerstone.

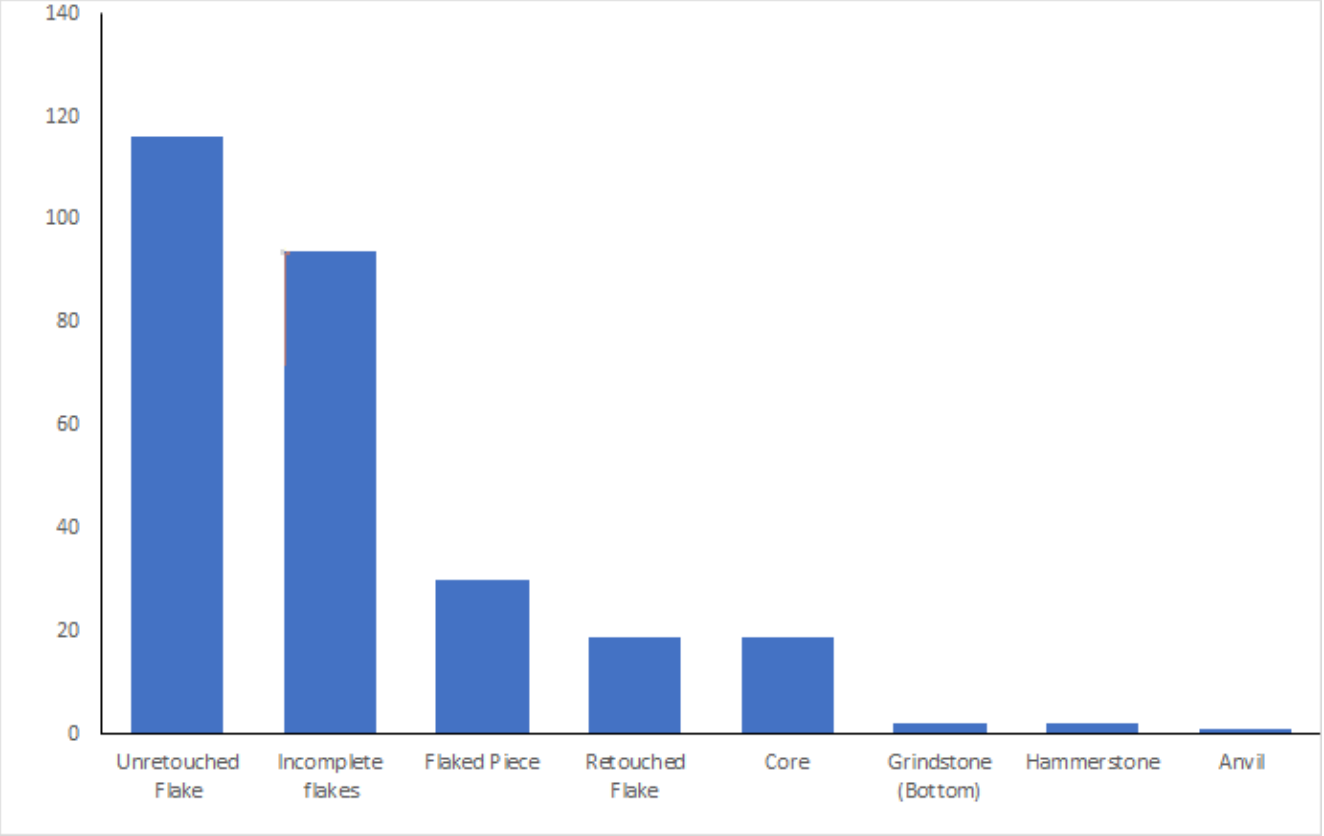

Figure 7-11 All artefacts from Wilcannia New Weir 1, by type

Most of the artefacts recorded at Wilcannia New Weir 1 are made from silcrete (237 artefacts), with other materials being relatively rare by comparison (refer to **Figure 7-12**).

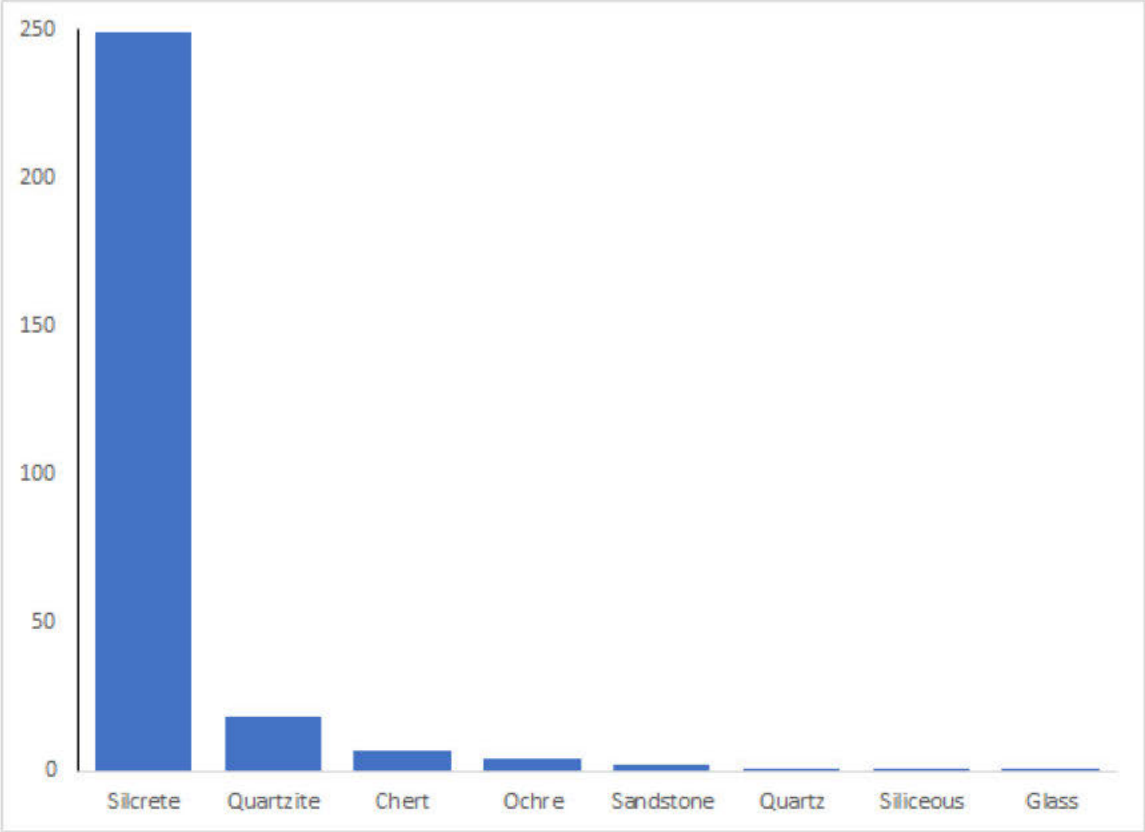

Figure 7-12 All artefacts from Wilcannia New Weir 1, by material

The summary statistics of the dimensions (length, width and thickness) of complete unretouched flakes at Wilcannia New Weir 1 (refer to Table 7-8) is very similar to the statistics computed for the set of all artefacts recorded during the survey (see below). This is unsurprising, given that the large assemblage recorded at Wilcannia New Weir 1 makes up the majority of the total number of artefacts recorded across the entire study area.

Table 7-8 Summary statistics of the dimensions of complete unretouched flakes from Wilcannia New Weir 1

Dimension	Minimum	1st quartile	Median	3rd quartile	Maximum	Mean
Length (mm)	10	20	20	25	45	22.35
Width (mm)	5	15	20	25	50	21.19
Thickness (mm)	2	5	5	8	15	6.22

Figure 7-13 Retouched silcrete flake from 24-5-176

Figure 7-14 Flaked glass artefact from 24-5-176

An inventory of all artefacts recorded at Wilcannia New Weir 1 is provided in **Appendix A**.

7.5.2 Site 24-5-177 – Wilcannia New Weir 2

Site 24-5-177 is an extensive site composed of 19 hearths interspersed with 14 stone artefacts and in proximity to several culturally modified trees. The site occupies the area on the northern side of the weir development, including the proposed fishway (refer to **Figure 7-15**).

The 19 hearths recorded at this site were all identified on the basis of clustered baked clay nodules (refer to **Figure 7-16**, **Figure 7-17** and **Figure 7-18**). Five were recorded as being a surface exposure with potential subsurface depth, one was a lag deposit and the remainder were surface scatters of material only. None of the hearths exhibited surface evidence of any content other than baked clay although two were within about 1m of surface artefacts. The hearths at this site had a mean surface area of 1.38 m^2 although as with 24-5-176 this mean is increased by a minority of comparatively large hearth features. All of the hearths occur on the broader Union Bend floodplain but are distinctly located with regard to the microtopography of the site which has a relief varying over 1m to 1.5m from low point to high point away from the river bank. All of the hearths are located on subtle rises in the landscape, avoiding the lower lying areas and shallow flood runners. This pattern is particularly well illustrated in the locations of hearths #3, 5,12,13 and 14, this linear arrangement following a low rise on the western extent of the survey area.

Of the 19 hearths recorded, two (17,18) are within the development footprint of the proposed laydown area and two (15,19) are on or near the alignment of the proposed road and turnaround.

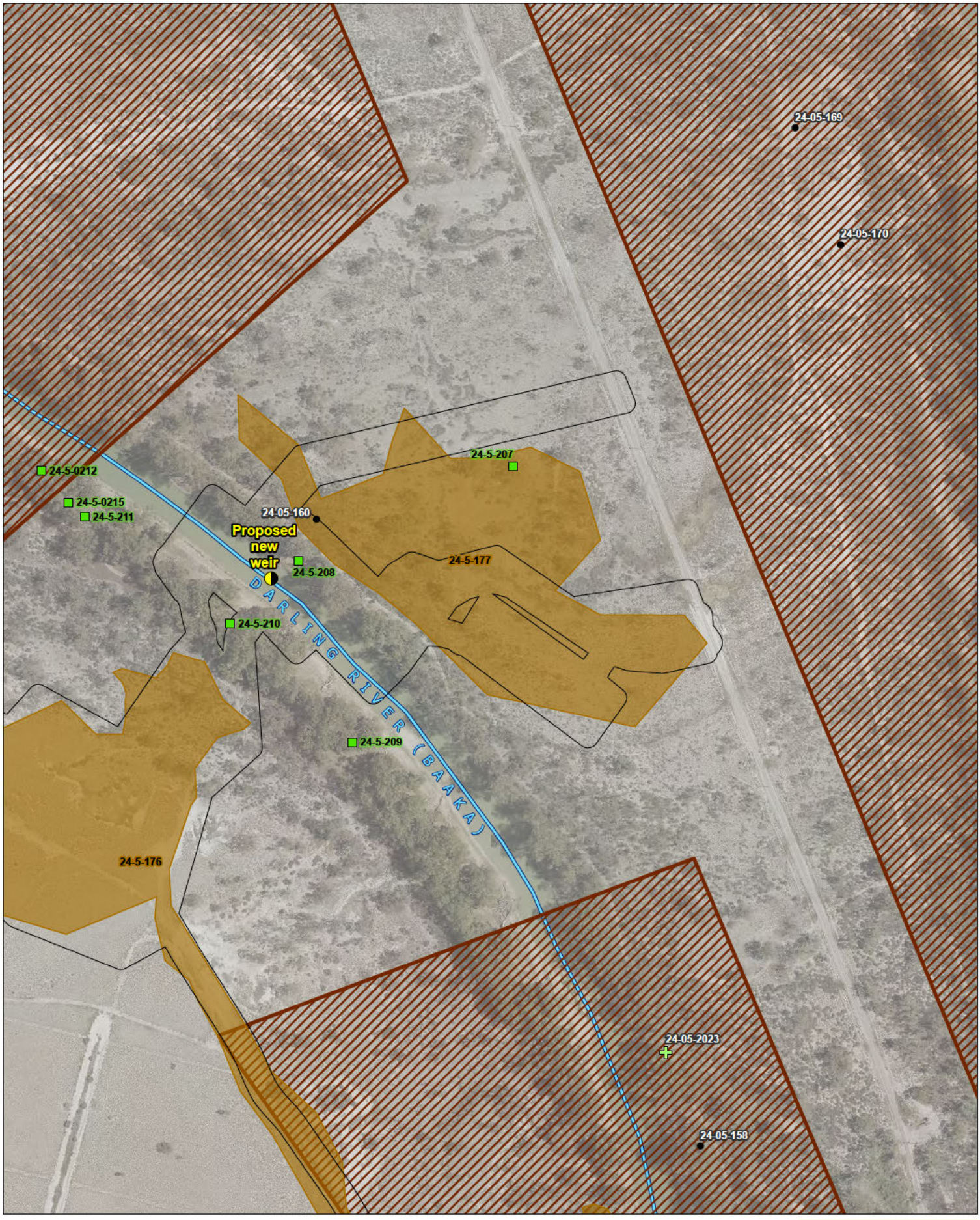

Figure 7-15: 24-5-177, Wilcannia New Weir 2

Figure 7-16 Example of hearth from 24-5-177 – Hearth #4

Figure 7-17 Example of hearth from 24-5-177 – Hearth #6

Figure 7-18 Example of hearth from 24-5-177 – Hearth #2

Fourteen artefacts were recorded at Wilcannia New Weir 2. Of the 14 artefacts recorded at 24-5-177, the majority (eight) are unretouched flakes, with three cores, two hammerstones and one grindstone (bottom) also present. Despite its small size the assemblage exhibits moderate diversity.

The 14 stone artefacts are sparsely distributed throughout the site extent, with less patterning with regard to topography than observed for hearths. Surface visibility was compromised by moderate vegetation cover and a lack of deflation suggesting the potential for substantially more stone artefacts to exist at the site. All of the stone artefacts were found in excess of 100 metres from the river bank, but again, surface visibility reduced with proximity to the river. Overall, the artefact density of the site is about 0.001/m^2 (one artefact in any

1,000 square metres) but exhibits one location where two artefacts were found within two metres of each other and another cluster of four artefacts at 0.01/m^2.

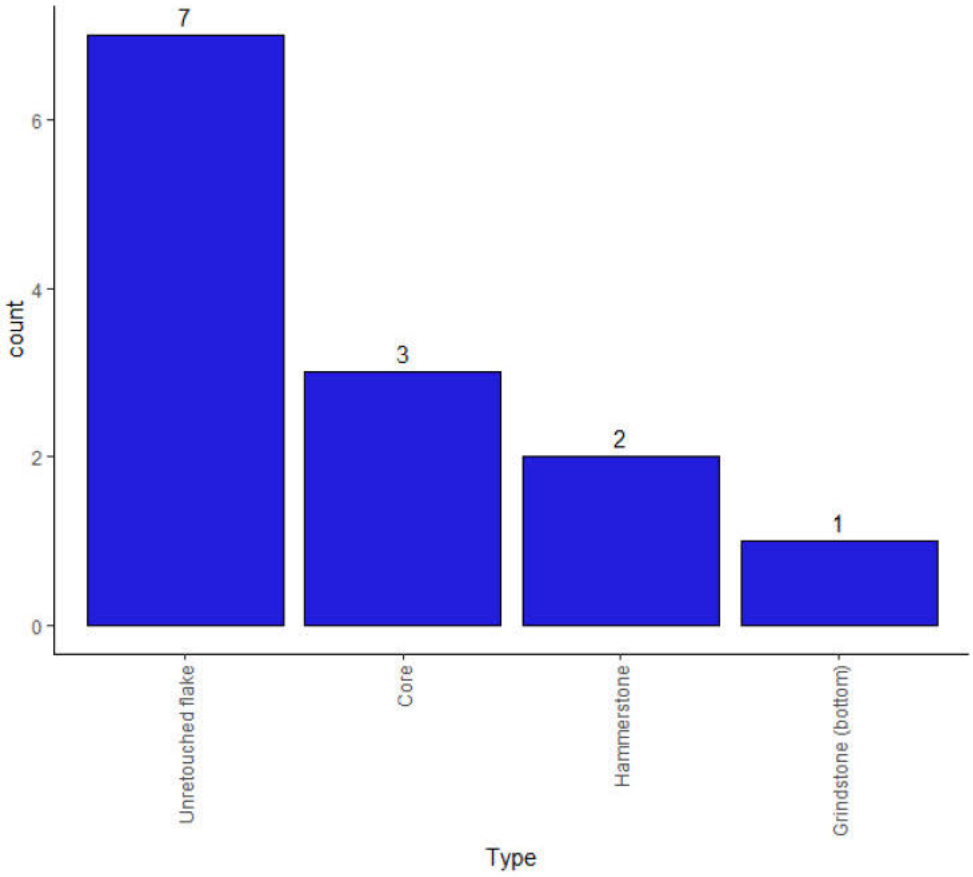

Figure 7-19 All artefacts from 24-5-177, by type

Summary statistics of the dimensions of complete unretouched flakes from 24-5-177 show that the flakes on this site are slightly larger than is typical of the flakes recorded across the study area overall (refer to **Table 7-9**). The median flake length is 31mm (compared with 20mm for all recorded flakes), median width is 22.5mm (compared with 20mm), although median thickness is 4mm (compared with 5mm). These data could indicate a difference in the knapping behaviour and knapping strategies employed by Aboriginal people on this site compared with other sites in the study area. Given the small size of the assemblage recorded at 24-5-177, however, it is also possible that these differences in median flake size are simply the result of random chance and do not reflect an actual difference between this assemblage and other assemblages across the study area.

Table 7-9 Summary statistics of the dimensions of complete unretouched flakes from Wilcannia New Weir 2

Dimension	Minimum	1st quartile	Median	3rd quartile	Maximum	Mean
Length (mm)	20	26.25	31	34.25	40	30.33
Width (mm)	10	17.75	22.5	25	35	22
Thickness (mm)	3	3	4	5	5	4

An inventory of all artefacts recorded at 24-5-177 is provided in **Appendix A**.

Figure 7-20 Chert flake from 24-5-177

Figure 7-21 Fine grained silcrete core from 24-5-177

Figure 7-22 Silcrete hammerstone from 24-5-177

7.5.3 Site 24-5-180 – Wilcannia Mission Aboriginal Place 4

Site 24-5-180 is an extensive scatter of stone artefacts over an about 700 m x 25 m area aligned about east-west to the south of Union Bend. The artefacts are spread along the existing access track through 'Yeoval' and the Wilcannia Mission Camps and Cultural Places Aboriginal Place, with very loose clusters towards the eastern and western extents (refer to **Figure 7-23**). The extent of the site is determined to a large degree by visibility conditions with the graded track providing a shallowly excavated, deflated, devegetated window into the immediate subsurface (refer to **Figure 7-3)**, but also, partly due to the limited extent of the study area. The linear site is about 225 metres from the river at its closest (the western most point), and about 580 metres from the river at its eastern end. Overall, the artefact density of the site is about 0.004/m^2 (one artefact in any about 250 square metres) but contains clusters up to 0.1/m^2 (one artefact in any about 10 square metres).

The recorded site extent of 24-5-180 overlaps to a significant extent with the access track through Yeoval (refer to **Figure 7-23**).

Figure 7-23: 24-5-180, Wilcannia Mission Aboriginal Place 4

Thirty-eight artefacts were recorded at 24-5-180, most of which (28 artefacts, 74%) are unretouched flakes (refer to **Figure 7-24**). Other artefacts consisted of five retouched flakes, two cores, and three grindstones (two of which are indeterminate, one of which is a topstone).

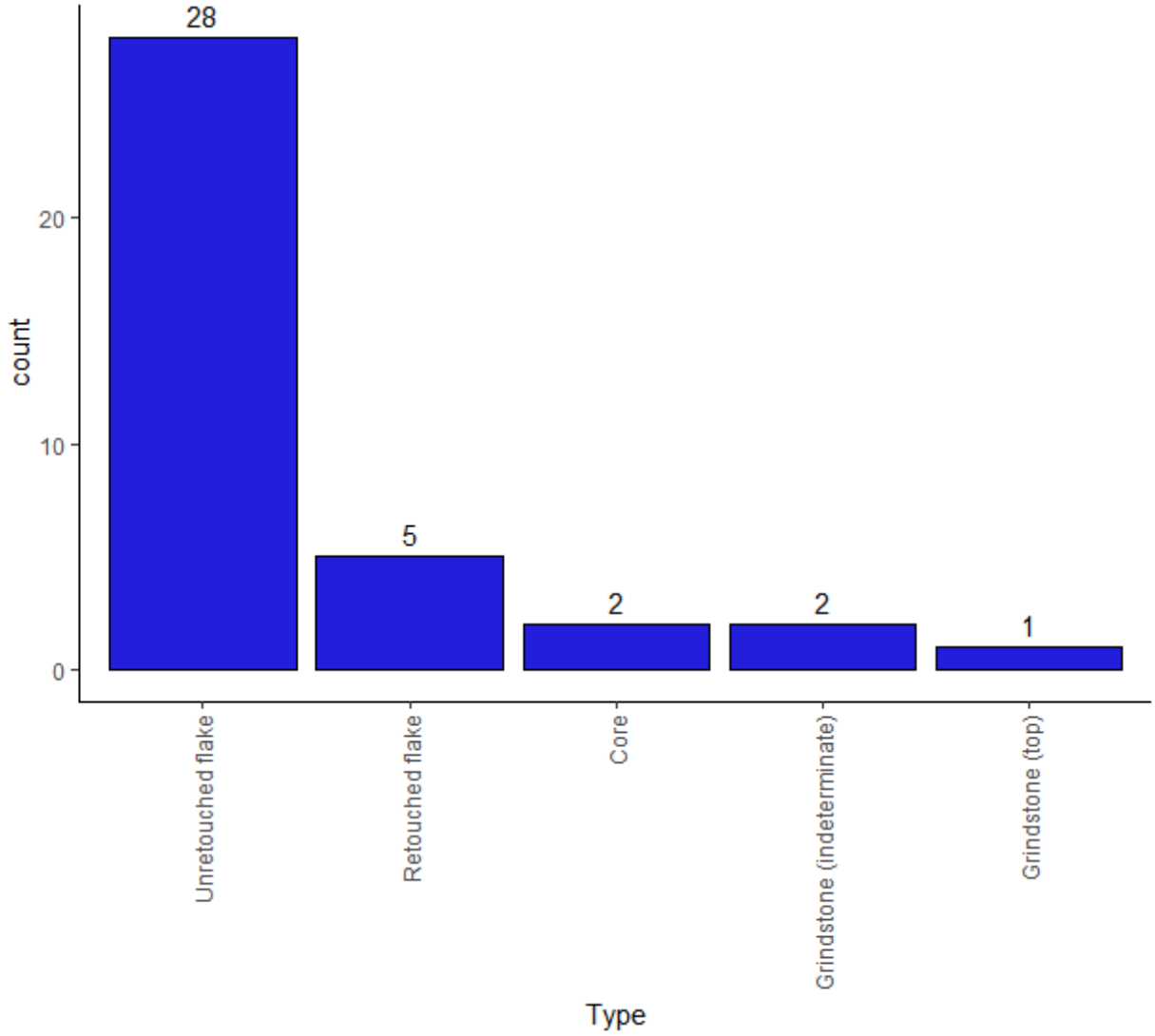

Figure 7-24 All artefacts from 24-5-180, by type

Most of the artefacts at 24-5-180 are made from silcrete (33 artefacts), with quartzite (four artefacts), quartz (one artefact) and ochre (one artefact) also present (refer to **Figure 7-25**).

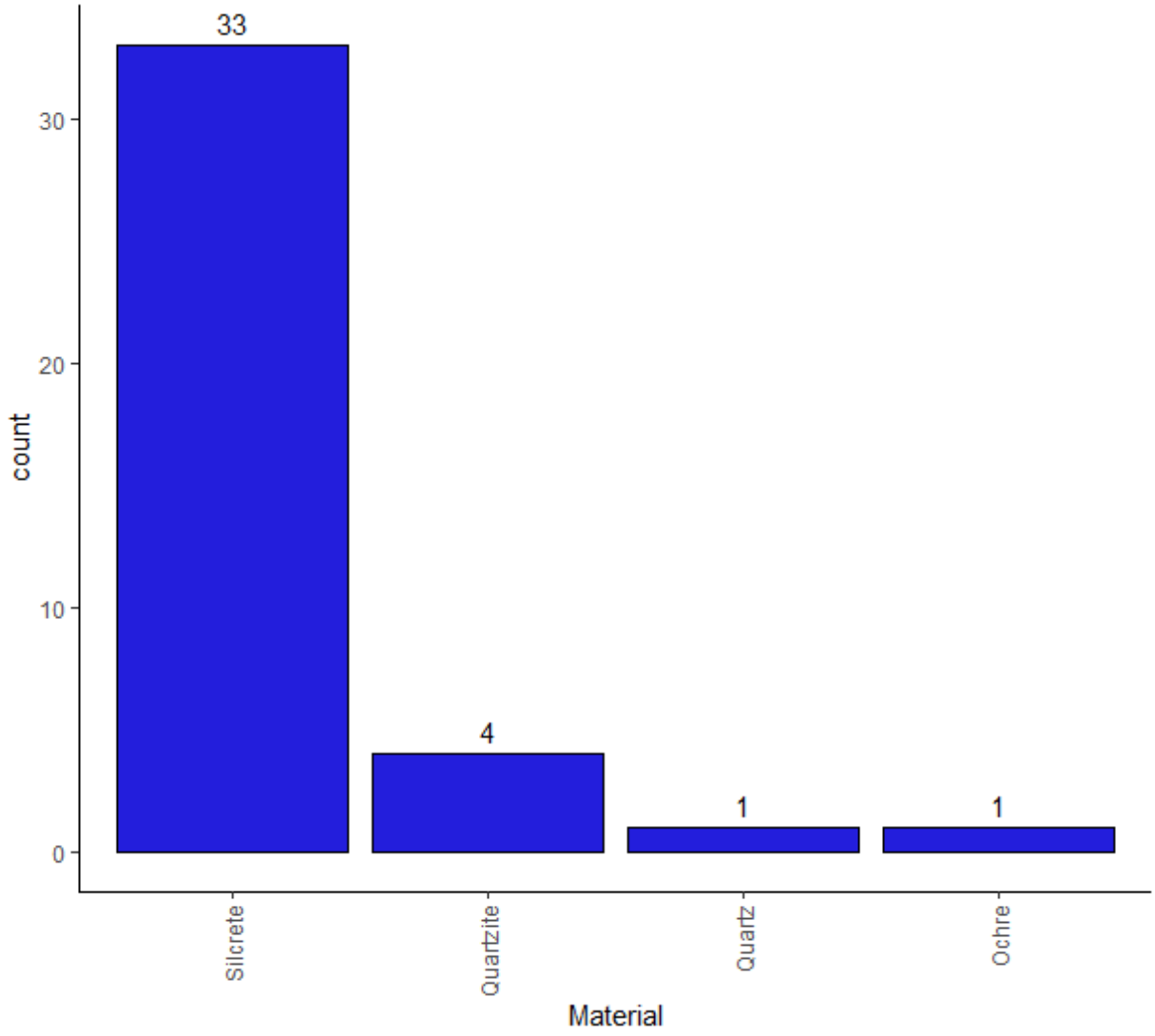

Figure 7-25 All artefacts from 24-5-180, by material

Summary statistics of the dimensions (length, width and thickness) of complete unretouched flakes at 24-5-180 indicate that the flakes on this site are large compared with flakes recorded across the study area overall. The median flake length at Wilcannia Aboriginal Place (AP) 4 is 30 mm, compared with a median length of 20 mm for all flakes recorded during the survey. Median flake width at Wilcannia AP4 is 23.5 mm (compared with 20 mm), and median flake thickness at Wilcannia AP4 is 10 mm (compared with 5mm) (refer to **Table 7-10**). These data indicate that flakes are larger at Wilcannia AP4 than at other sites in the study area. This difference in flake size might be the result of different knapping strategies being employed at this site. The difference could also be the result of differential survival of flakes on different sites: if post-depositional processes operate to remove larger or smaller flakes from a site, then this would create differences in the median size of flakes between sites where these processes do and do not operate. For example, the movement of floodwater across archaeological sites could preferentially remove small flakes, and consequently increase the median size of flakes in the remaining assemblage.

Table 7-10 Summary statistics of the dimensions of complete unretouched flakes from 24-5-180

Dimension	Minimum	1st quartile	Median	3rd quartile	Maximum	Mean
Length (mm)	20	28.75	30	36.25	40	31.42
Width (mm)	10	20	23.5	26.25	35	23.08
Thickness (mm)	5	5	10	10	15	8.92

An inventory of all artefacts at 24-5-180 is provided in **Appendix A.**

7.5.4 Summary of all stone artefacts recorded during the survey

Most of the artefacts recorded during the survey are unretouched flakes – of the 513 artefacts recorded, 379 (74 percent) are unretouched flakes (refer to **Figure 7-26**). Forty-four artefacts (eight per cent) are flaked pieces, 37 (seven per cent) are retouched artefacts, 29 (six per cent) are cores, nine (two percent) are grindstones of indeterminate type, four (one per cent) are grinding topstones, four (one percent) are bottom grindstones, and four (one percent) are hammerstones. The dominance of unretouched flakes is not unusual for stone artefact assemblages, as these artefacts are generally the most common product of the process of knapping stone to produce artefacts.

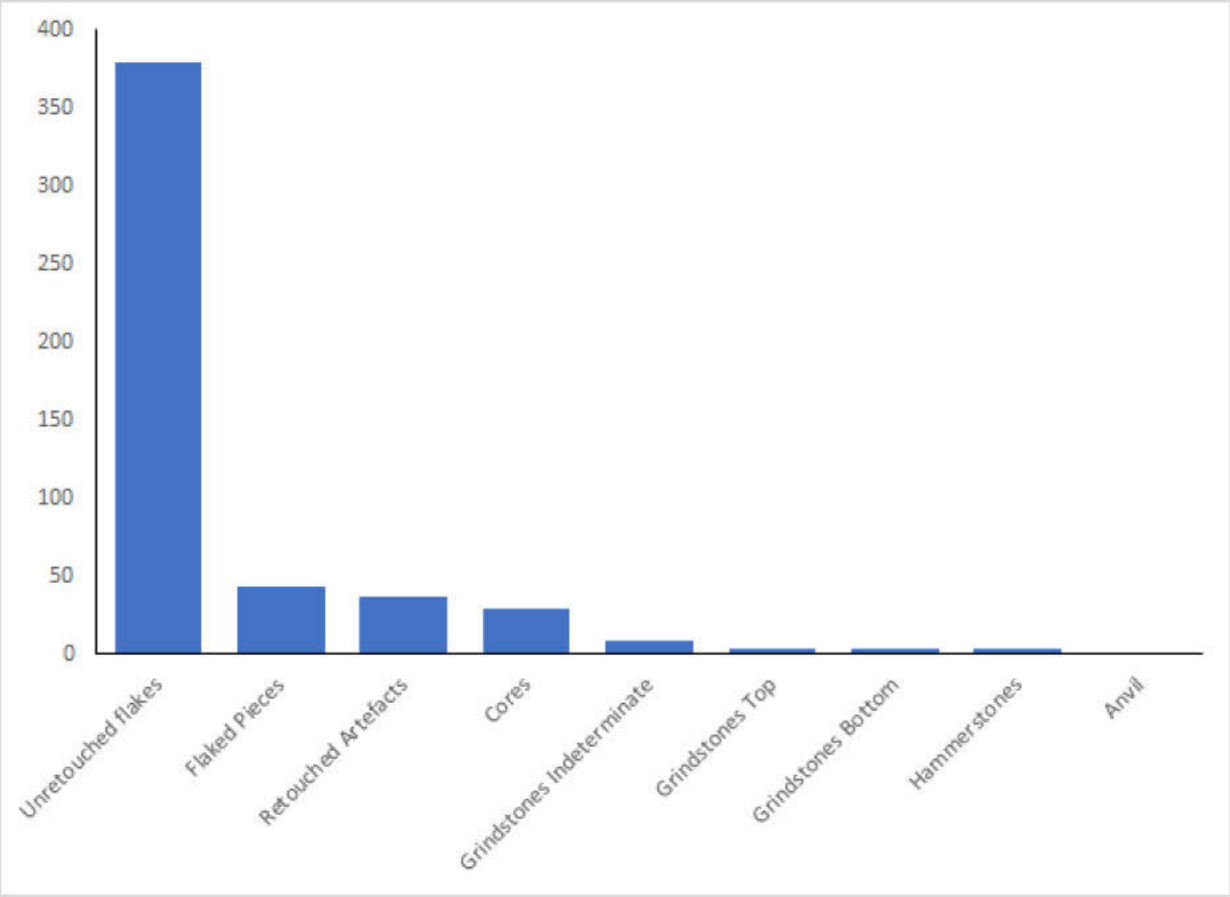

Figure 7-26 All artefacts by type

Among the retouched flakes recorded, distinct implement types are rare (refer to **Figure 7-27**). Only two backed artefacts (one a Bondi point, the other a crescent) were recorded, with all other retouched flakes being amorphously retouched flakes – in other words, retouched flakes which do not fall within any established implement type.

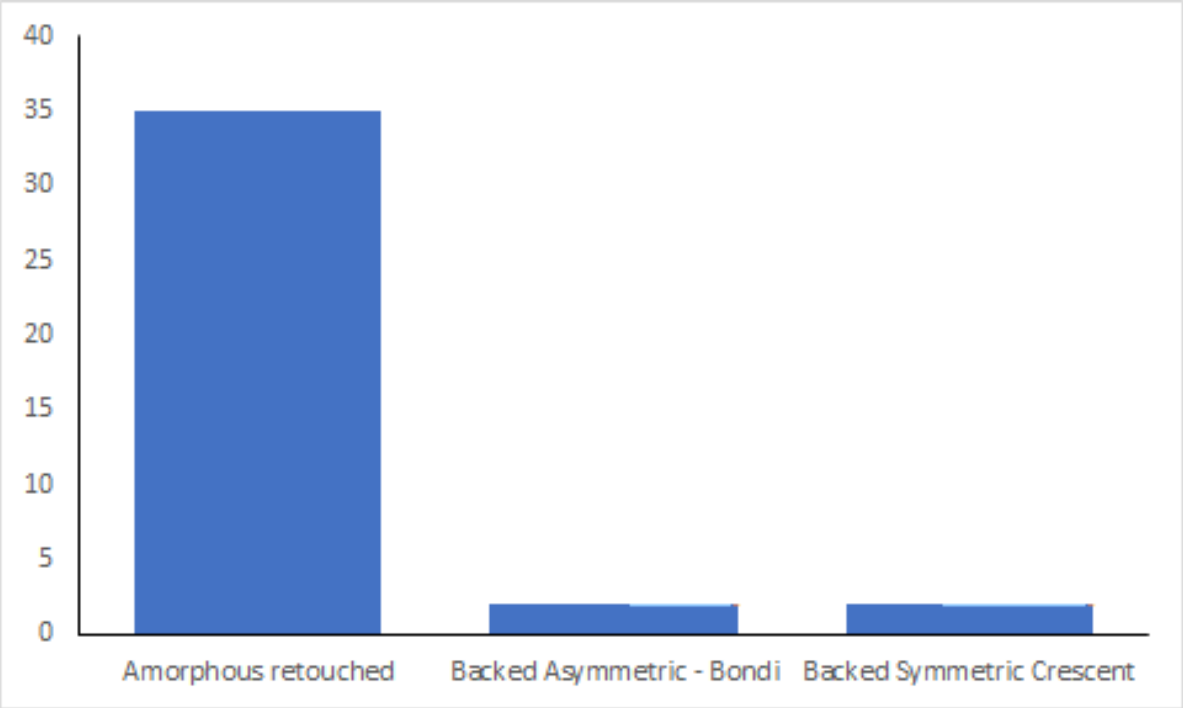

Figure 7-27 All retouched flakes by implement type

Silcrete is the stone material from which most of the artefacts recorded during the survey were made (refer to **Figure 7-28**). Four hundred and seventeen artefacts (85 percent of the artefacts recorded) are made from silcrete. Stone artefacts made from other materials (quartzite, chert, quartz, sandstone, ochre, glass, and siliceous rocks that could not be identified as any specific material) are present in lower numbers. The results of the survey indicate that silcrete is the material most commonly utilised by the Aboriginal groups who lived in the region. This probably indicates that silcrete occurred more commonly in the area and was easier to procure than other stone materials.

The finding of glass artefacts demonstrates that Aboriginal people in the area continued their traditional practice of producing flaked artefacts, after settlement of the area by non-Aboriginal people, adapting this practise to utilise introduced materials. Glass, as a newly arrived material with properties similar to brittle materials such as silcrete and chert, was utilised by Aboriginal people in the same way that stone had been prior to contact.

Adaptation of traditional practises to materials available during the post-European contact period is also evidenced in the use of the existing Wilcannia Weir to construct fish traps (refer to **Section 4.5.11**). As with the production of flaked artefacts from glass, the repurposing of rocks at the existing weir demonstrates both the continuity of traditional ways of producing and using artefacts, as well as the adaptability of Aboriginal culture to a world changed by European contact. The oral history of Aboriginal people in the Wilcannia region records other examples of new materials being recruited for the production of traditional artefacts, including sheets of tin and car panels for production of canoes (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018).

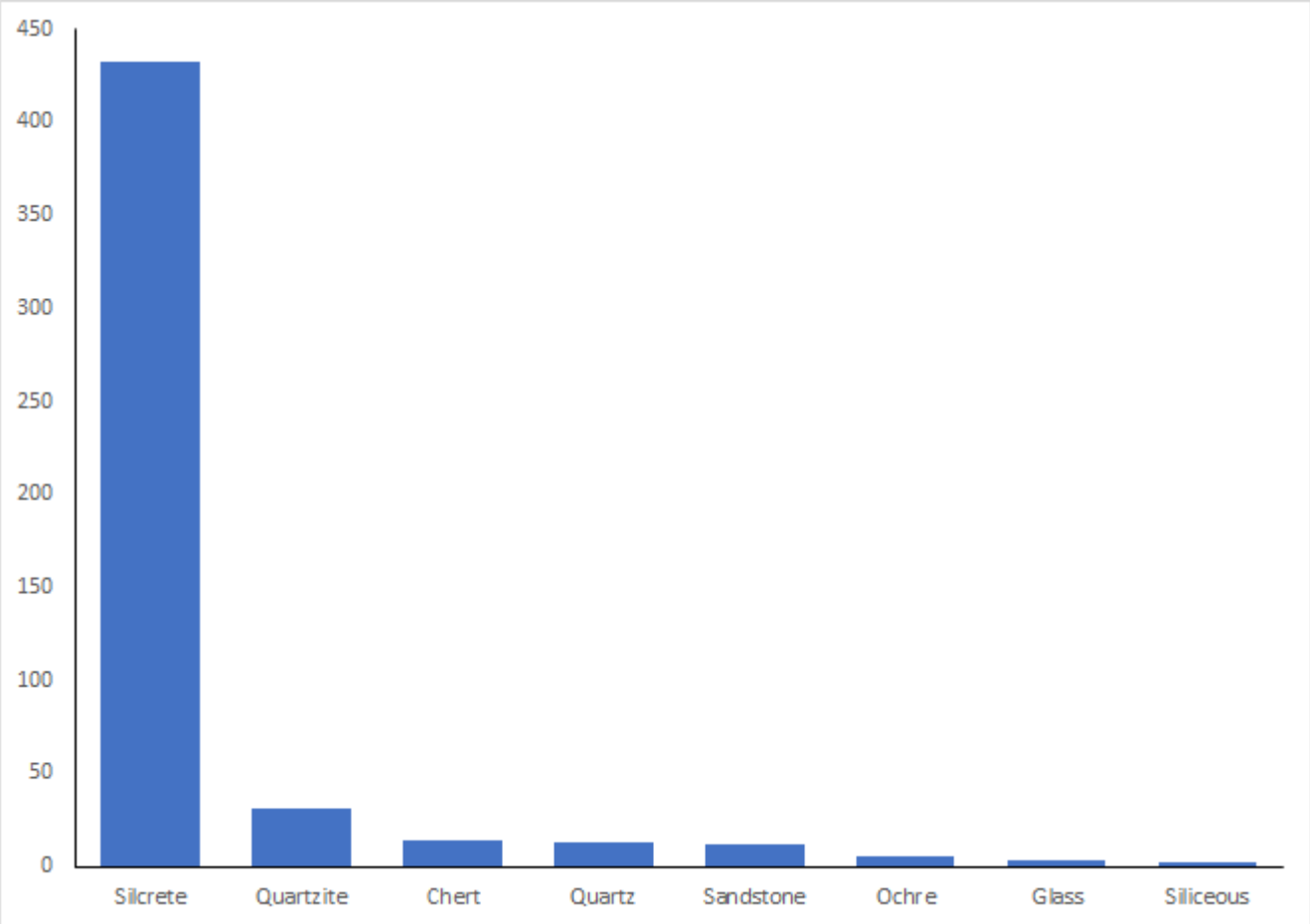

Figure 7-28 All artefacts by material

There is a noticeable difference in the frequency with which different materials have been used in the production of different artefact types. All flaked artefact types (unretouched flakes, flaked pieces, retouched flakes, and cores) are predominantly made from silcrete, with other materials being relatively less frequent (refer to **Table** 7-11). In contrast to this, grindstones and hammerstones are almost all made from sandstone and quartzite, with just a single grindstone (bottom) made from silcrete. The difference in material frequencies between artefact types is consistent with the properties of these materials and the likely functions the artefacts were produced to fulfil. Sandstone and quartzite tend to be tougher and more abrasive than materials like silcrete, chert, and quartz. They are consequently more suited for use as hammerstones (which need to be tough and resistant to breakage) and grindstones (which need to be abrasive and resistant to breakage). More brittle and fine-grained materials – such as silcrete, chert, quartz, and glass – are easier to fracture and produce sharp edges when they do, and consequently more suitable for the production of flaked artefacts.

Table 7-11 All artefacts by type and material

Type	Silcrete	Quartzite	Chert	Quartz	Sandstone	Ochre	Glass	Siliceous
Unretouched flake	331	20	12	12	1	1	1	1
Flaked piece	35	3	0	1	0	4	0	1
Retouched flake	32	0	1	0	0	0	1	0
Core	26	1	1	0	0	0	1	0
Grindstone (indeterminate)	0	3	0	0	6	0	0	0
Grindstone (bottom)	1	0	0	0	3	0	0	0
Grindstone (top)	0	2	0	0	2	0	0	0
Hammerstone	3	0	0	0	0	0	0	0
Anvil		1						

Overall, most of the artefacts recorded are complete (i.e. unbroken) (refer to **Table 7-12**). Unretouched flakes, retouched flakes, and cores are represented mostly by complete artefacts. By contrast, most grindstones and hammerstones are broken. The noticeably higher frequency of breakage among grindstones and hammerstones probably indicates that these artefacts were highly prized by their owners and were generally only discarded after breakage had made them unusable.

Table 7-12 All artefacts by type and completeness

Type	Complete	Broken/ Proximal	Distal fragment	Marginal fragment	Longitudinal cone-split	Medial fragment
Unretouched flake	217	49	53	12	28	18
Retouched flake	34	0	0	0	0	0
Core	20	9	-	-	-	-
Grindstone (indeterminate)	0	9	-	-	-	-
Grindstone (top)	2	2	-	-	-	-
Grindstone (bottom)	0	4	-	-	-	-
Hammerstone	1	3	-	-	-	-
Anvil	1					

The large sample of unretouched flakes recorded during the survey enables some general statements to be made about the size of flakes present within the study area. The complete (i.e. unbroken) unretouched flakes recorded during the survey range in length between five and 45 mm, with a bell-shaped distribution with a peak around 15-25 mm (refer to **Figure 7-29**). The distribution is roughly symmetrical around this central tendency, with the number of flakes tailing off at the high and low ends of the range.

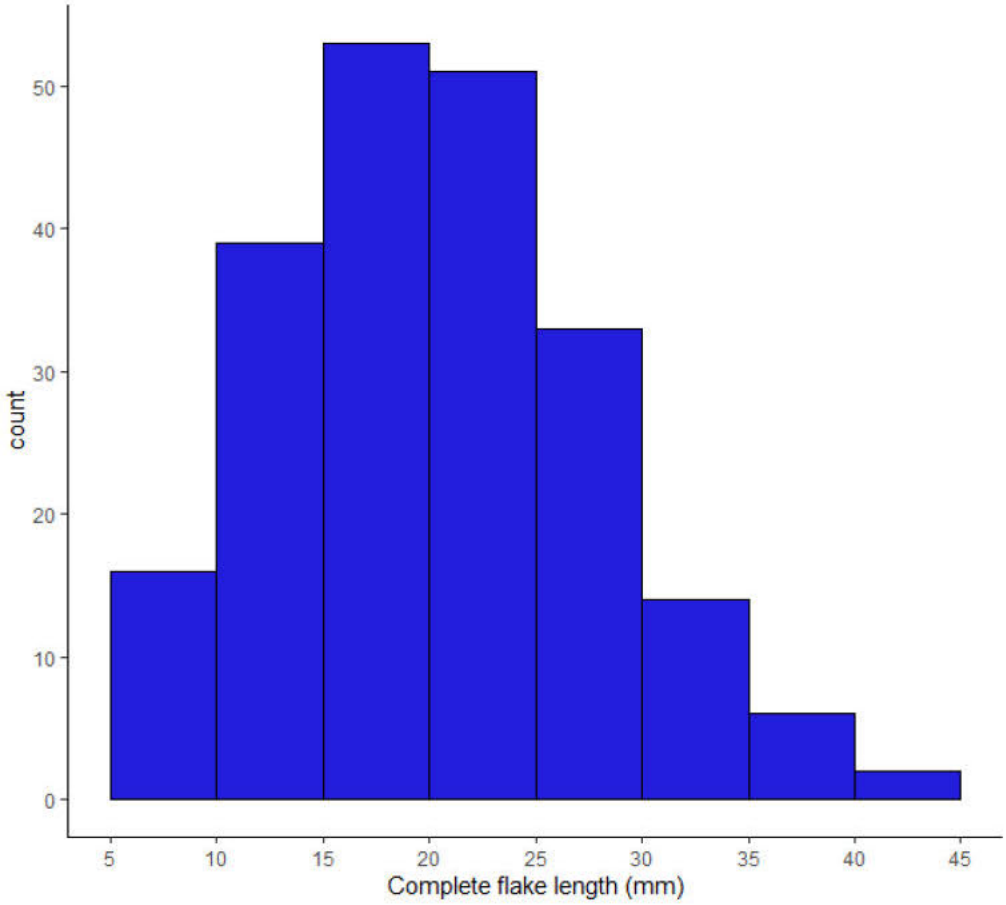

Figure 7-29 Length of all complete unretouched flakes

Summary statistics of the length, width and thickness of all complete unretouched flakes recorded during the survey show that flakes were between five and 45mm long, between five and 50mm wide, and between two and 15mm thick (refer to **Table 7-13**). The flakes in this area are, therefore, relatively small in size. This could be a consequence of the size of stone nodules available to the people living in the area (if stone occurs in small nodules, for example in river gravels, then the size of flakes that can be produced is limited by the size of the nodules available). It could also be a consequence of behavioural strategies employed by Aboriginal people. For example, production of small flakes could have been employed as a strategy of maximising the utility that could be extracted from the stone available, since producing small flakes enables a greater amount of potentially usable cutting edges to be created from a given quantity of stone.

Table 7-13 Summary statistics of the dimensions of all complete unretouched flakes

	Minimum	1st quartile	Median	3rd quartile	Maximum	Mean
Length (mm)	5	15	20	30	45	22.53
Width (mm)	5	15	20	25	50	20.14
Thickness (mm)	2	4	5	8	15	5.78

7.6 Discussion of archaeological survey results

The archaeological survey for the proposal recorded an extensive and diverse site complex consisting of large numbers of stone artefacts, hearths of varying size and purpose and culturally modified trees. These newly recorded sites complement those sites recorded previously in the local area, which include an additional number of similar sites, but also human burials, ethnographic/mythological sites, fish traps, an Aboriginal mound, and locations of historic importance to the local Aboriginal community. Collectively, these sites and objects provide a

picture of a vibrant, extensive cultural landscape well connected to the Barkandji people of Wilcannia. This cultural landscape amply reflects a primary message delivered by the Barkandji community to the proposal team – that the river, Baaka, is of central, very high importance of the Darling River (Baaka) to the Barkandji people and that presence of water in the river is crucial. Another particularly central point was the continued presence of the Barkandji People at Wilcannia, their cultural continuity and continued and unbroken connection to the river. The archaeological places and objects recorded during this and prior surveys are evidence of the unbroken connection of Barkandji people to this place despite the efforts of European society to displace and assimilate them. In the most prominent example, this short stretch of river exhibits examples of canoe scars ranging from the last few months, through to hundreds of years ago, following the life cycles of ancient River Red Gums. Numerous canoe scars (refer from **Figure 7-31** to **Figure 7-33**) remain that are associated with the people who made them, notably a canoe cut about 100 years ago by 'Granny Moysey' (d.1976) (refer to **Figure 7-32**), an important Barkandji Elder (ADB. 2000 Vol 15) (see also **Section 4.5.12.1**).

Figure 7-31 Badger Bates Canoe Tree – late 2020

Figure 7-30 Colin King Jr. Canoe Tree – circa 30 years ago

Figure 7-32 Granny Moysey's Canoe Tree – circa 100 years

Figure 7-33 Wowsers Bend Canoe Tree 1 – circa unknown

In addition to the canoe scars, there are scars that provide evidence of a range of uses and show how important a population of large, healthy trees was to the local Aboriginal people. Container scars are common in the local area as well as across the continent. Surviving evidence of toeholds cut into trees are far less common.

The stone artefact assemblage contains a range of artefacts that would be expected in this area, and yet displays measures of diversity that speak to the complexity of local Aboriginal life. The vast majority of the stone material used is silcrete, but the wide range of colour and, more importantly, texture of silcrete artefacts observed during the survey indicates multiple sources of this material were used. Combined with the varieties of other less common stone materials it is clear local Aboriginal people had access to a wide geological network. The size of the artefacts, being relatively small is strongly suggestive of economy being applied to the use of stone which in turn is suggestive of considerable effort going into its procurement. The presence of glass artefacts in the flaked stone assemblage is a further important archaeological manifestation of continuing traditional cultural practices through adaptation to new materials and technologies. The presence of a range of grinding implements (and fragments thereof) add to the picture of pre-contact life, and also provide research potential for the analysis of residues that would inform us of grinding practices in antiquity.

The extent of the recorded artefact scatter on the southern and eastern side of the river is remarkable in that it suggests considerable density, depth of deposit in some places, but also shows that the cultural material extends to at least 500 m from the river. Assuming the visibility conditions along the Yeoval access track allow for a consistent proportion of artefact to be discovered, the characteristics of 24-5-176 and 24-5-180 show distance decay of artefact density from 200m to 500m from the river.

Closer to the river the density of stone artefacts is lower based on the results of this survey, but this finding is compromised by increased vegetation cover and consequent decreased ability to see surface cultural material. In places where there were better patches of visibility, particularly in conjunction with raised topography, artefacts were found (see for example 24-5-168, 24-5-183, 24-5-184, 24-5-214, none of which would be affected by the proposal).

Similarly, while hearths are found in semi-devegetated flood plain areas (see 24-5-176 and 24-5-177) there were few observed close to the river's edge. The fact that several were found in places where visibility was better identifies potential for such material to occur where vegetation and leaf litter is currently thicker and this observation has ramifications for the proposed approach to managing the implementation of the proposal with regard to cultural heritage and will be explored further below.

Contrary to expectations based on ethnographic accounts of freshwater mussel exploitation, midden material in the study area was sparse, recorded in only five locations during the study and in each of the locations the scatter was described as 'sparse' or 'very sparse'.

It should be noted that the survey results enable a discussion of Aboriginal objects found on the ground surface. No archaeological excavations have been carried out as part of this assessment, and so no statements can be made on the presence or nature of Aboriginal cultural material that might occur in subsurface deposits. As noted in the predictive model (refer to **Section 4.6**), there is the potential for subsurface Aboriginal cultural material to occur within sediments near the Darling River (Baaka). This cultural material could include stone artefacts, hearths, midden, or burials of human remains.

8. Significance assessment

8.1 Basis for assessment

A significance assessment is made up of several significance criteria that attempt to define if and why a site is important, and to what degree. Such assessments recognise that sites may be important for different reasons to different people, and even at different times. The assessment of Aboriginal cultural heritage in this assessment is based upon the four values of the *Australia International Council on Monuments and Sites Burra Charter* (Australia ICOMOS 2013):

- Social values
- Historical values
- Scientific values
- Aesthetic values.

Each of these values is assessed below for Aboriginal sites in or adjacent to the study area, and an overall significance is assigned based on an average across the values. This is inherently a reductive process and oversimplifies what is important for different reasons to a range of different stakeholders but is a necessary process in being able to create comparative values between sites. The significance of each site ultimately informs the management of sites and places.

It should be noted that only Aboriginal sites occurring within the proposed development footprint and/or have potential to be affected by the proposal are assessed here. As scientific significance is determined using multiple criteria, this assessment has been structured through the use of two tables. **Table 8-1** summarises the assessment of scientific value for each site across multiple criteria. **Table 8-2** summarises the assessment of overall significance of each site.

8.2 Social significance

Aboriginal people's views on the significance of archaeological sites are usually related to traditional, cultural and educational values, although some Aboriginal people also value any scientific information a site may be able to provide.

Aboriginal cultural significance was assessed from consultation with the Wilcannia Aboriginal community during consultation sessions and during and following field assessments. It should be noted that Aboriginal significance assessed in this manner may not reflect the views of all members of the community.

8.2.1 Historic significance

The historic value of a site is determined through its association with historically important people, events or activities. 'Historically important' in the context of this assessment refers to important people of post European Australia, or events or activities that have occurred post European occupation.

8.2.2 Scientific significance

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

- It has demonstrable potential to yield information that will contribute to an understanding of the natural or cultural history of the region, state or nation
- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site

- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the locality, region, state or nation
- It is significant in demonstrating a high degree of technical innovation or achievement.

Research potential or scientific significance of an Aboriginal archaeological site can be assessed by using the criteria set out below. Each criterion is rated as low, moderate or high:

- Site integrity – The integrity of a site refers to its state of preservation, or condition. A site can be disturbed through a number of factors including natural erosion processes, destructive land use practices or repeated use of a site in the past by both humans and animals
- Site structure – Structure refers to a site's physical dimensions, that is, size and stratigraphy. A large site or a site with stratified deposits has more research potential than small sites and/or surface scatters. Sometimes however, specific research questions may be aimed at smaller sites in which case they would be rated at a higher significance than normal. Site structure cannot be assessed for scarred trees or isolated artefacts
- Site contents – This category refers to the range and type of occupation debris found in a site. Generally, complex art sites, extensive quarries with associated debris and surface sites that contain a large and varied amount of organic and non-organic materials are considered to have greater research potential than those sites with small, uniform artefacts, single motif art sites and small quarries with little or no debris. For scarred trees, contents may refer to the size and type of scar and/or how many scars there are on the one tree
- Representativeness and rarity – Representativeness refers to how much variability exists between the subject site and others inside or outside the subject area. It also considers the types of sites already conserved in the area and how much connectivity between sites exists. Rarity considers how often a particular site type occurs in an area. Assessment of representativeness and rarity requires some knowledge of the background archaeology of the area or region in which a study is being carried out. Rarity also relates to whether the subject site or area is important in demonstrating a distinctive way of life, custom, process, land use, function or design which is no longer practiced (OEH 2011).

8.2.3 Aesthetic significance

This refers to the sensory value of a place, and can include aspects such as form, texture, and colour, and can also include the smell and sound elements associated with use or experience of a site (Australia ICOMOS 2013). Aesthetic significance can be closely linked to the social value of a site.

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

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

8.3 Significance assessments

The assessed scientific significance of each site, and the site characteristics relevant to the significance assessment, are detailed in **Table 8-1**.

A summary of each site's assessed significance – on social, historic, scientific, and aesthetic grounds – is provided in **Table 8-2**.

Table 8-1 Assessed scientific significance by site

(CMT = Culturally modified tree, ICH = Intangible cultural heritage, OS = Open scatter, H = Hearth, RG = Resource and gathering site, FT = Fish trap)

Site	Site type	Integrity	Site structure	Contents/ Complexity	Representativeness	Rarity	Educational value	Other attributes	Overall assessment
24-5-145	ICH	**MODERATE** Current water levels and flows are reduced compared to the river's state when the story occurred	N/A	N/A	N/A	**HIGH** Only site associated with the story of the Ngatji and the Steamer	**HIGH** The story of the Ngatji and the Steamer continues to be passed on	Accessible, not relocatable	**HIGH**
24-5-146	FT	**LOW** No archaeological remains of fish traps have been recorded at this site – recording based on oral history	N/A	N/A	**LOW**	**LOW**	**MODERATE** The river and island provide an illustration of the context in which fish traps were constructed	Accessible, not relocatable	**LOW**
24-5-159	ICH	**MODERATE** Current water levels are low compared with the past, but the Union Bend waterhole is still an area of deep semi-permanent water	N/A	N/A	N/A	**HIGH** The stories associated with this site are unique, not replicated elsewhere	**HIGH** The stories associated with the Union Bend Ngatji site continue to be passed on	Accessible, not relocatable	**HIGH**
24-5-161	FT	**LOW** No archaeological remains of fish traps have been recorded at this site –	N/A	N/A	**LOW**	**LOW**	**MODERATE** The river and rocky platform provide an illustration of the context	Accessible, not relocatable	**LOW**

Site	Site type	Integrity	Site structure	Contents/ Complexity	Representativeness	Rarity	Educational value	Other attributes	Overall assessment
		recording based on oral history					in which fish traps were constructed		
24-5-162	RG	**MODERATE** Spring, and ochre source are intact. Water weeds are now gone	N/A	N/A	**LOW**	**MODERATE**	**MODERATE** An example of ochre procurement site and spring.	Accessible, not relocatable	**LOW-MODERATE**
24-5-163	RG	**MODERATE** Spring is intact. Water weeds are now gone	N/A	N/A	**LOW**	**MODERATE**	**MODERATE** An example of a spring	Accessible, not relocatable	**LOW-MODERATE**
24-5-164	ICH	**LOW** River water levels are low compared to the period of the fringe camps	N/A	N/A	**LOW**	**LOW**	**LOW** The morphology of the river currently is not equivalent to when the camps were occupied, and the swimming hole was used	Accessible, not relocatable	**LOW**
24-5-167	FT	**HIGH** Weir is intact and still in use	**HIGH** Weir structure is undisturbed	N/A	**LOW** Fish traps constructed at a modern weir are not a common site type	**HIGH** Modern weir in re-use for construction of fish traps	**HIGH** An obtrusive and visible site, with a rich body of oral history, and in continual use today	Accessible, relocatable as the weir is of loose-rock construction	**HIGH**
24-5-185	CMT	**HIGH** Tree in good health, scar distinct, symmetrical, undamaged	N/A	**LOW** Exhibits one scar, albeit good example	**HIGH** The site is broadly representative of its class	**MODERATE** One of a common class though size classes and regrowth (age) vary	**HIGH** Located in Wilcannia township adjacent to tourist facility, high potential for educational purposes	Accessible, easily relocated for inclusion in a research program	**MODERATE-HIGH**

Site	Site type	Integrity	Site structure	Contents/ Complexity	Representativeness	Rarity	Educational value	Other attributes	Overall assessment
24-5-186	CMT	**MODERATE** Tree in poor health, while scar is distinct trunk above is dead and cracked. Scar is symmetrical and distinct	N/A	**LOW** Exhibits one scar	**HIGH** The site is broadly representative of its class	**MODERATE** One of a common class though size classes and regrowth (age) vary	**HIGH** Located in Wilcannia township adjacent to tourist facility, high potential for educational purposes	Accessible, easily relocated for inclusion in a research program	**MODERATE**
24-5-187	CMT	**MODERATE** Tree is dead, trunk starting to crack above scar. Scar is symmetrical and distinct	N/A	**LOW** Exhibits one scar, albeit good example	**HIGH** The site is broadly representative of its class	**MODERATE** One of a common class though size classes and regrowth (age) vary	**HIGH** Located in Wilcannia township adjacent to tourist facility, high potential for educational purposes	Accessible, easily relocated for inclusion in a research program	**MODERATE**
24-5-191	CMT	**MODERATE** Tree in good health, scars distinct, undamaged. Roots undercut by erosion	N/A	**MODERATE** Tree exhibits multiple scars – container and toe-holds	**HIGH** The site is broadly representative of its class	**HIGH** Trees exhibiting container scars and toeholds are rare	**HIGH** Tree is easy to access through Yeoval, could be incorporated into school programs or tourism	Accessible, easily relocated for inclusion in a research program	**MODERATE-HIGH**
24-5-204	CMT	**MODERATE** Tree in good health, scar distinct, symmetrical, undamaged. Roots undercut by erosion	N/A	**LOW** Exhibits one scar, albeit good example	**HIGH** The site is broadly representative of its class	**MODERATE** One of a common class though size classes and regrowth (age) vary	**MODERATE** Tree is easy to access through Yeoval and scar is visible but cannot be safely observed up close	Accessible, easily relocated for inclusion in a research program	**MODERATE**
24-5-160	CMT	**MODERATE** Tree in good health though stressed, scar partly obscured by varying stages of regrowth. Scar	N/A	**LOW** Exhibits one scar,	**MODERATE** While broadly representative of its class the scar is partially obscured	**MODERATE** One of a common class though size classes and regrowth (age) vary	**MODERATE** Tree is easy to access via Union Bend Road and scar is visible but partially obscured and in proximity to better examples	Scar appears to be at the older end of the scale	**MODERATE**

Site	Site type	Integrity	Site structure	Contents/ Complexity	Representativeness	Rarity	Educational value	Other attributes	Overall assessment
		proper unable to be measured							
24-5-208	CMT	**LOW** Tree dead, fallen and washed to resting position – advanced decomposition	N/A	**LOW** Exhibits one scar, partially obscured.	**MODERATE** While broadly representative of its class the fabric of the tree is poor	**MODERATE** One of a common class though size classes and regrowth (age) vary	**MODERATE** Tree is easy to access via Union Bend Road and scar is visible but lies at mid bank requiring access via steep slope. Also in proximity to better examples	Scar and tree would be at the older end of the scale, based on regrowth and tree decomposition	**MODERATE**
24-5-209	CMT	**MODERATE** Tree in good health, scar mostly overgrown. Scar proper unable to be measured	N/A	**LOW** Exhibits one scar, mostly obscured	**LOW** While broadly representative of its class the scar is largely overgrown	**MODERATE** One of a common class though size classes and regrowth (age) vary.	**MODERATE** Tree is easy to access via Yeoval road and scar illustrates regrowth. In proximity to better examples		**LOW-MODERATE**
24-5-210	CMT	**MODERATE** Tree in good health, scar mostly overgrown.	N/A	**LOW** Exhibits one scar, mostly obscured	**MODERATE** While broadly representative of its class the scar is largely obscured	**MODERATE** One of a common class though size classes and regrowth (age) vary.	**MODERATE** Tree is easy to access via Yeoval access track and scar illustrates regrowth. In close proximity to better examples of canoe scars	Scar and tree would be at the older end of the scale, based on size of trunk and scar regrowth	**MODERATE**
24-5-176	OS, H	**LOW** Majority of site is graded track and windrows, artefacts mainly in displaced position. Hearths partially deflated	**LOW** Recorded site extent disturbed by grading	**HIGH** Eight flaked materials in six technological categories, high artefact numbers and density (in	**HIGH** The site is broadly representative of its class	**MODERATE** Large sites occur in places and the site's extent in disturbed context suggests it extends further outside the	**HIGH** Site is easy to access via Yeoval access track and artefacts are relatively easy to find. Could be incorporated into school programs or tourism	High potential for less disturbed objects to occur outside the recorded boundaries for some distance.	**MODERATE-HIGH**

Site	Site type	Integrity	Site structure	Contents/ Complexity	Representativeness	Rarity	Educational value	Other attributes	Overall assessment
				places), hearths close to river in proximity to CMTs		recorded boundaries		Hearths offer dating potential	
24-5-177	OS, H, CMT	**MODERATE-HIGH** Site extent largely undisturbed by modern activity. Cracking clays may have affected vertical integrity of some features	**MODERATE** Site components on higher sandy rises appear reasonably undisturbed, objects on lower cracking clays and flood runner depressions are more likely to be disturbed	**MODERATE** Two stone materials and four technological categories. 19 hearths and proximity to five CMTs	**HIGH** The site is broadly representative of its class	**LOW-MODERATE** Hearths in association with low density artefact scatters are common	**MODERATE-HIGH** Site is easy to access via Union Bend Road. A number of components (artefacts, hearths, trees) can be accessed for education or tourism programs	High number of hearths offers potential for dating	**MODERATE**
24-5-180	OS	**LOW** Majority of site is graded track and windrows, artefacts mainly in displaced position.	**LOW** Recorded site extent disturbed by grading and deflation	**LOW** Four stone materials and five technological categories	**MODERATE** Low density artefact scatters are common	**LOW** Low density artefact scatters are common	**LOW** Site is easy to access but sparse artefacts limit educational value	Site is useful in illustrating potential for cultural material to occur at greater distances from the river	**LOW**

Table 8-2 Site significance summary

(CMT = Culturally modified tree, ICH = Intangible cultural heritage, OS = Open scatter, H = Hearth, RG = Resource and gathering site, FT = Fish trap)

Site	Site type	Social	Scientific	Historic	Aesthetic	Overall assessment
24-5-145	ICH	HIGH	HIGH	HIGH	HIGH	**HIGH**
24-5-146	FT	MODERATE	LOW	LOW	MODERATE	**LOW-MODERATE**
24-5-159	ICH	HIGH	HIGH	HIGH	HIGH	**HIGH**
24-5-161	FT	MODERATE	LOW	LOW	LOW	**LOW**
24-5-162	RG	MODERATE	LOW-MODERATE	LOW	LOW	**LOW-MODERATE**
24-5-163	RG	MODERATE	LOW-MODERATE	LOW	LOW	**LOW-MODERATE**
24-5-164	ICH	MODERATE	LOW	LOW	LOW	**LOW-MODERATE**
24-5-167	FT	HIGH	HIGH	MODERATE	HIGH	**HIGH**
24-5-185	CMT	HIGH	MODERATE-HIGH	N/A	HIGH	**HIGH**
24-5-186	CMT	HIGH	MODERATE	N/A	MODERATE	**MODERATE**
24-5-187	CMT	HIGH	MODERATE	N/A	MODERATE	**MODERATE**
24-5-191	CMT	HIGH	MODERATE-HIGH	N/A	LOW	**MODERATE-HIGH**
24-5-204	CMT	HIGH	MODERATE	N/A	MODERATE	**MODERATE**
24-5-160	CMT	HIGH	MODERATE	N/A	LOW	**MODERATE**
24-5-208	CMT	HIGH	MODERATE	N/A	HIGH	**MODERATE**
24-5-209	CMT	HIGH	LOW-MODERATE	N/A	LOW	**MODERATE**
24-5-210	CMT	HIGH	MODERATE	N/A	MODERATE	**MODERATE**
24-5-176	OS, H	HIGH	MODERATE-HIGH	N/A	LOW	**MODERATE-HIGH**
24-5-177	OS, H, CMT	HIGH	MODERATE	N/A	LOW	**MODERATE**
24-5-180	OS	HIGH	LOW	N/A	LOW	**LOW**

The significance assessments presented in **Table 8-1** and **Table 8-2** show that while there are some potentially impacted sites with higher significance, individually most would be regarded as having moderate significance. Nonetheless, when the sites recorded in this survey are examined as a complex of sites, their significance is high. In a relatively short length of river there exists a site complex of remarkable diversity with considerable potential to contribute knowledge to our understanding of both pre-contact Australia and of Aboriginal society during the post-contact period. The site complex possesses considerable educational value. While further survey upstream and downstream would undoubtedly extend the recording of a number of sites within the range of types that have been recorded for this proposal, it can be predicted that the density of sites with personal connections

(such as Granny Moysey's canoe tree) would diminish with distance from the township. This makes the site complex around Wilcannia to be one of high significance with regard to depth of connection to place, of high significance to the local Aboriginal community and of considerable archaeological and anthropological research value.

The information obtained during this assessment is in line with information previously known on the significance of the cultural landscape around Wilcannia, which was the driver for the nomination and designation of the Wilcannia Mission Camps and Cultural Places Aboriginal Place (refer to **Section 9.3.5**).

9. Impact assessment

The impact assessment presented here has used the following principles to predict which sites would be directly impacted by the proposal, and which sites would be at risk of being inadvertently (indirectly) impacted:

- It is assumed that any site, or portion of a site, which lies within the proposal's construction footprint would be directly impacted by the proposal. While it is likely that detailed design of the proposal would refine and minimise the area of direct impact, at this design stage the construction footprint is assumed to represent the proposal's direct impact zone
- The potential for the proposal's impact zone to be refined and reduced at the detailed design stage is reflected in the recommendations made (refer to **Section 10**), which acknowledges that sites (or portions of sites) which are currently assessed as being subject to direct impact might be outside of the proposal's final impact zone
- The impact assessment only considers Aboriginal sites found during the archaeological survey, which covered the study area defined in **Section 6.2**. The assessment cannot assess the impact to Aboriginal heritage of any work outside the study area. If future changes or additions to the proposal occur which would extend outside the study area, an additional archaeological survey would be required
- The impact assessment assumes that Aboriginal sites within 50 metres of the proposal's construction footprint would be at risk of inadvertent impact
- The impact assessment considers impacts (indirect and direct) that would result from the proposal if no mitigation or management actions were taken to avoid, minimise, or prevent impact. This assessment is then used to generate this ACHAR's recommendations for mitigation and management actions (refer to **Section 10**).

9.1 Avoidance and minimisation of impacts

Due to the acknowledged importance of the Wilcannia area, and in particular the Darling River (Baaka), careful consideration of Aboriginal cultural heritage constraints and issues was a core component of the development of the design for the proposal.

During the early development phase for the selection of the new weir location, extensive consultation and engagement with the local community informed both the development of options and the confirmation of the preferred location. Further detail on the options development process is provided in Section 2 of the environmental impact statement.

The development of the proposal footprint, particularly the proposed location of construction activities, has incorporated careful consideration of Aboriginal cultural sites and values. Potential impacts on Aboriginal heritage were minimised, as far as practicable, by:

- Utilising existing access tracks as far as practicable to avoid unnecessary ground disturbance
- Early identification and mapping of significant trees along the river banks near the new weir site to facilitate avoidance where practicable, particularly culturally modified trees
- Close consultation with the Aboriginal community to ensure Aboriginal cultural values were understood and reflected in the location and design of the proposal
- Reconfiguration of the construction footprint, such as laydown areas, to avoid sensitive cultural heritage sites, in particular the hearths.

The proposal initially included removal of the entire existing weir. However, after receiving feedback from the RAPs about the cultural significance of the fish traps at the existing weir, the design was revised to include partial removal of the existing weir only. This refinement of the design at the existing weir site would reduce the direct impact of the proposal on the fish traps while allowing the existing weir to be decommissioned so that it is no longer an obstruction in the waterway.

9.2 Impact to archaeological sites

The elements of the proposal are described in **Section 1.2**.

The anticipated impact of the proposal to Aboriginal cultural material (sites) identified within and near the study area is detailed in **Table 9-1**. Note that this table lists impacts that would be anticipated if no mitigation measures were taken. Impact mitigation measures recommended by this assessment are listed in **Section 10.**

Table 9-1 Assessment of impact (harm) to archaeological sites

Activity	Type of harm (assuming no mitigation measures)	Degree of harm	Consequence of harm	Known sites affected
Construction of the new weir (a fixed crest type weir about 5.0 metres high and 26 metres wide)	Direct harm: Excavation for footings and weir wall would destroy culturally modified tree 24-5-208. Excavation might also affect currently unidentified subsurface Aboriginal objects, which could include artefacts, hearths, midden and potentially human burials.	High on 24-5-208. Potentially high on any currently unidentified subsurface Aboriginal cultural material.	Total loss of 24-5-208.	24-5-208
Construction of the fishway between the right (northern) bank of the river and the new weir	Potentially direct harm: Excavation might affect currently unidentified subsurface Aboriginal objects, which could include artefacts, hearths, midden and potentially human burials.	High degree of harm to any currently unidentified subsurface Aboriginal cultural material.	Potential total loss of any subsurface cultural material.	None
Equipment and machinery laydowns on north and south sides of river at the new weir	Direct harm: Ground-disturbing works would disturb Aboriginal objects on the ground surface. Ground disturbance might also impact currently unidentified subsurface Aboriginal objects.	High degree of harm to any sites, or site components intercepted by ground-disturbing works.	Partial loss of surface sites, where these intercept ground-disturbing works. Potential loss of any subsurface cultural material.	24-5-176 24-5-177

Activity	Type of harm (assuming no mitigation measures)	Degree of harm	Consequence of harm	Known sites affected
Tree trimming to enable operation of a crane (swinging and lifting) to construct the new weir	Direct harm: Where a crane is currently proposed to operate would impact 24-5-210 (Union Bend Coolamon Tree 1).	Potential high degree of harm to 24-5-210, if the tree were to be impacted by the crane and/or removed.	Total loss of 24-5-210.	24-5-210
Site compound on south side of river near new weir	Direct harm: Grubbing of vegetation and grading/levelling of the site would displace surface artefacts and hearths. These activities would also impact any currently unidentified subsurface Aboriginal objects.	High degree of harm to any sites, or site components intercepted by ground-disturbing works.	Partial or total loss of 24-5-176. Potential loss of any currently unidentified subsurface Aboriginal objects within area(s) of ground-disturbing works.	24-5-176
Access track and power supply works, on the right (northern) bank of the river adjacent to the new weir	Direct harm: Grubbing of vegetation and grading/levelling of the new access track and parking area has the potential to disturb surface and subsurface objects. Indirect harm: Damage to culturally modified tree (24-5-160) if works intersect the tree.	High degree of harm on any surface or subsurface sites intercepted.	Total loss of any material intercepted by ground-disturbing works.	24-5-160 24-5-177
Upgraded all weather access track from the Barrier Highway to the new weir location (southern side) (about three kilometres in total)	Direct harm to artefact scatters on road.	Moderate degree of harm to those artefacts within the graded track – they would remain in the site but be further displaced and some potentially broken.	Partial loss of any material intercepted by ground-disturbing works.	24-5-176 24-5-180
New 270 metre unsealed access track from Union Bend Road to the new weir location (northern side).	Direct harm to artefacts and hearths: Grading of new track.	Moderate degree of harm to those artefacts within the area of ground-disturbing works – they would remain in the site but be further displaced and some potentially broken. High degree of harm to hearths within the area of	Substantial loss of any material intercepted by ground-disturbing works.	24-5-177

Activity	Type of harm (assuming no mitigation measures)	Degree of harm	Consequence of harm	Known sites affected
		ground-disturbing works. Harm to any subsurface artefacts or hearths that might be present.		
Partial removal of the existing weir	Direct harm: The existing weir is registered as Aboriginal site 24-5-167, due to its long-term continuing use as a fish trap.	High degree of harm to 24-5-167	Partial loss of 24-5-167.	24-5-167
Partial removal of the existing weir	Indirect harm: Impact to culturally modified trees if care not exercised to avoid them.	Moderate to high degree of harm if trees are intercepted by heavy machinery.	Partial or full loss of sites depending on severity of damage.	24-5-185 24-5-186 24-5-187.
Inundation of a new section of weir pool between the existing weir and proposed new weir	Direct harm: Increased water levels over sites in the watercourse.	High degree of harm through removing access to sites.	Loss of fish trap and resource-gathering sites.	24-5-161 24-5-162 24-5-163 24-5-164

9.3 Impact to sites of concern identified in the proposal SEARs

The SEARs issued for the proposal (refer to **Table 1-1**) specify the need to assess the impact of the proposal to four sites: Falling Star, Billilla rocks, Union Bend Ngatji site and Steamers Point.

The SEARs also specify the need to determine whether the proposal would impact the proposed Barkandji Aboriginal Place nomination (now gazetted as the Wilcannia Mission Camps and Cultural Places Aboriginal Place). These are considered below.

9.3.1 Falling Star

In the Wilcannia region, the Falling Star story is associated with a physical site. The site, and the story with which it is linked – of a star that fell to Earth in the dreamtime (Jones 1989), constitute intangible and tangible Aboriginal cultural heritage.

The Falling Star site is a rocky area in the river bed, held to be the place where the falling star struck the earth during the dreamtime. The rocks today show signs of this impact (DPC 2020: 34).

The site associated with the Falling Star story is located outside the study area and would not be impacted by the proposal. Several different locations for this site having been recorded, with inaccuracies in early recording techniques likely being responsible for different recorded locations of the site (Martin pers. comm.). Information provided to Jacobs has established that a ground-truthed recording of this site made in 2018 by Murray Butcher and Dr Sarah Martin located the site about 10 kilometres (linear distance) upstream of the proposed new weir pool extent (Martin pers. comm.).

The proposal would not impact on the recorded site associated with the Falling Star story, either directly or indirectly. The proposal is not anticipated to have any impact on the intangible cultural heritage value of the Falling Star story.

9.3.2 Billilla Rocks

The Billilla Rocks site is located about 30 kilometres to the southwest of the study area (Martin pers. comm.).

Based on the distance between the proposal and this site, the proposal would not impact the Billilla Rocks site, either directly or indirectly.

9.3.3 Union Bend Ngatji site

The waterhole at Union Bend is associated with one or more stories relating to the Ngatji (or Rainbow Serpent), a creature involved in the creation of the Darling River (Baaka). The stretch of the river along the whole of Union Bend is associated with the intangible cultural heritage relating to the concept of the Ngatji (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018). The association between waterholes such as the one at Union Bend with the Ngatji is that these deeper areas of the river are known to the Barkandji people as areas in which the Ngatji lives (DPC 2020: 6). The lower water levels that have occurred in the river in the recent post-contact past, resulting from increased water extraction upstream, might have strengthened the association between deep waterholes and intangible cultural heritage relating to the Ngatji, due to the frequent lack of water in other stretches of the river and an increasing importance of deep waterholes as areas of refuge for the Ngatji. Union Bend is located within the Wilcannia Mission Camps and Cultural Places Aboriginal Place, gazetted in 2020 (New South Wales Government 2020).

Union Bend is downstream of the existing weir and flows at this location are therefore dependent on flows over the crest of the existing weir. The proposed new weir would be downstream of Union Bend and would result in the river at Union Bend becoming part of the weir pool. The new weir would result in the water level at Union Bend being between about 3.5 to 4.5 metres on a fairly consistent basis, with much less fluctuation in water level compared with the current state.

A change to the river's water level, such as the change which would result from the proposal, might have the effect of negatively impacting on the intangible cultural heritage of stories relating to the Ngatji, given that the Ngatji is associated with creating the river and is consequently associated with the morphology (in other words, the physical state or appearance) of the river. It is important to note, however, that the current morphology of the river is very different from its pre-contact state. The water levels currently existing in the river are the product of water extraction upstream of Wilcannia.

The higher water level that would be created by the new weir during some phases of operation might be seen by the Aboriginal community as a return to a state similar to 'the old days' prior to intensive water extraction upstream. During the archaeological survey and AFG meetings, it was repeatedly stated to Jacobs by RAP representatives that the current state of the river is substantially different from past decades (even within the memory of people under fifty years old), and that water levels are substantially lower than they would have been prior to increased water extraction. The creation of the increased weir pool seemed to be viewed as having the effect of creating a river morphology that would be more similar to the river's pre-contact morphology than its current state is. As a consequence, the change in water level which would result from the proposal might have a positive effect in relation to its intangible cultural value associated with the Ngatji and stories relating to the Ngatji, through returning the river to a state that is closer in appearance to its pre-contact state.

Union Bend is popular local fishing and recreational place for the local community. As part of the proposal, it is proposed to enhance the amenity of the location for the local community and visitors to create a 'community river place' without unduly interfering with the natural and culturally significant setting. Proposed enhancements include minor access track upgrades for safe vehicle access, installation of scattered seating and tables underneath the tree canopy near the river's edge, and the installation of interpretive signage, incorporating cultural art and education. All elements will be designed and agreed in consultation with the local community. It

is noted that not all of the recreation area at Union Bend was surveyed, as at the time of survey, no work was proposed at this location.

During the archaeological survey, it was communicated to Jacobs by RAP representatives that they did not anticipate the proposal would have any negative impact to Union Bend's association with the Ngatji, or to the intangible cultural heritage values attached to Union Bend through its connection with the Ngatji and stories relating to the Ngatji.

It is assessed here that the proposal would not have a negative impact on intangible cultural heritage values connected with the Union Bend Ngatji Site.

There are a number of archaeological sites in the landscape around Union Bend, including culturally modified trees, stone artefact scatters, historical Aboriginal houses and associated artefacts (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018, see also **Section 7** of this ACHAR). All of these archaeological sites are outside of the Darling River's (Baaka's) incised channel, and would be unaffected by the minor rise in water level the proposal would result in. It is assessed here that the proposal would not have any impact on archaeological sites around Union Bend.

9.3.4 Steamers Point

The stretch of water near Steamers Point, like Union Bend, holds cultural heritage value through being associated with the Ngatji. Steamers Point is gazetted as an Aboriginal Place (New South Wales Government Gazette 2014). Steamers Point is connected with a specific story involving the Ngatji, set in the post European contact period. The story relates an event in which a paddle steamer sank in the river near Steamers Point, due to disturbing and awakening the Ngatji, which then dragged the boat and its cargo barge under. The Aboriginal people in the area assisted in the task of salvaging the paddle steamer and its cargo. Realising that the Ngatji had been the cause of the wreck, and that the Ngatji needed to be subdued before people could enter the river, Clever People sang songs to lull the Ngatji to sleep, enabling people to salvage sunken bales of wool and enabling an Aboriginal Clever Man to dive into the waterhole and retrieve the body of a person who had sunk with the paddle steamer and drowned. (Butcher 2011; Kennedy pers. comm.; Martin pers. comm.; Whyman pers. comm.).

As with Union Bend, the depth of water at Steamers Point is probably a reason for the area's association with the Ngatji. It is possible that the association of Steamers Point with the Ngatji and stories associated with the Ngatji might have been reinforced by the fact that the river here forms part of the weir pool behind the existing weir. As a result, there is water in this section of the river much more frequently than many other stretches of the river in recent times, and this might consequently be viewed as a refuge for the Ngatji.

The water level at Steamers Point would be at the same full supply level as the existing weir when the new weir is in normal operation mode. When the new weir is in drought security operation mode, the full supply level would increase by up to one metre above the existing full supply level.

The proposal is not expected to cause changes in the morphology of the river around Steamers Point during large flows (including floods) because the new weir would operate at the existing full supply level, so the water level at Steamers Point would be the same as if the existing weir remained in operation. There is potential for minor changes in morphology when the new weir is in drought security operation mode and the water level is up to one metre above the existing full supply level, which would result in more of the bank being wet and there is potential for wave action to parts of the bank above the existing full supply level. As with Union Bend (refer to **Section 9.3.3**), it is important to note that the current morphology of the river is a consequence of post-contact water extraction upstream, and the weir pool created by the existing Wilcannia Weir. The morphology of the river within living memory is substantially different from today, and it is highly probable that typical water levels were higher prior to European contact and increased water extraction upstream. As discussed in relation to Union Bend, the water level created by the new weir would create a river morphology around Steamers Point that is more similar to the 'natural' pre-contact morphology of the river than the river's current morphology is. It is also noted that in periods of flood, the water level in this area rises to levels equivalent to or exceeding the level that

would be created by the new weir when operating at its full supply level. In other words, the water level at the full supply level would not be unprecedented or unusual when compared with water levels during flood events that the river currently periodically experiences. As a consequence, it cannot be assumed that the alteration of the river's morphology resulting from the proposal would represent a negative impact on the intangible cultural heritage values associated with Steamers Point.

During the archaeological survey, it was communicated to Jacobs by RAP representatives that they did not anticipate the proposal would have any negative impact to Steamers Point's association with the Ngatji, or to the intangible cultural heritage values attached to Union Bend through its connection with the Ngatji and stories relating to the Ngatji.

It is assessed here that the proposal would not have a negative impact on intangible cultural heritage values connected with Steamers Point.

There are a number of archaeological sites (including Aboriginal camps dating to the post-European contact period, culturally modified trees, stone artefact scatters, stone arrangements in the form of low mounds, middens, and a silcrete quarry) in the landscape around Steamers Point (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018; New South Wales Government Gazette 2014). Most of these archaeological sites are outside of the Darling River's (Baaka's) incised channel (refer to **Section 4.5.4**), and would be unaffected by the rise in water level (up to one metre) the proposal would result in. It is assessed here that the proposal would not have any impact on archaeological sites around Steamers Point.

An island near Steamers Point and the confluence of Paroo Channel and the Darling River (Baaka) is also listed as a fish trap and swimming place (AHIMS ID 24-5-146) (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 15). It has been documented through oral history work that although the AHIMS lists this site as being located within the Steamers Point Aboriginal Place, it is actually about one kilometre further upstream (near the confluence with the Paroo Channel) and consequently outside the Aboriginal Place (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018). As with Steamers Point Aboriginal Place in general, it is anticipated that the minor change in water levels that would occur only during drought security operation mode of the proposed new weir would not result in an impact to this site and its associated cultural heritage value.

9.3.5 Wilcannia Mission Camps and Cultural Places Aboriginal Place

The Wilcannia Mission Camps and Cultural Places Aboriginal Place is an area running along the river from Wilcannia to the area of the proposed new weir, and downstream of the proposed new weir. The area encompasses the river and areas of ground on both sides of the river (DPC 2020: 69). The area is gazetted as an Aboriginal Place (New South Wales Government 2020).

The Aboriginal Place was nominated on the basis of tangible and intangible cultural heritage values. The tangible cultural heritage values of the Place are summarised in the Department of Premier and Cabinet's assessment report:

> *Tangible values that the LALC wish to protect include canoe trees, coolamon trees, a mound site, middens, artefacts, ovens, and material remains of camping places from the 1920's to 1980's, as well as fishing places and the Ngatji (rainbow serpent) waterhole and related features.* (DPC 2020: 3)

Intangible cultural heritage values connected with the Aboriginal place include stories related to the Ngatji (which are particularly associated with deeper waterholes in the river), oral histories relating to traditional cultural practices such as the procurement of plant and animal foods and other resources from the landscape, and oral histories and stories relating to Aboriginal life in the area during the post-contact period. The connection of the Aboriginal Place with these stories and oral histories is cited as being of importance to the

survival of intangible cultural heritage within the Aboriginal community in the future, as summarised in the assessment report:

> *Intangible values that need to be handed down include strong family life, kinship, sharing and caring for each other as a community, resilience, independence, and problem solving*. (DPC 2020: 3)

When the Aboriginal Place was nominated, the anticipated location of the proposed new weir was excluded from the nominated area, in negotiation with WINSW, so as to eliminate or reduce the impact of the proposal on the heritage values of the Aboriginal Place (DPC 2020: 3). As a consequence of this decision, the majority of the construction footprint of the proposal would fall outside of the boundaries of the Aboriginal Place. The exception to this is the existing southern access track, which cuts through a corner of the Aboriginal Place's western edge. The proposal includes an upgrade to this access track. The intersection of the southern access track with the Aboriginal Place is the only instance in which the proposal's construction works would have an impact within the boundaries of the Aboriginal Place. Wilcannia LALC (as the owners of this land) would use the upgraded track following the construction of the new weir.

The creation of the weir pool at this extent of the river between the new weir and existing weir would result in an increase in water level along the river within the Aboriginal Place.

In terms of tangible cultural heritage (i.e. Aboriginal sites) the proposal would impact one Aboriginal site within the Aboriginal Place. This site is 24-5-176 (Wilcannia New Weir 1). The site of Wilcannia New Weir 1 is partially within the Aboriginal Place. This site is a scatter of stone artefacts on the ground surface, lying along the existing southern access track. Some of this artefact scatter is located within the Aboriginal Place, in the area where the access track cuts across a corner of the Aboriginal Place. The nature of the anticipated impact to this site is detailed in **Table 9-2** (also refer to **Section 9.2**).

Table 9-2 Potential impacts to tangible cultural heritage within the Wilcannia Mission Camps and Cultural Places Aboriginal Place

Site AHIMS #	Site name	Site type	Nature of potential impact
24-5-176	Wilcannia New Weir 1	Open site – stone artefacts along existing southern access track	Direct: damage or destruction of artefacts during upgrade of the access track. Note: this site is partially within the Aboriginal Place.

The potential impact of the proposal to the site listed in **Table 9-2** is recommended to be mitigated (refer to **Section 10**). It is recommended that a program of salvage collection of surface artefacts from Wilcannia New Weir 1 is carried out prior to the upgrading of the southern access track.

Consultation between WINSW and Heritage NSW, in October 2020, has confirmed that the southern access track is considered by Heritage NSW to be an existing use and is not considered to contradict the values that the Aboriginal Place was gazetted for. Heritage NSW does not consider that the proposed upgrade of the access track would substantially diminish the cultural values of the Aboriginal Place (correspondence is attached in **Appendix B**). The southern access track is located on land owned by the Wilcannia LALC and the property is used for cultural purposes. The upgraded track would be used by the local traditional owners who would benefit from the improved all-weather access to the rest of the property.

The community river place would be located at the end of Union Bend Road within the Aboriginal Place. Works would involve the creation of a car park area, and the placement of seating, artwork panels and interpretive signage. These works would be positioned in cleared areas with no existing trees. WINSW has consulted with the RAPs on the location of the community river place. Feedback from this consultation does not indicate that the RAPs consider the community river place to represent a negative impact to the intangible cultural heritage associated with the Aboriginal Place. WINSW has also consulted with Sarah Martin (Heritage NSW) about this location, which has established that Heritage NSW has no objections as long as the Aboriginal community are

consulted, supportive and there are no impacts to Aboriginal archaeological sites. Some of the RAPs have expressed concern that the proposed location of the community river place is too far from the town to be used for fishing, particularly when compared to the location of the existing weir. WINSW has considered this feedback but still considers the location to be the most feasible site for the community river place because it is Crown land, it is located next to the river, it is currently used for recreational purposes, and it is a short drive from the town.

In terms of intangible cultural heritage values connected with the Aboriginal Place, a possibility exists that the creation of the weir pool and the raising of the river's water level from its current state could impact these values. It is noted that many of the intangible cultural heritage values cited as being of significance to the Aboriginal Place relate to the river. For example, stories relating to the Ngatji and the waterholes in which it lives; oral histories relating to the procurement of food and drinking water from the river during historical occupation of the camps within the Aboriginal Place; and oral histories associated with fishing spots used historically and in continued use today. An example of the rich oral history connected with the river in the Aboriginal Place was communicated verbally to Jacobs archaeologists during the Aboriginal archaeological survey: a stretch of the river in which sand-sheets have accumulated along the river bed was utilised (within the last 40 years, to our informant's knowledge, and likely in years prior) by young Aboriginal people as a football training ground, during periods when the water level fell and exposed the sand sheets (Kennedy pers. comm.).

The proposal would have the effect of raising water levels by up to about four metres deeper than current levels on the stretch of river within the Aboriginal Place. It would also have the effect of stabilising the depth of the water at this level, decreasing the frequency and extent of fluctuations in water level. It is possible that in doing this, the proposal would impact areas associated with stories and oral histories, and consequently could have a negative impact on the intangible cultural heritage values connected with the Aboriginal Place. For example, the stabilisation of the water level might make the location of deep waterholes along the river less recognisable, which could have an impact on stories relating to the Ngatji and their connection with these specific locations in the landscape. In the case of the example of the sandsheet historically used as a football training ground, the raised and stabilised water level would prevent the expose of this sandsheet during periods of low rainfall. It is possible that this could result in a diminishing of the value of the oral history associated with the football training ground, resulting from the area being made invisible by the presence of the weir pool. A similar process might occur to fishing spots currently in use and connected with oral histories relating to past historical use.

In some ways, however, the proposal might have the effect of enhancing the connection of the river within the Aboriginal place and the intangible cultural heritage with which it is associated. As discussed in **Section 9.3.3** and **Section 9.3.4**, the current water level in the river is substantially lower than it has been within living memory, and lower than it was prior to increased water extraction or prior to European contact. The current morphology of the river is an artefact of current water usage upstream and is generally viewed by the Aboriginal community as an artificial or unnatural morphology compared with the river their ancestors (either in the recent past, or prior to European contact) would have known and interacted with. The creation of the weir pool along the stretch of river flowing through the Aboriginal Place and increase in water level might well be viewed as restoring the river within the Aboriginal Place to a morphology that is more similar to how the river would have been in 'the old days'. As a result, the changed morphology of the river might be better related to the oral histories connected with the Aboriginal Place. For example, stories describing how the people who lived in the camps drew water from the river, or procured food from the river, could be rendered more effective and easier for younger members of the community to comprehend and relate to after the water level through this section of the river has been increased by the operation of the proposal.

No information has been conveyed to Jacobs or WINSW by the Aboriginal community indicating that the proposal would negatively impact the intangible cultural heritage values connected with the Aboriginal Place. It is assessed here, consequently, that the proposal would not have an impact on intangible cultural heritage connected with the Aboriginal Place.

9.4 Significance of assessed impact

The Aboriginal sites that are anticipated to be impacted directly or at risk of indirect (inadvertent) impact as resulting from the proposal are listed in **Section 9.2**.

The significance of the Aboriginal sites anticipated to be impacted is detailed in **Section 8**.

Impacts to specific sites identified in the SEARs for the proposal are discussed in **Section 9.3**.

In this section, the significance of the proposal's anticipated impact is discussed. The term 'significance of impact' refers to the extent to which the impacts would diminish the value of the study area's Aboriginal cultural heritage.

9.4.1 Social and cultural values

The proposed development would not substantially diminish social or cultural values of the suite of sites recorded for this proposal, nor any site located wholly or partially on the study area. Local Aboriginal people will continue to hold the study area, and all remaining evidence of Aboriginal occupation within it, as being of high cultural value.

As discussed in **Section 8.3**, the suite of archaeological sites identified within the study area collectively possess considerable cultural value, both for their connection with the Aboriginal community's ancestral past (from both the pre-contact and post-contact periods) and for their potential use as an educational resource to teach younger members of the community about past Aboriginal life in the Wilcannia region. The fact that some of the sites would be partially or totally impacted by the proposal would diminish the suite of site's value. The extent to which the proposal would diminish the collective value of the area's sites is, however, relatively small. The proposal would impact a minority of the sites identified during this assessment. The majority of Aboriginal sites would remain intact and unaffected by the proposal. All but two of the culturally modified trees identified during this assessment would be unaffected by the proposal. The majority of open sites would also be unaffected. Most of the sites identified during this assessment (both culturally modified trees and open sites) are located within the Wilcannia Mission Camps and Cultural Places Aboriginal Place and are therefore likely to enjoy a high level of protection into the future.

This assessment recommends a number of mitigation actions (refer to **Section 10**), which would result in a reduction of the proposal's impacts. These include:

- Carrying out a program of archaeological excavation, to investigate whether any subsurface Aboriginal cultural material is present in areas where the proposal would conduct ground-disturbing works (access tracks and laydown/construction yards on the north and southern side of the proposed new weir). These excavations would enable a better understanding of the proposal's impacts to Aboriginal material in these areas, would sample and analyse any sub-surface material that might be present, and would enable the assessment to recommend further archaeological work (such as salvage excavation) if this is judged necessary. Archaeological excavations would also be carried out on hearths within the proposal's impact zone, to explore the nature of these items beneath the ground surface, and possibly enhance our understanding of their history and formation.
- Pruning a culturally modified tree near the construction zone of the proposed new weir, enabling the culturally modified section of the tree to remain in-situ, and the tree to be left alive, during and following the proposal's works. This action would preserve the cultural modification in its current location, on a living tree, negating the negative impact (destruction) that the proposal would otherwise have on this site and its cultural value.
- Using a 3D imaging technique to create a three dimensional archival recording of a scarred tree within the proposed weir pool's construction footprint. The potential to move this tree from its current location to the Barkandji Cultural Centre will also be assessed. Movement of the tree to the cultural centre would only be carried out if moving the tree intact is assessed as possible, and if this action is favoured by the RAPs. It is possible that other outcomes might be favoured by the RAPs, including leaving the tree in its current location or moving the tree into the river channel to act as a snag. While these measures (3D imaging of the tree, and possibly moving the tree to permanent storage in the Cultural Centre) would not enable the tree to remain unaffected in its current location, they would lessen the proposal's impact on the site's cultural

value by enabling the tree (or a 3-D record of the tree) to be viewed and used as an educational resource into the future.

- Collection of surface artefacts from open sites within the proposal's impact zone. Collected artefacts would be permanently stored in a location such as the Barkandji Cultural Centre. This measure would mitigate the impact of the proposal's ground-disturbing works (such as grading and upgrade of access tracks, grading and usage of equipment and construction laydown yards, and ground disturbance within construction zones such as the crane pad). This action would prevent the damage to, or destruction of, these objects that would result if the objects remained in their current location during the proposal's construction works. It would enable the objects to survive undamaged and be retained by the Aboriginal community.
- Removal and re-use of the rocks that make up the existing weir. The nature of re-use of the rocks will be developed in consultation with the RAPs and the wider local Aboriginal community. Possible actions include using the rocks in the community river place or constructing new fish trap(s) in the river. The existing fish traps would be inundated by the new weir pool most of the time and are likely to become an instream habitat feature. Removal and re-use of the rocks would enable the materials that make up the existing weir to be utilised in a visible way within the landscape, rather than being lost through the inundation of this site within the new weir pool.

These measures would have the effect of lessening the proposal's negative effect on the region's suite of Aboriginal sites, and on the cultural value possessed by these sites and by the objects they contain.

The proposal will also have some positive effects on cultural values attached to sites within the study area and attached to the landscape itself. First, it is anticipated that the increased weir pool will boost tourism to Wilcannia, and that the Aboriginal community will have an enhanced potential to educate the broader Australian community on the region's Aboriginal past. The creation of the proposed recreational area at Union Bend in particular has the potential for an enhancement of the area's educational value, through interpretive signage relating to Aboriginal sites in the area and to Aboriginal use of the surrounding landscape. These positive effects on the educational values of the area have been emphasised as beneficial by representatives of the Aboriginal community at Aboriginal focus group meetings, who have expressed strong support for the recreational area.

The increased weir pool might also be viewed by the Aboriginal community as restoring the river in this area to a state more similar to its state prior to the substantial decrease in water levels seen in recent decades. As discussed in **Section 4.1.1.3**, the water level in the river today is substantially lower than it would have been in the pre-contact, and recent past. In **Section 9.3.5**, it was discussed that the increase in water level within the weir pool might enhance the cultural value of the landscape, in returning the river to something resembling its previous morphology. In doing so, the weir pool might make the landscape more relatable to the oral history relating to Aboriginal usage of the landscape in the past. Consequently, the weir pool might be viewed by the Aboriginal community as an enhancement of the landscape's cultural value.

Representatives from the RAPs expressed concerns during the AFG meetings and archaeological surveys about the direct impacts of the proposal on the fallen culturally modified tree (24-5-208) and the fish traps at the existing weir (24-5-167). Water Infrastructure NSW's consideration of this feedback led to the commitment to carry out 3D scanning of the fallen culturally modified tree (management and mitigation measure AH2, refer to **Table 10-1**) and refinement of the design of the proposal from the originally proposed removal of the entire existing weir to the currently proposed partial removal of the existing weir so as to reduce direct impacts to the fish traps. Overall, the RAPs have indicated that they consider the impacts of the proposal to be offset by the value of the proposal to the Aboriginal community currently living in the region.

9.4.2 Scientific (archaeological) values, and assessment of cumulative impact

The proposal would not substantially diminish the scientific value of the region's archaeological resource. While the proposal would result in impacts to some sites, these impacts are minor relative to the total number of known sites in the study area and would be mitigated by the actions recommended in **Section 10**.

The cumulative impact of the proposal is assessed here as being low. The cumulative impact of a proposal refers to the negative effect which it would have on a region's archaeological resource, proportional to the amount of damage which that resource has suffered in the past, and the amount of the resource which would remain. In the case of this assessment's study area, the size of the remaining archaeological resource is high relative to the size of the resource that would be impacted by the proposal. This assessment identified a number of archaeological sites, consisting of culturally modified trees and open scatters of stone artefacts and hearths. The majority of these sites would be unaffected by the proposal, and most are located within the Wilcannia Mission Camps and Cultural Places Aboriginal place and would consequently be expected to enjoy a high level of protection into the future. The sites are distributed at a relatively high density throughout the study area. The results of this assessment's archaeological survey are consistent with previous archaeological and anthropological work in the area, which has also identified a large number of sites distributed densely through the area.

In comparison to the total number of known sites in the study area, the number of sites that would be impacted by the proposal is relatively small. Additionally, the proposal would impact a minority of each type of site recorded in the area: in other words, a minority of the culturally scarred trees, and a minority of the open scatters of stone artefacts and hearths (refer to **Section 7** for a comprehensive list of sites recorded by this assessment and refer to **Section 9** for the list of sites that would be impacted by the proposal). A number of mitigation measures are recommended by this assessment (refer to **Section 10)**, which would reduce the severity of harm to the area's archaeological value that would result from the anticipated impacts detailed in **Section 9**.

The impacts to sites would be mitigated in a number of ways, including salvage collection of surface artefacts where a direct impact has been identified; a program of archaeological excavation within the impact zone to investigate the presence and nature of subsurface Aboriginal cultural heritage material; 3-D archival recording of a scarred tree that would be impacted by inundation following construction of the new weir; and excavation of a sample of hearths within the impact zone to explore the nature of these items below the ground surface. These mitigation measures would have the effect of enhancing our understanding of archaeological sites in the region and documenting additional data relating to these sites. The measures would also preserve salvaged objects, which would be kept in permanent storage in a place agreed to by the Aboriginal community. Although removal of objects from their archaeological context represents an impact to sites, it serves to retain some of their scientific value by preserving them for future study, educational purposes, or other purposes as the Aboriginal community sees fit.

As discussed in **Sections 4.1.1.3**, **9.3.3** and **9.3.5** of this ACHAR, the proposal would have the positive effect of raising water levels in the increased weir pool, creating a river morphology more similar to how the river would have been prior to intensive water use upstream creating the present low water levels. This consequence of the proposal is likely to be viewed as a positive effect in terms of the area's cultural heritage value, as it would go some way to restoring the appearance of the river to its past state.

In summary, given the overall richness of the known archaeological resource within the study area, the relatively small proportion of archaeological sites and Aboriginal objects that would be impacted by the proposal, and the mitigation measures which would serve to preserve some of the archaeological value of the impacted sites, the proposal's cumulative impact to the region's cultural heritage resource is assessed as being low.

10. Mitigation and management measures

Where direct impact to sites is unavoidable, mitigation measures (MM) are recommended.

Table 10-1 identifies mitigation and management measures recommended to be carried out prior to construction works commencing. **Table 10-2** identifies mitigation and management measures recommended to be carried out at the start of, and during, construction works. These recommendations have been made with consideration of the likely potential impact (direct or indirect) to each site, and the assessed significance of each site.

An Aboriginal cultural heritage management plan would be prepared as part of the construction environmental management plan prior to construction to include measures to minimise the potential for impacts as far as practicable, manage Aboriginal heritage, and procedures for any unexpected finds. The plan would be prepared in consultation with the RAPs, Wilcannia LALC, the Barkandji Native Title Corporation and other knowledge holders and take into account the outcomes of recommended further investigations (refer to **Table 10-1**).

Table 10-1 Detailed design/pre-construction impact mitigation and management measures

Number	Impact	Applicable sites	Measure
AH1	Direct disturbance of Aboriginal heritage sites	Entire construction area	Detailed design and construction planning will avoid direct impacts on identified items/sites of Aboriginal heritage significance as far as reasonably practicable. The configuration of the construction compounds and associated access tracks will be reviewed, as far as practicable, to avoid and minimise impacts on Aboriginal heritage.
AH2	Removal of a culturally modified tree	24-5-208 (Union Bend Canoe Tree 7)	The scarred section of the tree will be 3D scanned to create an archival 3D model. Management outcomes for the tree following scanning will be developed in consultation with the local Aboriginal community. If the tree is relocated into the river to form a 'snag' or fish habitat, the location would be chosen to avoid impeding the function of the new weir.
AH3	Management of salvaged items	All directly affected areas	A detailed salvage methodology will be prepared by a suitably qualified archaeologist in consultation with the RAPs. The methodology will be included in an Aboriginal cultural heritage management plan and will ensure any artefacts salvaged are managed in accordance with the requirements of the NPW Act. The salvage methodology will apply to both the collection of surface artefacts (AH5) and archaeological excavations (AH4, AH6). The salvage methodology will describe the process for consultation with the RAPs in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). The RAPs will be engaged to assist in the salvage, which will be managed by an appropriately qualified archaeologist. The salvage methodology will specify how salvaged archaeological material will be analysed and will

Number	Impact	Applicable sites	Measure
			specify the temporary and long-term storage locations for this material. Analysis and reporting of archaeological material collected will be provided to Heritage NSW.
AH4	Disturbance to hearth sites	24-5-176 (Wilcannia New Weir 1) 24-5-177 (Wilcannia New Weir 2) Measure applies to those hearths within the above sites that will be directly impacted by the proposed construction works	It is estimated that about 20 hearths will be directly impacted by the proposal. Where possible, the design of the proposal will be refined during the detailed design phase to minimise the number of hearths that would be impacted. Any refinements to the design to minimise impacts to hearths would occur in consultation with representatives of the RAPS and the project archaeologist. Directly impacted hearths within the identified sites and within the construction footprint will be subject to salvage excavation to examine their subsurface structure and contents and to recover dateable material (e.g. charcoal). Results of these excavations will be documented in an Aboriginal Archaeological Report.
AH5	Salvage of surface artefacts	24-5-176 (Wilcannia New Weir 1) 24-5-177 (Wilcannia New Weir 2) 24-5-180 (Wilcannia Mission Aboriginal Place 4)	Surface collection of artefacts within the construction footprint, from sites along the southern access track (part of 24-5-177, whole of 24-5-180) will occur in a corridor for five metres either side of the approximate centreline of the existing track. Collection will be undertaken by a qualified archaeologist in cooperation with representatives of the RAPs and include recording and documentation to professional standards in laboratory conditions. Collected artefacts will be held in temporary storage in Wilcannia at a location agreed with Wilcannia LALC, and ultimately in long-term storage in the Barkandji Cultural Centre. Results of the surface collection will be documented in a salvage report.
AH6	Archaeological excavation	Locations within the proposal's construction footprint and outside the river channel, around the area of the proposed new weir	Archaeological excavations will be conducted at representative locations across the construction footprint to assess the potential for undiscovered subsurface archaeological material to be present, and to salvage a sample of this material. An archaeological excavation methodology will be prepared in in consultation with the RAPs. Findings of the archaeological excavations will be documented in an Aboriginal Archaeological Report. This report will contain recommendations specifying whether any further archaeological work should be undertaken. The report will be distributed to the RAPs for review and comment.

Number	Impact	Applicable sites	Measure
AH7	Trimming of a culturally modified tree to allow a construction crane to lift and swing	24-5-210 (Union Bend Coolamon Tree 1)	The tree will remain in situ and be lopped to a position that will allow movement of the construction crane but above the upper extent of the cultural scar. Trimming of the tree will be undertaken by a tree surgeon and monitored by the RAPs.
AH8	Indirect harm from visitors to the community river place	24-5-177	Opportunities to develop a heritage interpretation and education strategy will be investigated during detailed design, in consultation with the RAPs and the wider local Aboriginal community. This could include signage and other treatments to increase understanding and protection of the site.
AH9	Removal of the existing weir	24-5-167	The rocks that make up the existing weir will be reused locally, where possible. The nature of re-use of the rocks will be developed in consultation with the RAPs and the wider local Aboriginal community. Possible actions include using the rocks in the community river place or constructing new fish trap(s) in the river. It must be noted that new fish traps could not be placed within the safety exclusion zone of the new weir (about 100 metres upstream and downstream of the new weir; WaterNSW will determine the size of the exclusion zone).

Table 10-2 Construction mitigation and management measures

Number	Impact	Sites applicable	Measure
AH10	Minimising impacts during construction	Entire site	An Aboriginal cultural heritage management plan will be prepared in consultation with the RAPs. It will include measures to minimise impacts to Aboriginal heritage including: ▪ Unexpected finds procedure ▪ Detailed site salvage strategy ▪ Management and care and control plans for salvaged Aboriginal objects ▪ Plans and installation procedures for fencing and protective coverings ▪ Heritage components of induction package for construction workers and supervisors ▪ Outcomes of further investigations post-approval of the environmental impact statement.
AH11	Monitoring of ground-disturbing works	Areas involving ground-disturbing works across the proposal's	Monitoring of preliminary ground disturbance works will be undertaken by the RAPs during the construction phase. Any artefacts found will be collected, or other cultural remains identified.

Number	Impact	Sites applicable	Measure
		construction footprint	Monitoring should be undertaken by a team of four people, if four RAP representatives are available.
AH12	Avoiding impact to culturally modified trees	24-5-160 (Union Bend Canoe Tree 3) 24-5-185 (Old Wilcannia Weir Canoe Tree 3) 24-5-186 (Old Wilcannia Weir Canoe Tree 2) 24-5-187 (Old Wilcannia Weir Canoe Tree 1)	The four identified canoe trees will be fenced prior to construction and construction site personnel will be made aware of their location and importance. Fences will be placed at a minimum five metre buffer outside the dripline of the trees. No works, including storage of materials or machinery, is to be undertaken within the fenced area around the tree.
AH13	Monitoring potential indirect impact	24-5-204 (Union Bend Coolamon Tree 8) 24-5-191 (Union Bend Coolamon Tree 14)	A monitoring program will be developed for scarred trees with potential to be destabilised. This monitoring will be carried out by the construction contractor, or the RAPs.
AH14	Avoiding indirect impact	Sites within 50 metres of the proposal's construction footprint	Aboriginal sites will be temporarily fenced with high visibility material and marked on site plans as areas to be avoided.
AH15	Avoiding accidental impact	All	A cultural heritage induction will be developed for all construction personnel attending the construction site. The induction will be delivered by the Barkandji community and developed by the RAPs and a qualified archaeologist.
AH16	Unexpected finds	Not applicable	An Unexpected Finds Procedure will be developed and included in the construction environmental management plan. It would set out procedures for dealing with Aboriginal objects, human remains and suspected humans remains found during the construction work. Where unknown human or suspected human skeletal remains are found on the site, work must stop in the immediate area, the area made secure from further disturbance and the Water Infrastructure NSW project manager notified. In accordance with the *Coroners Act 2009*, the NSW Police must be called to enable them to investigate whether the remains are human and if they are associated with a crime. In the case where the NSW Police determine that the remains are historic, Heritage NSW and all RAPs will be notified of the historic heritage find.

10.1 Conservation outcomes

As discussed in **Section 9.1**, the design of the proposal has sought to avoid and minimise impacts to Aboriginal objects, sites and places to the fullest practical extent, while meeting the proposal's objectives and operational requirements. The design of the proposal has been amended in response to feedback received from the RAPs including partially removing the existing weir instead of entirely removing the existing weir so as to minimise impacts to fish traps at this location.

The location of elements of the proposal such as access tracks, construction compounds, and laydown yards, has been selected to avoid Aboriginal sites wherever possible given the constraints of engineering requirements and other environmental considerations.

For example, existing access tracks would be used where possible, to minimise the need for additional ground to be cleared and disturbed in the creation of new access tracks. Equipment and vehicle laydown yards have been located at a distance from the river bank, to avoid the dense vegetation along the bank and minimise the proposal's impact to culturally modified trees and aggraded sedimentary bodies along the banks that might have the potential to contain buried Aboriginal objects. The size of the proposal's construction footprint has been reduced as much as possible to limit the impact of construction work on Aboriginal sites.

Salvaged archaeological material (from surface collection, archaeological excavations, and any other future excavation work) will create a collection of artefacts which can be used by the Aboriginal community for educational purposes. Salvage actions will consequently result in a positive conservation outcome in preserving the cultural value of the salvaged objects themselves.

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Appendix A. Open site artefact inventories

Table 11-1 Inventory of all artefacts from Wilcannia New Weir 1, 24-5-176

ID	Type	Material	Completeness	Length	Width	Thickness
1	Unretouched flake	Silcrete	Complete	20	20	3
2	Unretouched flake	Silcrete	Longitudinal cone-split	25	15	5
3	Unretouched flake	Silcrete	Distal fragment	20	30	5
4	Retouched flake	Silcrete	Complete	25	30	10
5	Flaked piece	Silcrete	NA	NA	NA	NA
6	Unretouched flake	Silcrete	Longitudinal cone-split	30	20	8
7	Unretouched flake	Silcrete	Broken	25	10	5
8	Flaked piece	Ochre	NA	NA	NA	NA
9	Unretouched flake	Silcrete	Complete	15	20	2
10	Unretouched flake	Silcrete	Distal fragment	10	15	2
11	Unretouched flake	Silcrete	Complete	15	12	2
12	Unretouched flake	Silcrete	Complete	20	10	2
13	Unretouched flake	Silcrete	Complete	25	20	5
14	Unretouched flake	Silcrete	Distal fragment	18	10	3
15	Unretouched flake	Silcrete	Distal fragment	20	15	5
16	Unretouched flake	Silcrete	Complete	30	10	5
17	Unretouched flake	Silcrete	Complete	20	30	10
18	Unretouched flake	Silcrete	Complete	30	20	5
19	Unretouched flake	Silcrete	Complete	20	15	5
20	Unretouched flake	Silcrete	Distal fragment	25	15	10
21	Unretouched flake	Silcrete	Complete	15	20	5
22	Unretouched flake	Silcrete	Complete	20	10	5
23	Unretouched flake	Silcrete	Longitudinal cone-split	25	15	2
24	Unretouched flake	Silcrete	Complete	15	30	2
25	Unretouched flake	Silcrete	Complete	15	15	5
26	Unretouched flake	Silcrete	Distal fragment	20	35	10
27	Unretouched flake	Silcrete	Broken	10	15	2
28	Unretouched flake	Silcrete	Complete	20	15	5
29	Unretouched flake	Silcrete	Marginal fragment	15	NA	NA
30	Unretouched flake	Silcrete	Complete	25	20	5

ID	Type	Material	Completeness	Length	Width	Thickness
31	Unretouched flake	Silcrete	Complete	NA	NA	NA
32	Unretouched flake	Silcrete	Complete	20	22	3
33	Unretouched flake	Silcrete	Longitudinal cone-split	30	20	5
34	Unretouched flake	Silcrete	Complete	20	18	2
35	Unretouched flake	Silcrete	Distal fragment	30	20	10
36	Unretouched flake	Silcrete	Marginal fragment	20	12	2
37	Unretouched flake	Quartzite	Marginal fragment	40	NA	NA
38	Retouched flake	Silcrete	Complete	35	30	5
39	Unretouched flake	Silcrete	Marginal fragment	10	NA	NA
40	Unretouched flake	Silcrete	Broken	10	12	2
41	Unretouched flake	Silcrete	Broken	15	20	2
42	Unretouched flake		Marginal fragment	10	NA	NA
43	Unretouched flake	Silcrete	Complete	20	12	2
44	Unretouched flake	Silcrete	Longitudinal cone-split	30	10	8
45	Unretouched flake	Silcrete	Complete	20	30	10
46	Unretouched flake	Silcrete	Distal fragment	12	15	3
47	Unretouched flake	Silcrete	Complete	22	25	5
48	Unretouched flake	Silcrete	Broken	20	20	10
49	Unretouched flake	Silcrete	Distal fragment	25	20	10
50	Retouched flake	Silcrete	Complete	30	15	10
51	Unretouched flake	Silcrete	Complete	30	20	5
52	Unretouched flake	Silcrete	Marginal fragment	10	NA	NA
53	Unretouched flake	Silcrete	Complete	20	25	5
54	Unretouched flake	Silcrete	Complete	12	10	3
55	Unretouched flake	Silcrete	Complete	12	20	3
56	Unretouched flake	Chert	Broken	20	20	5
57	Unretouched flake	Silcrete	Complete	15	15	2
58	Unretouched flake	Silcrete	Longitudinal cone-split	20	10	5
59	Unretouched flake	Silcrete	Complete	30	20	5
60	Unretouched flake	Silcrete	Complete	30	20	10
61	Unretouched flake	Silcrete	Broken	15	15	2
62	Unretouched flake	Silcrete	Broken	10	10	2
63	Unretouched flake	Silcrete	Complete	10	15	2

ID	Type	Material	Completeness	Length	Width	Thickness
64	Core	Silcrete	Complete	40	50	40
65	Unretouched flake	Silcrete	Complete	20	30	10
66	Unretouched flake	Silcrete	Medial fragment	10	15	2
67	Unretouched flake	Silcrete	Longitudinal cone-split	20	10	8
68	Unretouched flake	Silcrete	Distal fragment	20	15	8
69	Unretouched flake	Silcrete	Complete	20	25	10
70	Unretouched flake	Silcrete	Medial fragment	20	NA	NA
71	Unretouched flake	Silcrete	Medial fragment	10	NA	NA
72	Unretouched flake	Silcrete	Complete	20	30	5
73	Unretouched flake	Silcrete	Complete	20	20	10
74	Unretouched flake	Silcrete	Broken	10	15	3
75	Unretouched flake	Silcrete	Medial fragment	25	NA	NA
76	Unretouched flake	Silcrete	Complete	25	15	5
77	Unretouched flake	Silcrete	Distal fragment	12	NA	NA
78	Unretouched flake	Silcrete	Broken	30	22	5
79	Unretouched flake	Silcrete	Complete	30	15	5
80	Unretouched flake	Silcrete	Complete	20	20	5
81	Unretouched flake	Silcrete	Distal fragment	20	NA	NA
82	Unretouched flake	Silcrete	Complete	10	15	5
83	Unretouched flake	Silcrete	Longitudinal cone-split	35	20	8
84	Unretouched flake	Silcrete	Complete	25	22	5
85	Unretouched flake	Chert	Complete	15	5	2
86	Unretouched flake	Silcrete	Medial fragment	20	NA	NA
87	Unretouched flake	Silcrete	Complete	15	30	10
88	Unretouched flake	Silcrete	Longitudinal cone-split	18	15	3
89	Unretouched flake	Quartzite	Complete	15	15	5
90	Unretouched flake	Silcrete	Complete	25	20	8
91	Unretouched flake	Silcrete	Medial fragment	10	10	2
92	Unretouched flake	Silcrete	Medial fragment	15	20	3
93	Unretouched flake	Silcrete	Complete	25	10	5
94	Core	Silcrete	Complete	45	50	40
95	NA	Silcrete	NA	15	10	3
96	Flaked piece	Silcrete	NA	NA	NA	NA

ID	Type	Material	Completeness	Length	Width	Thickness
97	NA		NA	NA	NA	NA
98	Unretouched flake	Silcrete	Distal fragment	30	NA	NA
99	Unretouched flake	Chert	Distal fragment	35	15	8
100	Unretouched flake	Silcrete	Distal fragment	40	NA	NA
101	Unretouched flake	Chert	Broken	12	23	3
102	Unretouched flake	Silcrete	Broken	20	15	3
103	Unretouched flake	Silcrete	Complete	25	20	5
104	Unretouched flake	Silcrete	Complete	20	20	5
105	Unretouched flake	Silcrete	Medial fragment	15	10	2
106	Core	Silcrete	Complete	30	35	30
107	Core	Silcrete	Complete	30	35	30
108	Unretouched flake	Silcrete	Complete	20	15	5
109	Unretouched flake	Silcrete	Complete	30	20	8
110	Unretouched flake	Silcrete	Complete	22	22	5
111	Unretouched flake	Silcrete	Complete	12	15	2
112	Retouched flake	Silcrete	Complete	30	30	20
113	Flaked piece	Silcrete	NA	30	NA	NA
114	Flaked piece	Silcrete	NA	NA	NA	NA
115	Unretouched flake	Silcrete	Broken	15	10	5
116	Unretouched flake	Silcrete	Distal fragment	20	20	10
117	Unretouched flake	Silcrete	Longitudinal cone-split	50	40	10
15	Grindstone (bottom)	Sandstone	Broken	80	48	10
16	Retouched flake	Silcrete	Complete	30	30	10
17	Hammerstone	Silcrete	Broken	50	40	20
18	Retouched flake	Silcrete	Complete	25	40	15
19	Retouched flake	Silcrete	Complete	35	30	10
20	Unretouched flake	Silcrete	Longitudinal cone-split	30	20	5
21	Retouched flake	Silcrete	Complete	20	30	10
22	Core		Complete	10	70	10
23	Unretouched flake	Silcrete	Complete	25	20	10
24	Unretouched flake	Silcrete	Complete	10	15	5
25	Flaked piece	Silcrete	NA	NA	NA	NA
26	Unretouched flake	Silcrete	Broken	20	10	8

ID	Type	Material	Completeness	Length	Width	Thickness
27	Unretouched flake	Silcrete	Complete	25	30	7
28	Unretouched flake	Sandstone	Complete	20	20	5
29	Core	Silcrete	Broken	30	20	10
30	Unretouched flake	Silcrete	Medial fragment	20	10	3
31	Flaked piece	Silcrete	NA	20	NA	NA
32	Unretouched flake	Quartzite	Complete	35	45	8
33	Unretouched flake	Chert	Broken	15	8	1
34	Unretouched flake	Silcrete	Broken	30	15	8
35	Unretouched flake	Silcrete	Distal fragment	35	15	5
36	Retouched flake	Silcrete	Complete	28	30	10
37	NA	Silcrete	NA	50	30	10
38	Unretouched flake	Quartzite	Complete	15	25	7
39	Unretouched flake	Quartzite	Complete	45	35	10
40	Unretouched flake	Quartz	Complete	15	15	7
41	Unretouched flake	Silcrete	Broken	15	20	8
42	Unretouched flake	Silcrete	Complete	20	23	8
43	Unretouched flake	Silcrete	Complete	25	17	5
44	Unretouched flake	Silcrete	Longitudinal cone-split	20	10	6
45	Unretouched flake	Silcrete	Complete	20	20	6
46	Unretouched flake	Silcrete	Marginal fragment	NA	NA	NA
47	Unretouched flake	Silcrete	Complete	30	25	5
48	Unretouched flake	Silcrete	Broken	17	7	3
49	Retouched flake	Silcrete	Complete	30	22	5
50	Retouched flake	Silcrete	Complete	35	15	5
51	Unretouched flake	Quartzite	Distal fragment	NA	NA	NA
52	Unretouched flake	Silcrete	Complete	15	20	5
53	Flaked piece	Ochre	NA	NA	NA	NA
54	Retouched flake	Silcrete	Complete	35	15	6
55	Flaked piece	Silcrete	NA	NA	NA	NA
56	Flaked piece	Quartzite	NA	NA	NA	NA
57	Unretouched flake	Silcrete	Complete	35	25	10
58	Unretouched flake	Silcrete	Complete	10	12	3
59	Unretouched flake	Silcrete	Complete	25	18	5
60	Unretouched flake	Quartzite	Complete	30	20	10

ID	Type	Material	Completeness	Length	Width	Thickness
61	Flaked piece	Silcrete	NA	NA	NA	NA
62	Core	Quartzite	Complete	30	30	20
63	Unretouched flake	Silcrete	Complete	35	40	15
64	Core	Silcrete	Complete	45	70	40
65	Unretouched flake	Silcrete	Broken	20	20	5
66	Retouched flake	Silcrete	Complete	45	40	15
67	Unretouched flake	Quartzite	Broken	20	15	5
68	Unretouched flake	Silcrete	Broken	15	30	12
69	Unretouched flake	Silcrete	Complete	30	35	15
70	Unretouched flake	Quartzite	Broken	25	25	5
71	Unretouched flake	Silcrete	Complete	30	25	10
72	Flaked piece	Ochre	NA	15	NA	NA
73	Core	Silcrete	Complete	35	50	30
74	Flaked piece	Silcrete	NA	25	NA	NA
75	Unretouched flake	Silcrete	Complete	25	15	6
76	Unretouched flake	Silcrete	Complete	25	38	10
77	Unretouched flake	Silcrete	Complete	25	20	8
78	Unretouched flake	Silcrete	Complete	15	15	8
79	Unretouched flake	Silcrete	Marginal fragment	NA	NA	NA
80	Unretouched flake	Quartzite	Broken	20	10	3
81	Unretouched flake	Silcrete	Complete	20	28	5
82	Unretouched flake	Silcrete	Complete	20	15	5
83	Unretouched flake	Silcrete	Complete	20	15	5
84	Retouched flake	Silcrete	Complete	45	20	8
85	Unretouched flake	Silcrete	Marginal fragment	NA	NA	NA
86	NA		NA	NA	NA	NA
87	Unretouched flake	Silcrete	Complete	20	30	7
88	Flaked piece	Silcrete	NA	NA	NA	NA
89	Flaked piece	Silcrete	NA	NA	NA	NA
90	Flaked piece	Silcrete	NA	NA	NA	NA
91	Unretouched flake	Silcrete	Complete	25	20	7
92	Retouched flake	Silcrete	Complete	30	30	5
93	Flaked piece	Silcrete	NA	NA	NA	NA
94	Unretouched flake	Silcrete	Complete	30	40	10
95	Unretouched flake	Silcrete	Broken	15	20	5

ID	Type	Material	Completeness	Length	Width	Thickness
96	Flaked piece	Silcrete	NA	NA	NA	NA
97	Unretouched flake	Silcrete	Distal fragment	25	NA	NA
98	Unretouched flake	Silcrete	Complete	10	10	10
99	Unretouched flake	Silcrete	Complete	25	20	9
100	Unretouched flake	Silcrete	Longitudinal cone-split	30	10	5
101	Flaked piece	Quartzite	NA	NA	NA	NA
102	Unretouched flake	Silcrete	Complete	25	35	5
103	Unretouched flake	Silcrete	Longitudinal cone-split	15	20	8
104	Unretouched flake	Silcrete	Broken	10	18	2
105	Unretouched flake	Silcrete	Complete	25	15	5
106	Unretouched flake	Silcrete	Broken	15	30	10
107	Core	Silcrete	Broken	20	15	10
108	Unretouched flake	Silcrete	Distal fragment	20	NA	NA
109	Flaked piece	Silcrete	NA	NA	NA	NA
110	Core	Silcrete	Complete	25	25	15
111	Unretouched flake	Silcrete	Distal fragment	NA	NA	NA
112	Unretouched flake	Silcrete	Complete	16	12	5
113	Core	Silcrete	Broken	NA	NA	NA
114	Core	Silcrete	Complete	35	55	40
115	Flaked piece	Silcrete	NA	NA	NA	NA
116	Unretouched flake	Silcrete	Complete	30	20	12
117	Unretouched flake	Silcrete	Broken	20	14	5
118	Flaked piece	Quartzite	NA	NA	NA	NA
119	Unretouched flake	Quartzite	Distal fragment	NA	NA	NA
120	Unretouched flake	Silcrete	Complete	20	15	9
121	Unretouched flake	Silcrete	Complete	30	25	5
122	Unretouched flake	Ochre	Complete	15	25	12
123	Flaked piece	Silcrete	NA	NA	NA	NA
124	Unretouched flake	Silcrete	Complete	20	15	4
125	Core	Silcrete	Broken	30	30	15
126	Unretouched flake	Silcrete	Complete	25	20	5
127	Unretouched flake	Quartzite	Complete	35	50	15
128	Unretouched flake	Silcrete	Complete	22	22	5

ID	Type	Material	Completeness	Length	Width	Thickness
129	Unretouched flake	Silcrete	Complete	25	25	5
130	Unretouched flake	Silcrete	Broken	20	20	NA
131	Unretouched flake	Silcrete	Complete	30	25	10
132	Unretouched flake	Silcrete	Broken	25	20	8
133	Retouched flake	Silcrete	Complete	45	40	15
134	Unretouched flake	Silcrete	Distal fragment	NA	NA	NA
135	Flaked piece	Silcrete	NA	NA	NA	NA
136	Unretouched flake	Silcrete	Complete	25	25	8
137	Unretouched flake	Silcrete	Complete	25	30	9
138	Unretouched flake	Silcrete	Longitudinal cone-split	30	25	8
139	Unretouched flake	Chert	Complete	10	25	6
140	Core	Silcrete	Broken	25	15	10
141	Flaked piece	Siliceous	NA	NA	NA	NA
142	Unretouched flake	Silcrete	Complete	35	30	5
143	Flaked piece	Silcrete	NA	NA	NA	NA
144	Unretouched flake	Silcrete	Complete	20	15	3
145	Unretouched flake	Silcrete	Complete	25	20	5
146	Flaked piece	Silcrete	NA	NA	NA	NA
147	Unretouched flake	Silcrete	Complete	30	25	10
148	Flaked piece	Silcrete	NA	NA	NA	NA
149	Unretouched flake	Silcrete	Broken	10	35	8
150	Flaked piece	Silcrete	NA	NA	NA	NA
151	Unretouched flake	Silcrete	Complete	15	10	3
152	Unretouched flake	Silcrete	Complete	20	15	4
153	Unretouched flake	Silcrete	Complete	15	25	7
154	Unretouched flake	Silcrete	Complete	25	15	4
155	Unretouched flake	Silcrete	Broken	12	15	5
156	Unretouched flake	Silcrete	Complete	30	35	4
157	Flaked piece	Silcrete	NA	NA	NA	NA
158	Unretouched flake	Silcrete	Complete	25	20	5
159	Unretouched flake	Silcrete	Marginal fragment	NA	NA	NA
160	Unretouched flake	Silcrete	Medial fragment	NA	15	NA
161	Unretouched flake	Silcrete	Complete	30	25	10
162	Unretouched flake	Silcrete	Complete	10	10	5

ID	Type	Material	Completeness	Length	Width	Thickness
163	Unretouched flake	Silcrete	Complete	30	25	5
164	Unretouched flake	Silcrete	Longitudinal cone-split	25	20	5
165	Unretouched flake	Silcrete	Longitudinal cone-split	30	25	8
166	Unretouched flake	Silcrete	Complete	30	25	5
167	Unretouched flake	Silcrete	Complete	30	20	10
168	Unretouched flake	Silcrete	Broken	10	25	4
169	Unretouched flake	Chert	Complete	20	20	3

Table 11-2 Inventory of all artefacts from Wilcannia New Weir 2, 24-5-177

ID	Type	Material	Completeness	Length	Width	Thickness
1	Unretouched flake	Silcrete	Complete	20	25	3
2	Core	Silcrete	Broken	70	50	30
3	Unretouched flake	Silcrete	Complete	35	17	5
4	Unretouched flake	Chert	Complete	32	10	3
5	Unretouched flake	Silcrete	Complete	30	20	NA
6	NA	Silcrete	NA	15	15	2
7	Unretouched flake	Silcrete	Complete	25	35	4
8	Unretouched flake	Silcrete	Longitudinal cone-split	20	30	10
9	Hammerstone	Silcrete	Broken	60	50	40
10	Core	Silcrete	Complete	40	50	20
11	Hammerstone	Silcrete	Complete	140	110	80
12	Core	Silcrete	Complete	30	45	10
13	Unretouched flake	Silcrete	Complete	40	25	5
14	Grindstone (bottom)	Silcrete	Broken	70	40	40

Table 11-3 Inventory of all artefacts from Wilcannia Mission Camps and Cultural Places Aboriginal Place 4, 24-5-180

ID	Type	Material	Completeness	Length	Width	Thickness
118	Unretouched flake	Silcrete	Distal fragment	20	30	5
119	Unretouched flake	Silcrete	Complete	35	25	10
120	Unretouched flake	Silcrete	Broken	20	20	5
121	Retouched flake	Silcrete	Complete	25	22	10

ID	Type	Material	Completeness	Length	Width	Thickness
122	Unretouched flake	Silcrete	Longitudinal cone-split	22	12	2
123	Retouched flake	Silcrete	Complete	22	35	15
124	Core	Silcrete	Complete	35	50	35
125	Retouched flake	Silcrete	Complete	50	20	15
126	Grindstone (indeterminate)	Quartzite	Broken	50	20	20
127	NA	Ochre	Fragment	NA	NA	NA
128	Unretouched flake	Silcrete	Distal fragment	20	30	5
129	Unretouched flake	Quartzite	Distal fragment	20	10	NA
130	Grindstone (indeterminate)	Quartzite	Broken	50	30	15
131	Unretouched flake	Silcrete	Distal fragment	15	20	5
132	Unretouched flake	Silcrete	Distal fragment	20	20	10
133	Grindstone (top)	Quartzite	Broken	50	40	10
134	Core	Silcrete	Complete	40	50	25
135	Unretouched flake	Silcrete	Complete	20	20	10
136	Unretouched flake	Silcrete	Complete	22	22	10
137	Unretouched flake	Silcrete	Distal fragment	20	20	5
138	Unretouched flake	Silcrete	Complete	40	25	10
139	Retouched flake	Silcrete	Complete	30	32	15
140	Unretouched flake	Silcrete	Complete	25	35	12
141	Retouched flake	Silcrete	Complete	22	25	8
142	Unretouched flake	Silcrete	Broken	25	30	8
143	Unretouched flake	Quartz	Distal fragment	30	20	4
144	Unretouched flake	Silcrete	Complete	30	10	5
145	Unretouched flake	Silcrete	Complete	35	35	10
146	Unretouched flake	Silcrete	Broken	15	20	5
147	Unretouched flake	Silcrete	Longitudinal cone-split	30	15	18
148	NA	Silcrete	NA	30	25	5
149	Unretouched flake	Silcrete	Medial fragment	30	NA	NA
150	Unretouched flake	Silcrete	Medial fragment	20	NA	NA
151	Unretouched flake	Silcrete	Complete	30	10	5
152	Unretouched flake	Silcrete	Complete	30	25	5
153	Unretouched flake	Silcrete	Complete	40	30	15
154	Unretouched flake	Silcrete	Complete	30	20	10

ID	Type	Material	Completeness	Length	Width	Thickness
155	Unretouched flake	Silcrete	Broken	20	20	5
156	Unretouched flake	Silcrete	Marginal fragment	NA	NA	NA
157	Unretouched flake	Silcrete	Complete	40	20	5

Appendix B. Aboriginal community consultation

Date	From	To	Medium	Subject	Brief description
10-Sep-20	Jacobs	Heritage NSW	Email	Agency Letter	WaterNSW is proposing to construct a replacement weir in Wilcannia to provide long-term town water supply and preserve and enhance the social, economic and environmental benefits for Wilcannia, its people and its surrounds. Following the consultation guidelines, Jacobs (on behalf of WaterNSW) is seeking registrations of interest from Aboriginal people who hold cultural knowledge relevant to the Wilcannia area and the cultural and spiritual significance of the Darling River and surrounding cultural landscape more generally.
10-Sep-20	Jacobs	National Native Title Tribunal	Email	Agency Letter	WaterNSW is proposing to construct a replacement weir in Wilcannia to provide long-term town water supply and preserve and enhance the social, economic and environmental benefits for Wilcannia, its people and its surrounds. Following the consultation guidelines, Jacobs (on behalf of WaterNSW) is seeking registrations of interest from Aboriginal people who hold cultural knowledge relevant to the Wilcannia area and the cultural and spiritual significance of the Darling River and surrounding cultural landscape more generally.
10-Sep-20	Jacobs	NTSCorp	Email	Agency Letter	WaterNSW is proposing to construct a replacement weir in Wilcannia to provide long-term town water supply and preserve and enhance the social, economic and environmental benefits for Wilcannia, its people and its surrounds. Following the consultation guidelines, Jacobs (on behalf of WaterNSW) is seeking registrations of interest from Aboriginal people who hold cultural knowledge relevant to the Wilcannia area and the cultural and spiritual significance of the Darling River and surrounding cultural landscape more generally.
10-Sep-20	Jacobs	Office of Registrar Aboriginal Land Rights Act	Email	Agency Letter	WaterNSW is proposing to construct a replacement weir in Wilcannia to provide long-term town water supply and preserve and enhance the social, economic and environmental benefits for Wilcannia, its people and its surrounds. Following the consultation guidelines, Jacobs (on behalf of WaterNSW) is seeking registrations of interest from Aboriginal people who hold cultural knowledge relevant to the Wilcannia area and the cultural and spiritual significance of the Darling River and surrounding cultural landscape more generally.

Date	From	To	Medium	Subject	Brief description
10-Sep-20	Heritage NSW	Jacobs	Email	Agency Letter	Automated reply - Covid delays
10-Sep-20	National Native Title Tribunal	Jacobs	Email	Agency Letter	Automated reply - Use NNTT form or search website
14-Sep-20	Jacobs	Central Darling Shire Council	Email	Agency Letter	WaterNSW is proposing to construct a replacement weir in Wilcannia to provide long-term town water supply and preserve and enhance the social, economic and environmental benefits for Wilcannia, its people and its surrounds. Following the consultation guidelines, Jacobs (on behalf of WaterNSW) is seeking registrations of interest from Aboriginal people who hold cultural knowledge relevant to the Wilcannia area and the cultural and spiritual significance of the Darling River and surrounding cultural landscape more generally.
29-Sep-20	Jacobs	Heritage NSW	Email	Agency Letter	Just following up my previous email to enquire if a list of the names of Aboriginal people who may hold cultural knowledge relevant the proposed project area would be available.
10-Sep-20	Heritage NSW	Jacobs	Email	Agency Letter	Automated reply - Covid delays
22-Sep-20	Gerald Quayle, Barkandji Native Title	Jacobs – Andrew Costello	Phone call	Registration	Phone message in response to advertisement.
25-Sep-20	Jacobs – Andrew Costello	Gerald Quayle, Barkandji Native Title	Phone call	Registration	Call returned to let him know we'd received his call.

Date	From	To	Medium	Subject	Brief description
25-Sep-20	WaterNSW	Wilcannia LALC	Email	Agency Letter	Summary of meeting, attached TAFE certificate documents, and agency letter for project.
02-Oct-20	Heritage NSW	Jacobs	Email	Agency Letter	Thank you for your follow-up email. I have fwd your email to the officer who will look into your request, and you should hear from him soon.
07-Oct-20	WaterNSW – Mina Suh	Heritage NSW – Phil Purcell	Email	Agency Letter	Hope you are well (and settled in to DPC?). I wanted to advise that the ACHAR for Wilcannia Weir Replacement Project has formally commenced including the advertisement for call of RAPs. Our consultant, Jacobs, recently sent correspondence (attached) requesting a list of names of Aboriginal knowledge holders around the project location to Heritage NSW. I am surmising the nominated officer may be you and thought I might request this directly. If so, it would be greatly appreciated if you could provide the list to us at your earliest convenience. The advertisement period formally closes today (just FYI). Please do not hesitate to contact me if you have any questions on the above. As promised, we will continue to update you via email regarding the project (and major milestones along the ACHAR development).
08-Oct-20	Heritage NSW	WaterNSW and Jacobs	Email	Agency Response	Supplied response letter to 'letter to agencies', including list of potential Aboriginal stakeholders to contact
22-Oct-20	Owen Whyman, via Troy Gavin	WaterNSW	Email	RAP registration	Supplied RAP registration form for Owen Whyman (senior)

Date	From	To	Medium	Subject	Brief description
22-Oct-20	WaterNSW	Sarah Martin	Email	Information	Informed Sarah and Badger Bates of the timing for the 1st AFG and the archaeological survey
23-Oct-20	Wilcannia LALC	Jacobs	Email	RAP registration	Supplied RAP registration forms for Jennifer Thwaites, Kevin Bates, Steven Harris
27-Oct-20	Wilcannia LALC, via Troy Gavin	WaterNSW and Jacobs	Email	RAP registration	Supplied RAP registration forms for Michael Kennedy and Leslie Harris
28-Oct-20	Monica Kerwin, via Troy Gavin	WaterNSW and Jacobs	Email	RAP registration	Supplied RAP registration forms for Monica Kerwin and Bama Johnson
02-Nov-20	Sarah martin	WaterNSW	Email	RAP registration	Notified that Badger Bates wishes to be registered as RAP and as a participant at the 1st AFG and archaeological survey
05-Nov-20	WaterNSW and Jacobs	AFG participants	AFG Meeting	Project information	Presented information on the proposal, and the proposed method of archaeological assessment (see ACHAR)
09-Dec-20	WaterNSW and Jacobs	AFG participants	AFG Meeting	Assessment results	Presented information on the archaeological assessment results, and proposed recommendations
14-Jun-22	Elders (Aunty Nareen Cattermole, Uncle Scratchie (Kevin Senior) Cattermole, and Uncle Leslie (Wadi) Harris), Michael Cassidy (Wilcannia	WINSW (Brendan O'Neill, Naiomi Finlayson and Felicity Rooney)	Meeting in Wilcannia	Proposal impacts	Meeting to discuss fish trapping (which would not be possible at the proposed new weir due to the proposed exclusion zone for safety) and the fallen scar tree at the new weir site (Union Bend Canoe Tree 7 (24-5-208)). There were no new concerns raised regarding these items, and there was consensus that the Elders preferred the fallen scar tree to become a snag in the new town pool. Mitigation measure AH2 is consistent with this outcome.

Date	From	To	Medium	Subject	Brief description
	LALC Chairperson and RAP representative) and Brendan Adams				

Appendix C. AHIMS site cards

AHIMS site cards have been redacted for confidentiality.

Appendix D. Addendum report – survey of new community river place location

ACHAR Addendum Report - Community River Place Survey

Document no: IS350400-ABH-NP-REP-002

Water Infrastructure NSW

Wilcannia Weir Replacement Project
5 July 2022

ACHAR Addendum Report - Community River Place Survey

Client name:	Water Infrastructure NSW		
Project name:	Wilcannia Weir Replacement Project		
Client reference:	*[Client reference]*	**Project no:**	IS350400
Document no:	IS350400-ABH-NP-REP-002	**Project manager:**	Simon Cornell
Revision no:	3	**Prepared by:**	Oliver Macgregor
Date:	5 July 2022	**File name:**	IS350400_Wilcannia ACHAR_Appendix D_220705_D3

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1. Introduction

1.1 Background to this report

Jacobs prepared an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Wilcannia Weir Replacement project (the proposal), based in part on archaeological surveys carried out in 2020 and 2021.

After the ACHAR was written and circulated to the proposal's Registered Aboriginal Parties (RAPs) for their review and comment, one element of the proposal was redesigned and its proposed location changed. The location of the proposed community river place, which had been planned to be next to the proposed new weir, was moved to the Crown reserve at the southern end of Union Bend Road. This change to the location of the community river place occurred because it was initially proposed on land that is subject to the *Commons Management Act1989*, which would have made implementing the proposal difficult due to constraints in that Act for this type of place.

The new location proposed for the community river place is managed by Central Darling Shire Council and is already used for recreation. The proposal would enhance the site's recreational facilities and features.

The new proposed location for the community river place had been partially covered by the 2019 archaeological survey, but most of the area had not been surveyed during that time.

As RAP feedback on the ACHAR had been returned and incorporated into the final version of the report, it was decided that the assessment of this new area would be written up in an addendum report (this document) to be attached as an appendix to the ACHAR.

1.2 Study area

This addendum report deals only with the area proposed for the community river place, which is shown in **Figure 1-1**.

Other works areas for the proposal are assessed in the main body of the ACHAR.

This report is an addendum to the Wilcannia Weir Replacement Aboriginal Cultural Heritage Assessment Report (Jacobs 2022, referred to hereafter as 'the ACHAR') and should be read in conjunction with that report.

1.3 Proposal description

A comprehensive description of the overall proposal is provided in Section 1.2 of the ACHAR.

This addendum report is concerned with a single element of the proposal, the community river place. This is proposed to be a small recreation area located at the southern end of Union Bend Road, adjacent to the northern (left) bank of the Darling River (Baaka).

The proposed location lies within the boundary of the Wilcannia Mission Camps and Cultural Places Aboriginal Place. It is adjacent to Union Bend, and consequently to the stretch of the river that constitutes the Union Bend Ngatji Site. Both these places have been identified in the proposal's Secretary's Environmental Assessment Requirements (SEARs) as items the proposal specifically needs to consider in its assessment of impacts and the significance of these impacts to Aboriginal heritage.

1.4 Purpose and scope of this report

The purpose of this report is to assess the potential impacts to Aboriginal cultural heritage from constructing and operating the community river place. The report:

- Addresses SEAR number 5 as shown in **Table 1-1** of the ACHAR
- Assesses the potential impacts of constructing and operating the proposal on Aboriginal cultural heritage objects and places

- Recommends measures to mitigate and manage the impacts identified.

The report functions as an addendum to the ACHAR, and is intended to be read in conjunction with that report. Much of the background information required to assess the Aboriginal heritage values associated with the proposed community river place location is contained within the ACHAR and not repeated here. This report relies on referencing the relevant sections of the ACHAR to provide this information.

1.5 Authorship

The report was authored by:

- Oliver Macgregor (Senior Archaeologist, Jacobs). Oliver holds a PhD in archaeology and palaeoanthropology from the Australian National University and has over ten years' experience as an archaeologist.

The report was reviewed by:

- Fran Scully (Principal Archaeologist, Jacobs). Fran holds an MSc in archaeological geophysics from the University of Bradford and has over 29 years' experience as a field archaeologist, consultant archaeologist, cultural heritage advisor, heritage regulator and policy advisor.

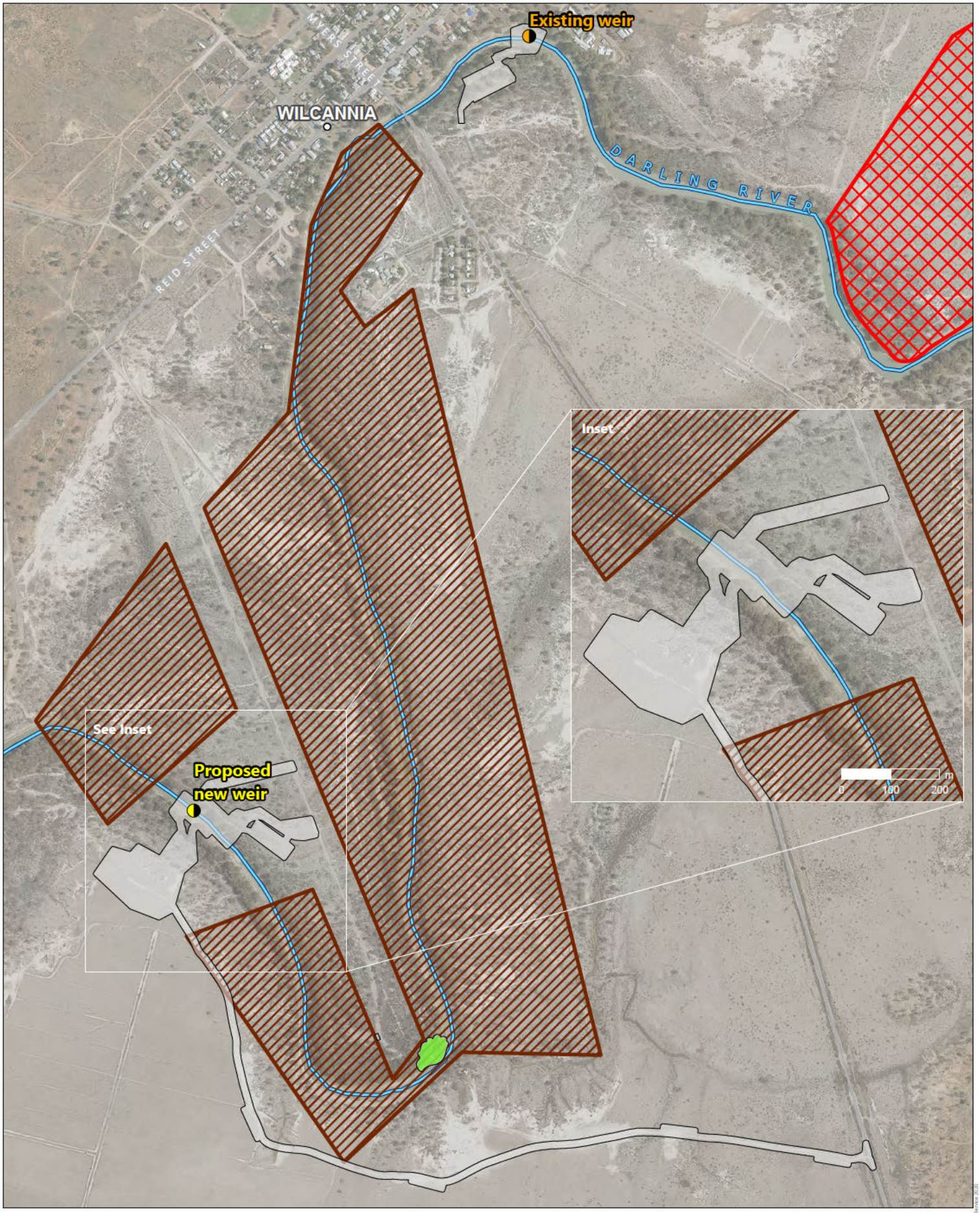

Figure 1-1: Proposed works

2. Legislative and policy framework

An overview of the legislative and policy framework relevant to the proposal is provided in Section 2 of the ACHAR.

3. Aboriginal community consultation

A description of the Aboriginal community consultation process carried out for the proposal is provided in Section 3 of the ACHAR.

Additional consultation actions carried out in the preparation of this addendum report consisted of:

- Water Infrastructure NSW (WINSW) contacted the RAPs for this proposal, informing them of the need to survey the new community river place location, and to arrange a convenient time for the survey to occur
- WINSW arranged for the RAPs to supply two Sites Officers to take part in the survey.

Some of the RAPs have expressed concern that the proposed location of the community river place is too far from the town to be used for fishing, particularly when compared to the location of the existing weir. WINSW has considered this feedback but still considers the location to be the most feasible site for the community river place because it is Crown land, it is located next to the river, it is currently used for recreational purposes and it is a short drive from the town.

WINSW is also consulting Barkandji Native Title Group Aboriginal Corporation, Heritage NSW and Central Darling Shire Council (as the land manager) about the proposed community river place.

At the same time as this addendum report was appended to the ACHAR, the ACHAR was also revised to reflect a change in the design of the proposal to partially remove the existing weir instead of entirely removing the existing weir so as to reduce impacts to the fish traps at this location. WINSW provided hard copies of the revised draft ACHAR including this appendix to the RAPs on 27 April 2022. A period of 28 days was provided to RAPs to review the revised draft ACHAR and provide feedback and input. No feedback was received from the RAPs regarding the community river place or this addendum report.

4. Background information

Background information relevant to the proposal area, and consequently relevant to the proposed community river place, is provided in Section 4 of the ACHAR. This includes information on:

- The environmental context of the proposal area and the surrounding region
- Ethnohistorical information on Aboriginal society in the region
- The search of the Aboriginal Heritage Information Management System (AHIMS) carried out to identify previously recorded Aboriginal sites in the proposal area and the surrounding region (See also **Appendix C** of the ACHAR)
- Previous archaeological studies carried out in the region
- A description of previously identified Aboriginal sites within the proposal area.

A discussion of Aboriginal cultural values relevant to the proposal area is provided in Section 5 of the ACHAR.

5. Previously identified sites

A comprehensive understanding of previously recorded Aboriginal sites has been obtained through:

- A search of the AHIMS database on 14 September 2021 (see Section 4.3 and Figure 4.2 of the ACHAR)
- Consultation with the proposal's RAPs (see Section 3 of the ACHAR)
- A review of previous archaeological studies carried out within the proposal area (see Section 4.4 of the ACHAR)
- The archaeological survey, carried out in November 2020, which included a corridor along the riverbank (the river channel, the bank crest, and an area of around ten metres beyond the bank crest) which covered a small section along the southern edge of the proposed community river place area.

The proposed community river place lies entirely within the boundaries of the Wilcannia Mission Camps and Cultural Places Aboriginal Place. The description of this site below is reproduced from Section 9.3.5 of the ACHAR.

The previously recorded site 24-5-159, Union Bend Ngatji Waterhole, is located immediately south of the proposed community river place. The description of this site below is reproduced from Section 4.5.10 of the ACHAR.

5.1 Site 24-5-159 (Union Bend Ngatji Waterhole)

The Union Bend Ngatji Waterhole site is a place connected with intangible cultural heritage, known by the Barkandji people as an area in which the Ngatji lived. The concept of the Ngatji and stories relating to the Ngatji, are connected to the physical landscape of Union Bend, in particular the morphology of the river itself. The relatively deep water as the river travels around Union Bend is an important aspect of this connection, as this deep water is viewed as a refuge for the Ngatji. Union Bend is one of a number of deep waterholes in the river upstream that are linked to stories of the Ngatji (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018).

The site is also documented as a resource-gathering area for the Aboriginal community. The waterhole has been used as a place to procure water and fish, and as a swimming and meeting place (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018: 27).

This site does not have specific spatial boundaries, but is taken to encompass the width of the river channel and the crests of the riverbank. The general morphology of the river (including the river's course, the shape of the river channel and banks, and the water level) constitutes the main physical feature of the site.

The site is within the Wilcannia Mission Camps and Cultural Places Aboriginal Place, gazetted in 2020 (New South Wales Government 2020). The Aboriginal Place in general, and the Union Bend Ngatji Site itself, are both mentioned in the SEARs as significant sites (refer to Section 1.4 of the ACHAR). In response to the SEARs requirement that this assessment consider the impact of the proposal on the Union Bend Ngatji site, the heritage significance of this site and the effects and impacts the proposal would have on the site are discussed in detail in **Section 8**.

5.2 Wilcannia Mission Camps and Cultural Places Aboriginal Place

The Wilcannia Mission Camps and Cultural Places Aboriginal Place is an area running along the river from Wilcannia to the area of the proposed new weir, and downstream of the proposed new weir. The area encompasses the river and areas of ground on both sides of the river (DPC 2020: 69). The area is gazetted as an Aboriginal Place (New South Wales Government 2020).

The Aboriginal Place was nominated on the basis of tangible and intangible cultural heritage values. The tangible cultural heritage values of the Place are summarised in the Department of Premier and Cabinet's assessment report:

> *Tangible values that the LALC wish to protect include canoe trees, coolamon trees, a mound site, middens, artefacts, ovens, and material remains of camping places from the 1920's to 1980's, as well as fishing places and the Ngatji (rainbow serpent) waterhole and related features.* (DPC 2020: 3)

Intangible cultural heritage values connected with the Aboriginal place include stories related to the Ngatji (which are particularly associated with deeper waterholes in the river), oral histories relating to traditional cultural practices such as the procurement of plant and animal foods and other resources from the landscape, and oral histories and stories relating to Aboriginal life in the area during the post-contact period. The connection of the Aboriginal Place with these stories and oral histories is cited as being of importance to the survival of intangible cultural heritage within the Aboriginal community in the future, as summarised in the assessment report:

> *Intangible values that need to be handed down include strong family life, kinship, sharing and caring for each other as a community, resilience, independence, and problem solving*. (DPC 2020: 3)

6. Archaeological survey methods

6.1 Aims

The archaeological survey aimed to:

- Determine whether any Aboriginal objects are present within the proposed community river place.
- Identify any areas with a likelihood of Aboriginal objects being buried beneath the surface, and which should be regarded as areas of Potential Archaeological Deposit (PAD).
- Gather and record information on any sites associated with intangible cultural heritage that are present within or near to the community river place.

The purpose of the archaeological survey was to gather information on the nature of Aboriginal objects present in the study area and the archaeological 'site' or 'sites' they make up. This information has been used as a basis for a significance assessment of each site and its contents and recommendations for heritage management mitigation to be taken.

The survey assessed whether any areas have a high potential to contain buried Aboriginal objects and should consequently be designated as areas of PAD. The decision to designate areas of PAD was made in consultation with Aboriginal representatives from the RAPs present on the site.

The archaeological survey adhered to the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010).

6.2 Survey area

The survey covered the entirety of the proposed community river place. A buffer zone of approximately 20 metres around the edges of the area was also surveyed.

For a map of the survey area, refer to **Figure 1-1**.

6.3 Archaeological survey procedure

The field survey was aimed at locating Aboriginal objects, Aboriginal sites (including places associated with intangible cultural heritage) and PADs.

The method stated that, in the event that archaeological sites or areas of PAD were encountered, the following attributes would be recorded:

- Site location (single point for isolated artefacts, or as a boundary drawn around larger sites such as artefact clusters or middens)
- Site type
- Landform context
- Vegetation type
- Land use
- Categories of features and artefacts present on the site
- Orientation/aspect of the site
- Observations on individual cultural features (e.g. stone artefacts**)**

- Observations on culturally modified trees: living status of tree; condition of tree; condition of scar; tree species; length and width of scar; height above ground; presence of regrowth; depth of scar (height of regrowth); shape of scar; orientation of scar; presence/absence of axe marks. Culturally modified trees are trees with any evidence of past intentional modification by humans and include scarred and carved trees
- Observations of other specific site types (burials, ceremonial sites) following the requirements of Heritage NSW site recording forms
- Photographs of the site and individual site features/artefacts judged necessary by the field team
- Any other comments or information as judged relevant by the field team.

Where sites were associated with intangible cultural heritage, information provided by RAPs in the field would be recorded.

The survey also recorded land disturbance, survey coverage variables (ground exposure and archaeological visibility) and landform types across the study area.

Data was captured using a GPS enabled tablet computer running the Avenza Maps recording platform.

Two representatives from the RAPs participated in the archaeological survey (see **Table 6-1**). The survey was carried out on 26 October 2021.

Table 6-1 Participants in the Aboriginal archaeological survey, 26 October 2021

Name	Organisation
Michael Kennedy	Wilcannia Local Aboriginal Land Council
Bama Johnson	Barkandji youth being mentored by elders
Mina Suh	WINSW
Oliver Macgregor	Jacobs
Fran Scully	Jacobs

7. Archaeological survey results

7.1 Landform, survey coverage, and visibility

The survey area sits on a single landform, a flat and fairly level blacksoil plain adjacent to the northern (left) bank of the Darling River (Baaka). The visible regolith (i.e. surface soils or sediments) across the proposal area consists of a pale grey silt/clay with small amounts of sand and small (typically under five millimetres) rounded gravels. This regolith is predominantly alluvial deposit brought into the area during flood events, though some sediments in the area might have been deposited (or reworked) by wind. In some areas, the friable surface soils have been eroded and reworked by water (and possibly also wind) to form hard claypans. Larger particles (such as gravels and in some cases Aboriginal stone artefacts) are sitting on the surface of these claypans, having been left there as a 'lag deposit' after the finer soils and sediments were eroded away.

A number of informal vehicle tracks cross through the survey area. Along these vehicle tracks, the surface regolith has been substantially eroded by vehicle tyre scuffage and subsequent wind and water erosion of the expose ground surface.

Vegetation across the survey area consists of open woodland, with river red gums growing near the bank of the river, toward the southern portion of the survey area and other species such as box gums being predominant toward the north of the survey area, which is further from the riverbank. Underneath the canopy, undergrowth consisted of low shrubs, and sparse grass cover in some areas. Leaf litter was also present in some areas (see **Figure 7-1** to **Figure 7-4** for illustrations of typical vegetation and ground surface coverage across the survey area).

The effectiveness of archaeological survey for cultural material on or under the ground (for example stone artefacts, shell middens, hearths) is greatly affected by ground cover. Any form of ground cover such as pasture, leaf litter or imported overburden will impede the ability to see such cultural material. The survey area had variable surface visibility due to the area containing a mixture of relatively undisturbed riverside vegetation in places (trees, shrubs, herbage and thick leaf litter), through to well-used vehicle tracks in others.

Ground surface visibility across the survey area was approximately 30 per cent.

Figure 7-1 Southern edge of survey area, looking west

Figure 7-2 Southern edge of survey area, looking east

Figure 7-3 Survey area viewed form the northern edge, looking south

Figure 7-4 Centre of survey area, looking north

7.2 Survey results

No Aboriginal objects were found within the proposed community river place (the survey area).

The ground surface across the survey area is made up of alluvial deposits of clay silt, with some sands and small gravels (generally under five millimetres diameter). These deposits have been laid down during flood events, during which water from the river would cut across the landform from one side of Union Bend to the other.

It is notable that no Aboriginal objects were identified on the ground surface in the study area, in contrast with areas further north along the banks of the river or along Union Bend Road, where scatters of surface artefacts (stone artefacts and some fragments of shell) are fairly densely distributed (see Jacobs 2021; 2022).

It is likely that the relative elevation of the landscape is responsible for the lack of surface artefacts within the survey area, in contrast with areas further north. The land is locally less elevated at the southern end of Union Bend Road, as the ground surface slopes downward gradually toward the south. As a consequence, water flow during flood events would be more common within the survey area, as this region of Union Bend would take less of a rise in river levels to become inundated. The increased frequency of flood inundation would have the effect of eroding the ground surface and scouring away Aboriginal cultural deposits and objects. For this reason it is assessed that the survey area does not have a high potential to contain Aboriginal objects within subsurface deposits. None of the survey area is assessed as being PAD.

It is noted that the survey area lies within an Aboriginal Place (the Wilcannia Mission Camps and Cultural Places Aboriginal Place) and adjacent to an area of known Aboriginal cultural significance (the Union Bend Ngatji site). Although works in this area are unlikely to impact any Aboriginal archaeological material, their impact on these items of cultural significance needs to be considered (see **Section 8.2**).

8. Impact assessment

The proposed works within the survey area would consist of:

- Installation of interpretive signage, involving sinking posts into the ground
- Installation of scattered seating and tables underneath the tree canopy near the river's edge, involving minor impacts to shallow sediments at the ground surface
- Minor access track upgrades for safe vehicle access
- Possible clearing of areas for vehicle movement and parking, involving clearing undergrowth vegetation only. No trees will be removed, and no grubbing of roots will be involved. Most vehicle movement within the area, both during construction and during ongoing usage of the community river place, would be along existing vehicle tracks.

All elements will be designed and agreed in consultation with the local community.

8.1 Impact to archaeological sites

No Aboriginal objects have been identified within the survey area, and none of the survey area is assessed as being PAD (see **Section 7.2**). The works proposed in the survey area would not have any impact on any known Aboriginal objects, and is not assessed as being likely to impact any subsurface archaeological material.

8.2 Impact to sites of concern identified in the SEARs

The impacts would occur within the Aboriginal Mission Camps and Cultural Places Aboriginal Place, and adjacent to the Union Bend Ngatji Site. These sites, and their cultural value to Aboriginal people, are discussed in **Section 5**.

8.2.1 Aboriginal Mission Camps and Cultural Places Aboriginal Place

Given the minor nature of the impacts that would occur within the survey area, the works would represent negligible impact to the cultural values associated with the Aboriginal Mission Camps and Cultural Places Aboriginal Place. No tangible material (e.g. hut remains or historical artefacts) associated with the Aboriginal Place would be impacted by the works, as there are none within the survey area. The minor alterations to the area (signage, seating, landscaping, and clearing of areas for vehicles) would not be expected to have an impact on the cultural values associated with the Aboriginal Place.

WINSW has consulted with the RAPs on the location of the community river place. The RAPs have indicated that they are strongly supportive of the proposed location of the river place at the end of Union Bend Road, and have raised no objections to it. Feedback from this consultation does not indicate that the RAPs consider the river place to represent a negative impact to the intangible cultural heritage associated with the Aboriginal Place. WINSW has also consulted with Sarah Martin (Heritage NSW) about this location, which has established that Heritage NSW has no objections as long as the Aboriginal community are consulted, supportive and there are no impacts to Aboriginal archaeological sites.

8.2.2 Union Bend Ngatji site

The establishment of the community river place, and its ongoing usage, are not expected to have any impact on the Union Bend Ngatji site, or on the cultural values associated with this site. The Union Bend Ngatji site is linked to the watercourse itself, and to the morphology of the river and its immediate banks. The community river place would not cause any alteration to the morphology of the river, and would consequently not alter the Union Bend Ngatji site, or have an effect on the cultural values linked to the site.

During the archaeological survey, it was communicated to Jacobs by RAP representatives that they did not anticipate the proposal would have any negative impact to Union Bend's association with the Ngatji, or to the intangible cultural heritage values attached to Union Bend through its connection with the Ngatji and stories relating to the Ngatji.

9. Mitigation and management measures

The proposed community river place requires no additional management or mitigation measures, beyond those set out in the ACHAR.

All management and mitigation measures set out in the ACHAR now apply to the proposed location of the community river place (i.e. the study area of this report) as they do to the wider Wilcannia Weir Replacement proposal area.

Refer to Section 10 of the ACHAR for the list of management and mitigation measures.

10. References

Central Darling Shire Council and Wilcannia Local Aboriginal Land Council 2018 *Wilcannia Aboriginal Community Heritage Study*.

DECCW 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*. Sydney: Department of Environment, Climate Change and Water.

DPC 2020 *Wilcannia Mission Camps and Cultural Places Aboriginal Place Assessment Report*, Department of Premier and Cabinet, NSW Government, Sydney.

Jacobs 2021 *Union Bend Road upgrade: Aboriginal heritage due diligence investigation report*. Report to WINSW.

Jacobs 2022 *Wilcannia Weir Replacement - Aboriginal Cultural Heritage Assessment*, Report to WaterNSW.

New South Wales Government 2020 *Declaration of an Aboriginal Place Pursuant to Section 84: Wilcannia Mission Camps and Cultural Places Aboriginal Place*: New South Wales Government Gazette. 279.

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