



Appendix C

Aboriginal heritage impact assessment



Aboriginal Heritage Assessment

Narran-Warrambool Reserve Area 1

Prepared for DRNSW
April 2022

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Aboriginal Heritage Assessment

Narran-Warrambool Reserve Area 1

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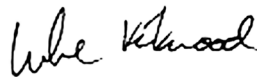


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1 April 2022

Approved by



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1 April 2022

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Executive Summary

The Department of Regional NSW (DRNSW) has engaged EMM Consulting Pty Ltd (EMM) to undertake a high-level review of potential Aboriginal heritage issues and statutory requirements as part of the Review of Environmental Factors (REF) as an internal assessment tool for activities associated with opal prospecting and opal mining in Area 1 (the project area) of the *Narran-Warrambool Reserve* (NWR). This report has been prepared to support the REF and documents the Aboriginal heritage management recommendations in reference to future opal prospecting and mining activities.

The project area (Area 1) refers to the southern portion of the Narran–Warrambool Reserve (NWR). The project area comprises of approximately 1,972 km² and is broadly bounded by the Barwon River and Narran River to the south-east and north-west respectively. Overall, previous investigations demonstrate an extensive number of previously documented Aboriginal objects, sites and/or places across the NWR. Despite only a handful of previous investigations having been undertaken, some 555 Aboriginal objects, sites and places, equivalent to ~1/10 km² are within, or in close proximity to, the NWR. While dominated by stone artefact sites of various densities and culturally modified trees, it also includes a rich landscape of rarer and often more significant sites and places compared with the broader NSW archaeological record. These include numerous Dreaming and/or ceremonial locations, often around springs and reliable water sources, burials, and fish traps - the latter in nearby areas at Brewarrina recently identified as nationally significant.

The survivability of cultural materials will, however, be adversely affected by historical and recent activities. This includes extensive opal prospecting and mining that has occurred within the project area, as well as associated infrastructure. The urbanisation of Lightning Ridge township will also have resulted in extensive impacts in this locale. To date, the exact level of these impacts to the cultural resource of NWR remains poorly understood.

The assessment of Aboriginal heritage needs to be managed in accordance with a number of Heritage NSW guidelines, including the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. These guidelines provide a framework for the detailed investigation of cultural materials and liaison with the Aboriginal community, as well as providing the necessary documentation to apply for Aboriginal Heritage Impact Permits (AHIPs) from Heritage NSW.

Based on the cultural findings, to protect existing and potential Aboriginal heritage throughout Area 1 generous buffers were given to all previously identified cultural sites, places and deposits, and areas where they are predicted to occur. The methodology for protecting cultural heritage was formulated into a traffic light system, with different colours indicating potential risk and suggested investigative and assessment measures needed. This tool acts as the risk assessment for any opal prospecting or mining activities within Area 1.

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1 Introduction

1.1 Background to the project

The Department of Regional NSW (DRNSW) is a determining authority under Section 5.5 of the EP&A Act, due to the role of DRNSW as the issuer of licences and leases for opal prospecting and mining. This Aboriginal heritage assessment forms a section of the Review of Environmental Factors (REF) that assesses the likely environmental impacts of commonly used 'standard methods' for opal prospecting and opal mining and considers those methods if applied in Area 1 (the project area) of the Narran-Warrambool Reserve (NWR). The entirety of the NWR is depicted in Figure 1.1. For detailed information regarding opal mining and prospecting methods, reference to the REF should be made.

DRNSW commissioned EMM Consulting Pty Limited (EMM) to prepare this report to support the REF. It documents the existing Aboriginal heritage within the project area (Figure 1.2) as well as providing recommendations for the mitigation of impacts to existing sites and areas of cultural value.

1.1.1 Opal prospecting in the project area

Opals in the Narran-Warrambool Reserve are found in two forms: rounded nodules, termed 'nobbies'; or in seams. The opal bearing material is a soft greyish claystone often referred to as 'opal dirt'. Opal is generally extracted by underground mining and a typical mining operation involves sinking a vertical shaft and driving horizontal shafts, or 'levels', to obtain opal dirt. Some open cut mining is also undertaken in the area. In areas where opals are found in seams, gemstones are usually recovered at the working face of the mine.

Mining generally occurs along defined low ridgelines (known as 'ridge country') where the opal bearing material is closer to the surface.

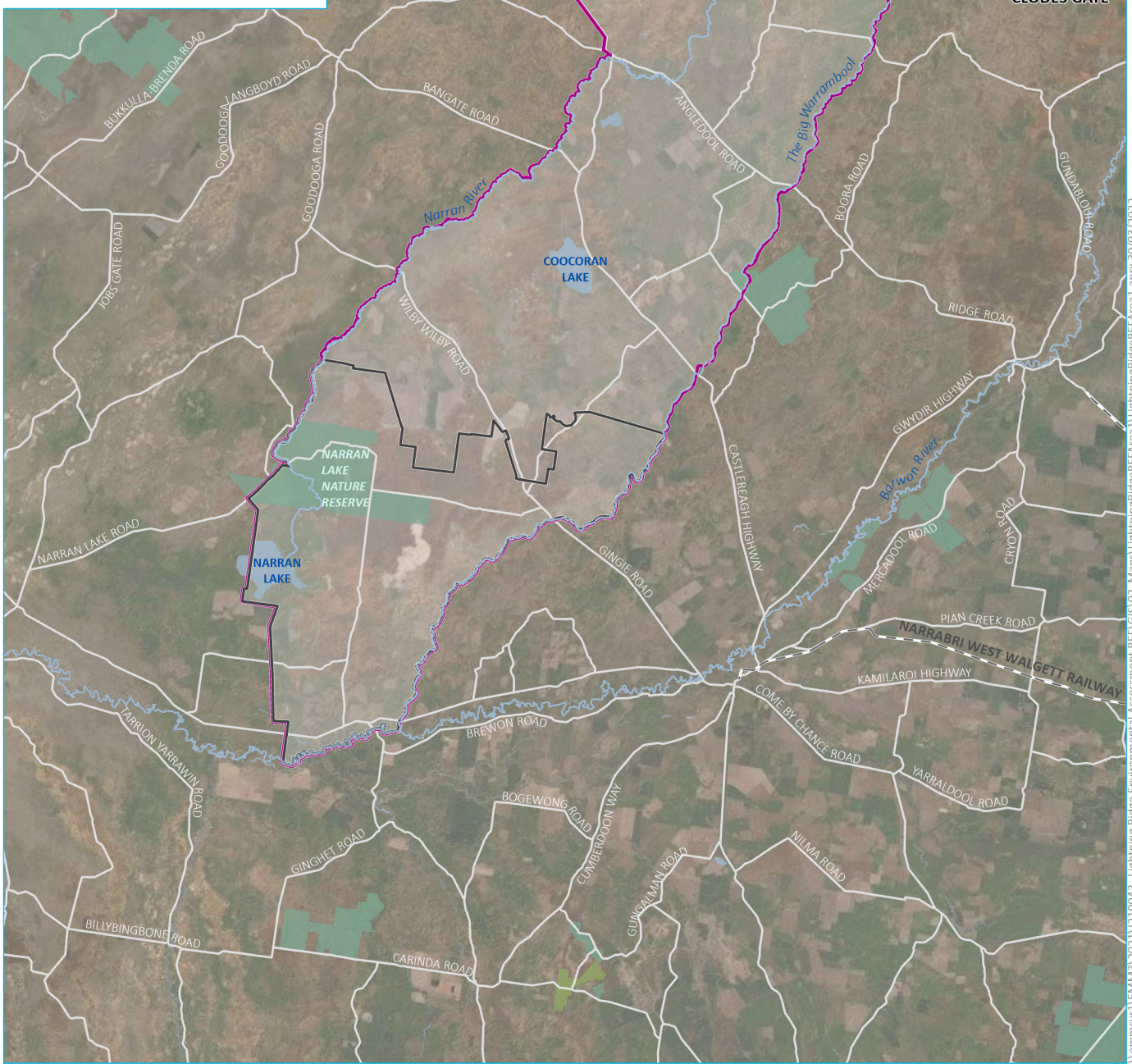
1.1.2 Description of the activity

Mineral exploration for opals is generally referred to as *opal prospecting*. It is conducted under an Opal Prospecting Licence or Mineral Claim. Opal Prospecting Licences are granted over much larger areas than those granted under a Mineral Claim but are purely for prospecting and do not authorise mining.

Opal mining within the NWR currently takes place within Opal Prospecting Areas (OPAs). There are four OPAs currently designated within the NWR. Notably, certain land is not to be included in an opal prospecting area (refer to Section 233 of the Mining Act) such as land which forms part of a reserve or if the land has been determined to be *agricultural land* – which is a defined term under Schedule 2 of the Mining Act.

1.2 Project location

This assessment considers the potential impact of opal prospecting and mining within the southern portion of the NWR known as Area 1 and referred to within this report as the project area (Figure 1.2). The project area comprises of approximately 1,972 km² and is broadly bounded by the Barwon River and Narran River to the south-east and north-west respectively. The project area lies between Walgett to the east and Brewarrina to the west.



Source: EMM (2022); DRNSW (2021); DNRME (2021); DES (2019); DFSI (2017); GA (2011); ASGC (2006)



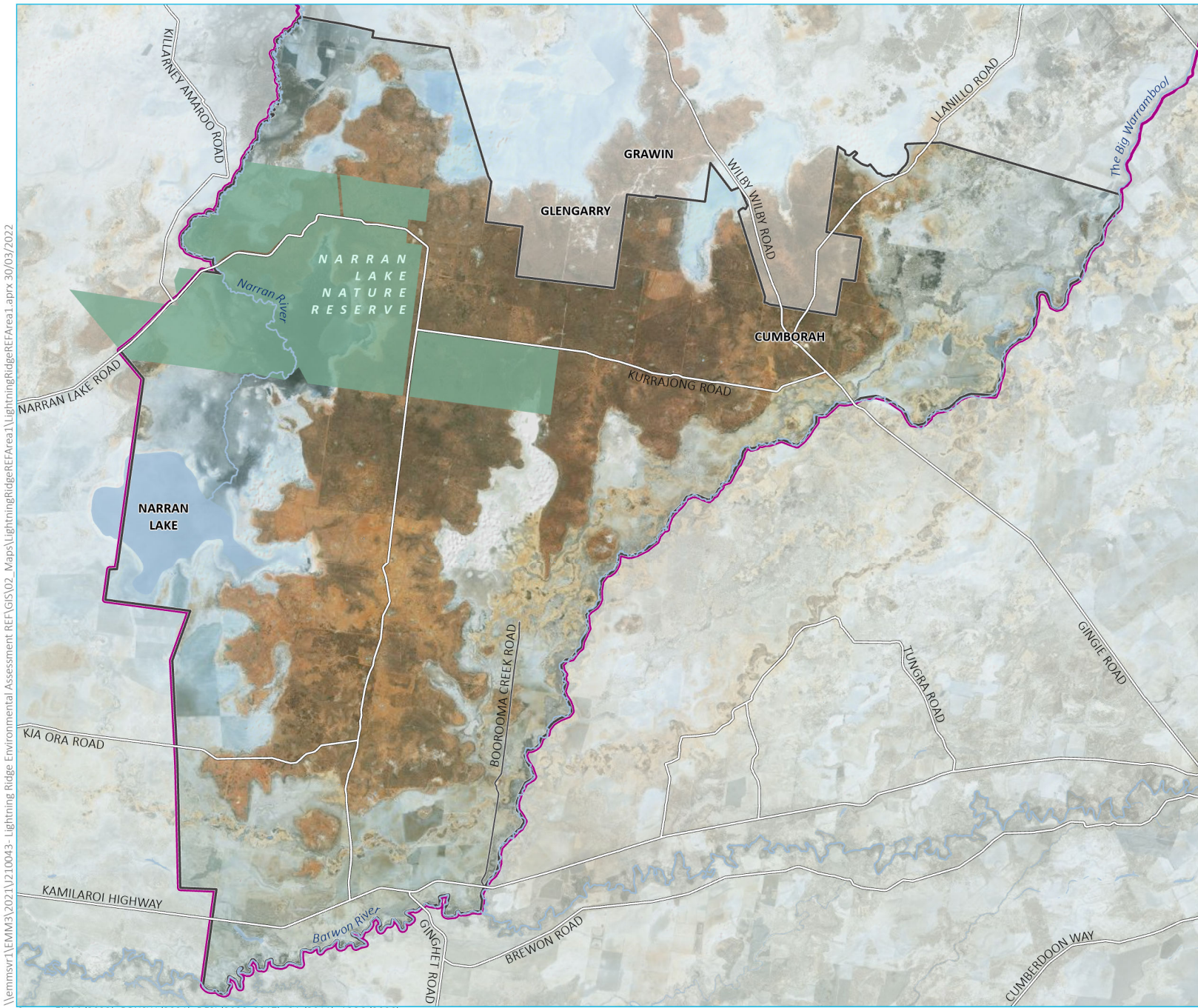
- KEY**
- Area 1
 - Narran- Warrambool Reserve
 - QLD/NSW state boundary
 - Existing environment
 - Rail line
 - Major road
 - Named watercourse
 - Named waterbody
 - NPWS reserve
 - State forest

Regional setting

Narran-Warrambool Reserve Area 1
Aboriginal Heritage Assessment
Figure 1.1



emmsv1\EMM3\2021\210043- Lightning Ridge Environmental Assessment REF\GIS\02_Maps\LightningRidge\FArea1\LightningRidge\FArea1.aprx, 30/03/2022



- KEY**
- Area 1
 - ▭ Narran-Warrambool Reserve
 - Existing environment
 - Major road
 - Minor road
 - Named watercourse
 - ▭ Named waterbody
 - ▭ NPWS reserve

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Source: EMM (2022); DRNSW (2021); DFSI (2020, 2017); GA (2011); ASGC (2006)



Local setting

Narran-Warrambool Reserve Area 1
Aboriginal Heritage Assessment
Figure 1.2



1.2.1 Project definitions

In outlining the project, key areas have been described to facilitate the assessment of direct and indirect impacts during construction and operation. The project areas to be considered include:

- Project area: The project area is Area 1 of the NWR. This report considers the potential impacts which may occur from opal prospecting or mining within Area 1 and proposes mitigation and management measures to preserve heritage values.
- Study area: The study area is not a specifically defined area, when referring to the study area this generally means regionally.

1.3 Purpose of this report

This heritage assessment supports the REF for the activities associated with opal prospecting and opal mining within Area 1. It documents the existing Aboriginal sites within the project area and allows DRNSW to understand the possible heritage constraints prior to opening up Area 1 to opal prospecting and mining activities, in a bid to avoid impacts to Aboriginal heritage values.

The specific objectives of this assessment are to:

- provide a high-level overview of the existing environment and archaeological landscape within the project area;
- identify Aboriginal heritage constraints in the project area, and indicative impacts arising from the project;
- identify where data gaps relating to Aboriginal heritage and recommend appropriate actions to address the identified data gaps; and
- develop recommendations to guide the planning process and investigation that would be required to support further environmental assessment and associated approvals or permits.

This report has been prepared in accordance with the legislation set out in Section 2.

1.4 Limitations

The Aboriginal heritage impact assessment was limited to a desktop review of available dataset and previous reports. No field work was conducted, which limits the capacity to accurately assess whether Aboriginal heritage exists outside of previously investigated areas. Therefore, caution should be taken outside of identified areas of cultural sensitivity; and the unexpected finds procedure (Section 6.2.1) should be utilised.

No Aboriginal consultation was undertaken for the project, which limits the identification of intangible and/or cultural sites and places that may be within the activity area. Such sites are known to exist within the broader region. Likewise, it should be noted that in previous consultation with the Dharriwaa Elders Group (DEG) on opal mining in the Narran-Warrambool Reserve, the group has identified the importance of comprehensive and transparent consultation and engagement with the Indigenous communities of the region. mining leases (Dharriwaa Elders Group 2005) (Bangalay Botanical Surveys 2008). The DEG proposed a process of engagement to ensure that key cultural features are correctly identified and managed.

2 Statutory framework

Aboriginal heritage is managed under several Commonwealth and State legislation. A summary of the key legislation is provided in this section.

2.1 Commonwealth

2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* preserves and protects areas (especially sacred or intangible sites) and places of particular significance to Aboriginal people from damage or destruction. Steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10 of the Act). Section 9 provides temporary protection while the site is investigated, while Section 10 provide permanent protection. Once provided these protections, no further activities can be undertaken on the site.

In addition, the Act also protects objects by Declaration, notably Aboriginal skeletal remains (Section 12 of the Act). This can be applied at a State level where a State is unwilling or unable to provide such protection.

2.1.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* provides for protection of natural and cultural heritage places. The Act establishes a National Heritage List (NHL) and a Commonwealth Heritage List (CHL) upon which places of natural or cultural significance can be listed. Sites at a national level and can be in public or private ownership. The CHL is limited to places owned by the Commonwealth, and most frequently encompass Department of Defence sites. Sites and places listed on the NHL are considered to be of State and local heritage value, even if they are not listed or documented as such at a State level.

The values of sites and places on the NHL/CHL are protected under this Act. The Act requires that the Minister administering the Act assess any action which has, will have, or is likely to have, a significant impact on the heritage values. Where relevant, a referral is made to the relevant Commonwealth Department, and either approval, approval with controls, or rejection of the proposed action is determined.

In the case of the NWR, there are no identified places on the NHL or CHL lists. However, the Brewarrina Aboriginal Fish Traps (Baiame's Ngunnhu)—a series of rock walls within the Darling River – situated west of the project area are listed. Similar structures may be present within the project area, and would potentially have similar values of significance.

2.1.3 Native Title Act 1993

The *Native Title Act 1993* provides recognition and protection for native title. The Act establishes the managing body, National Native Title Tribunal, who administers native title claims to rights and interests over lands and waters by Aboriginal people. It also administers the future act processes that allow proponents to identify and manage potential native title issues for a given activity on a site where a claim has yet to be made or finalised. Typically, the provisions of this Act can only be applied to Crown land.

In addition, the Act provides for Indigenous Land Use Agreements (ILUA), which is an agreement between a native title group and others about the use and management of land and waters. ILUAs were introduced as a result of amendments to the Act in 1998. They allow people to negotiate flexible and bipartisan agreements to suit their particular circumstances often circumventing lengthy timeframes associated with the native title process. An ILUA can be negotiated over areas where native title has, or has not yet, been determined. They can be part of a broader determination or settled separately.

Several parts of the NWR are identified as Crown land and are therefore potentially subject to the provisions of this Act (refer to Figure 4.11 in the REF). Currently, there are no finalised claims within the NWR, but two active claims are abutting the NWR – the Gomeroi People to the east, and the Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan people to the south. Where activities are occurring in areas subject to this Act, there is potential for native title claimants (if determined) to seek compensation for any impact that the works have had upon their rights outlined in the claim (access to land, hunting, fishing, etc). Under Section 24FA of the Act, an applicant undertaking work can seek a ‘future act’ protection that will effectively extinguish native title of the identified area. This process requires the notification of the application, and liaison with any identified Aboriginal parties, and can result in an ILUA in some situations. This process requires several months to complete.

2.2 State

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the over-arching Act that dictates the nature of assessment and management of the environment during a development project, and within which heritage forms a component. It requires that environmental and heritage impacts are considered by consent authorities prior to granting development approvals.

The Act has two main approval pathways within which heritage needs to be considered. Generally for smaller scale (either financially or spatially), Parts 4 (Division 4.1) and 5 (Division 5.1) of the Act are implemented. Part 4 requires that a proponent submits a Development Application (DA) to local council for a given development, and within this document a consideration of Aboriginal and historical heritage is required. The specific nature of the assessment is usually determined at a pre-DA meeting with the council, and in relation to the relevant heritage Acts. Where Aboriginal heritage is identified as an issue, the DA may become Integrated Development, whereby the State government, Heritage NSW, is also required to review and provide comments on the DA prior to its issue. Part 5 of the Act is a similar process, but only relates to approvals developed and issued by State government departments. Each State government department has their own internal approach to considering environmental issues, but ultimately must develop a Review of Environmental Factors (REF), which is comparable to a DA, and which requires consideration and management of heritage. Similarly, where heritage is identified as an issue, liaison with relevant State consent authorities and approvals under other Acts may still be required.

The other approval pathway relates to State Significant Development and/or Infrastructure (Parts 4.7 and 5.2, respectively). These processes require an Environmental Impact Statement (EIS) to be developed for a project and assessed currently by the Heritage NSW. Importantly, the SSD and SSI processes turns off a number of pieces of other legislation, including parts of the *National Parks and Wildlife Act 1974*. In the case of Aboriginal heritage, both the assessment and approval for harm are dictated by the Secretary’s Environmental Assessment Requirements (SEARs) outlining the contents and scope of the EIS, and the Project Approval that dictates controls on how a development should proceed.

2.2.2 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) provides protection for Aboriginal objects and places across NSW:

- An Aboriginal object is defined as: *Any deposit, object or material evidence (not being a handcraft 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: *any place declared to be an Aboriginal place under section 84.* This is a very specific piece of legislation that provides process and management of Aboriginal sites of cultural, but not necessarily scientific, values. They are commonly, but not always associated with intangible values.
- Any place declared to be an Aboriginal place by the Minister for the Environment, under Section 84 of the Act.

Heritage NSW provides a series of guidelines as a framework for identifying and managing Aboriginal heritage and the cultural heritage interests of Aboriginal parties within development planning contexts. These consist of two main documents:

1. a due diligence that is a first step in identifying whether or not a proposed activity has a risk of harming Aboriginal objects; and
2. an Aboriginal cultural heritage assessment (ACHA) that forms a more detailed investigation of the Aboriginal objects within an area, and provides the necessary documentation for Heritage NSW when considering approvals if required.

Aboriginal objects, whether recorded or as yet undiscovered, are afforded statutory protection under the *National Parks and Wildlife Act 1974*. Under Section 86 of the Act it is an offence to disturb, destroy or deface Aboriginal objects without the approval of the Director General of the Department of Premier and Cabinet, Heritage NSW (formerly the Office of Environment and Heritage [OEH]). This approval is usually in the form of an Aboriginal Heritage Impact Permit (AHIP), which are outlined in Section 90 of the Act. A breach of Section 86 of the *National Parks and Wildlife Act 1974* could result in prosecution and fines in excess of \$1 million.

To obtain an AHIP, certain assessment and documentation must be provided to Heritage NSW for their consideration. Once satisfied, they may endorse an AHIP to harm cultural heritage either conditionally or unconditionally. They can also refuse an application as outlined in Section 90C of the Act, and which can be appealed in accordance with Section 90L.

2.2.3 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* provides process and protocols for the transfer of vacant Crown land ownership to a Local Aboriginal Land Council, where the land is not for an essential purpose or for residential land. These lands are then managed and maintained by the Local Aboriginal Land Council.

For the purposes of this report, the Act is primarily important to inform relevant Aboriginal communities for consultation; and where Crown land forms part of the development area, this may require additional liaison with the LALC as a potential, or existing, landowner.

3 Existing environment

The following section provides a summary of the environmental and archaeological context of the general region and NWR, and how they influence the cultural materials that may be expected within the project area.

3.1 Environmental context

Understanding environmental context assists with predictions of archaeological potential, such as the likelihood of archaeological material being present in the landscape, its spatial distribution and its preservation. Landscape features were an important factor for the choice of camping, transitory and ceremonial areas used by Aboriginal people. Similarly, these landscape features and historical land-use play a role in the level of preservation and the integrity of archaeological sites.

3.1.1 Soils, landforms and geology

The *Land Systems of Western New South Wales* report by the Soil Conservation Service of NSW (Walker 1991) describes the land systems in western NSW. A land system is an area characterised by recurring topographical, soil and vegetation systems. The study area lies across 16 land systems (Eurie, Gingie, Goodooga, Jomara, Lightning Ridge, Llanillo, Long Meadow, Mid-Darling, Narran, Nidgerly, Rostella, Rotten Plain, Rugby, Tatala, Upper Darling), with two covering the majority of the area. These are the Llanillo and Lightning Ridge Land Systems.

The Llanillo Land System is characterised by gently undulating to flat alluvial plains with cracking and non-cracking deep grey Quaternary clay. This land system is present around drainage lines such as the Barwon River and The Big Warrambool. Llanillo plains exhibit minimal relief (<1 m) with large areas being subject to flooding, and small, localised areas of slightly elevated plains may also occur. Twelve other land systems within the study area are likewise characterised by alluvial plains. The majority of these exhibit similar topographic and flooding patterns to the Llanillo Land System, with the Rugby Land System (constrained to the eastern and northern edges of the study area) exhibiting some sandy rises and low dunes, with slopes of 1%–3% and relief up to 1 m. The Tatala Land System is present in small pockets of the study area and is likewise characterised by undulating sandy rises on alluvial plains. Tatala Land Systems feature slopes of 2%–3% and relief up to 8 m.

The Lightning Ridge Land System covers the remainder of the study area. This land system is characterised by long (up to 1 km) gravelly ridges, plateaux and slopes, with relief between 3–20 m and slope up to 4%. Moderately deep sandy deposits and/or red earths with loamy sand topsoils occur on slopes and plateaux, with soil depth decreasing on ridges. Localised drainage depressions may be present, and some level dendritic drainage lines also occur; the latter are subject to minor sheet wash.

Given the deep geological age of many of these land systems, commonly cultural materials are constrained to the surfaces, and less frequently in the upper portion (A1 horizon). Previous archaeological work in the area has not incorporated test excavations; and as a result, the potential depth of archaeological deposits is, however, unknown at this stage. Given their frequent shallow and/or surface distribution, cultural materials are highly susceptible to impacts from historical and surface activities, and areas of minor elevation and/or accumulation (such as alluvial terraces, sand dunes) are more conducive to preservation.

3.1.2 Hydrology

The study area is situated in the Barwon catchment of Murray-Darling Basin. Several major rivers flow through and around the study area, including the Narran River, Barwon River and the Big Warrambool. The Narran, Coocoran and Angledool Lakes, as well as a series of minor creeks, wetlands, swamps and waterholes, are scattered throughout the study area. In the past, these bodies of water would have provided Aboriginal people with a range of natural resources, and regionally such water sources have formed a focus of past visitation and occupation.

However, these major river systems also result in significant inundation of the region periodically. This can result in both the burial, but also the erosion and loss of cultural materials that may be present along their margins. Areas that are above such inundation will therefore have a higher likelihood of retaining cultural materials where present.

3.1.3 Previous disturbance

Within the project area the primary land disturbing activities include agriculture, and minor areas of historical opal prospecting and mining. Opal prospecting involves drilling auger holes to check the depth of opal-bearing deposits. Opals are most commonly mined via underground mining, which involves shafts sunk through sandstone and other layers. Horizontal levels are then dug by hand or machine, with excavated material mechanically hoisted to the surface. This material is then transported off-site for processing (Brinckerhoff and Street 2004). While much of the mining is underground, activities around the mineshaft and the processing of material on the surface, results in extensive impacts to the upper soil profile.

Additional disturbances in the project area are limited to vegetation clearance and agricultural activity. Agricultural activity within the fertile, dark grey alluvial soils along drainage channels is likely to be intensive and would have significantly impacted the soil profile, thereby limiting archaeological potential.

Other activities including an existing road network and the urbanisation around the township of Cumborah within Area 1 are all likely to have adversely effected cultural materials in these areas, if previously present.

4 Archaeological context

The following section provides a review of previous studies undertaken in, or near, the study area, and the Aboriginal objects, sites and places documented within Area 1. The assessment adopted several processes and requirements outlined in Heritage NSW guidelines, including the *Due Diligence Code of Practise for the Protection of Aboriginal Objects in NSW* and *Code of Practise for the Archaeological Investigation of Aboriginal Objects in NSW* to determine cultural materials that may be present across the project area. The investigations did not undertake Aboriginal consultation in development of this section. A consideration of Aboriginal heritage within the proposed activity was undertaken and is summarised below.

4.1 Previous archaeological studies

Previous studies within the study area have been relatively limited, with many undertaken over 30 years ago. These have included regional studies, as well as smaller investigations directly associated with mining and/or development activities. A summary of the reports is presented in Table 4.1.

Table 4.1 Summary of previous studies undertaken within and around the study area

| Author | Report | Year | Description and findings |
|--|---|---------------|--|
| Howard Creamer (National Parks and Wildlife Service [NPWS]) | <i>A Report on Gaurageel Springs and the Mythology of the Narran River</i> , North Central NSW | 1982 | Investigation of an Aboriginal mythological site (09-2-0010) north of Angledool. The site is an archaeological complex comprised of stone artefact scatters, a scarred tree, and a series of waterholes along the Narran River. A Dreaming story relates how the Narran River was formed after Biaime fought two Rainbow Serpents who had swallowed his wives. Creamer notes that the site and story are a local manifestation of a regional cultural landscape. |
| Jane Balme | <i>North Central Rivers Archaeological Project</i> (Preliminary report and Vol. 1) | 1984, 1986 | Regional study of the North Central Rivers. Involving desktop research and archaeological survey. Balme noted that archaeological site types in the region are diverse, with culturally modified trees and open campsites (surface stone artefact scatters) dominating the recorded assemblage. She also observed certain patterns in the spatial distribution of site types; to some extent, the occurrence of a given site type depends on geology and topography (eg fish traps occur in water, burials are more common in sandy deposits). Of importance to the current study was Balme's finding that flooding and elevation were major determinants of archaeological survivability. |

| Author | Report | Year | Description and findings |
|---|--|------|--|
| Sarah Martin | <i>Archaeological Survey of Proposed Seismic Lines, Goodooga–Lightning Ridge, NSW</i> | 1985 | Archaeological survey of six proposed seismic lines in Lightning Ridge and Goodooga. Most of the area surveyed was covered in dark grey alluvial clay (likely corresponding to the Llanillo Land System) which had been ploughed for farming. Martin implemented a predictive model which expected sites to be found across all landforms with clustering around permanent and semi-permanent water sources. Large site complexes were expected in places where multiple landforms and resource zones could be exploited from a single camp. A section of one seismic line between Angledool Lake and the Narran River crossed several landforms and ecological zones. Six sites were located between the eastern side of the lake and the western side of the river, including several fish traps, three artefact scatters and a quarry. These are within the current study area. Martin also re-identified several traditional burials which were located in a red sandy deposit. Overall, site locations conformed to expectations formed by Martin’s predictive model. |
| Jo McDonald | <i>Goodooga-Goondoobluie Archaeological Reconnaissance of Proposed Seismic Work in Northern NSW</i> | 1986 | Further survey work on seismic lines between Goodooga and Goondoobluie. Sixteen sites, mostly, artefact scatters and isolated finds, were recorded. The predominant raw material was silcrete, with some quartz and quartzite represented. Artefact scatters were frequently found in eroded areas with good visibility and in proximity to watercourses (although this reflects the focus of the survey). Three sites were located several kilometres from the Big Warrambool on red sandy soil/clay pans. McDonald interpreted these sites as indicating either transient occupation during floods, or that areas away from major watercourses were used more than previously thought. |
| NPWS | <i>Brewon Road Aboriginal Burial, Walgett</i> | 1989 | NPWS investigated a skeleton exposed during bridge repairs at Brewon Road, Walgett (18-2-0005). The skeleton was buried in black clay, an unusual feature given that other recorded burials are generally in sandy deposits. The bones were not in correct anatomical position, leading the NPWS officer to conclude the remains were a secondary burial (relocation of bones following defleshing). The bones likely belonged to a middle aged/elderly man who had had three upper incisors removed well before death. This suggests groups in the area practiced tooth avulsion. Several well-healed ante mortem bone fractures were also observed, suggesting interpersonal violence and a degree of medical knowledge. |
| Central West Archaeological and Heritage Services (CWAHS) | <i>An Aboriginal Archaeological Survey & Heritage Assessment Report: The Proposed Llanillo Bore Trust Water Supply Pipeline, Lightning Ridge, NSW.</i> | 1997 | CWAHS conducted an Aboriginal heritage assessment and survey of the proposed Llanillo Bore Trust Water Piping System. Ten sites were identified and all were located on a floodplain or adjacent to a watercourse. They were found in a range of soil profiles, including both sand and clay dominated contexts. |
| Australian Museum Business Services (AMBS) | <i>Walgett Shire LGA Aboriginal Heritage Study</i> | 2011 | AMBS’s LGA-wide study was prepared to inform the Walgett LEP and DCP. The report notes culturally modified trees and open campsites (stone artefact scatter) being the dominant site types in the region. Importantly, it was noted the distribution of these sites reflects not normative patterns but rather the location of CHM investigations as well as places of erosion and good visibility. Similar to other studies, it was found that campsites are usually located on elevated flat areas near water sources, with sites featuring evidence of repeat inhabitation being located near the largest and most reliable water sources. |

| Author | Report | Year | Description and findings |
|----------------|---|------|--|
| EMM Consulting | <i>Bourke Small Stock Abattoir ACHA</i> | 2016 | Although this report was focused on a more arid and heavily-farmed area than the current study area, it appears similar archaeological patterns were observed. Twenty-five sites (all artefact scatters) were recorded, with silcrete being the dominant raw material type. The majority of sites were again located in areas subject to agricultural, water and wind erosion. The report concluded that the cultural assemblage documented part of a single broader cultural landscape. |

4.2 Previously recorded sites

The Aboriginal Heritage Information Management System (AHIMS) database is managed by Heritage NSW and includes a location and description of Aboriginal objects and sites recorded through academic research and cultural heritage management. A review of the broader review of the entire Narran-Warrambool Reserve has previously been undertaken (EMM 2021). This demonstrated that various parts of the region have been previously investigated over the past 30 or so years. Some 555 Aboriginal sites and places have been previously recorded. These sites are dominated by stone artefacts (n=227; ~41%) and culturally modified trees (n =231; ~41.5%). The database also includes a number of site types that are increasingly rare in NSW, including ceremonial and Dreaming sites (n=8), fish traps (n=3), burials (n=15), rock engravings (n=1), and bora sites (n=2). Many of the ceremonial sites appear related to key water sources such as springs, including the Gaurageel Springs, Cumborah Springs, Coorigul Springs, and Mooredale Wells; and clearly indicate the importance of these environmental features to past Aboriginal visitation and use. A number of post-Contact sites, notably burials and cemetery grounds were also documented.

This broader picture is reflected within Area 1 (Figure 4.1). Of the 239 previously documented sites within Area 1 and its curtilage (summarised in Table 4.2), 174 (73%) are various densities of stone artefacts and 33 (14%) are culturally modified trees. Lesser occurrences of ceremonial and Dreaming sites (n=5), burials (n=1), earth mounds (n=5), grinding grooves (n=1), hearths (n=3), middens (n=8), quarries (n=1) and rock art (n=1) are also documented. Spatially, these are extensively found along the Narran River and associated tributaries, which aligns with broader arid zone studies on the late Holocene (<5,000 years) behaviours of populations moving between such environmental features – a home base strategy (eg Smith 2013). The data especially highlights the importance of Narran Lake and Narran River, with over 164 documented sites found around their edges, including burials, hearths and stone artefacts. However, many of the sites are more closely linked with cultural heritage management (CHM) studies undertaken across the study area, and as such reflect detailed investigations of smaller areas that may not reflect the broader archaeological record.

Table 4.2 Summary of AHIMS site types within Area 1

| Site type | Number of sites | | % of total | |
|---|-----------------|--------------------|----------------|--------------------|
| | Category total | Sub-category total | Category total | Sub-category total |
| Aboriginal Ceremony and Dreaming site | 5 | | 2.09 | |
| – Aboriginal Ceremony and Dreaming site | | 3 | | 1.25 |
| – Aboriginal Ceremony and Dreaming site and waterhole | | 2 | | 0.84 |
| Aboriginal resource and gathering site | 1 | | 0.41 | |
| – Resource and gathering site with midden | | 1 | | 0.41 |
| Art site | 1 | | 0.41 | |
| – Rockshelter with art | | 1 | | 0.41 |

| Site type | Number of sites | | % of total | |
|--|-----------------|--------------------|----------------|--------------------|
| | Category total | Sub-category total | Category total | Sub-category total |
| Artefact site | 174 | | 72.80 | |
| – Isolated artefact | | 61 | | 25.52 |
| – Low density artefact scatter (2-14) | | 58 | | 24.26 |
| – Medium density artefact scatter (15-50) | | 6 | | 2.51 |
| – High density artefact scatter (>50) | | 1 | | 0.42 |
| – Undefined artefactual site | | 48 | | 20.08 |
| Burial site | 1 | | 0.41 | |
| Culturally modified tree | 33 | | 13.80 | |
| – Carved or scarred (unspecified) | | 26 | | 10.87 |
| – Scarred trees | | 5 | | 2.09 |
| – Culturally modified trees with unspecified artefact(s) | | 1 | | 0.42 |
| – Culturally modified trees with potential burial | | 1 | | 0.42 |
| Earth Mound | 5 | | 2.09 | |
| – Earth mound with hearth | | 3 | | 1.25 |
| – Earth mound with shell/artefact(s) | | 2 | | 0.84 |
| Grinding groove site | 1 | | 0.41 | |
| Hearth | 3 | | 1.25 | |
| Midden | 7 | | 2.92 | |
| – Midden | | 4 | | 1.67 |
| – Midden with artefact(s) | | 1 | | 0.42 |
| – Midden with hearth | | 2 | | 0.84 |
| Natural resource site | 8 | | 3.34 | |
| – Quarry | | 2 | | 0.84 |
| – Quarry with unspecified number of artefact(s) | | 3 | | 1.25 |
| – Quarry with grinding grooves | | 1 | | 0.42 |
| – Quarry with culturally modified tree | | 2 | | 0.84 |
| TOTAL | 239 | - | 100 | - |

4.3 Dreaming pathways

Creation stories and songlines hold high significance for Aboriginal people and their culture. These myths are one of the foundational spiritual features of the world’s oldest continuing culture, which help connect indigenous people to the land and their community. Some stories are widespread and connect multiple language groups within Aboriginal culture. There are two major dreaming pathways present within the study area and should be highlighted for their intangible significance.

i Narran Lake Creation

Dharriwaa (the Narran Lakes) have been an important site to Aboriginal people for thousands of years. For local Aboriginal people, this dreamtime story physically links to the Brewarrina Fish traps (important heritage sites) to a waterhole at Byrock and Mt Gundabooka, which are all hundreds of kilometres apart (Somerville 2008). The events of the story (below), mark the events at each of these places on the landscape.

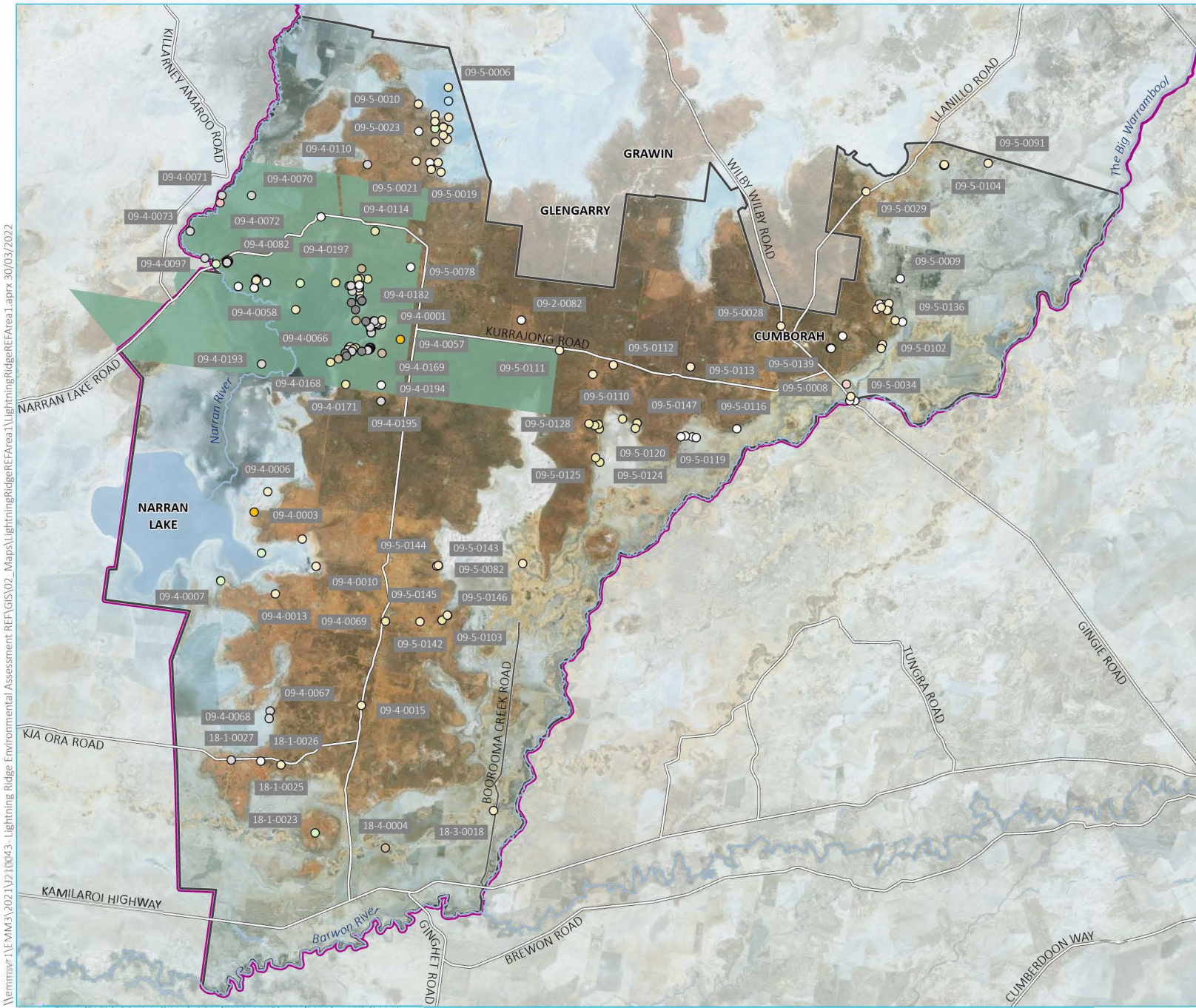
- The Lake's creation began with the Great Spirit Father (Baiaame or Byamee) who went hunting with his two wives Birrahgnooloo and Cunnunbeillee (Lovett 2022). He sent them off to collect frogs and yams and the women were very tired when they met him later at Coorigel Spring. Spotting the cool, fresh water, the wives decided to bathe.
- The wives were swallowed by two kurreahs (crocodile like creatures) which dived into an underground watercourse that led to the Narran River, leaving all other watercourses dried up in their wake. When the Great Spirit Father reached Coorigel Spring, he soon realised what happened and went in pursuit of the kurreah. He went through the underground channel that joined to the Narran, seeing nothing but dried waterholes on the way. When he reached the end of the Narran the hole was still wet and muddy.
- Seeing his enemies, the Great Spirit Father hurled spears, wounding both kurreahs who flailed in pain lashing their tails, creating great hollows in the ground where water began to quickly fill. To trap them further, the Great Spirit Father drove them from the water and killed them. Ever afterward during flood times, the Narran flowed into these hollows, forming the wetland today. His wives then came back to life and were warned to never bathe in the deep holes of the Narran again.

ii The Black Duck Storyline

Recent studies surrounding the saltwater Aboriginal people have retraced a significant songline that potentially travels across 300 km of Australia's south-east (Fuller, Moore, and Edwards 2021). There are a range of theories where the Black Duck songline travelled (eg from Hawkesbury River north, eventually turning south west to Narran Lakes and the Snow Mountains, connecting into a circle at its origin on the Gippsland Coast), however knowledge holders describe how their people would have traveled these songlines in order to conduct trade, attend ceremonies and to enable greater access to resources.

The story revolves around Umbarra (Yuin people)/Wumbarra (Dharawal people) the Black Duck, who is an animal hero or totem (rather than a Creator) (Fuller 2020). By diving into the water or making splashes, a man named Merriman was warned by the Black Duck every time there was danger coming. One day, Merriman's tribe was fishing when he saw the Black Duck give a warning. He told his people to take the women, children and elders in canoes to Merriman's Island. All the warriors waited by the lakeside until nightfall, when the invaders came. The other men were trying to reach the island to steal the women, but Merriman's men got another warning from the Black Duck. A battle ensued but Merriman was victorious.

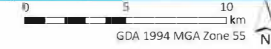
Local groups attribute this story to their long-term survival, stating that the Black Duck saved their people (Fuller 2020).



- KEY**
- Area 1
 - Narran- Warrambool Reserve
 - Existing environment
 - Major road
 - Minor road
 - Named watercourse
 - Named waterbody
 - NPWS reserve
- AHIMS**
- Aboriginal Ceremony and Dreaming site
 - Aboriginal resource and gathering site
 - Burial
 - Engraved rock art site
 - Grinding Groove
 - Hearth
 - Isolated artefact
 - Artefact scatter
 - Modified (Carved or Scarred) Tree
 - Shell
 - Shelter with art
 - Stone arrangement
 - Stone quarry
 - Undefined artefact site
 - Waterhole

\\emmsw1\EMM3\2021\U2\DW43 - Lightning Ridge Environmental Assessment REF\GIS\02 - Maps\LightningRidgeREFArea1.aprx 30/03/2022

Source: EMM (2022); DRNSW (2021); DFSI (2020, 2017); GA (2011); ASGC (2006)



Aboriginal sites and places identified within REF Area 1

Narran-Warrambool Reserve Area 1
Aboriginal Heritage Assessment
Figure 4.1



5 Assessment of archaeological sensitivity

5.1 Areas of cultural sensitivity

Understanding environmental context assists with predictions of archaeological potential, such as the likelihood of archaeological material being present in the landscape, its spatial distribution and its preservation. Landscape features were an important factor for the choice of camping, transitory and ceremonial areas used by Aboriginal people. Similarly, these landscape features and historical land-use play a role in the level of preservation and the integrity of archaeological sites.

Based on this high-level desktop review, the archaeological and cultural resource of Area 1 has a number of definable characteristics that can be used to predict sensitivity in other areas. The distribution of known sites and places suggest that the large river systems surrounding the area, can cause substantial flooding and inundation of the landscape. This can result in both the burial of sites and places, but also the erosion and loss of cultural materials that may be present along their margins. Locations that are above such inundation areas, such as elevated areas over-looking the major river systems, will therefore have a higher likelihood of retaining cultural materials where present. Cultural materials have the potential to be present in areas with the environmental characteristics of sediment deposition, including sand dunes, source-bordering dunes and alluvial terraces, etc. Often these deposits will contain stratified cultural materials and/or human remains and can therefore be of high significance.

It is important to highlight that no consultation was undertaken throughout this process and that previous criticisms have been provided by the traditional elders group throughout the region. In light of this limitation, it is vital to acknowledge that the entire area is a cultural landscape, and that locations with no physical evidence of past human occupation may still have significant meaning to first nations people. To mitigate this issue, great care was taken to buffer landscape features with the potential for both archaeological and intangible heritage with a stoplight system (outlined below).

5.2 Assessment methodology

The Aboriginal heritage assessment utilised existing environmental information and archaeological data to develop predictions about Aboriginal sites, places and/or deposits within Area 1. This included a review of the elevation, hydrology, vegetation and other environmental variables that may influence the types and survivability of cultural materials (eg rockshelters require steep escarpments to be present); and a review of previous cultural heritage management reports and studies and the Heritage NSW Aboriginal Heritage Information Management System (AHIMS) to identify known cultural material, their types and distribution.

Upon researching the local archaeology and site reports a predictive model was utilised to assess the potential for unidentified sites across Area 1. The existing sites and publicly available landscape/hydrology data were correlated and then mapped. The entirety of Area 1 was checked manually to capture any areas of likely cultural sensitivity based on satellite imagery. Areas of likely cultural sensitivity included waterholes, floodplains and traveling stock routes. These landscape features were assigned buffers to limit the potential risk of disturbing unsurveyed Aboriginal heritage sites.

Site cards and reports were consulted to accurately represent each site boundary and their significance. A traffic light system (outlined in Figure 5.1) was developed to transparently communicate the different limitations of cultural sensitivity areas with the intent of avoiding potential impacts to Aboriginal heritage sites and places. This detailed risk appreciation process allows for land outside of those areas of identified cultural sensitivity to be targeted for opal prospecting and opal mining, with diminished possibility of uncovering Aboriginal heritage.

The distribution of these sites and places aligns well with environmental characteristics and suggest that the large river systems surrounding the region, such as the Barwon River, result in substantial flooding and inundation of the landscape. As such, past use of the region appears to have focussed on smaller creeks and/or water-holes, as well as elevated areas over-looking these major river systems. Given the deep geological age of many of these land systems, commonly cultural materials are constrained to the surfaces, and less frequently in the upper portion (A1 horizon). As such, there are a number of definable characteristics that can be used to predict sensitivity in other areas. Locations that are above such inundation areas, such as elevated areas over-looking the major river systems, will have a higher likelihood of retaining cultural materials where present. Cultural materials have the potential to be present in areas with the environmental characteristics of sediment deposition, including sand dunes, source-bordering dunes and alluvial terraces, etc. Often these deposits will contain stratified cultural materials and/or human remains and can therefore be of high significance.

To develop a suitable cultural sensitivity ranking across Area 1, each of the previously identified sites and culturally sensitive landforms were broadly categorised and assigned a unique sensitivity value (Figure 5.1). These rankings have been based on a general knowledge of the research potential, representativeness, rarity and cultural values of certain site types compared with another. For example, rockshelters will typically have a higher level of research potential (containing art works, deep stratified cultural deposits, etc) compared with a surface stone artefact. Some sites (Table 5.1) were assigned a higher cultural sensitivity due to their importance and rarity, for example, the orange sensitivity site (09-5-0008, pigment painting).¹ Further, some sites may include more than one site type, for example, some artefact scatter sites had evidence of hearths (potential Aboriginal camp sites), which can increase their cultural sensitivity. In most cases, the rankings are not based on site specific knowledge of the site in question, although where presented in available cultural heritage management reports and/or site cards, this has been adopted.

¹ This site is unlikely to be in the position provided from the AHIMS database due to being located on a floodplain instead of a cave. Based on the description on the site card, a large buffer around adjacent Cumborah Knob has been produced in the likely location of the culturally significant site. Multiple site descriptions surrounding the rock art describe the significance of this landscape feature and it should be avoided. This is a high-risk area, and no work should be permitted without further assessment to properly locate and record the site.

Table 5.1 Previously identified sites and places within Area 1 that are considered to have greater levels of archaeological and cultural significance based on their site types and available descriptions

| Site ID | Site Name | Site Type | Cultural Sensitivity | Location |
|-----------|--|---------------------------------------|----------------------|--|
| 09-5-0008 | Guisley Caves | Rock Art (pigment) | Orange | Unknown, given large boundary covering several opal leases |
| 09-5-0009 | Brigalow Canoe Tree | Potential burial Tree | Red | Known, within opal lease 736 |
| 09-5-0005 | Mooredale Wells | Aboriginal Ceremony and Dreaming Site | Red | Known, adjacent to opal lease 956 |
| 09-5-0007 | Morendah Plain, Morgans Wells | Aboriginal Ceremony and Dreaming Site | Red | Known, adjacent to opal lease 956 |
| 09-4-0003 | Terewah Mythological Site | Aboriginal Ceremony and Dreaming Site | Red | Known, east of Narran Lake |
| 09-5-0002 | Cumborah Springs | Aboriginal Ceremony and Dreaming Site | Red | Known, 98 m west of opal lease 1101 |
| 09-4-0014 | Narran Lake Burial, Terrawah | Burial | Red | Known, north of Narran Lake |
| 09-4-0057 | Marngi Warramul Mythological Area, Narran Lake | Aboriginal Ceremony and Dreaming Site | Red | Known, east of Narran Lake |

5.3 Impact assessment

Opal prospecting and opal mining has the potential to impact recorded, and unidentified Aboriginal heritage sites, places and deposits. To help identify areas where any proposed activity may intersect with cultural materials, the following buffers were assigned to areas of cultural sensitivity:

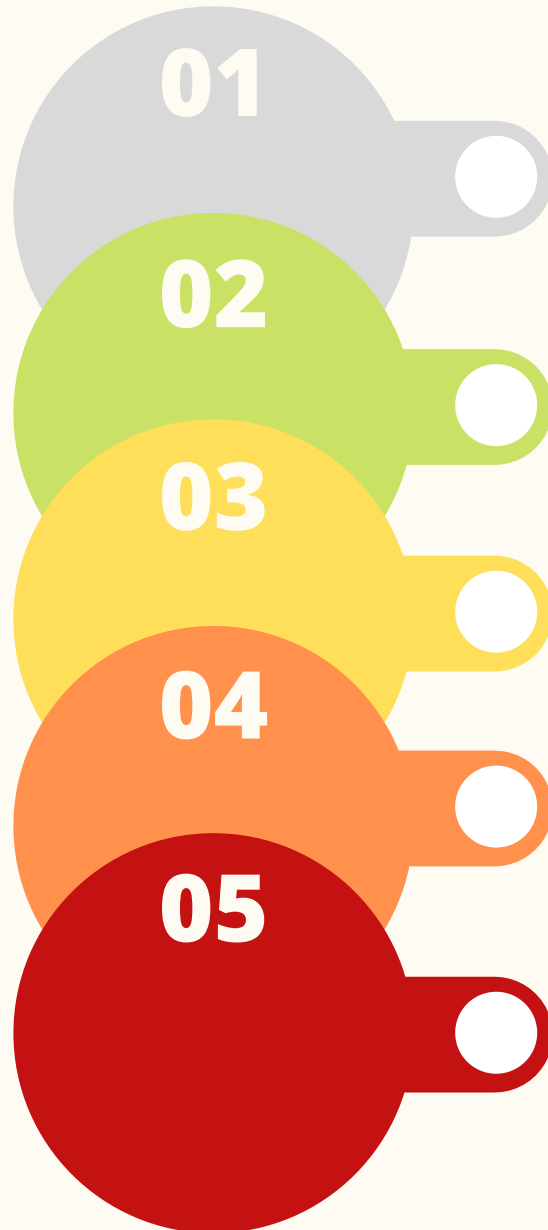
- archaeological sites – 50 m (unless otherwise stated in report);
- watercourses, waterholes, traveling stock routes and creeks – 50 m;² and
- lakes – 200 m.

These areas of cultural sensitivity were assigned a colour to represent the mitigation measured required to undertake activities within those areas. These mitigation measures are summarised in Section 6 and Figure 5.1.

Of the 245 existing opal leasing lots within Area 1, a total of 169 have partial cultural sensitivity limitations. Some 76 are considered to be entirely encompassed by cultural sensitivity restrictions. This is a total of roughly 65 km² of land. Of these 169 lots, 64 have over 90% usable land (n=11, 100% unconstrained) and 24 lots have less than 10% of the total area available for opal leases without Aboriginal heritage restrictions. A detailed summary of Aboriginal heritage constraints per opal lease lot has been provided in spatial format to DRNSW.

² While Heritage NSW guidelines typically stipulate 200 m for this buffer, an analysis of the available information from the Narran Warrambool Reserve suggests that the majority of the data are all situated within 50m of these types of environmental feature.

Aboriginal Heritage Mitigation Process



No Cultural Sensitivity

No Aboriginal Heritage Impact Permit (AHIP) required. Follow unexpected finds procedure

Green Cultural Sensitivity

Potential for site identification, area avoidance. Follow unexpected finds procedure

Yellow Cultural Sensitivity

Culturally significant areas, AHIP required

Orange Cultural Sensitivity

Further archaeological investigation required to identify culturally significant site. AHIP required for opal leases provided in this area

Red Cultural Sensitivity

Highly significant area, AHIP required

6 Management recommendations

6.1 The archaeological and cultural resource

The previous investigations within the project area demonstrate an extensive number of previously documented Aboriginal objects, sites and/or places. Despite only a handful of previous investigations having been undertaken, some 239 Aboriginal objects, sites and places are within Area 1. While dominated by stone artefact sites of various densities and culturally modified trees, it also includes a rich landscape of rarer and often more significant sites and places compared with the broader NSW archaeological record. These include numerous Dreaming and/or ceremonial locations, often around springs and reliable water sources, burials, and fish traps - the latter in nearby areas at Brewarrina recently being identified as nationally significant.

The distribution of these sites and places align with environmental characteristics of the NWR and previous investigations. These all suggest that the large river systems surrounding the NWR, such as the Barwon River, result in substantial flooding and inundation of the landscape. As such, past use of the region appears to have focussed on smaller creeks and/or water-holes, as well as elevated areas over-looking these major river systems. Indeed, nearly 30% of the documented sites are found in the vicinity of Narran Lake and/or Narran River found in the southwest and western fringe of the NWR.

The survivability of cultural materials will, however, be adversely affected by historical and recent activities. This includes extensive opal prospecting and mining that has occurred within the study area, as well as associated infrastructure. The urbanisation of Lightning Ridge township will also have resulted in extensive impacts in this locale. To date, the exact level of these impacts to the cultural resource of Area 1 remains poorly understood.

6.2 Aboriginal heritage constraints tool

To protect existing and potential Aboriginal heritage throughout Area 1 generous buffers were given to all previously identified cultural sites, places and deposits, and areas where they are predicted to occur. The methodology for protecting cultural heritage was formulated into a traffic light system, with different colours indicating potential risk and suggested mitigation measures needed. This tool acts as the risk assessment for any activity on the opal lease lots and is simplified in Figure 5.1.

The Aboriginal heritage constraints tool is utilised as follows:

1. No colour sensitivity: land has been previously disturbed from both construction, mining and/or agricultural activities, or is in landforms deemed to be of limited cultural heritage sensitivity. The potential for cultural material to have survived is considered to be of low likelihood. Works may proceed without further assessment but should include the adoption of an unexpected finds procedures (below).
2. Green sensitivity: this category includes landforms of potential cultural heritage sensitivity. For these areas, a standardized buffer was applied to each landform (200 m for lakes and 50 m for all other features including watercourses, waterholes and traveling stock routes). These mapped locations represents areas where Aboriginal cultural heritage may be present (tangible and intangible heritage values). An activity specific due diligence assessment should be undertaken for all works proposed for these areas to determine the risk to cultural materials and whether further investigation is required prior to works occurring.

3. Yellow sensitivity: this category includes previously documented and/or AHIMS registered Aboriginal sites. Each site was given a 50 m buffer around the existing recorded site boundary or centroid. These buffers are expected to capture the extent of the registered AHIMS sites, as well as areas of archaeological subsurface potential. These areas should be avoided. If impacts are proposed, an approved Aboriginal Heritage Impact Permit (AHIP) (which involves consultation with the wider Aboriginal community as well as a program of archaeological and anthropological investigation) is required before works are allowed in these areas.
4. Orange sensitivity: this category was created for high significance previously documented and/or AHIMS registered Aboriginal heritage sites where accurate locational data does not exist. For Area 1 there is one site categorized as 'orange' – AHIMS #09-5-0008, a rock art site located in a cave. The site card does not provide enough detail to relocate this potentially rare and significant site accurately. In light of this, an orange buffer has been mapped to capture its possible location based on available information. A field survey with adequate Aboriginal consultation is required to confirm the location, nature, extent and significance of this site, and determine next steps. Given the general significance of these sites, a formal assessment would be required to suitably characterize and defined the cultural materials prior to determining whether a development activity is feasible, and an AHIP obtained prior to any potential disturbance. Given the high significance of these sites, it is likely that they would be re-classified as of red sensitivity through the above assessment process and the local Aboriginal community and/or Heritage NSW would reject any attempts at obtaining an AHIP for these locations.
5. Red sensitivity: This category reflects previously documented and/or AHIMS registered Aboriginal heritage sites that are considered to be of high heritage significance. A 50m buffer has been applied to all sites within this category. As areas identified as being within this category are of a high cultural and scientific significance, AHIPs authorizing impact to these sites are unlikely to be approved by the NSW Government and these areas should be avoided.

6.2.1 Unexpected finds protocols

Based on the findings of this report, the following recommendations should be adopted for any unexpected finds within Area 1:

- All workers should be made aware of their obligations under the NSW *National Parks and Wildlife Act 1974*. A basic understanding of how to identify Aboriginal cultural heritage sites should be included in this training.
- All permit holders should be made aware of the cultural sensitivity traffic light cultural heritage sensitivity system and the requirements for undertaking work or development in a given area.
- In the event that previously unknown Aboriginal object(s) and/or sites are discovered during the proposed activity, all works must stop, and an appropriately qualified heritage specialist should be contacted to assess the nature, extent, and significance of the potential heritage sites. Notification should be provided to Heritage NSW once the nature of the potential heritage site has been confirmed. Works should not proceed without advice from Heritage NSW and/or an appropriately qualified heritage specialist.
- In the unlikely event that human remains are discovered, all activities must stop, the affected area must be cordoned-off and NSW Police contacted. Where determined to be of Aboriginal ancestry, Heritage NSW must also be contacted on (02) 9873 8500.

References

- Bangalay Botanical Surveys 2008, "Review of REF and Supporting Documentation for Opal Prospecting Area 1-4. 'Opal Mining within the Narran-Warrambool Reserve, Lightning Ridge Review of Environmental Factors.'"
- Brinckerhoff, Parsons, and Edward Street 2004, "Tugun Bypass Environmental Impact Statement Technical Paper Number 2 Engineering Design Tugun Bypass Alliance."
- Dharriwaa Elders Group 2005, "Submission Regarding the "Opal Mining within the Narran- Warrambool Reserve, Lightning Ridge – Review of Environmental Factors"."
- Fuller, R.S 2020, "The Astronomy and Songline Connections of the Saltwater Aboriginal Peoples of the New South Wales Coast." University of New South Wales.
- Fuller, R.S, G Moore, and J Edwards 2021, "'Singing up Country': Reawakening the Black Duck Songline, across 300km in Australia's Southeast." *The Conversation*, 2021. <https://theconversation.com/singing-up-country-reawakening-the-black-duck-songline-across-300km-in-australias-southeast-167704>.
- Lovett, Siwan 2022, "The Origin of the Narran Lake - Dharriwaa Creation Story." Australian River Restoration Centre. 2022. <https://arrrc.com.au/the-origin-of-the-narran-lake-dharriwaa-creation-story/>.
- Smith, Mike A. 2013, *The Archaeology of Australia's Deserts. Cambridge World Archaeology*. Cambridge University Press: Melbourne, Victoria.
- Somerville, Margaret 2008, "Bubbles on the Surface: A Methodology of Water." Paper Presented at the AARE Annual Conference: Brisbane.
- Walker, P.J. 1991, "Land System of Western NSW - Technical Report No. 25." Soil Conservation Service of NSW, Sydney.