FIFTEEN50

Merool Holiday Park

Statement of Environmental Effects

30 March 2022

Report for Merool Holiday Park

Statement of Environmental Effects

Prepared by:
Fifteen50 Consulting PTY LTD
5/210 Pakenham Street Echuca VIC 3564
PO Box 155 Moama NSW 2731
T. 03-5482 1332
admin@fifteen50.com.au

Prepared for:
Tasman Holiday Parks – Merool on the Murray
131 Merool Rd
Moama NSW 2731

Prepared by: Rin Cheok and Emily Clark
Reviewed: Nathan Heinrich
Approved: Nathan Heinrich
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1. Introduction and background

1.1 Statement of environmental effects

The Statement of Environmental Effects (SEE) outlines the impacts of the proposed riverbank rehabilitation along the riverbank of the Murray River within Merool on the Murray, a.k.a. Merool Holiday Park. This document has been prepared to support a Development Application (DA) to be lodged with Murray River Council for the proposed development of bank stabilisation works. This SEE will also support a controlled activity approval (CAA) application that will also be lodged with the NSW Department of Planning, Industry and Environment (DPIE) for the development.

1.2 Site location

The development is located at 131 Merool Rd, Moama NSW. There are two sites within the property that are proposed to receive bank stabilisation works. Site 1 covers 15m of riverbank within Lot 4 DP560393 and site 2 covers 175m within Lot 5 DP560393. Refer Figure 1 below for locations of the two sites.

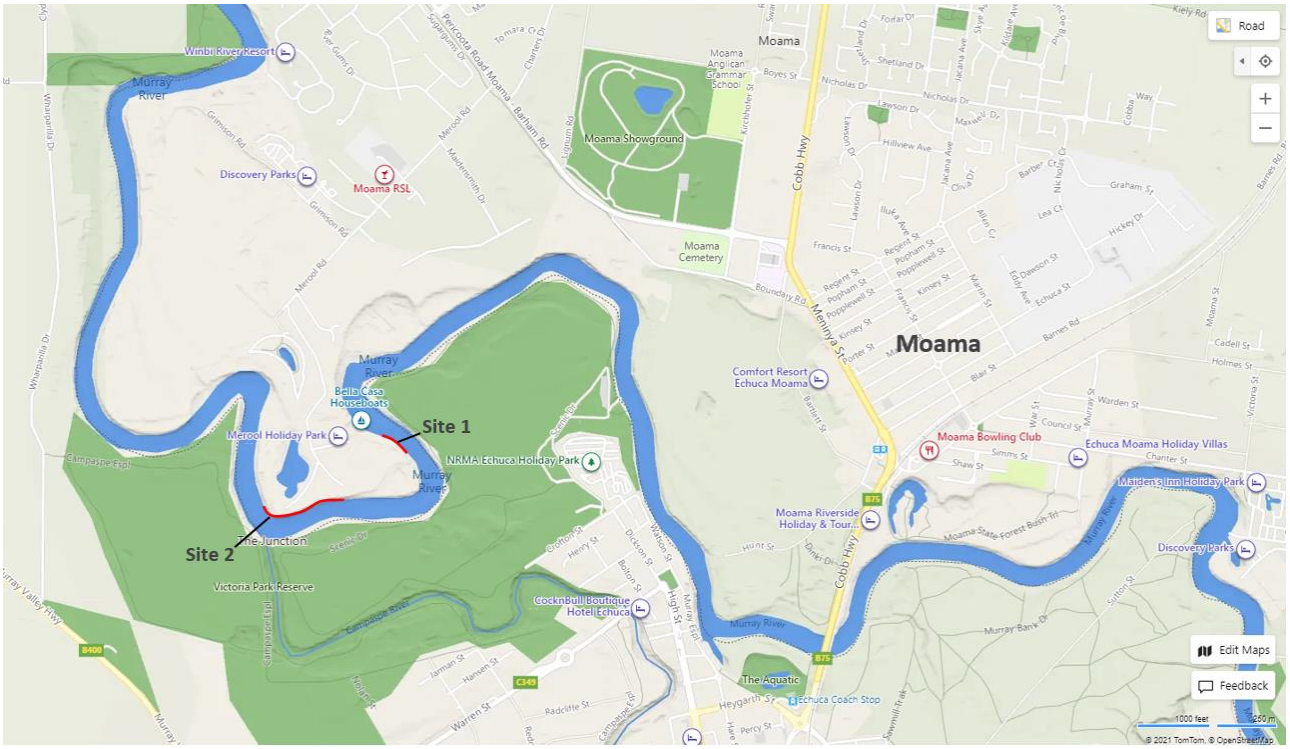


Figure 1: Site Location (Source: Bing Maps, accessed 15/10/21)

1.3 The proponent

The proponent is Tasman Tourism, with Neil Meskin (Head of Development) as the main contact.

1.4 Project details

The proposal involves the rehabilitation of approximately 190m of Murray Riverbank within Merool Holiday Park to reduce the impacts of erosion on existing park infrastructure. The rehabilitation works include:

- Reshaping riverbank to provide a steady batter
- Rock armouring of the riverbank
- Bank toe protection

The bank protection works involve reshaping the riverbank to provide a 1V:1.5H batter which will be lined with geotextile fabric and rock beaching.

1.5 Reasons for the activity and justification

Tasman Tourism has identified the need for bank stabilisation works at various locations along the Murray River frontage at Merool Holiday Park. Tasman Tourism commissioned Fifteen50 Consulting to assess the condition of the riverbank and identify areas where targeted bank stabilisation works were required. Two locations were identified in need of stabilisation and reinforcement. The proposed works will prevent further erosion, protect native vegetation and stabilise the unsafe riverbank used by staff and guests. The erosion in these areas has been caused over time due to rain, high water events and impacts from high traffic activities, both in the water and on land.

The proposed works are in close proximity to existing assets in the park such as tourist cabins, private cabins and a series of retaining walls. Restoration of the riverbank in these areas will protect these assets further as well as demonstrate improvements to the native vegetation within the riparian corridor.

1.6 Project objectives

The objectives of the proposed works are to:

- Restore the integrity of the riverbank
- Protect existing infrastructure in the park
- Provide opportunity for natural regeneration of the riverbank through targeted vegetation plantings

2. Description of the site

2.1 Murray River

The sites are located adjacent to the Murray River. This river generally flows in a westerly direction from the Australian Alps to Lake Alexandrina in South Australia. The river ranges from 70-90 metres wide around Merool at the normal river level. The proposed development sites are both located on outside bends of the river which are often subject to the highest velocity flows, which is characterised by steep cuttings in the riverbank.

The water level in the river varies on a seasonal basis but is on average sits at 87.4m AHD at Echuca Wharf, 3km upstream of the site. Changes in irrigation water demand, river operation requirements and flooding all impact the water level at the site. At the time the feature survey was undertaken for this proposal, the river level at the site was 88.8mAHD, reflecting the fluctuating nature of the river water level. These changes contribute to bank erosion and are partly responsible for the compromised riverbank at the development site.

2.2 Riverbank

The riverbank has a number of large River Red Gum trees (*Eucalyptus camaldulensis*), Cedar Wattle (*Acacia dealbata*) and Common Nettle (*Urtica dioica*). The riverbank is accessed via established tracks through the park and located within a public usage area of the park. There is a range of built infrastructure along the riverbank including retaining walls, stairs, cut-outs and a series of pontoons. Rows of holiday park cabins are located at the top of the riverbank on level ground.

Land tenure is freehold within NSW with confirmed presumptive right of ownership to the middle of the river (confirmed with NSW Crown Lands and Water, 16/07/2021).

The riverbank is in poor condition in two locations within the park, shown as site 1 and site 2 in Figure 2 and Figure 3 below. The bank is almost vertical in these two locations with significant erosion observed which has led to loss of material in the riverbank. Other areas of riverbank are relatively stable with established vegetation that proves to be effective at controlling erosion. There is erosion present at areas where vegetation has been lost.

Figure 2: Site 1 – riverbank erosion (eroded toe, causing bank failure)

Figure 3: Site 2 – riverbank erosion (undercutting, leading to mass failure)

3. Planning and regulatory context

3.1 Approval process

3.1.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) provides the statutory basis for planning and environmental assessment in New South Wales. The Minister for Planning and Public Spaces is responsible for implementing the EP&A Act. This Act provides the framework for environmental planning and development approvals and includes provisions to ensure that the potential environmental impacts of a proposed development are assessed and considered in the decision-making process.

The EP&A Act contains two parts which impose requirements for planning approval:

Part 4 provides for control of local development that requires development consent from the local council

Part 5 provides for control of 'activities' that do not require development consent or approval from the Minister for Planning.

This proposal is permissible with the consent of council under the Murray Local Environment Plan 2011. The proposal requires approval under Part 4 of the EP&A Act. Table 1 lists the EP&A Act requirements for this development.

Table 1: EP&A Act requirements

Matters for consideration	Section of this report were addressed
a. The provisions of: i. Any environmental planning instrument, and ii. Any draft environmental planning instrument that is or has been placed on public exhibition and details of which have been notified to the consent authority, and iii. Any development control plan, and iv. Any planning agreement that has been entered into under Section 93F, or any draft planning agreement that a developer has offered to enter into under Section 93F, and v. The regulations (to the extent that they prescribe matters for the purposes of this paragraph, that apply to the land to which the development application relates.	Section 3.2
b. The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	Section 5
c. The suitability of the site for development	Section 5.1
d. Any submissions made in accordance with this Act or the regulations	Noted
e. The public interest	Noted

3.1.2 Designated development

Under Part 4 of the EP&A Act, an Environmental Impact Statement (EIS) is required if the development is 'designated development', a Statement of Environmental Effect (SEE) is required for all other developments. Schedule 3 of the Environmental Planning and Assessment Regulation 2000 lists all development which falls under 'designated development'. As this development does not describe works listed in Schedule 3, a SEE is required to be submitted with the development application.

3.1.3 Integrated development

Under Section 91 of the EP&A Act, development that requires both development consent and one or more listed approvals or licences is 'integrated development'. The proposal is classified as integrated development as outlined in Table 2.

The EP&A Act provides that, on receipt of the development application (DA) for integrated development, copies of the application must be forwarded by the consent authority to each 'approval body'. These approval bodies will review the DA and SEE and advise the consent authority whether they will grant the relevant approval or licence and the conditions attached.

Table 2: Integrated development approvals required

Legislation	Provision	Approval
Water Management Act 2000	Part 3 Chapter 3	Controlled Activity Approval
Fisheries Management Act 1991	Part 7	Permit to dredge and reclamation works

3.2 Environmental planning instruments

3.2.1 Planning for Bushfire Protection (2019)

Section 4.14 of the EP&A Act requires compliance with Planning for Bush Fire Protection 2019 (PBP). The site is located within a vegetation buffer adjacent to the Murray River and one small area of Category 1 vegetation. The development land is considered Bush Fire Prone Land on the NSW Planning Portal website as shown in Figure 4. The proposed riverbank rehabilitation works described in Section 1.4 fall under Rural Fires Regulation Clause 45 (l) "the carrying out of earthworks or drainage works" and as such is classified as a development that is excluded from requirements for bush fire safety authority. As such, a Bush Fire Threat Assessment Report is not required to be included with this SEE.

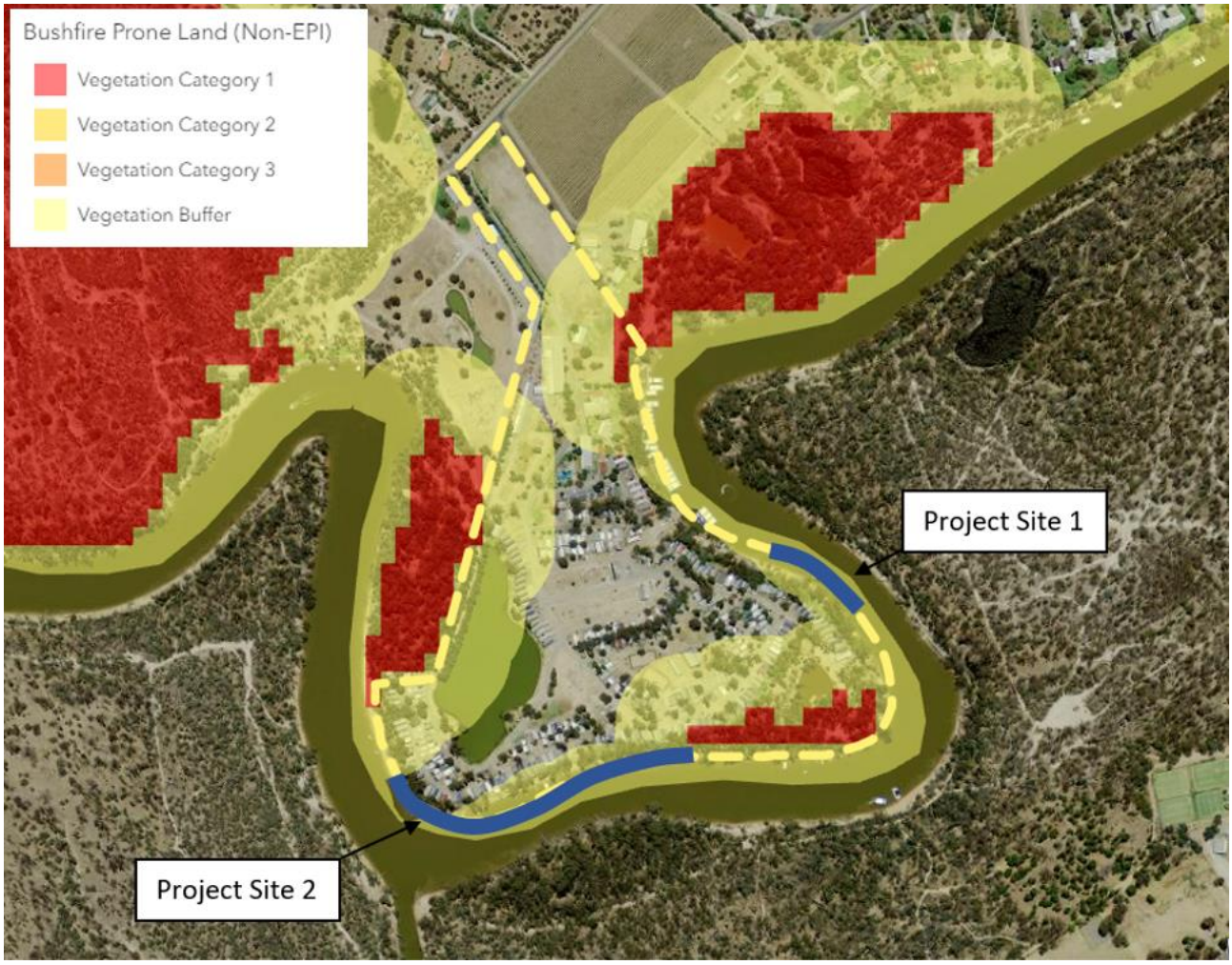


Figure 4: Bushfire prone land (Source: NSW Planning Portal, accessed 14/10/2021)

3.2.2 Local Environmental Plan

The site is located within Moama ward under the jurisdiction of Murray River Council. As such, the Murray Local Environment Plan (LEP) 2011 applies. Under the Murray LEP, the development site is zoned Conservation Management (C3) and Recreational Waterway (W2), Figure 5.

The objectives of the C3 zone are:

- To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values
- To provide for a limited range of development that does not have an adverse effect on those values.

The objectives of the W2 zone are to:

- To protect the ecological, scenic and recreation values of recreation waterways
- To allow for water-based recreation
- To provide for sustainable fishing industries and recreational fishing

Under the LEP, the proposed works are classified as 'environmental protection works' which is a permitted activity with consent in both zones. A development application is required to support the application for consent to council. Applicable sections of the LEP are outlined below.

- Part 5.10 – Heritage
- Part 5.21 – Flood planning
- Part 7.2 – Earthworks
- Part 7.3 – Biodiversity
- Part 7.4 – Development on riverfront areas
- Part 7.5 – Riparian land and Murray River and other watercourses – general principles
- Part 7.6 – Additional provisions – development on riverbed and banks of the Murray and Wakool Rivers
- Part 7.7 – Wetlands

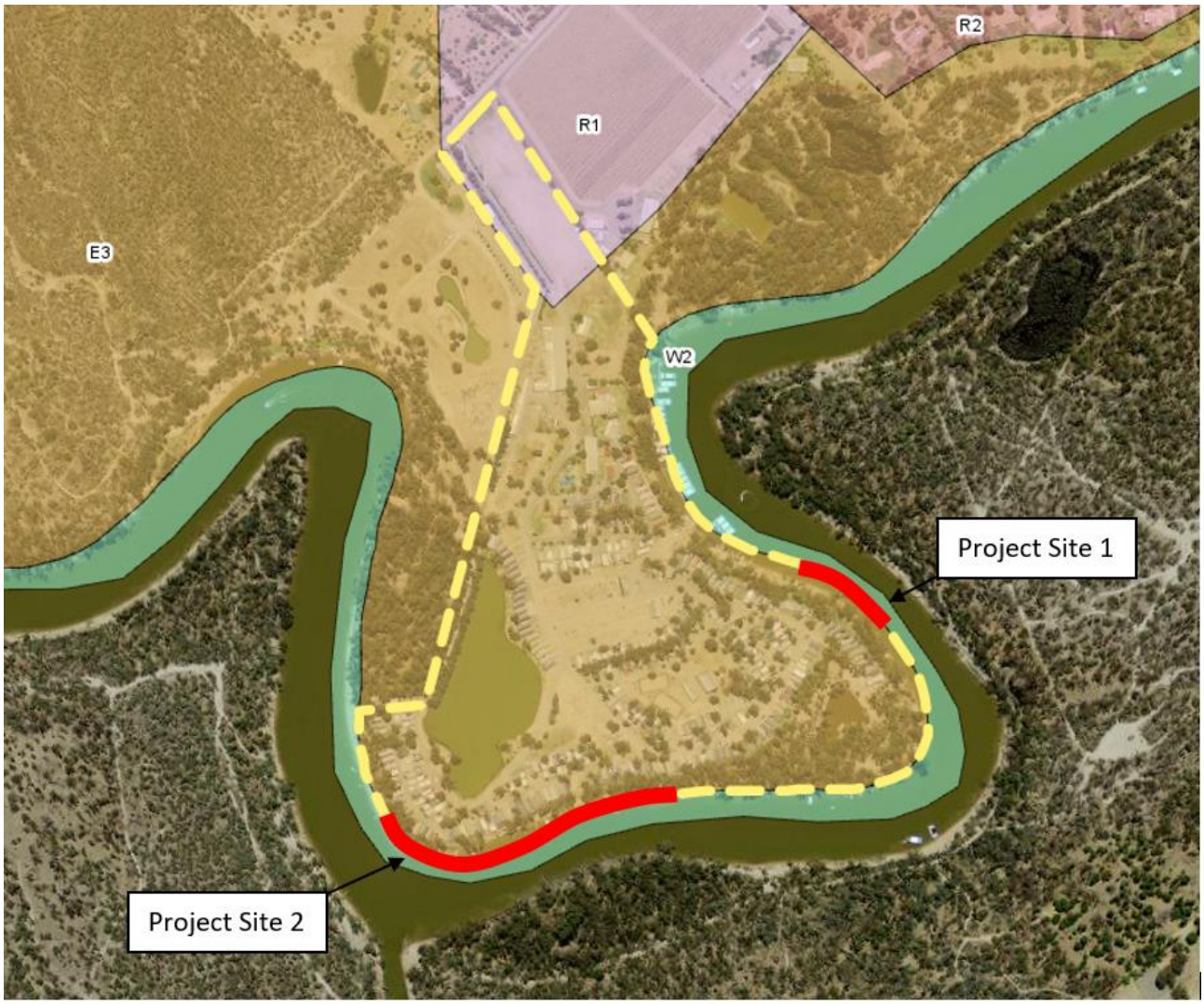


Figure 5: Land zoning (Source: NSW Planning Portal, accessed 14/10/2021)

Heritage conservation

Part 5.10 of Murray LEP 2011 specifies the requirements of the consent authority in relation to impacts on areas of heritage significance. The objectives are:

- To conserve the environmental heritage of the Murray
- To conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views
- To conserve archaeological sites
- To conserve Aboriginal objects and Aboriginal places of heritage significance.

A cultural heritage due diligence assessment was undertaken by Austral Archaeology in October 2021 with the final report issued on 29/11/2021. The conclusion from this investigation was that 'no further archaeological investigations are required before commencing the works. A copy of the report is provided in Appendix D.

A site survey by the Moama Local Aboriginal Land Council was undertaken on 23/11/2021. The site report is included in Appendix E of this SEE. No evidence of cultural heritage was observed on site.

The proposed development will not contravene the objectives of the LEP.

Flood planning

Part 5.21 of Murray LEP 2011 specifies the requirements for development on land identified as "flood planning area" on the Flood Planning Map. The objectives of this clause are to:

- minimise the flood risk to life and property associated with the use of land
- allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes because of climate change
- to avoid adverse or cumulative impacts on flood behaviour and the environment
- to enable the safe occupation and efficient evacuation of people in the event of a flood.

The proposed development will adhere to Part 5.21 of the LEP by referring to the requirements of Chapter 11 of Murray DCP 2012, addressed in Section 5.4 of this SEE. Figure 6 illustrates the that both sites are located within a flood planning area.

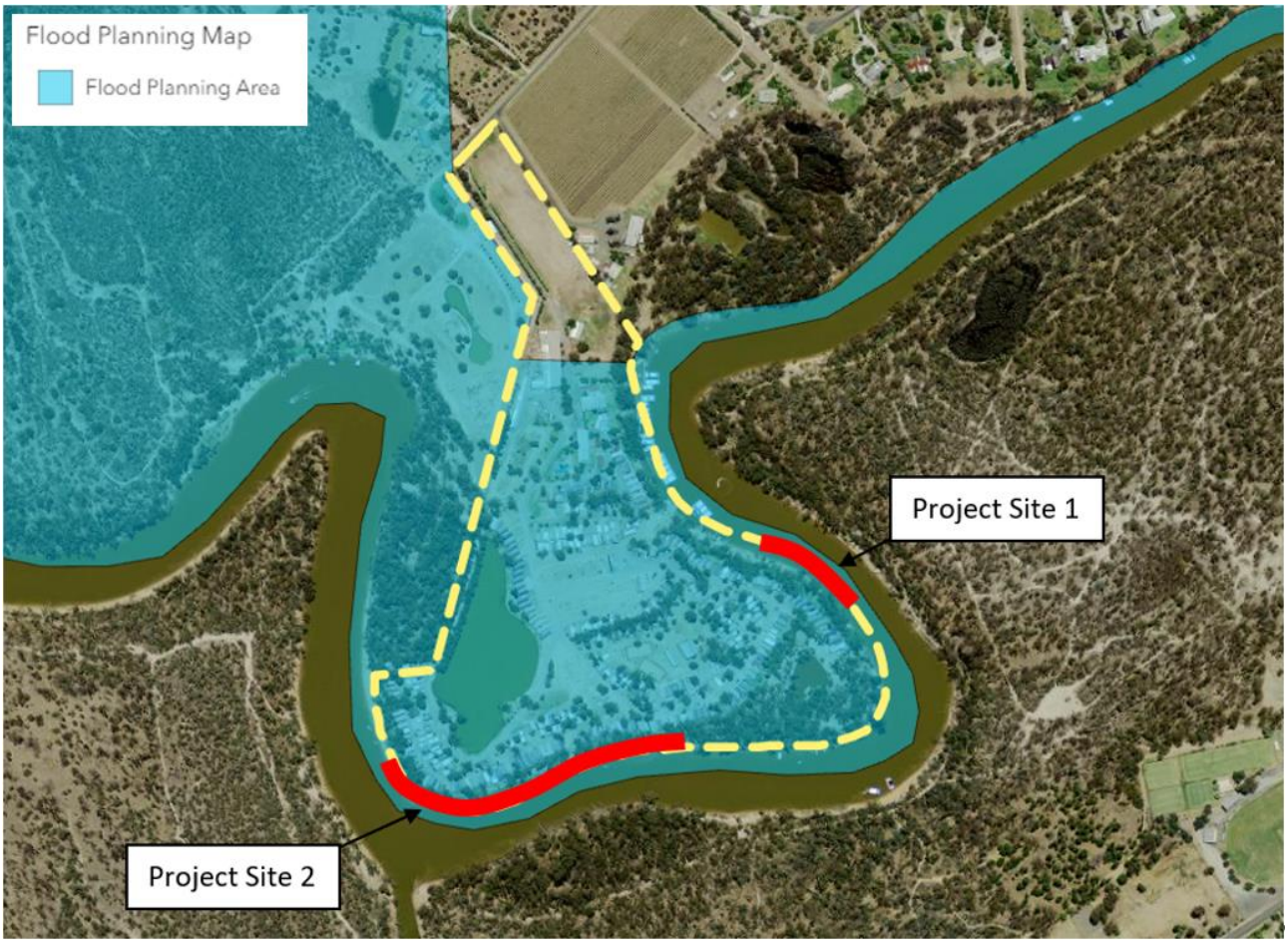


Figure 6: Floodplanning area (Source: NSW Planning Portal, accessed 14/10/2021)

Earthworks

Part 7.2 of Murray LEP 2011 specifies the requirements for earthworks. The objectives are to:

- To ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land
- To allow earthworks of a minor nature without requiring separate development consent.

This development proposal addresses the above in Section 5.5 of this SEE.

Biodiversity protection

The proposed development site is mapped as terrestrial biodiversity and key fish habitat in the Murray LEP. Part 7.3 of Murray LEP 2011 specifies the requirements for biodiversity protection. The objective of this clause is to maintain aquatic and terrestrial biodiversity by:

- Protecting native fauna and flora
- Protecting the ecological processes necessary for their continued existence
- Encouraging the recovery of native fauna and flora and their habitats.

This development proposal addresses the above in Section 5.2 of this SEE.

Development of river front areas

The proposed development site is located adjacent to the Murray River, focusing on the riverbank or riparian zone. As this is a river front area, Part 7.4 of the Murray LEP 2011 specifies the requirements for the development of river front areas. The objective of this clause is to:

- Support natural riverine processes, including the migration of the Murray and Wakool Rivers' channels,
- Protect and improve the bed and bank stability of those rivers,
- Maintain and improve the water quality of those rivers,
- Protect the amenity, scenic landscape values and cultural heritage of those rivers and to protect public access to their riverine corridors,
- Conserve and protect the riverine corridors of those rivers, including wildlife habitat.

This development proposal addresses the above in Sections 5.4 and 5.5 of this SEE.

Riparian land, Murray River and other watercourses—general principles

The entirety of the proposed development area sits within the Murray River's riparian zone and therefore falls under Part 7.5 of the Murray LEP 2011. This specifies the requirements for Riparian zones along the Murray and other watercourses. The objective of this clause is to protect and maintain:

- water quality within the Murray and Wakool Rivers and other watercourses,
- the stability of the bed and banks of those rivers and other watercourses,
- aquatic riparian habitats,
- ecological processes within those rivers and other watercourses and riparian areas.

This development proposal addresses the above in Sections 5.4 and 5.5 of this SEE.

Additional provisions—development on riverbed and banks of the Murray and Wakool Rivers

Developments on the riverbed and banks of the Murray River have additional provision under Part 7.6 of the Murray LEP 2011. The objectives of this clause are to:

- manage and maintain the quality of water in the Murray and Wakool Rivers,
- protect the environmental values and scenic amenity and cultural heritage of those rivers,
- protect the stability of the bed and banks of those rivers,
- limit the impact of structures in or near those rivers on natural riverine processes and navigability of those rivers.

This development proposal addresses the above in Sections 5.4 and 5.5 of this SEE.

Wetlands

Part 7.7 of Murray LEP 2011 specifies the requirements for development on land identified as "Wetlands and Freshwater Lakes" on the Wetlands Map, which the land of the proposed development falls under. The objective of this clause is to ensure that natural wetlands are preserved and protected from the impacts of development.

When assessing a development application, the consent authority must consider potential adverse impacts from the proposed development on the following:

- The growth and survival of native flora and fauna
- The condition and significance of the native flora on the land and whether it should be substantially retained
- The provision and quality of habitats for indigenous and migratory species
- The surface and groundwater characteristics of the site, including water quality, natural water flows and salinity, and
- Any wetland in the vicinity of the proposed development and any proposed measures to minimise or mitigate those impacts.

This development proposal addresses the above in Section 5 of this SEE.

3.2.3 Development Control Plan (DCP)

The Murray Development Control Plan 2012 has the purpose of bringing together the objectives of the *Environmental Planning and Assessment Act 1979*, to implement the Murray Shire Strategic Land Use Plan 2010-2030, to assist in the administration of Murray Local Environmental Plan 2011, and to provide good planning outcomes for development in the Shire.

The design of the proposed development has taken into consideration and incorporated the controls outlined in Murray DCP 2012 to meet the objectives of the plan. Applicable sections of the DCP are listed below.

- Chapter 9 – Vegetation removal
- Chapter 10 – Watercourses and riparian land
  - Section 10.1 – Visual amenity
  - Section 10.4 – retaining walls
  - Section 10.7 – Liability and public safety
  - Section 10.8 – landscaping
  - Section 10.9 – Unauthorised structures
- Chapter 11 – Flood prone land

Vegetation removal

Chapter 9 of Murray DCP 2012 applies to vegetation removal and should be read in conjunction with Parts 5.9 and 5.9AA of the LEP.

On 25/8/2017, the SEPP (Vegetation in Non-Rural Areas) 2017) a.k.a. Vegetation SEPP repealed Clauses 5.9 and 5.9AA of the Standard Instrument LEP, which relate to tree preservation. These clauses were replaced with the Vegetation SEPP's new regulations for clearing vegetation in urban and other non-rural areas. This applies to land within zone E3 Environmental Management (now Zone C3, Conservation Management).

It was assumed that the Chapter 9 of the DCP which prescribes the species of tree and vegetation to which the repealed LEP clauses applies is now enforced under Vegetation SEPP regulations.

This development proposal addresses the above in Section 5.2 of this SEE.

Watercourses and Riparian Land

Chapter 10 of the Murray DCP applies to development or works around watercourses and riparian land within the Murray River Shire council area. The objectives of this DCP chapter are to:

- To ensure that appropriate consideration is given to development with the potential to adversely affect the riverine environment of the Murray River and rivers within Murray River Council, including the cumulative impacts and to ensure the long-term sustainability of their essential biophysical function.
- To establish a consistent and coordinated approach to environmental assessment of proposed river structures along the Murray River and other rivers.
- To conserve and promote the better management of the natural and cultural heritage values of the riverine environment of the rivers in Murray River Council.
- To manage rivers in ways which slow, halt or reverse the overall rate of degradation in their systems.
- To maintain the beneficial use if the rivers resources but not however at the expense of the environment, and
- To implement the objectives of the local provision contained in the Murray LEP 2011.

The design of the bank stabilisation works have taken into consideration and incorporated the controls outlined in the DCP to ensure the objectives of the plan occur. The inclusion of these controls is summarised in Table 3 below.

Table 3: DCP controls for watercourses and riparian land

DCP Objectives	DCP controls	Implementation in proposal
Visual amenity • To protect the visual amenity created by the natural river environment • To avoid works and structures that have a detrimental visual impact	• All structures and buildings are to be designed to minimise the visual impact on the natural environment. • Buildings and structures are to utilise materials and colours that blend with the natural environment. Bright or offensive colours and materials will not be supported by Council. • Landscaping of native riparian vegetation is to be used to soften visual amenity impacts but not used as a substitute for appropriate siting of buildings and structures in the river environment.	• Rock armouring is less visually intrusive compared to retaining walls and other built structures that inhibit erosion. Rock will be placed around existing vegetation to minimise the visual impact of removing vegetation. • The rock will initially conflict visually with the surrounding riverbank, however the gaps in the rocks will collect sediment over time and allow for the establishment of vegetation. • Targeted vegetation planting will occur above the rock armoured face to promote the establishment of native vegetation and minimise the visual impact. The rock armouring must occur at the riverbank interface to effectively stabilise the riverbank.
Retaining walls • To restrict retaining walls to be only installed where there are no other means of bank stabilisation. • To preserve the riverine environment from artificial structures that have detrimental effect on	• Retaining walls will only be considered by Council if alternative solutions have been demonstrated to be unachievable. – Limit access to the site – Revegetation of the bank – Revegetate the riparian area – Rock rip rap along the toe of the bank and revegetation of the bank face. – Construct timber groynes.	• The proposed method to stabilise the bank is a combination of rock rip rap armouring along the toe of bank and revegetation of the riverbank with native plant species. This approach directly achieves the objectives of this clause.

DCP Objectives	DCP controls	Implementation in proposal
the river system in Murray River Council.		
Landscaping • To restore the riverine vegetation within Murray River Council • To screen buildings and structures from the river	• All development applications are to include a landscaping plan. • Landscaping must utilise indigenous species of riparian vegetation. • Where land is degraded, landscaping shall include measures to rehabilitate those areas. • Landscaping must be designed to screen or at least soften the appearance of buildings and structures.	• A landscaping plan is included in the preliminary design submission with the development application. • Species proposed are indigenous riparian vegetation. • The purpose of this development is to rehabilitate degraded sections of the riverbank.

Flood prone land

Chapter 11 of Murray DCP 2012 applies to land use and development on flood prone land within the Shire. It should be read in conjunction with Clause 7.8 of the LEP, although this clause has been superseded by Clause 5.21 of the LEP. The objectives of this DCP chapter are to:

- provide detailed controls and criteria for the assessment of development applications on land affected by flooding in Murray Shire
- consolidate existing flood planning principles and policies from relevant government agencies into a coherent framework for application at the development control level by Murray Shire Council
- reduce the impact of flooding and flood liability on individual property owners and occupiers
- reduce private and public losses resulting from flooding
- restrict the intensification of development below the Flood Planning Level (FPL)
- limit development below the FPL to those activities and works considered to have an essential relationship with the river and its floodplain
- provide specific measures for the control of caravan parks and associated development types within flood affected areas
- provide for the consideration of the cumulative effects of any development on flood affected land, which in or of itself may be considered to be insignificant
- provide for and protect the natural passage, storage and quality of flood waters
- recognise and help sustain the natural ecosystems of floodplains and riparian zones including the protection of associated vegetation and wetlands
- inform the community as to the extent and hazard of flood affected land in Murray Shire
- deal consistently with applications for development on flood affected land, generally in accordance with the Floodplain Management Manual: The Management of Flood Liable Land issued by the New South Wales Government 2005
- encourage the development and use of land which is compatible with the indicated flood hazard.

The design of the bank stabilisation works have taken into consideration and incorporated the controls outlined in the DCP to ensure the objectives of the plan occur. The inclusion of these controls is summarised in Table 4 below.

Table 4: DCP controls for development on flood prone land

DCP control	Implementation in proposal
Whether the proposed development is reasonable having regard for the flood risk and resources available to the location. Applicants should place no reliance on the implementation of a condition specifying a private evacuation/flood management plan as a means to overcome an unacceptable flood risk.	• The proposed development is not considered an occupied structure. • The only feasible location for bank stabilisation works is directly on the riverbank, which is subject to flooding impacts. • The rip rap rock armouring is flexible in nature and may dislodge in places during a flood event. This can be restored at the conclusion of a flood event. • The development will not impact the behaviour of flood water due to its installation following a very similar profile to the riverbank. • The rip rap rock armouring improves bank stability and hence protects the existing infrastructure within the park.
The need for a benefit/cost assessment that takes account of the full cost to the community of the flood response and flood damage likely to be incurred to the development and upon other development.	• Rip rap rock armouring will not impact other community assets in a negative way. • The rip rap rock armouring improves bank stability and hence protects the existing infrastructure within the park. • Low-cost option to reinstate rock beaching in places at the conclusion of a flood event. This does not impact on the community.
Specific principles relating to flood liable land contained within Murray Regional Environmental Plan No.2 - Riverine Land (MREP2) including: • the benefits to riverine ecosystems of periodic flooding • the hazard risks involved in the development of that land • the redistribution effect of the proposed development on floodwater • the availability of other suitable land in the locality not liable to flooding • the availability of flood free access for essential facilities and services • the pollution threat represented by any development in the event of a flood • the cumulative effect of the proposed development on the behaviour of floodwater • the cost of providing emergency services and replacing infrastructure in the event of a flood • flood mitigation works constructed to protect new urban development should be designed and maintained to meet the technical specifications of the NSW government department responsible for such works.	• The rip rap rock armouring will reduce bank erosion and associated sedimentation of the Murray River waterway. • The rock profile will follow a similar profile to the existing riverbank, hence will not impact the behaviour of flood water. • The rock armouring will not extend above the top of bank therefore will not change any aspect of floodwaters leaving the river stream. • If bank stabilisation works are not completed, a flood would have significant impacts to existing park infrastructure due to continued erosion of the riverbank. • The only feasible location for bank stabilisation works is directly on the riverbank, which is subject to flooding impacts. • Rock armouring provides more energy dissipation effects compared to a retaining wall which 'rebounds' wave action. This would have a higher impact to the nature of water movement down the river.
The Floodplain Development Manual – the Management of Flood Liable Land (2005).	• Noted

DCP control	Implementation in proposal
High Hazard Floodway requirements • Primitive camping grounds will be considered provided that any permanent facilities associated with the provision of a water supply, toilet and refuse disposal are in keeping with the basic needs of the camping ground and can be shown to withstand the force and duration of flooding and will not adversely impact on river water quality under flood conditions. • No approval will be considered for any permanent facilities associated with caravan parks or tourist accommodation, including: – permanent or non-flexible connection to services such as power, water and sewerage; – permanent residency areas of caravan parks; – relocatable homes (homes not being capable of being registered under the Traffic Act); – the subdivision of lots for separate occupation sites; and - permanent flood control works.	• The proposed development is located in an area categorised as "High Hazard Floodway" given works are proposed in the stream of the Murray River. • The development does not require services or permanent connections. • The rip rap rock armouring is suitable for submersion and is designed to withstand flow velocity of the Murray River. If some dislodgement occurs, the rip rap can be respread on site.

3.3 Other environmental legislation and approval

3.3.1 Fisheries Management Act 1994

Under Section 198A of the Fisheries Management Act 1994 (FMAct), dredging is defined as:

- any work that involves excavating water land; or
- any work that involves the removal of material from water land that is prescribed by the regulations as being dredging work to which this Division applies.

This section describes water land as land submerged by water:

- whether permanently or intermittently; or
- whether forming an artificial or natural body of water.

The development involves excavation of material from the bank of the Murray River and constitutes dredging, as defined by the FM Act.

The FM Act lists threatened aquatic species, endangered populations and ecological communities and key threatening processes. Potential impacts on species, populations and communities, subject to the FM Act, would need to assess impacts on threatened aquatic species.

Section 5 of the SEE includes an assessment of the impacts of the development.

3.3.2 Water Management Act 2000

The Water Management Act 2000 (WM Act) is administered by Natural Resources Access Regulator. Under Part 3, Chapter 3, an application for a controlled activity approval for works on waterfront land (defined as within 40m of a waterway) will be applied for in conjunction with the DA process.

3.3.3 Heritage Act 1977

Non-Aboriginal heritage, including historical archaeological relics, buildings, structures, archaeological deposits and features of local and State significance in NSW are protected under the *Heritage Act 1977*.

Places of State significance are included on the State Heritage Register, which is maintained by the Heritage Division of the Office of Environment and Heritage (OEH). The Heritage Division also maintains the State Heritage Inventory, which includes items identified by both local councils in their individual Local Environmental Plans, and by State Government agencies in their heritage and conservation registers requires under s170 of the Act (s170 registers).

Archaeological relics

Section 4(1) of the Act (as amended 2009) defines a relic as "any deposit, artefact, object or material evidence that Relates to the settlement of the area that comprises New South Wales… and (b) is of state or local heritage significance." It is an offence under Section 139 of the Act to disturb or excavate land knowing or with reasonable cause to suspect that the disturbance or excavation would affect relics except in accordance with a permit (or in accordance with a gazetted exception to the Act).

Permits are issued under Section 140 of the Act, or Section 60 for State significant relics. There are several exceptions and exemptions under Section 139(4) of the Act, Section 57(2) for State significant relics for minor activities that would not adversely affect significance. Section 146 of the Act requires that all identified relics are reported to the Heritage Council (or Heritage Division).

3.3.4 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) can protect areas and objects that are of particular significance to Aboriginal people in accordance with Aboriginal tradition. The ATSIHP Act allows the environment minister, on the application of an Aboriginal person or group of persons, to make a declaration to protect an area, object, or class of objects from a threat of injury or desecration.

Declarations can stop activities and override other approvals but cannot order people to carry out activities such as conservation or repairs to damages areas. When the ATSIHP Act was introduced, it was intended that the Minister would make declarations as a last resort in cases when state or territory laws do not provide effective protection.

3.3.5 National Parks and Wildlife Act 1974

Aboriginal cultural heritage (objects and Places) in NSW is protected under the *National Parks and Wildlife Act 1974*. Protection of Aboriginal heritage is outlined in section 86 of the Act, as follows:

- "A person must not harm or desecrate an object that the person knows is an Aboriginal object" s86(1).
- "A person must not harm an Aboriginal object" s86(2).
- "A person must not harm or desecrate an Aboriginal place" s86(4).

The Aboriginal Heritage Information Management System (AHIMS) contains information and records about Aboriginal objects that have been reported to the Director General of the Department of Premier and Cabinet. It also contains information about Aboriginal Places which have been declared by the Minister for the Environment to have special significance with respect to Aboriginal culture.

Aboriginal Places are also listed in the Aboriginal Place Atlas, State Heritage Inventory, and are declared in the NSW Government Gazette.

A cultural heritage due diligence assessment was completed by Austral Archaeology on 29/11/2021and site survey was undertaken by the Moama Local Aboriginal Land Council on 23/11/2021. Copies of the reports are provided in Appendix D and Appendix E of this SEE respectively. No cultural heritage artefacts were observed on site.

3.3.6 Biodiversity Conservation Act 2016

The purpose of the Biodiversity Conservation Act 2016 (BC Act) is:

- To conserve biological diversity at bioregional and state scales
- To maintain the diversity and quality of ecosystems
- To support biodiversity conservation in the context of a changing climate
- To assess the extinction risk of species and ecological communities, and identify key threatening processes
- To establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity.

The threatened species assessment process under section 5A of the EP&A Act includes a Test of Significance (also known as the Five-part test). These factors must be considered by decision makers regarding the effect of a proposed development or activity on threatened species, populations or ecological communities, or their habitats.

An assessment of the potential impacts of the proposal on threatened species, populations, ecological communities and Outstanding Biodiversity Values listed on the BC Act was carried out in accordance with section 5A of the EP&A Act. A test of significance was conducted to characterise the significance of any potential impacts within Appendix F. The assessment concluded that there would be no significant impact on threatened species, populations or ecological communities, or their habitats.

Under the Act, proponents proposing to clear native vegetation can offset their obligations through the Biodiversity Offset Scheme, in this case to native vegetation is proposed to be cleared.

3.3.7 Biodiversity Conservation Regulations 2017

The Biodiversity Conservation Regulation 2017 sets out threshold levels for when the BOS will be triggered. The threshold has two elements:

- whether the amount of native vegetation being cleared exceeds an area threshold **(in this case no clearing will occur so the threshold in no exceeded)**
- whether the impacts occur on an area mapped on the Biodiversity Values Map published by the Environment Agency Head.

If clearing and other impacts, including biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017, exceed either trigger, the BOS applies to the proposal.

The BOS applies to clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 on land identified on the map. Under this clause the following impacts are listed:

(1) The impacts on biodiversity values of the following actions are prescribed (subject to subclause (2)) as biodiversity impacts to be assessed under the biodiversity offsets scheme—

(a) the impacts of development on the following habitat of threatened species or ecological communities—

(i) karst, caves, crevices, cliffs and other geological features of significance,

(ii) rocks,

(iii) human made structures,

(iv) non-native vegetation,

(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,

(c) the impacts of development on movement of threatened species that maintains their lifecycle,

(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),

(e) the impacts of wind turbine strikes on protected animals,

(f) the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

(2) The additional biodiversity impacts prescribed by this clause—

(a) are prescribed for the purposes of assessment and biodiversity assessment reports under the Act, but are not additional biodiversity impacts for the purposes of calculating the number and class of biodiversity credits that are required under a biodiversity assessment report to be retired to offset the residual impact on biodiversity values of proposed development, proposed clearing of native vegetation or proposed biodiversity certification of land, and

(b) may be taken into account in the determination of the biodiversity credits required to be retired (or other conservation measures required to be taken) under a planning approval or vegetation clearing approval or under a biodiversity certification of land.

The environmental impact of development proposals that do not exceed the Biodiversity Offset Scheme Threshold and will not otherwise have a significant impact on biodiversity values as assessed by the test of significance will continue to be assessed under section 4.15 of the *Environmental Planning and Assessment Act 1979*. In the case of this development:

- No native vegetation clearing will occur
- The activity will take please in an area mapped on the Biodiversity Values Map, but none of the biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 will occur
- Therefore, the BOS is not triggered, and no further assessment is required.

3.4 State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

The State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP) was one of a suite of Land Management and Biodiversity Conservation (LMBC) reforms that commenced in New South Wales on 25 August 2017. The Vegetation SEPP works together with the Biodiversity Conservation Act 2016 and the Local Land Services Amendment Act 2016 to create a framework for the regulation of clearing of native vegetation in NSW.

The Vegetation SEPP regulates clearing that is not linked to development requiring consent. Clearing that is ancillary to development requiring consent will be assessed as part of the development assessment process and may require further assessment and approval under the Biodiversity Conservation Act 2016. Clearing below the biodiversity offsets threshold on land to which the Vegetation SEPP applies only requires a permit issued under the SEPP and will no longer require development consent. However, development consent will still be required for the clearing of vegetation that is a heritage item or that is located in a heritage conservation area, as well as vegetation that is an Aboriginal object or that is located in an Aboriginal place of heritage significance.

Works will occur on land that is Zoned C3 and W2 and the Biodiversity Offsets Threshold in this area is one hectare or more. Vegetation clearing of this size will not occur.

3.5 State Environmental Planning Policy (Koala Habitat Protection) 2021

The Koala SEPP 2021 replicates the objectives and provisions of Koala SEPP 2020, SEPP 44, which was in force from 1995 through to 2019. The SEPP:

- aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

Section 5 of the SEE includes an assessment of the impacts of the proposed development.

The site is listed in a LGA that contains Koalas (Schedule 1) and contains the feed trees (River Red Gum above 15%) that Koalas require (Schedule 2) of the SEPP. It is noted that no feed trees will be removed by this project, but it is at Councils discretion if a Plan of Management is required for this project.

3.6 Commonwealth legislation

Under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), any actions which are likely to have a significant impact on matters of National Environmental Significance (NSE) require approval from the commonwealth minister for Environment and Heritage. NSE items cover:

- World Heritage properties
- National Heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coal mining development.

Section 5 of the SEE includes an assessment of the impacts of the development, with no EPBC referral required for this development.

3.7 Summary of approvals

Table 5 provides a summary of the approvals and notifications likely to be required for the development.

Table 5: Summary of approvals

Legislation / Act	Approvals required	Agency
Environmental Planning and Assessment Act 1979	Part 4 – Development consent and integrated development	Murray River Council
Water Management Act 2000	Part 3, chapter 3 – Controlled Activity Approval	Natural Resource Access Regulator
Fisheries Act	Part 7 Approval	NSW Fisheries

4. Description of the development

4.1 Overview

The rip rap rock beaching and revegetation works will take place at two sections of Murray Riverbank frontage at Merool Holiday Park. The riverbank will be reshaped in targeted locations to a steady batter before placement of geotextile fabric and 300 – 400mm diameter rip rap rock in an interlocking arrangement. The rock beaching will extend up the riverbank before transitioning to jute mesh and revegetation plantings to the top of bank. Bank excavation will be limited to that required to create a stable batter.

4.2 Construction methods

Construction will be completed using mechanical excavators, working from the land. Topsoil from the riverbank will be scraped using the excavator bucket to form a 1:1.5 to 1:2 batter. Geotextile material will then be laid directly on the exposed surface before placement of imported rip rap rock in an interlocking arrangement.

Stockpiled topsoil will be respread across the finished surface above the rock beaching before placement of jute mesh. Vegetation plantings will then be completed in accordance with the approved landscape plan submitted to Council with the development application.

4.3 Guidelines

Best management practice needs to be adhered to therefore, the 'Guidelines for Controlled Activities on Waterfront Land (NRAR 2018) will be adhered to. The suite of guidelines include:

- In-stream works
- Laying pipes and cables in watercourses
- Outlet structures
- Riparian corridors
- Vegetation Management Plans
- Watercourse crossings

The CEMP will provide further details on how these guidelines will be implemented during the proposed works.

4.4 Timing and duration

The timing of the works is expected August 2022 to coincide with a natural low water level in the Murray River. This would assist with minimising the risk of sedimentation of the waterway during construction. The works are expected to take two weeks to complete once started.

5. Impact assessment

5.1 Land use

5.1.1 Existing environment

Merool Holiday Park was established in 1983 and its location and usage has remained largely the same since then. The construction of the caravan park would have resulted in significant levels of disturbance from the development of the cabins, land clearing and the introduction and building up of land as well as the development of dams.

The existing riverbank frontage already contains cabins and access to the rivers and included decking, pipelines, pontoons, fencing and stairs.

5.1.2 Impact assessment

The landowners directly affected by the proposed works are the proponents of the project and its beneficiaries. The existing land use will not be impacted negatively, but improved. Future potential land uses will not be changed.

5.1.3 Mitigation measures

The construction footprint will be limited to specific areas of bank erosion which are in need of rehabilitation (see Appendix A for the area of works).

5.2 Biodiversity

5.2.1 Flora

Existing environment

The proposed project area is located in the Riverina Bioregion and the Murray Fans subregion, identified under the Interim Biogeographic Regionalisation for Australia.

The New South Wales plant community type (PCT) classification was developed in 2011 to establish an unambiguous master community-level classification for use in vegetation mapping programs, biometric-based regulatory decisions, and as a standard typology for other planning and data gathering programs. One vegetation community occurs within the works area:

- River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion (PCT 5)

Details of this PCT are shown in Table 6.

Table 6: PCT characteristics

PCT	PCT name	Description
5	River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW Southwestern Slopes Bioregion and the eastern Riverina Bioregion	Very tall open forest dominated by River Red Gum (Eucalyptus camaldulensis subsp. camaldulensis) with trees averaging about 25 m high and a canopy cover of about 40%. The shrub layer is sparse or absent with Mountain Cedar Wattle (Acacia dealbata) sometimes present. The ground cover may be mid-dense or dense and is dominated by grass species such as snow grass Poa labillardieri, Blown Grass (Lachnagrostis filiformis) and Mat Grass (Hemarthria uncinata var. uncinata) along with sedges such as Carex tereticaulis, Carex inversa and Carex appressa and rushes such as Juncus amablis and Juncus subsecundus. Forb species include Ranunculus spp., Persicaria prostrata, Wahlenbergia fluminalis, Pratea concolor and Centipeda cunninghamii. Occurs on silty-sandy loam-clay soils on levees or other raised landform elements adjacent to rivers and wetlands.

Threatened species

A database search was undertaken on 9 December 2021 of the NSW Environment, Energy and Science (BioNet Atlas) and the Department of Agriculture, Water and Environment websites to identify threatened species that may be found within the proposed project site as listed under the *Biodiversity Conservation Act 2016 and the Environmental Protection and Biodiversity Act 1999* (EPBC Act).

A desktop search of the online databases was undertaken as follows:

- NSW Environment, Energy and Science BioNet Atlas (refer to Appendix C)

- Department of Agriculture, Water and Environment, Environmental Protection and Biodiversity Conservation (EPBC) Protected Matters Report (refer to Appendix C).

Nine threatened flora species were identified in a 5km search radius, using the Protected Matters Search Tool and NSW Atlas search. Table 7 identifies these species, their threat level, predicted occurrence and a comment on their potential to occur on site. While some species have the potential to occur in the landscape, they are unlikely to occur under current and future management scenarios, therefore, they are not subject to the 'test of significance', as set out in Section 7.3 of the BC Act.

Table 7: Threatened flora with potential habitat

Scientific name	Common name	Level of threat		Suitable habitat
		State	Federal	
Amphibromus fluitans	River Swamp Wallaby-grass	V	V	No suitable habitat, River Swamp Wallaby-grass grows mostly in permanent swamps (NSW OEH 2013h) and also lagoons, billabongs, dams and roadside ditches.
Brachyscome muelleroides	Mueller Daisy		V	Unlikely habitat, grows in damp areas on the margins of claypans in moist grassland with *Pycnosorus globosus, Agrostis avenacea and Austrodanthonia duttoniana.*
Lepidium monoplocoides	Winged Peppercress	E1	E	Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by *Allocasuarina luehmannii* (Bulloak) and/or eucalypts, particularly *Eucalyptus largiflorens* (Black Box) or *Eucalyptus populnea* (Poplar Box).
Maireana cheelii	Chariot Wheels	V	V	Unlikely habitat, usually found on heavier, grey clay soils with *Atriplex vesicaria* (Bladder Saltbush). Recorded on the Hay Plain in *Atriplex vesicaria, Maireana aphylla* and *Acacia homalophylla* shrublands. Soils include heavy brown to red-brown clay-loams, hard cracking red clay, other heavy texture-contrast soils.
Pimelea spinescens subsp. spinescens	Plains Rice-flower		CE	Unlikely habitat, Plains Rice-flower occurs in lowland grassland habitats to the North and West of Melbourne with an extent of occurrence of approximately 27,500km2
Pterostylis despectans	Lowly Greenhood	E4A	E	No habitat, The New South Wales population occurs in natural forb-rich grassland on flat alluvial plains and not derived from Acacia pendula woodland.
Sclerolaena napiformis	Turnip Copperburr	E1	E	Potential habitat, highly unlikely to occur due to the location of the infrastructure in cleared / disturbed areas.
Swainsona murrayana	Slender Darling Pea		V	Potential habitat, highly unlikely to occur due to the location of the infrastructure in cleared / disturbed areas.
Swainsona plagiotropis	Red Darling-pea		V	Potential habitat, highly unlikely to occur due to the location of the infrastructure in cleared / disturbed areas.

Note V=vulnerable, E/E1 = endangered and E4A/CE = critically endangered

Threatened communities

The above-mentioned databases were also searched for threatened ecological communities (TEC). Eight TEC's were listed:

- Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions
- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions
- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Mallee Bird Community of the Murray Darling Depression Bioregion
- Natural Grasslands of the Murray Valley Plains
- Weeping Myall Woodlands
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

These communities did not occur at the proposed project site or will not be impacted upon by the proposal.

Impact assessment

A general flora assessment was conducted across the proposed project site. 15 native flora species and four weed species are expected to be encountered within the assessment footprint that is consistent with the characteristics of Murray River landscapes. The flora assessment revealed no vegetation species; populations or communities, that are of local, regional or state conservation significance (refer to Table 8). The development is designed in such a way the negate impact to all native vegetation.

Table 8: Flora species expected on-site

Scientific name	Common name	Threatened / status
Eucalyptus camaldulensis	River Red Gum	No
Acacia dealbata	Cedar Wattle	No
Acacia acinacea	Golden Dust Wattle	No
Atriplex semibaccata	Creeping saltbush	No
Poa labillardieri	Tussock grass	No
Carex tereticaulis	Sedge	No
Einadia nutans	Climbing saltbush	No
Enchylaena tomentosa	Ruby saltbush	No
Senecio glossanthus	Slender Groundsel	No
Stemodia florulenta	Blue rod	No
Vittadinia cuneata	Fuzzweed	No
* *Centaurea calcitrapa*	Star thistle	Weed

Scientific name	Common name	Threatened / status
* *Lactuca serriola*	Prickly lettuce	Weed
* *Paspalum dilatatum*	Paspalum	Weed
* *Pennisetum clandestinum*	Kikuyu	Weed

Mitigation measures

- Use existing tracks and disturbed areas to access the site
- Trimming and lopping of the minimum extent of trees below 15cm DBH
- Excavation works are not to disturb tree roots greater than 15cm diameter, to be hand excavated to reduce impact
- The tree retention zone (12x Diameter at Breast Height) shall be cordoned off and no parking or stockpiling will occur within this zone.

5.2.2 Fauna

Threatened species

A database search was undertaken on 9 December 2021 of the NSW Environment, Energy and Science (BioNet Atlas) and the Department of Agriculture, Water and Environment websites to identify threatened species that may be found within the proposed project site as listed under the *Biodiversity Conservation Act 2016* and the *Environmental Protection and Biodiversity Act 1999* (EPBC Act).

A desktop search of the online databases was undertaken as follows:

- NSW Environment, Energy and Science BioNet Atlas (refer to Appendix B)
- *Fisheries Management Act 2004*
- Department of Agriculture, Water and Environment, Environmental Protection and Biodiversity Conservation (EPBC) Protected Matters Report (refer to Appendix B).

Table 9 lists the fauna species with state and national conservation significance that have potential to occur within the study area. The column in Table 9 headed 'comment', identifies if critical habitat will be impacted. Although some habitat preference is available at the proposed works site, none of these will be impacted upon. Nine of the identified species, Sloane's Froglet, Growling Grass-frog, Silver Perch, Murray Hardyhead, Flathead Galaxias, Trout Cod, Murray Cod, Macquarie Perch and Murray Crayfish, have been assessed under the 'test of significance', as set out in Section 7.3 of the BC Act (refer Appendix F).

Table 9: Listed fauna species

Class	Species name	Common name	State	National	Comment
Reptile	*Delmar impar*	Stiped legless-lizard		V	No habitat, found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component.

Class	Species name	Common name	State	National	Comment
Aves	*Grantiella picta*	Painted Honeyeater		V	Likely habitat but no impacts, Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests.
Aves	*Hirundapus caudacutus*	White-throated Needletail		V	Unlikely habitat, more common in coastal areas, less so inland.
Aves	*Numenius madagascariensis*	Eastern Curlew		CE	Unlikely habitat, it generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts.
Aves	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	Unlikely habitat. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha spp*.) and spikerushes (*Eleocharis spp*.).
Aves	*Pedionomus torquatus*	Plains-wanderer		CE	Unlikely habitat, Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species.
Aves	*Pezoporus occidentalis*	Night Parrot		E	No habitat, The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterized by the presence of large and dense clumps of Spinifex, and it may prefer mature spinifex that is long and unburnt.
Aves	*Polytelis swainsonii*	Superb Parrot		V	Potential habitat. Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. These habitats will not be impacted due to the short duration of the project.
Aves	*Falco hypoleucos*	Grey Falcon	E1,P,2		Potential habitat. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. No impacts expected.
Aves	*Rostratula australis*	Australian Painted Snipe	E1,P	E	Unlikely habitat, inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans.
Aves	*Calidris ferruginea*	Curlew Sandpiper	E1,P	CE, Mig	No habitat. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts.
Aves	*Lathamus discolor*	Swift Parrot		CE	Potential habitat. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*.

Class	Species name	Common name	State	National	Comment
					Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*.
Aves	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		No habitat to be impacted. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.
Aves	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)	V,P		Potential habitat but will not be impacted. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.
Aves	*Stagonopleura guttata*	Diamond Firetail	V,P		Potential habitat but no impact expected. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.
Mammal	*Pteropus poliocephalus*	Grey-headed Flying Fox		V	Unlikely habitat, occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.
Mammal	*Nyctophilus corbeni*	Corben's Long-eared Bat		V	Unlikely habitat. Inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland
Mammal	*Phascolarctos cinereus*	Koala	V	V	Potential habitat. Inhabits eucalypt woodlands and forests. Feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.
Mammal	*Petaurus norfolcensis*	Squirrel glider		V	Potential habitat but will not be impacted due to the presence of surrounding habitat. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum Forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.

Class	Species name	Common name	State	National	Comment
Mammal	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tail bat		V	Potential habitat but no impacts expected. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country.
Insects	*Synemon plana*	Golden Sun Moth		CE	No habitat. Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which ground layer is dominated by wallaby grasses *Austrodanthonia spp*.
Frogs	*Crinia sloanei*	Sloane's Froglet		E	Potential habitat
Frogs	*Litoria raniformis*	Growling Grass-frog		V	Potential habitat
Fish	*Bidyanus bidyanus*	Silver Perch	V*	CE	Potential habitat nearby, no works will occur in water
Fish	*Craterocephalus fluviatile*	Murray Hardyhead		E	Potential habitat nearby, no works will occur in water
Fish	*Galaxias rostratus*	Flathead Galaxias		CE	Potential habitat nearby, no works will occur in water
Fish	*Maccullochella peelii*	Trout Cod		E	Potential habitat nearby, no works will occur in water
Fish	*Maccullochella peelii*	Murray Cod		V	Potential habitat nearby, no works will occur in water
Fish	*Macquaria australasica*	Macquarie Perch		E	Potential habitat nearby, no works will occur in water
Fish	*Euastacus armatus*	Murray Crayfish	V		Potential habitat nearby, no works will occur in water

Note V=vulnerable, P=protected, E/E1=endangered and E4/CE= critically endangered; Mig= Migratory under EPBC Act/International convention; *listed under the *Fisheries Act 1994*

Impact assessment

The proposed works will have negligible impact on fauna at the site. The development is unlikely to have any significant impact on threatened species and ecological communities due the extensive habitat surrounding the development site. The public nature of the site and location within a caravan park means this area is frequently used by park guests which can deter the presence of native fauna. The test of significance in Appendix F provides a detailed assessment of potential impacts to fauna resulting from this development.

Mitigation measures

- Ensure sediment fences are in place (as required) until the site works are stable, during and following construction
- Any open excavations left open overnight to have fauna access ramps at one end
- No excavations to be left open longer than 24hrs.

- No vegetation to be removed during construction.

5.3 Indigenous heritage

5.3.1 Environmental context

The project area is located on the Shepparton Formation and the Riverine Plains of the Murray River Basin. Riverine environments were and still are important areas for Aboriginal people. The project area is situated on the Murray riverbank, within a developed section of Floodplain Transition Woodlands, characterised as semi-arid with annual rainfall below 550 millimetres. The fertile soils of the upper floodplains and peneplain margins support woodlands 15-25 metres tall dominated almost entirely by box eucalypts. These woodlands are also characterised by a largely continuous grassy ground cover and a sparse layer of mostly sclerophyllous shrubs (Keith, 2006).

This vegetation community provides habitat for a variety of animals and would have also provided potential food and raw materials for Aboriginal people. Typical animals inhabiting this vegetation community include kangaroos, wallabies, sugar gliders, possums, echidnas, a variety of lizards and snakes, birds, as well as rats and mice. As the project area is adjacent to the Murray River, Riverine areas supported a diverse range of species that were exploited by Aboriginal communities including Murray cod, golden perch, Australian smelt, freshwater mussels, and eastern snake-necked turtle. Avian species included emu, magpie goose, Australian wood duck, black swan, and Australasian shoveler. Terrestrial species include brush tail possum, western grey kangaroo, red kangaroo, and the water rat.

The project area is likely to have provided a suitable place for food and implements to be resourced in the distant past. The prevalence of the Murray River and wetland areas in close proximity to the project area would have provided abundant seasonal food and freshwater year-round. Flora and fauna associated with the river system would have provided diversity in sustenance. The Riverine Plain provided a rich and diverse economic resource, utilised by Aboriginal people over an extended period of time from the late Pleistocene through the Holocene to the present.

5.3.2 Aboriginal Heritage Information System (AHIMS)

A basic search of the AHIMS database was conducted by Fifteen50 on 15/10/2021 for the following areas which encompasses the project area with a search buffer of 1,000m:

- Lot 4 DP560393
- Lot 5 DP560393

The search revealed 5 registered Aboriginal sites located within 1000m of the project area. A copy of the AHIMS database search is provided in Appendix A.

An extensive AHIMS search was undertaken by Austral Archaeology on 30/9/2021 which identified 23 Aboriginal archaeological sites within a 12 x 10 km search of the proposed project area. None of these registered sites are located within the project area.

Table 10: AHIMS sited identified within 15 km of the project area (Source: Austral Archaeology)

Site type	Occurrence
Modified tree (carved or scarred)	16
Earth mound, shell, artefact	3
Burial	2

Site type	Occurrence
Shell	1
Shell, Artefact, Hearth	1
Total	**23**

5.3.3 Impact assessment

Despite the lack of existing registered Aboriginal sites located within the project area and within close vicinity (200 metres), the Murray River is classified as a culturally sensitive landform which is an indication of past Aboriginal occupation. A lack of registered sites in an area can also be an indication of a lack of archaeological investigation and research undertaken.

The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010) was reviewed to determine if further impact assessment is required, including the requirement for an Aboriginal Heritage Impact Permit (AHIP) for the proposed development.

This code sets out the reasonable and practicable steps that individuals and organisations need to take in order to:

1) Identify whether or not Aboriginal objects are, or are likely to be, present in an area
2) Determine whether or not their activities are likely to harm Aboriginal objects (if present)
3) Determine whether an AHIP application is required
4) In following the generic due diligence process, the following processes have occurred (refer to Table 11 which was summarised from Austral Archaeology's Due Diligence report in Appendix D)

Table 11: Aboriginal heritage due to diligence process

Step	Guide	Response
1a. Will the proposed activity disturb the ground surface or any recorded culturally modified trees?	Review project footprint in relation to the AHIMS search to determine whether the proposed activity will disturb the ground surface or involve vegetation clearance including lopping.	**Yes** - move to step 2a(i)
2a(i). Search the AHIMS database and determine whether any Aboriginal sites have been recorded in or within 15,000 metres of the project area.	If not already undertaken, undertake 'basic' AHIMS search of the project area Lot and DP. Append AHIMS basic search results ☒	**23 sites recorded**- go to step 2a(iii)
2a(ii). Obtain copies of AHIMS records	If not already undertaken from step 2, undertake 'extensive' AHIMS search of the project area Lot and DP. Append AHIMS extensive search results ☒ Map project area and all AHIMS results using GDA94 latitude and longitude data.	Number of Aboriginal objects in the searched area: 23 These sites are located within 15km of the project area but are not located within the project area.

Step	Guide	Response
	If not already undertaken at step 2 above, map AHIMS results and append ☒ Request and review copies of all site cards within the searched area. Append all site cards ☒	
2a(iii). Review other sources of information to determine whether Aboriginal objects are likely to be present in the project area?	If you are aware of other sources of information, you need to use these to identify whether or not Aboriginal objects are likely to be present in the project area. Previous studies ☒ Previous reports ☒ Previous archaeological survey ☒ Review relevant Local Environmental Plan, notably Schedule 5 and maps ☐ Other ☐ Append results ☐	• Site types with the potential to occur include ovens, scarred trees, middens, burials and artefacts. • Shell middens, ovens and scarred trees are the most frequently occurring site type and are often identified on the banks of rivers or creeks. • Middens are generally located near water and resource collection, although are in locations that do not flood. • Scarred trees are often located in the flood plain river corridor. • Burials are likely to be found in sandy deposits, along watercourses, in well-drained areas; • Artefact scatters are most likely to occur on well-drained and raised, level ground, near sources of freshwater or wetlands, or along spur crest or ridgelines. See Appendix D.
2b. Having regard to landscape features, are Aboriginal objects likely to be present in the project area?	Is any part of the proposed activity on land that is not disturbed land and: Within 200 metres of waters? ☒ Within a sand dune system? ☐ On a ridge top, ridge line or headland? ☐ Within 200 metres below or above a cliff face? ☐ Within 20 metres of, or in a cave, rock shelter, or a cave mouth? ☐ Append mapped results ☒	**Yes** - The project area is located in close proximity to several culturally sensitive landforms which are an indication of past Aboriginal occupation. These include Riverine floodplains and the Murray River. Areas that have not been as heavily disturbed may contain previously unrecorded cultural material.
3. Can you avoid harm to the object or disturbance of the landscape feature?	Where, because of step 2a(i, ii, iii) you think it is likely that there are Aboriginal objects present in the	**No** - As the works will include maintenance works for the bank, harm cannot be avoided. Therefore, both the river and the landforms will be

Step	Guide	Response
	project area, describe whether you can avoid harm to those objects. Where you have checked any boxes in step 2b above, describe whether you can redesign the project area to avoid the landscape feature(s). Append results ☐	impacted by the proposed upgrades to the bank.
4. Engage heritage consultant to undertake visual inspection and desktop assessment for the purposes of due diligence.	Undertake a desktop assessment of Aboriginal heritage. This must consider the project area as a whole, not just the particular area(s) where Aboriginal object(s) have been recorded on AHIMS or where landscape features are located. At a minimum this should include existing knowledge of Aboriginal cultural heritage from previous reports or studies, including any reports from AHIMS. Append results of the desktop assessment ☒ Undertake a visual inspection of the project area to determine whether Aboriginal objects are present, or likely to be present in the project area. Ground truth recorded Aboriginal objects in and adjacent to the project area. The visual inspection must be undertaken by a person with expertise in locating and identifying Aboriginal objects, i.e., a consultant with appropriate qualifications, or an Aboriginal person or landholder with experience in locating and identifying Aboriginal objects. Append results of the visual inspection ☒	A formal Aboriginal Cultural Heritage Due Diligence Assessment has been developed to assess the impact of the proposed development. See Appendix D.
5. Further investigations and impact assessment	Step 5 must be undertaken by a person with expertise in Aboriginal cultural heritage management.	A formal Aboriginal Cultural Heritage Due Diligence Assessment has been developed to assess the impact of the proposed development. See Appendix D.

5.4 Water quality and hydrology

5.4.1 Existing environment

The site is located adjacent to the Murray River within Merool Holiday Park. Water quality of the Murray River in the Echuca-Moama region presents with high levels of turbidity. This is created through irrigation practices, fluctuating river water levels, rainfall run-off, de-vegetation of riverbanks and wave actions from boat traffic. On visual inspection, the water quality at the site is no better or worse than other areas in the vicinity.

Stormwater runoff from the river frontage and surrounding cabins ultimately flows down the slopes to the river and contributes to some of the erosion experienced at the site.

5.4.2 Impact assessment

The proposed rehabilitation works will be constructed during a period of low river flow. Bank reshaping works are required in order for the geotextile membrane and rock beaching to be placed correctly along a stable grade. This will involve mechanical excavation works which creates a surface that has potential for sedimentation of the waterway. Construction will be undertaken during dry conditions where sedimentation and erosion control measures can be in place. Earthworks in water would result in a temporary increase in river turbidity.

This temporary disturbance to water quality is viewed to be insignificant compared to the long-term benefits of the rehabilitation works. Improved bank stability with rock beaching will prevent further erosion from occurring, as well as provide time for revegetation to take place of the top of the stabilised banks. Hence the works will contribute to a decrease in sedimentation of the waterway.

5.4.3 Mitigation measures

- Timing construction works to take place during dry weather and low-flow river levels where possible.
- Re-direct stormwater flow paths from cabins away from rehabilitated river frontage
- Environmental safeguards (silt curtains, sediment fences) shall be installed consistent with Managing Urban Stormwater: Soils and Construction (Blue Book) for the duration of construction.
- Only clean rock (no fines) shall be used in construction of the works.
- No snags are to be removed from the waterway to facilitate construction

5.5 Soils

5.5.1 Existing environment

The soils associated with the subject land are predominately grey silty clays overlaying hard riverine grey mottled clay. These soils are common on the riverine environment and are derived from alluvial material. Topographical variation across the site is negligible. The soil proves to actively erode in the presence of high velocity water as evident by the sheer faces of riverbank where the proposed works are targeted. Without reinforcement, the riverbank will continue to erode and encroach on existing infrastructure in the park.

5.5.2 Impact assessment

Reshaping of the river embankment in targeted locations will be required. The purpose of the reshaping is to provide a stable surface that can be lined with uniform, clean rock. Rock beaching placement will improve the stability of the banks and prevent further erosion of the soil from taking place.

5.5.3 Mitigation measures

- None required

5.6 Traffic and access

5.6.1 Existing environment

The sites of the proposed development are located along the river frontage boundary of Merool Holiday Park. There is currently an internal road and informal footpaths leading to the riverbanks, and there are structures in the vicinity such as decking, pipelines, pontoons, fencing and stairs within Impact assessment.

Vehicular entry to the site is via Merool Road and through existing formed and sealed roads through Merool Holiday Park. The proposed development will not cause an increase in traffic volume on the local road network due to the nature of works.

5.6.2 Impact assessment

The impact of any traffic changes or access issues during the construction phase of the proposed development will be minor and temporary in nature. Construction equipment and vehicles will enter the site through the main entry point in Merool Holiday Park and completely avoid tree-covered areas located along the bank of the Murray River.

5.6.3 Mitigation measures

- Construction traffic management will be limited to that required for the management of vehicles on site. Set down of materials will occur inside the compound where public access is excluded.

5.7 Waste storage and management

5.7.1 Existing environment

There is currently no waste generated at the site as it is only used by people who are accessing the Murray River by foot across decking and stairs to reach a boat. In other areas of the park, there are bins for rubbish going to landfill and recycling facilities for users of the park.

5.7.2 Impact assessment

Construction activities will generate human waste, soft rubbish and hard rubbish. During construction, there will be a skip bin present to store hard rubbish and it will be emptied appropriately every time it reaches full capacity. Bins for rubbish going to landfill and recycling facilities will be provided for construction workers and emptied daily to keep the site clean and contained.

When the proposed development is constructed, the skip bins will be taken away.

5.7.3 Mitigation measures

- Provision of waste storage facilities during and after construction.

5.8 Noise

5.8.1 Existing environment

The acoustic environment at the site is considered typical for a rural area. Pre-development noise is limited to passing cars and low noise generating activities. The site is surrounded by vegetation with few established buildings within 300m. The nearest residence to the site is approximately 500m away.

5.8.2 Impact assessment

During construction, there will be an increase in the amount of noise in the vicinity of the works, largely due to the machinery and equipment required. These impacts are considered low due to the following:

- Works will be undertaken during standard construction work hours:
  - 7am - 6pm Monday to Friday and 8am – 12noon on Saturday
- Short-term nature of the works
- Location of nearby residential properties.

After completion of the development, there will be no increase in noise associated with the works.

5.8.3 Mitigation measures

- Neighbouring properties in the vicinity of the area will be informed of the commencement of proposed works
- Works will commence and cease at nominated times
- Works not to be undertaken after hours on weekends and/or public holidays.
- Works during construction will be in accordance with noise limit requirements outlined, within EPA and Local Government guidelines

5.9 Visual impact

5.9.1 Existing environment

The site is located in an area of disturbed and previously cleared land along the bank of the Murray River, within Merool Holiday Park boundary. The riverbank presents as a natural feature in the landscape with modifications present in the form of walkways and pontoons for mooring of boats. These structures provide some stability of the riverbank, however they are inconsistent in size, type, location and construction standard. There is an existing dilapidated retaining wall along the waterfront. There are cabins located along the top of the riverbank which are a visual impact to the natural amenity of the environment.

5.9.2 Impact assessment

The new rock beaching in the proposed development will be visible and a change to current conditions. While the rocks will minimise further erosion from occurring, it will also enhance the surrounding environment by providing a uniform riverbank. The overall visual amenity will increase as a result of these works. The rock beaching will be complimented with native vegetation plantings which will promote the regeneration of the river frontage. Over time, vegetation will likely establish in the gaps of the beaching which will act as a natural screen.

Alternative options such as retaining walls would rectify the erosion issue, however, have a much larger negative impact on the visual amenity of the site.

5.9.3 Mitigation measures

- The rehabilitation works proposed are natural in the form of visible rock beaching. Geotextile membrane underneath the rock beaching will not be visible.
- Native vegetation plantings will compliment the rock beaching work
- Engineered structures will be avoided (i.e retaining walls)
- Dilapidated structures will be cleaned up during construction to improve the visual amenity at the site

5.10 Social impact

5.10.1 Existing environment

The current site has some social importance as a hub for water-based recreational activities which are close to accommodation at Merool Holiday Parks.

5.10.2 Impact assessment

The proposed development is likely to result in positive social impacts due to improvement of visual landscape at the site as well as assuage general concerns about further erosion of the banks. The rehabilitation works will allow for the continued safe usage of cabins, decking and stairs around the site.

No impacts to neighbouring properties are expected.

5.10.3 Mitigation measures

- Timing of construction works to be managed by contractor whilst working with Tasman Tourism at Merool Holiday Park, to minimise disruption to park and local residents.

5.11 Air quality

5.11.1 Existing environment

Air quality on the subject land is generally very good with no polluting industries located nearby that affect quality.

5.11.2 Impact assessment

Vehicle emissions during construction are the largest impact to air quality resulting from the development. The short-term nature of the construction project means these impacts will be very low. There will be no long-term effects to the air quality surrounding the immediate area. Clean rock with no fines will be used for the rock beaching to reduce dust and sedimentation of the waterway.

5.11.3 Mitigation measures

- Areas of surface disturbance will be limited to only what is necessary for construction
- Working areas will be stabilised as soon as possible to reduce amounts of windblown dust
- Machinery and equipment will not be left idling during construction and be turned off when not in use.
- Works during construction will be in accordance with air emissions limit requirements outlined, within EPA and Local Government guidelines.
- No fires will be lit onsite to burn waste or materials. Fires are prohibited onsite and within area of proposed works.
- Clean rock will be used for rock beaching to minimise dust generation.

6. Environmental management

To minimise any potential impacts of the proposal, a number of environmental safeguards have been identified in Table 12

Table 12: Summary of mitigation measures

Impact	Mitigation measure
Land Use	• The construction footprint will be limited to specific areas of bank erosion which are in need of rehabilitation (see Appendix A for the area of works).
Biodiversity	• Use existing tracks and disturbed areas to access the site • Trimming and lopping the minimal extent of trees below 15cm DBH • Excavation works are not to disturb tree roots greater than 15cm diameter. To be hand excavated to reduce impact • Tree retention zone to be cordoned off and no parking or stockpiling of materials to occur within this zone • Native vegetation removal will be avoided • Weed management prior to, during and after construction • Revegetation measures will be arranged as part of the rehabilitation works
Indigenous heritage	• A due diligence process has been undertaken in Section 5.3 of this report which has identified the need for a formal Aboriginal Due Diligence Assessment to be undertaken by a heritage consultant. This report is attached as Appendix D. • In addition, the following Aboriginal objects or sites finds management process must be followed: – If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking earthwork activities, the proponent must: – Not further harm the object – Immediately cease all work at the particular location – Secure the area so as to avoid further harm to the Aboriginal object – Notify OEH as soon as practical on 131555, providing any details of the Aboriginal object and its location – Not recommence any work at the particular location unless authorised in writing by OEH.
Water quality and hydrology	• Timing construction works to take place during dry weather and low-flow river levels where possible. • Redirect stormwater flow paths from cabins away from rehabilitated river frontage • Environmental safeguards (silt curtains, sediment fences) shall be installed consistent with Managing Urban Stormwater: Soils and Construction (Blue Book) for the duration of construction • Only clean rock (no fines) shall be used in construction of the works. • No snags are to be removed from the waterway to facilitate construction
Soils	• None required

Impact	Mitigation measure
Traffic and access	• Construction traffic management will be limited to that required for the management of vehicles on site. Set down of materials will occur inside the compound where public access is excluded.
Waste storage and management	• Provision for waste storage facilities during and after construction followed by a waste management system implemented by the proponent.
Noise	• Neighbouring properties in the vicinity of the area will be informed of the commencement of proposed works • Works will commence and cease at nominated times • Works not to be undertaken after hours on weekends and/or public holidays.
Visual	• The rehabilitation works proposed are natural in the form of visible rock beaching. Geotextile membrane underneath the rock beaching will not be visible. • Native vegetation plantings will complement the rock beaching work • Engineered structures will be avoided (i.e retaining walls) • Dilapidated structures will be cleaned up during construction to improve the visual amenity at the site
Social	• Timing of construction works to be managed by contractor whilst working with Tasman Tourism at Merool Holiday Park, to minimise disruption to park and local residents.
Air quality	• Areas of surface disturbance will be limited to only what is necessary for construction • Working areas will be stabilised as soon as possible to reduce amounts of windblown dust • Machinery and equipment will not be left idling during construction and be turned off when not in use. • Works during construction will be in accordance with air emissions limit requirements outlined, within EPA and Local Government guidelines. • No fires will be lit onsite to burn waste or materials. Fires are prohibited onsite and within area of proposed works. • Clean rock will be used for rock beaching to minimise dust generation.

7. Conclusion

This SEE has assessed the proposal under the Murray LEP 2011 and Part 4 of the EP&A Act, and has concluded that the construction of the proposed development will have minimal impact, will have non-significant ongoing impacts and will have more positives than negatives.

The issues discussed in this SEE include construction and ongoing (operational) impacts. However, these impacts are considered minor provided the mitigation measures are implemented.

8. References

DECCW. (2010). *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW.* Sydney, NSW.

Keith, D. (2006). *Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT.* Sydney: Department of Environment and Conservation NSW.

APPENDIX A

Development plan

PROJECT SCOPE

1. PROPOSED WORK INCLUDE:
   - 1.1. RE-GRADING THE BANK INFILLING ERODED AREAS
   - 1.2. ROCK ARMORING OF RIVERBANK FOR SITE 1 AND SITE 2
   - 1.3. RE-VEGETATION OF DISTURBED LANDS

GENERAL SPECIFICATIONS

2. ALL OH&S REQUIREMENTS ARE TO BE MET AS PER AS2865 (2009).
3. SITE ACCESS IS TO BE DETERMINED BY THE SUPERINTENDENT AND IS TO BE AGREED UPON WITH COUNCIL
4. ALL WORKMANSHIP AND MATERIALS SHALL COMPLY WITH THESE DRAWINGS AND RELEVANT AUSTRALIAN STANDARDS
5. THE CROSS SECTIONS SHOWN SHALL REFEREED AS INDICATOR OF EXTENT OF WORK AND THE AREAS IN-BETWEEN CROSS SECTIONS NEED SIMILAR OR FLATTER ROCK ARMOR BATTER. IDEALLY BATTER SHALL NOT BE LESS THAN 1H:1V AND MORE THAN 1H:2V. ANY DEVIATION BETWEEN DRAWINGS NOTES AND TECHNICAL SPECIFICATION IS TO BE RAISED WITH THE SUPERINTENDENT PRIOR TO CONSTRUCTION.
6. MINIMUM THICKNESS OF ROCK ARMORING SHALL 400mm AND NOT TO BE MEASURED FROM CROSS SECTIONS.
7. SITE TO BE EXCAVATED ONLY TO ESTABLISH FIRM BASE FOR ROCK PLACEMENT AND PRIOR APPROVAL FROM SUPERINTENDENT SHALL BE TAKEN BEFORE EXCAVATION.
8. TOPSOIL TO BE KEPT SEPARATE AND SPREAD OVER DISTURBED AREAS AT COMPLETION OF WORKS.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONFIRM THE LOCATION AND DEPTH OF ALL OBSTRUCTIONS AND UNDERGROUND SERVICES IN THE VICINITY OF THE PROPOSED WORKS PRIOR TO THE COMMENCEMENT OF ANY WORKS.
7. ALL SURFACES TO BE COMPLETED TO FINISHED SURFACE LEVEL.
8. ALL TRUCKS TRANSPORTING DEBRIS FROM THE SITE MUST BE COVERED.
9. CONSTRUCTION WORK IS PERMITTED ON THE SITE BETWEEN THE HOURS OF 7am-5pm MONDAY TO SATURDAY INCLUSIVE. NO WORK IS PERMITTED ON SUNDAYS OR PUBLIC HOLIDAYS. NOISE CONTROLS SET OUT IN COUNCIL CONSENT MUST BE ADHERED TO. WORK OUTSIDE OF THE HOURS SPECIFIED SHALL NOT BE UNDERTAKEN WITHOUT THE WRITTEN APPROVAL OF COUNCIL'S SUPERINTENDENT.
10. ALL CONSTRUCTION MATERIALS AND MACHINERY MUST BE KEPT WITHIN WORKSITE.
11. ALL ASSETS MODIFIED OR DAMAGED BY THE PROPOSED WORKS SHALL BE REINSTATED TO THE SATISFACTION OF THE SUPERINTENDENT.

ROCK MATERIALS

12. ROCK SHOULD NOT BE ADVERSELY AFFECTED BY REPEATED WETTING AND DRYING AND SHALL HAVE A CRUSHING STRENGTH OF NOT LESS THAT 25 MPa
13. GRANULAR FILTER TO BE CRUSHED ROCK NDCR 20 mm
14. D50 ROCK MUST MEET THE FOLLOWING SPECIFICATION:

Equivalent Spherical Diameter	Percent (By weight) of rock of smaller size
1.5 - 2.0 D_{50}	100%
D_{50}	50%
0.3 - 0.4 D_{50}	10-20%
0.1 - D_{50}	< 5 %

ROCK SUPPLY AND PLACEMENT

11. SUPPLY AND PLACEMENT OF ROCK TO BE IN ACCORDANCE WITH THESE DRAWINGS AND ONSITE DIRECTION BY DESIGN ENGINEER OR SITE SUPERINTENDENT.
12. ROCK SHALL BE CAREFULLY PLACED BY BUCKET FROM A LOADER OR EXCAVATOR FROM NO GREATER THAN 1.0 m ABOVE THE MATERIAL ONTO WHICH IT IS TO BE PLACED.
13. ROCK SHALL BE WORKED INTO PLACE SO AS TO PRODUCE A BLANKET OF INTERLOCKING ROCK THAT HAS NO SIGNIFICANT VOIDS.
14. BIDIM A44 SHALL BE USED AS GEOFABRIC.
15. GEOFABRIC TO BE LAYERED IN SECTIONS PERPENDICULAR TO FLOW DIRECTION FROM DOWNSTREAM TO UPSTREAM WITH 500mm OVERLAP.
16. GRADING SHALL PRODUCE A CONSISTENT MIX OF ROCK SIZES.
17. FINISHED SURFACE OF ROCK IS TO BE ROUGH AND ON DESIGN GRADE.
18. EXCESS SOIL FROM EARTHWORKS SHOULD BE SPREAD OVER ROCK PROTECTION WORKS FOLLOWING FINAL ROCK PLACEMENT.

EXCAVATION

19. ALL EARTHWORKS SHALL COMPLY AS3798 - GUIDLINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS.
20. ALL FILL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 200mm WHEN MEASURED LOOSE. EACH LAYER SHALL BE COMPACTED TO A OPTIMUM MOISTURE CONTENTS (-1% TO +3%) TO ACHIEVE A DRY DENSITY IN ACCORDINACE WITH AS 1289.5.1.1 AT THE SURFACE LEVEL AND AT 200mm BELOW SURFACE LEVEL.
21. ALL DISTURBED SURFACES ARE TO BE TOP SOILED AND RE-VEGETATED WITH COUNCIL APPROVED SPECIES.
22. EXCAVATION SHALL BE UNDERTAKEN IN A MANNER THAT MINIMIZES DISTURBANCE TO MATERIAL OUTSIDE THE LIMITS OF THE BATTERS.

REHABLITATION OF DISTURBED AREAS

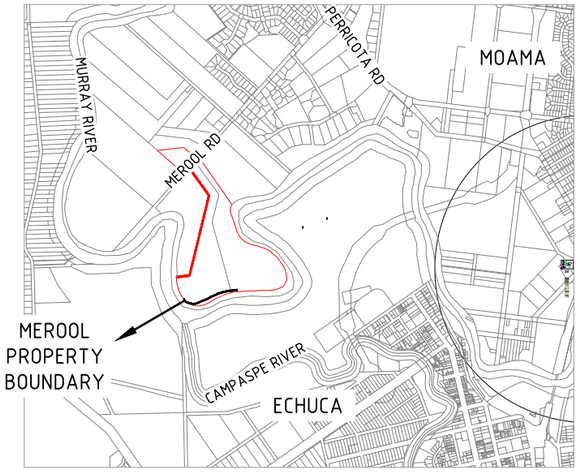
23. REHABILITATION OF DISTURBED AREAS SHALL NOT BE UNDERTAKEN UNTIL THE PREPARED AREA HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE DESIGN AND BEEN APPROVED BY THE SUPERINTENDENT.
24. ALL STRUCTURES INCLUDING PONTOONS TO BE REINSTATED AFTER COMPLETION OF CONSTRUCTION
25. RE-VEGETATION AREA IS GENERALLY IN VICINITY OF 5m ABOVE STAR PICKET EXPECT RETAINING WALLS. IN CASE OF RETAINING WALLS VEGETATION AREA IS UP-TO TOE OF THE WALL.

ENVIRONMENTAL

26. THE CONTRACTOR SHALL ENSURE THAT NOISE AND AIR EMISSIONS DURING CONSTRUCTION ARE WITHIN EPA AND LOCAL GOVERNMENT LIMITS.
27. CONTRACTOR TO COMPLETE WORKS IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN. ADEQUATE EROSION AND SEDIMENT CONTROLS MUST BE IN PLACE FOR THE DURATION OF CONSTRUCTION AND BE MAINTAINED BY THE CONTRACTOR.
28. NO FIRES ARE TO BE LIT OR WASTE MATERIALS BURNT ON THE SITE.
29. CONTRACTOR TO MINIMISE DUST GENERATION AT ALL TIMES THROUGHOUT CONSTRUCTION BY WATER APPLICATION ON AS-NEEDS BASIS.
30. ALL MACHINERY AND MATERIALS TO BE LOADED/UNLOADED WITHIN WORKSITE.
31. CONTRACTOR TO DEMONSTRATE ADHERENCE TO 'COME CLEAN, GO CLEAN' PRINCIPLE BY PROVIDING EVIDENCE OF PLANT WASHDOWN RECORDS TO THE SUPERINTENDENT, PRIOR TO PLANT MOVEMENT ON/OFF SITE. THE 'SITE' INCLUDES THE LOCATION OF THE BORROW PIT EXCAVATION.

SURVEY

32. ALL LEVELS ARE TO A.H.D.
33. ALL CHAINAGES AND LEVELS ARE IN METRES, DIMENSIONS FOR DETAILS AS SHOWN.



LOCALITY PLAN
SCALE 1:20,000

DRAWING INDEX

WARNING

BEWARE OF UNSTABLE BANK

THE STATE OF BANK AT SOME LOCATIONS ARE HIGHLY UNSTABLE AND HIGHLY UNSUITABLE FOR CONSTRUCTION EQUIPMENT. CONSTRUCTION EQUIPMENT MOVEMENT PATHS FOR WORK PURPOSE SHALL BE REVIEWED FOR SUITABILITY BY SUPERINTENDENT BEFORE MOBILIZATION

Rev.	Description	Drn	Ckd	App	Date
B	ISSUED FOR CLIENT REVIEW	H.S	H.S	N.H	29/03/2022
A	ISSUED FOR CLIENT REVIEW	H.S	S.W	N.H	18/11/2021

DOCUMENTS ISSUED DO NOT BEAR ORIGINAL SIGNATURES. EVIDENCE OF VERIFICATION AND APPROVAL MAY BE OBTAINED FROM THE COMPANY.

Scale: VARIES | Sheet: A1

	Name	Date
Drawn	H. SINGH	28/10/21
Design	H. SINGH	28/10/21
Checked	S. WALES	28/10/21
Discipline Head	N. HEINRICH	29/10/21
Job Manager	S. WALES	29/10/21

Client: tasman HOLIDAY PARKS

FIFTEEN50

Project: MEROOL RIVER BANK REHABILITATION

Title: COVER SHEET

Drawing Status: FOR REVIEW

Drawing No. 21091-01 | Sheet. 01/06 | Rev. B

N

LEGEND:

D_{50} 450 mm ANGULAR ROCK ON 2H:1V

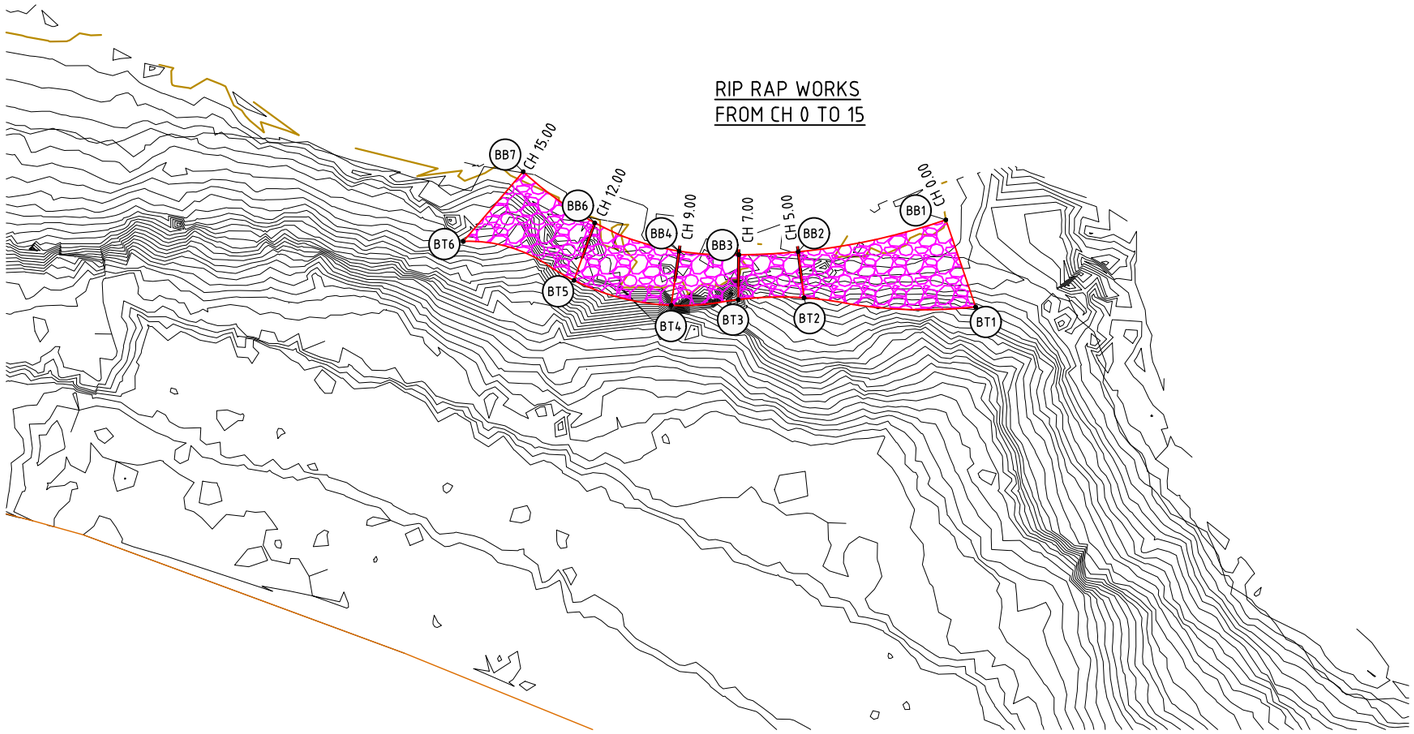
D_{50} 450 mm ANGULAR ROCK ON 2H:1V TO 1H:1V

D_{50} 450 mm ANGULAR ROCK ON 1H:1V

(BTX) ROCK BEACHING TOP SET OUT POINTS

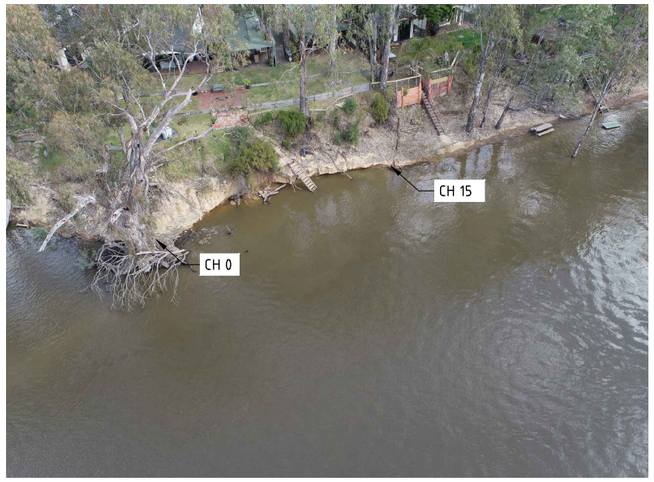
(BBX) ROCK BEACHING BOTTOM SET OUT POINTS

RIP RAP WORKS FROM CH 0 TO 15



SITE 1

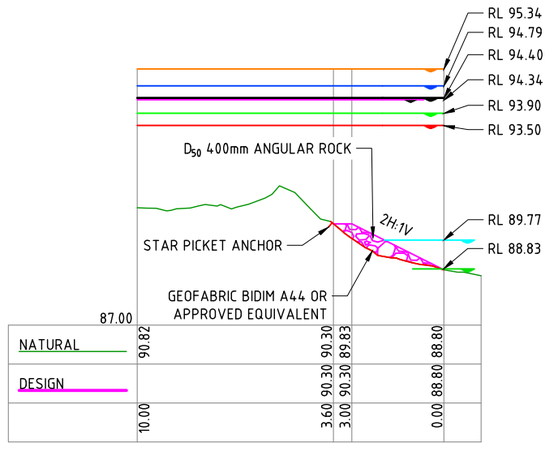
SCALE 1:200



SITE 1 - PHOTO

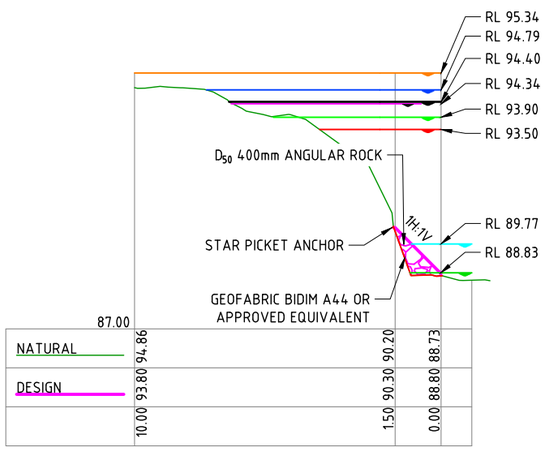
QUANTITIES			
ROCK COMPOSITION	ROCK SIZE	VOLUME	WEIGHT
	(mm)	(m^3)	TONNES
D_{50}	400.0	50.0	130.0
GEOTEXTILE AREA = 50 m^2			

FLOOD LEVELS	
FLOOD TYPE	RL mAHD
DESIGN FLOOD (1 in 100 YEAR)	95.34
DESIGN FLOOD (1 in 20 YEAR)	94.79
BOM MAJOR FLOOD EVENT	94.40
DESIGN FLOOD (1 in 10 YEAR)	94.34
BOM MODERATE FLOOD EVENT	93.90
BOM MINOR FLOOD EVENT	93.50
PEAK WATER LEVEL (18/10/2021)	89.77
SURVEY WATER LEVEL (27/09/2021)	88.83



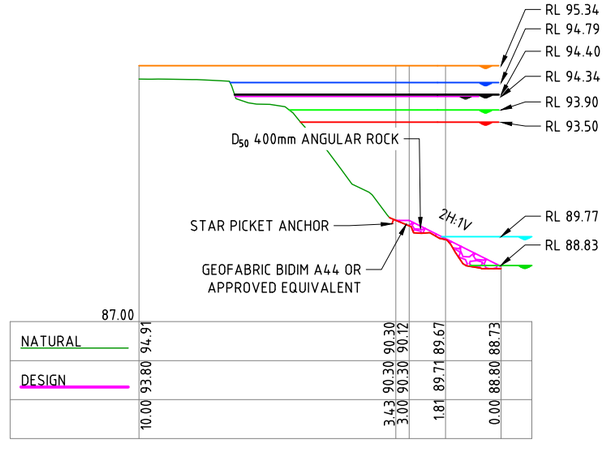
SECTION AT CH. 0.00

SCALE 1:100



SECTION AT CH. 12.00

SCALE 1:100



SECTION AT CH. 15.00

SCALE 1:100

1:100 0 2 4 6 8 10m

2 1 AT A1

Rev.	Description	Drn	Ckd	App	Date
B	ISSUED FOR CLIENT REVIEW	H.S	H.S	N.H	29/03/2022
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Scale: VARIES | Sheet: A1

	Name	Date
Drawn	H. SINGH	28/10/21
Design	H. SINGH	28/10/21
Checked	S. WALES	28/10/21
Discipline Head	N. HEINRICH	29/10/21
Job Manager	S. WALES	29/10/21

Client: tasman HOLIDAY PARKS

FIFTEE50

Project: MEROOL RIVER BANK REHABILITATION

Title: SITE 1 - PLAN AND CROSS-SECTION

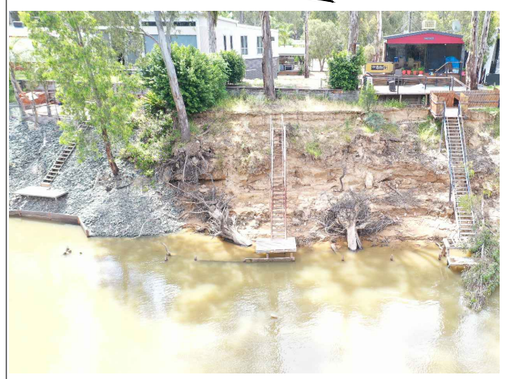
Drawing Status: FOR REVIEW

Drawing No. 21091-02 | Sheet. 02/06 | Rev. B

RIP RAP WORKS
FROM CH 60 TO 240

SITE 2

1:250 0 5 10 15 20 25m
5 4 3 2 1 AT A1

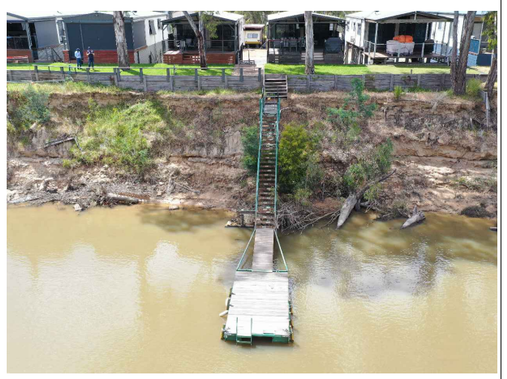


CH60 START OF WORKS

CH110 TO 130

CH185 TO CH 195

CH195 TO 210



CH228 TO CH 240 END OF WORKS

Rev.	Description	Drn	Ckd	App	Date
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Job Manager	S. WALES	29/10/21

Client: tasman HOLIDAY PARKS

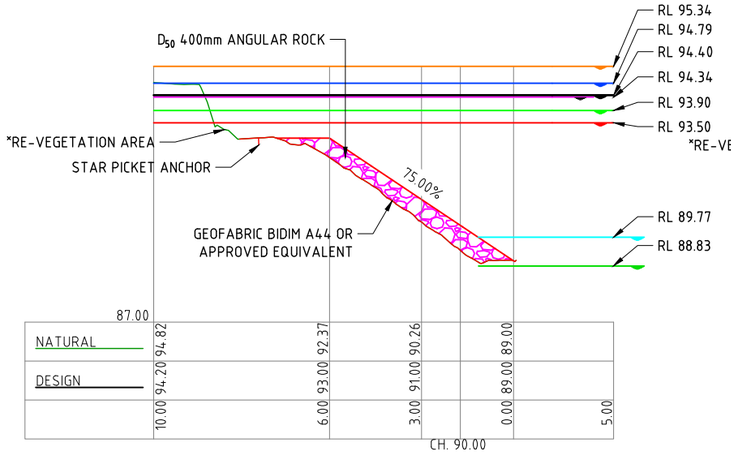
FIFTEE50

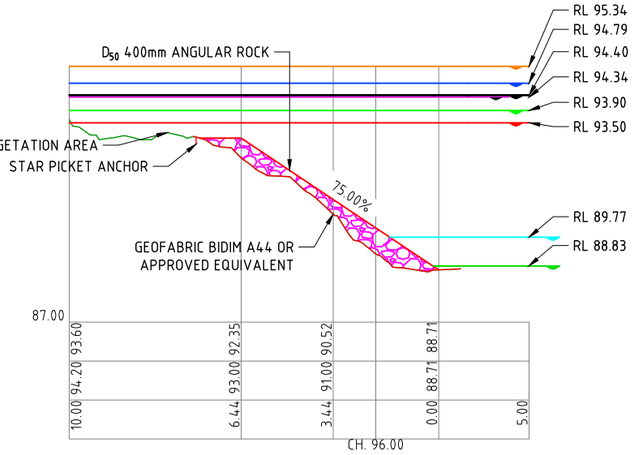
Project: MEROOL RIVER BANK REHABILITATION

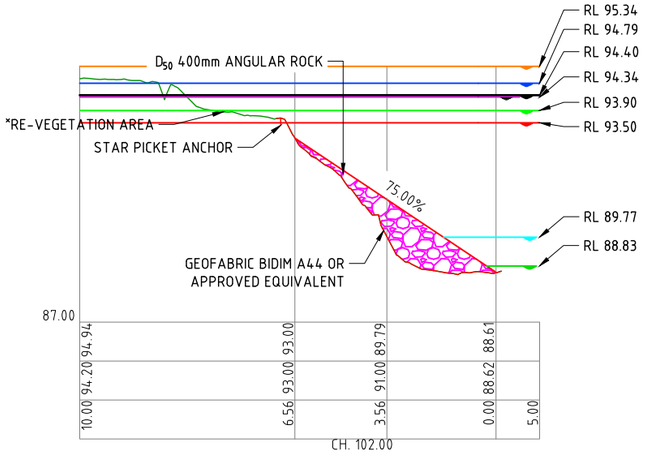
Title: SITE 2- PLAN

Drawing Status: FOR REVIEW

Drawing No. 21091-03 | Sheet. 03/06 | Rev. B

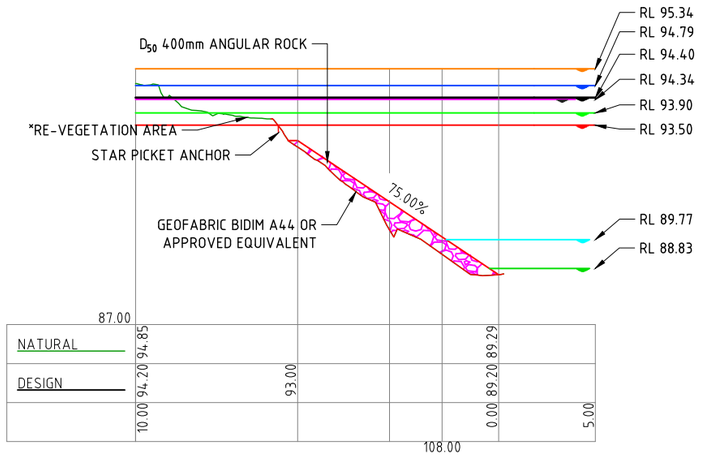


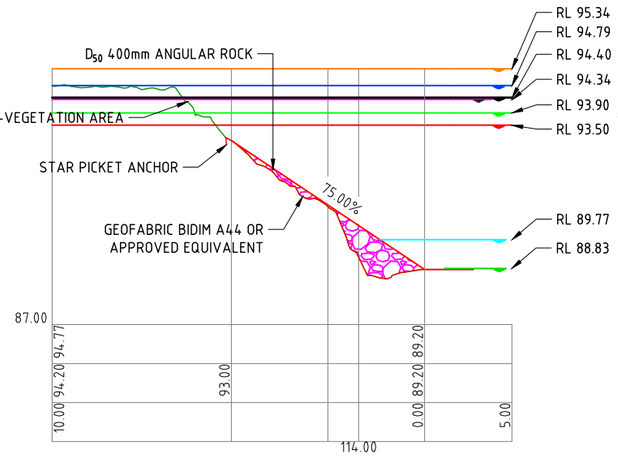


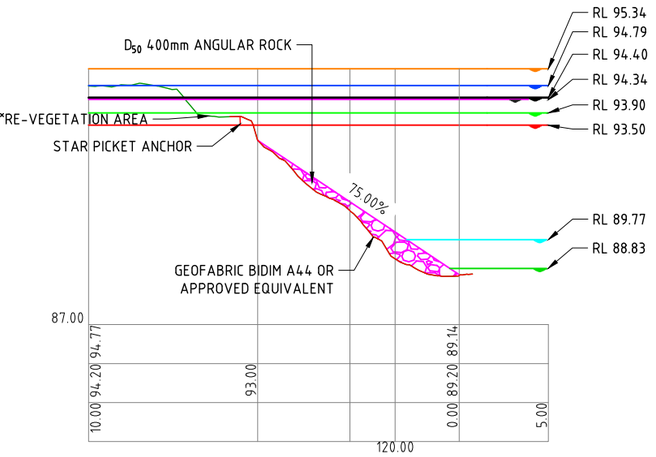


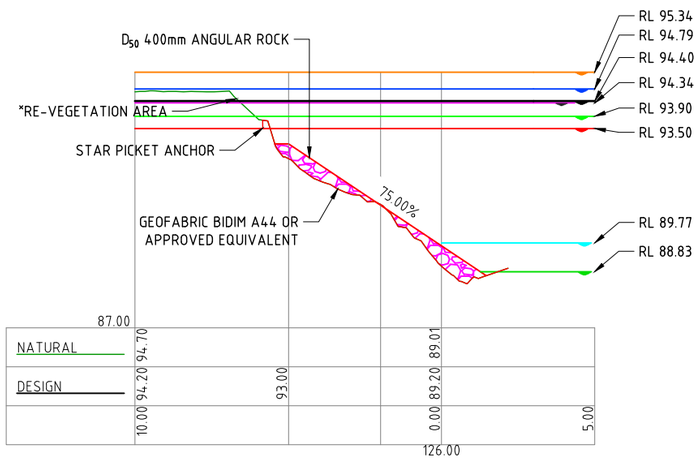
*REFER NOTE 25 SHEET 1 FOR RE-VEGETATION AREA DETAILS

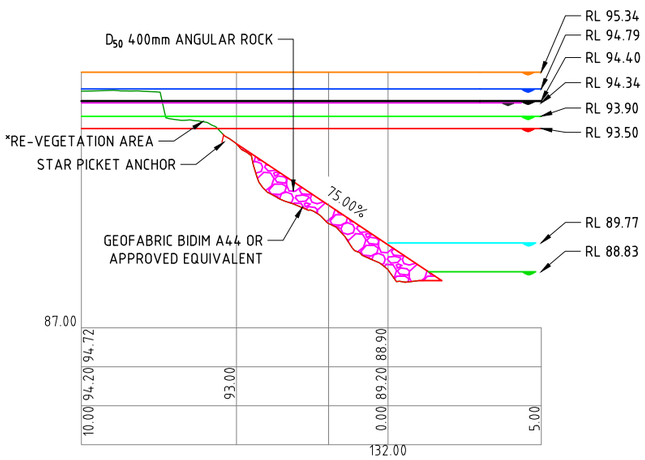
FLOOD LEVELS	
FLOOD TYPE	RL mAHD
DESIGN FLOOD (1 in 100 YEAR)	95.34
DESIGN FLOOD (1 in 20 YEAR)	94.79
BOM MAJOR FLOOD EVENT	94.40
DESIGN FLOOD (1 in 10 YEAR)	94.34
BOM MODERATE FLOOD EVENT	93.90
BOM MINOR FLOOD EVENT	93.50
PEAK WATER LEVEL (18/10/2021)	89.77
SURVEY WATER LEVEL (27/09/2021)	88.83

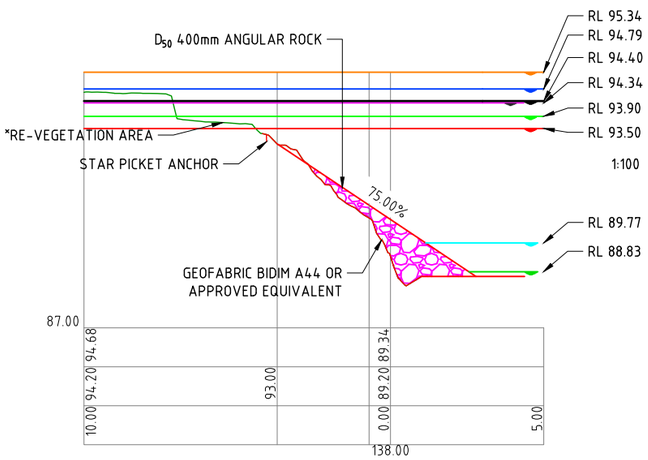












1:100

0 2 4 6 8 10m
2 1 AT A1

WARNING

BEWARE OF UNDERGROUND SERVICES

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Job Manager	S. WALES	29/10/21

Client: tasman HOLIDAY PARKS

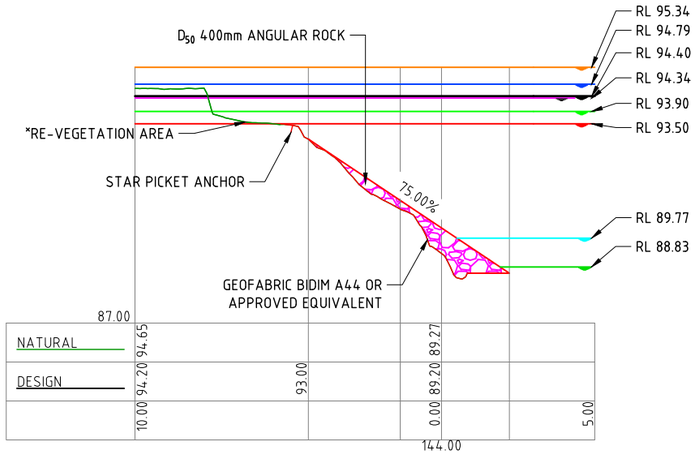
FIFTEE50

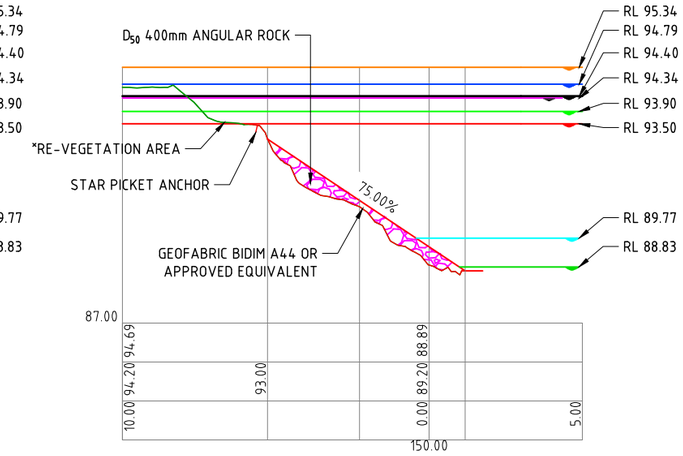
Project: MEROOL RIVER BANK REHABILITATION

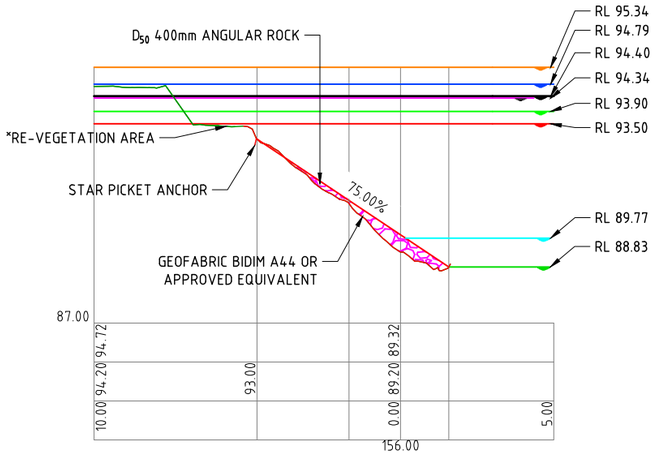
Title: SITE 2- CROSS-SECTIONS SHEET 1 OF 3

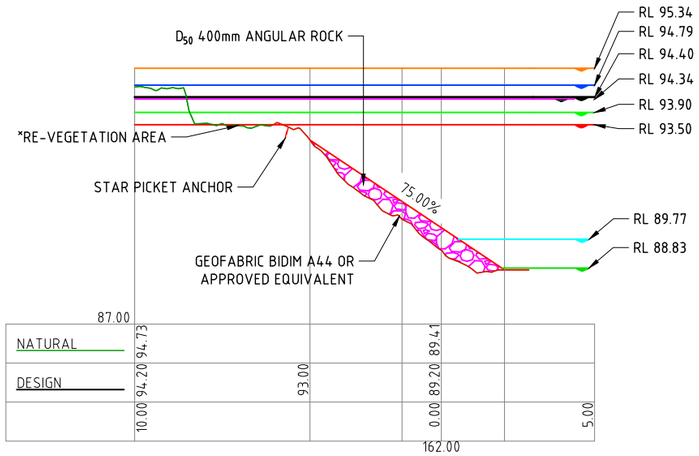
Drawing Status: FOR REVIEW

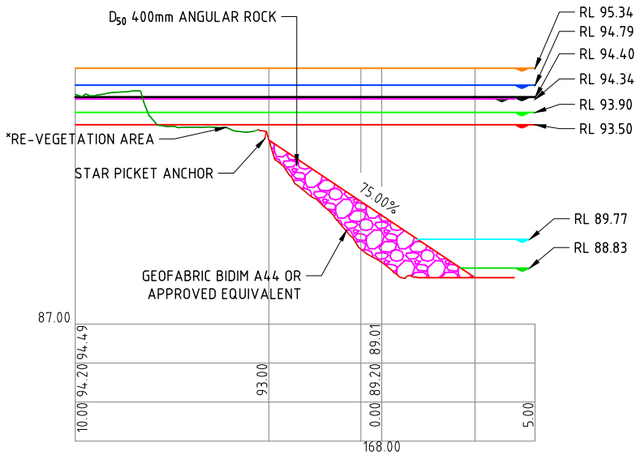
Drawing No. 21091-04 | Sheet. 04/06 | Rev. B

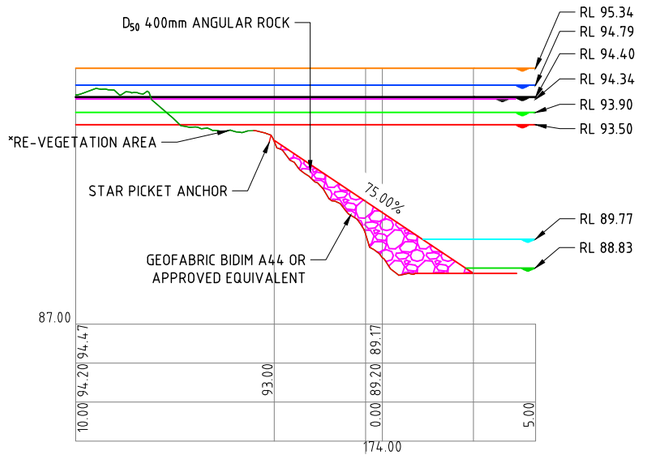


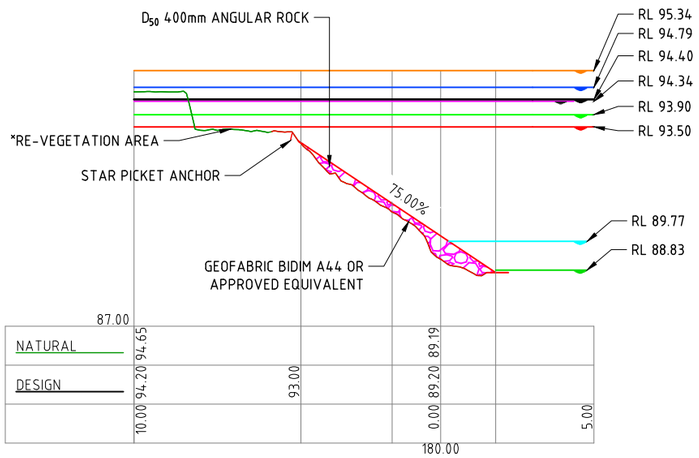


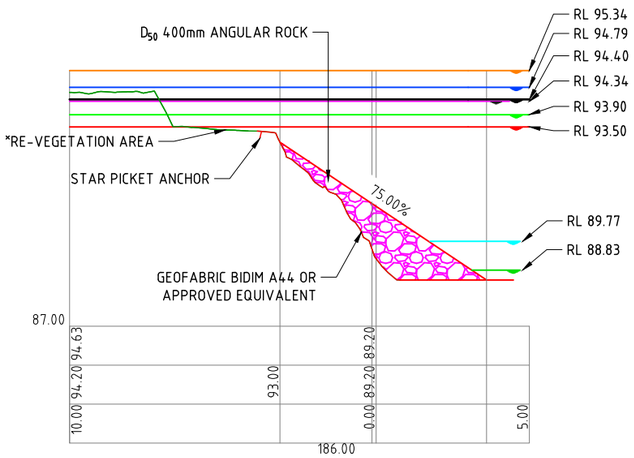


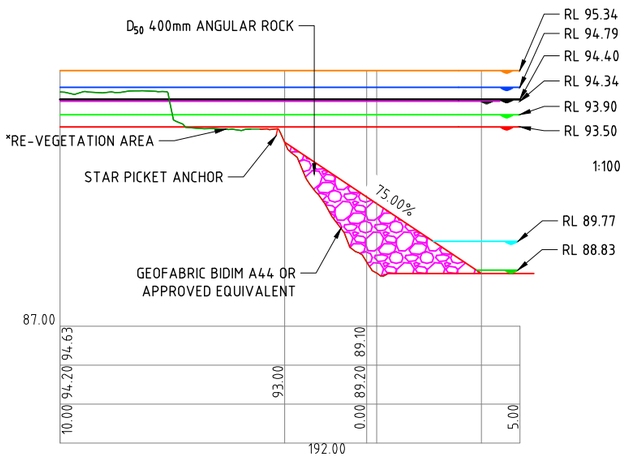












*REFER NOTE 25 SHEET 1 FOR RE-VEGETATION AREA DETAILS

FLOOD LEVELS	
FLOOD TYPE	RL mAHD
DESIGN FLOOD (1 in 100 YEAR)	95.34
DESIGN FLOOD (1 in 20 YEAR)	94.79
BOM MAJOR FLOOD EVENT	94.40
DESIGN FLOOD (1 in 10 YEAR)	94.34
BOM MODERATE FLOOD EVENT	93.90
BOM MINOR FLOOD EVENT	93.50
PEAK WATER LEVEL (18/10/2021)	89.77
SURVEY WATER LEVEL (27/09/2021)	88.83

1:100

2 1 0 2 4 6 8 10m
AT A1

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Discipline Head	N. HEINRICH	29/10/21
Job Manager	S. WALES	29/10/21

Client: tasman HOLIDAY PARKS

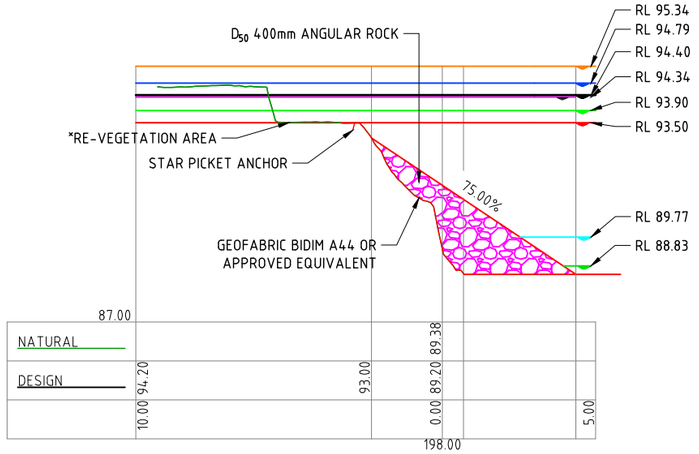
FIFTEEN50

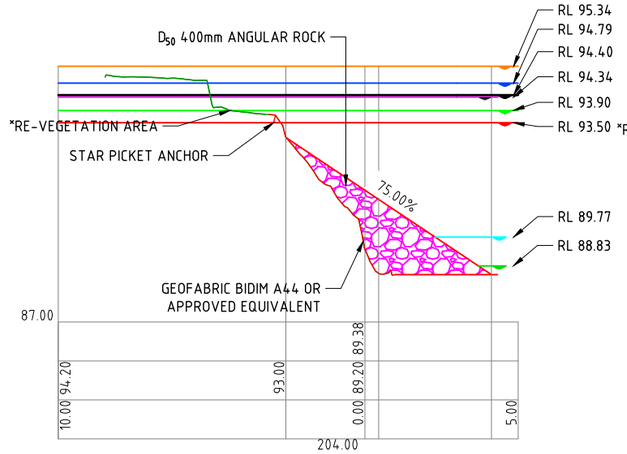
Project: MEROOL RIVER BANK REHABILITATION

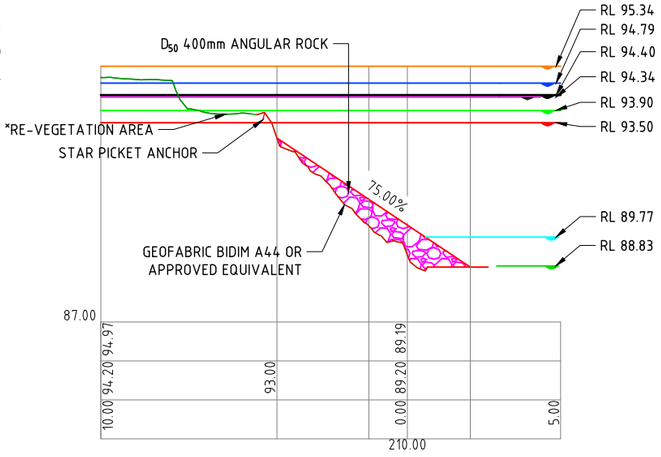
Title: SITE 2- CROSS-SECTIONS SHEET 2 OF 3

Drawing Status: FOR REVIEW

Drawing No. 21091-05 | Sheet. 05/06 | Rev. B







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BOM MODERATE FLOOD EVENT	93.90
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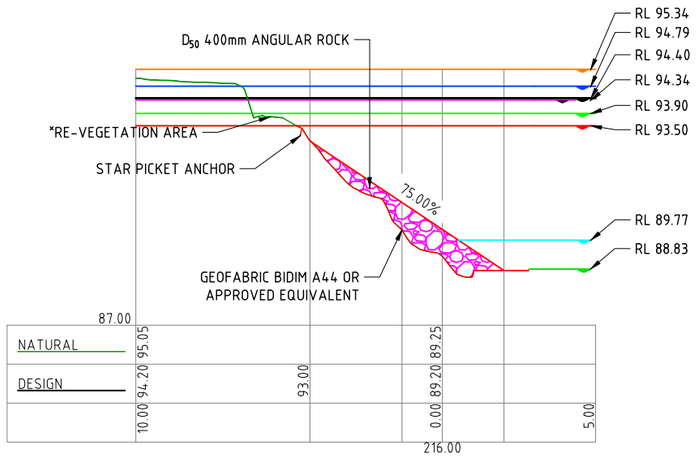

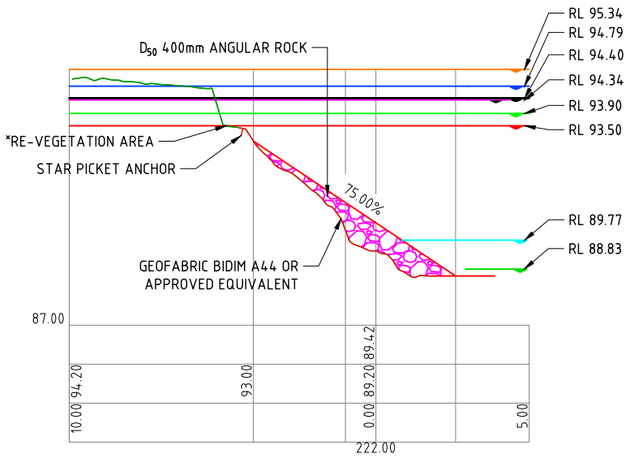

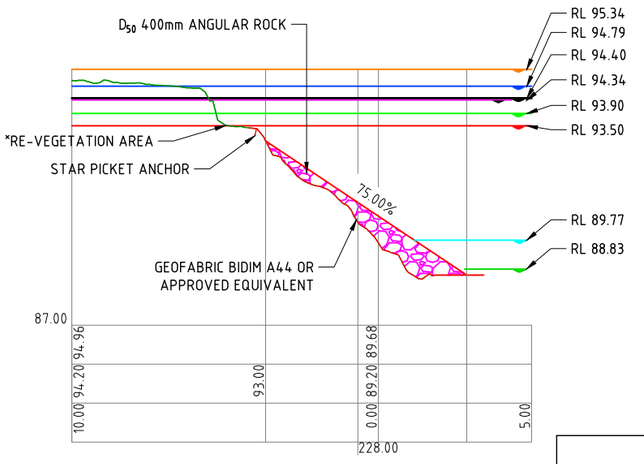

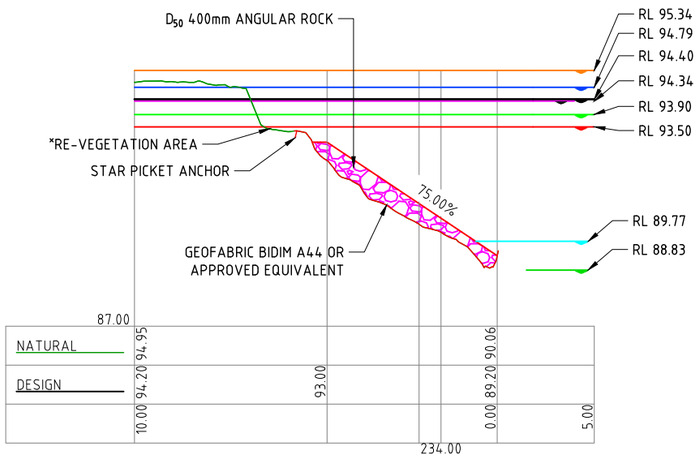

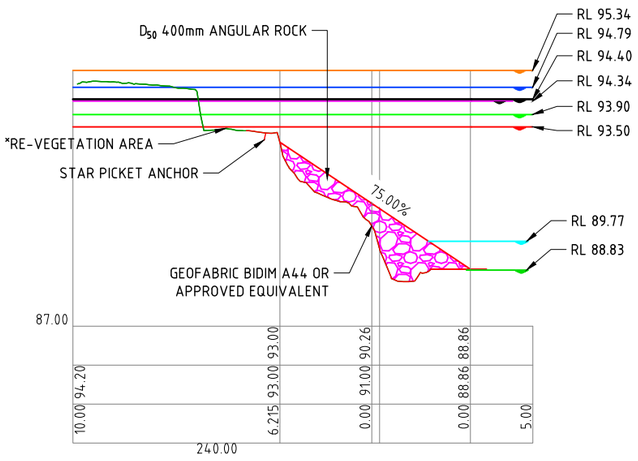

QUANTITIES			
ROCK COMPOSITION	ROCK SIZE	VOLUME	WEIGHT
	(mm)	(m^3)	TONNES
D_{50}	400.0	750.0	1950.0
GEOTEXTILE AREA = 1150 m^2			

1:100 0 2 4 6 8 10m
2 1 AT A1

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Discipline Head	N. HEINRICH	29/10/21
Job Manager	S. WALES	29/10/21

Client: tasman HOLIDAY PARKS

FIFTEE50

Project: MEROOL RIVER BANK REHABILITATION

Title: SITE 2- CROSS-SECTIONS SHEET 3 OF 3

Drawing Status: FOR REVIEW

Drawing No. 21091-06 | Sheet. 06/06 | Rev. B

APPENDIX B

AHIMS Search Results

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Emily

Client Service ID : 631111

Emily Clark

2 Alva Close
Eltham Victoria 3095

Attention: Emily Clark

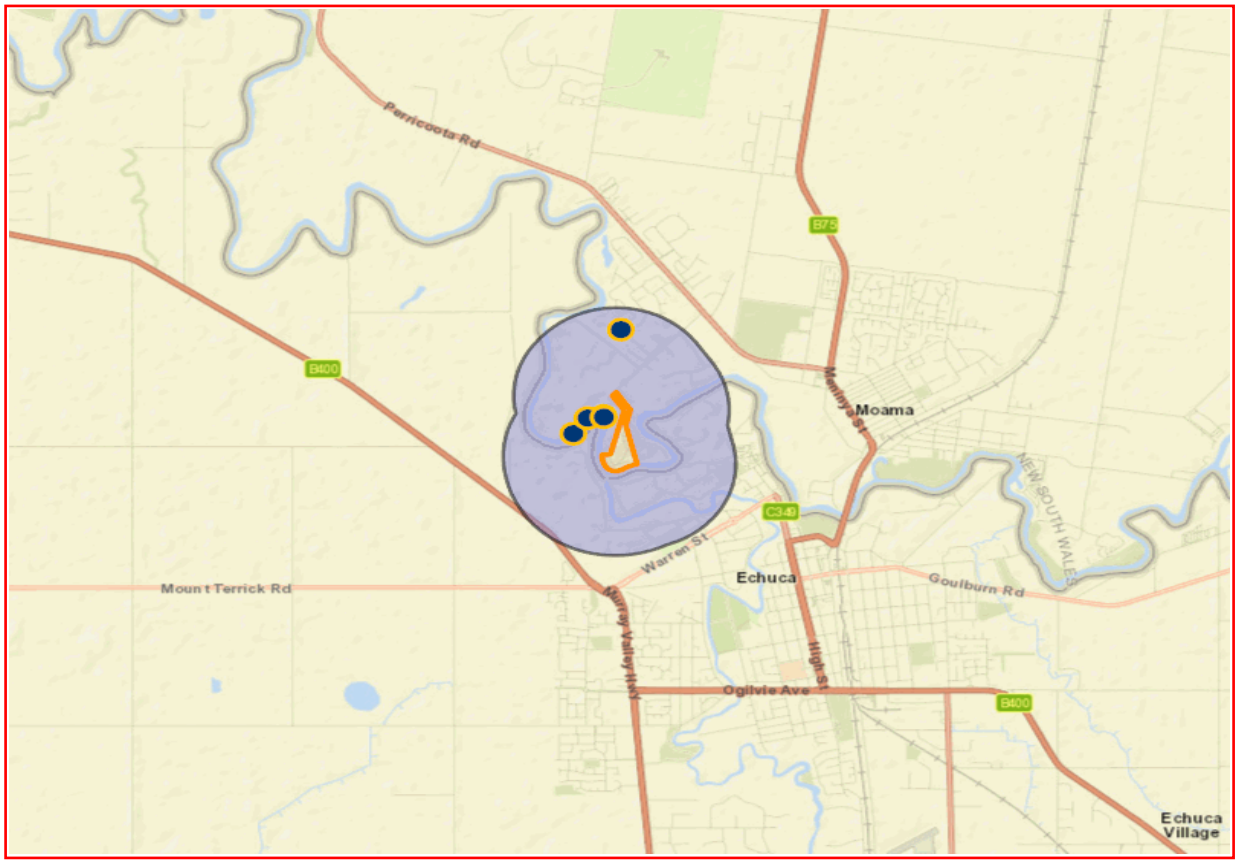
Email: emily.clark@fifteen50.com.au

Date: 18 October 2021

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 5, DP:DP560393, Section : - with a Buffer of 1000 meters, conducted by Emily Clark on 18 October 2021.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

5	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Emily

Client Service ID : 631110

Emily Clark

2 Alva Close
Eltham Victoria 3095

Attention: Emily Clark

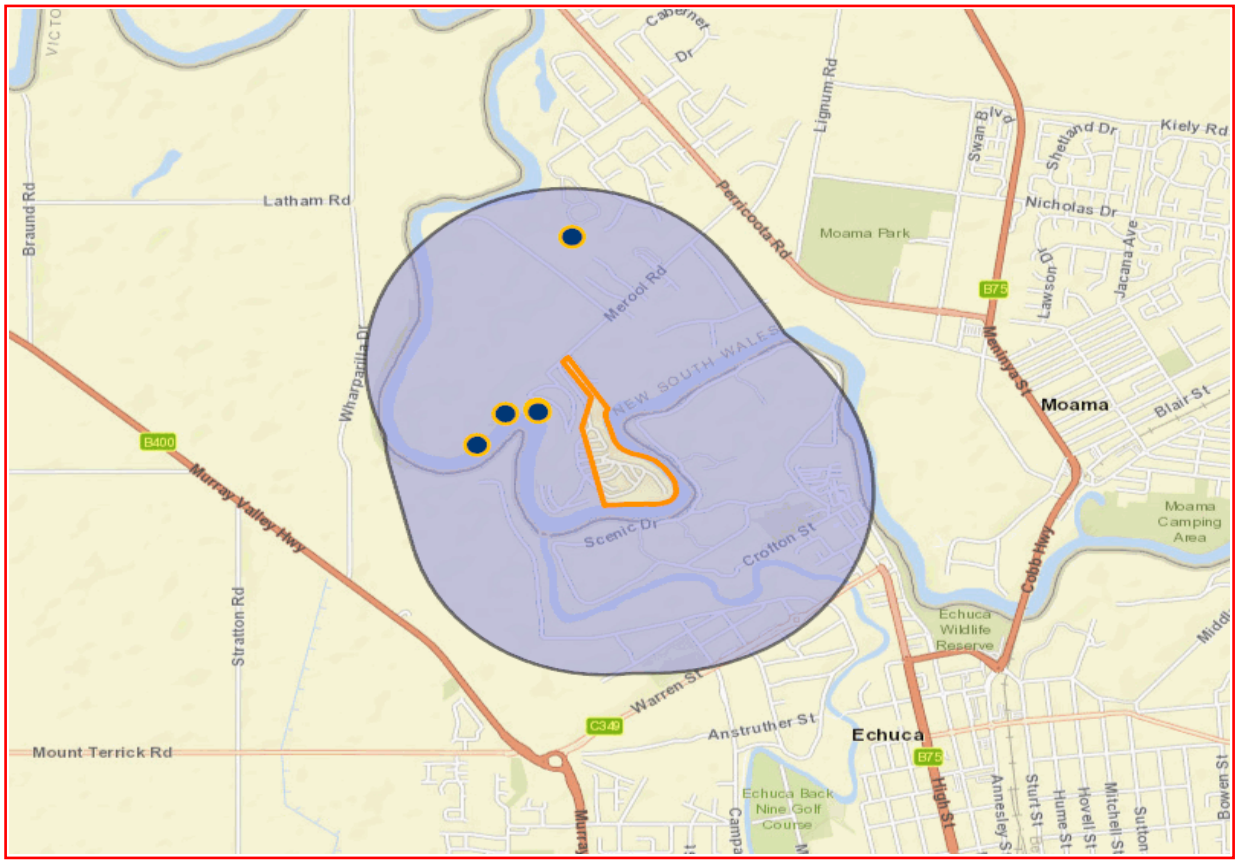
Email: emily.clark@fifteen50.com.au

Date: 18 October 2021

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 4, DP:DP560393, Section : - with a Buffer of 1000 meters, conducted by Emily Clark on 18 October 2021.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



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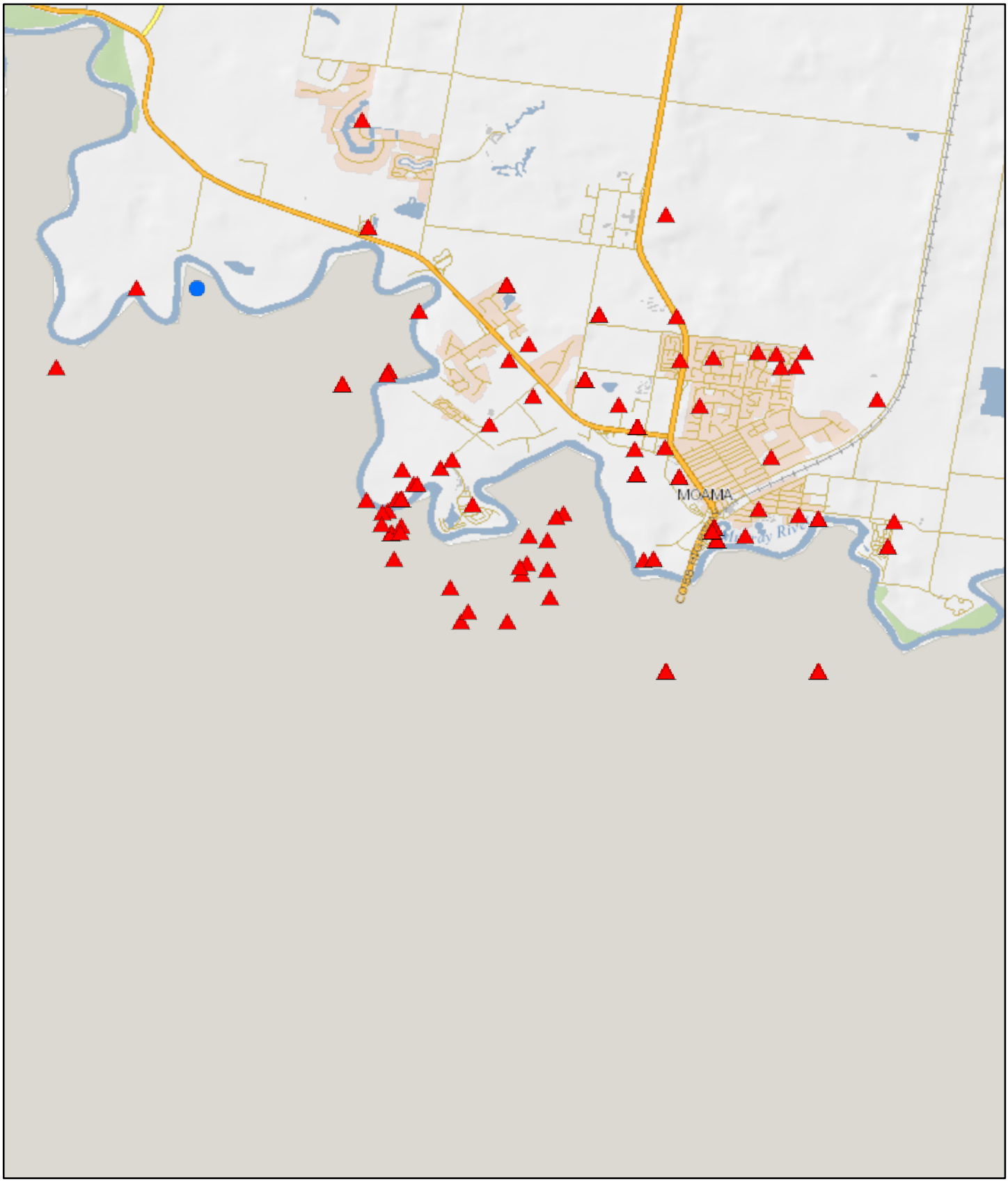
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

APPENDIX C

NSW BioNet Atlas & EPBC Reports

Atlas Map - Fauna



December 9, 2021

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0 0.75 1.5 3 km

drawGraphics_poly

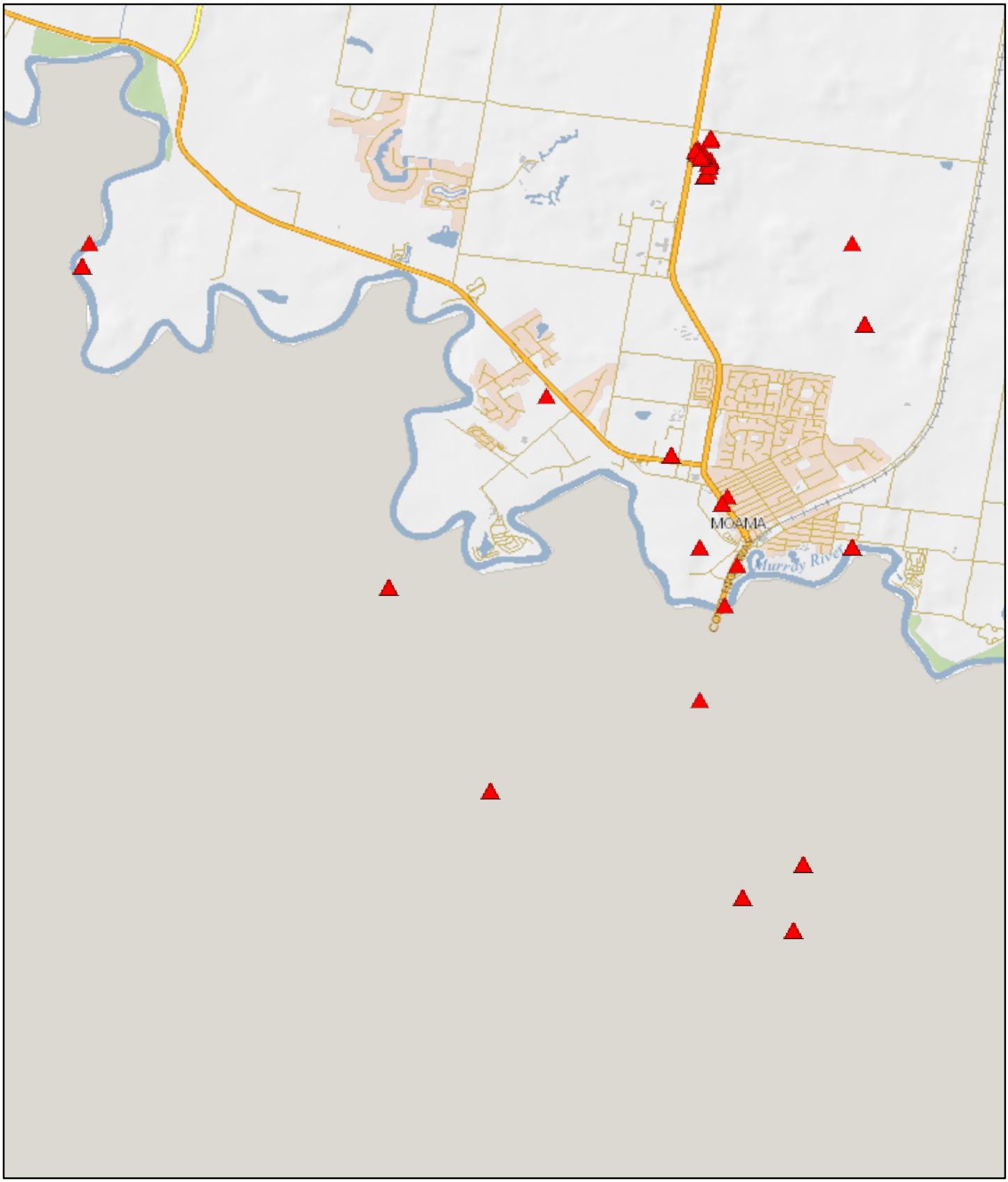
Override 1

spc0

spc2

Copyright 2017

Atlas Map - Flora



December 9, 2021

1:64,000

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0 0.75 1.5 3 km

drawGraphics_poly

Override 1

spc0

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Australian Government

Department of Agriculture, Water and the Environment

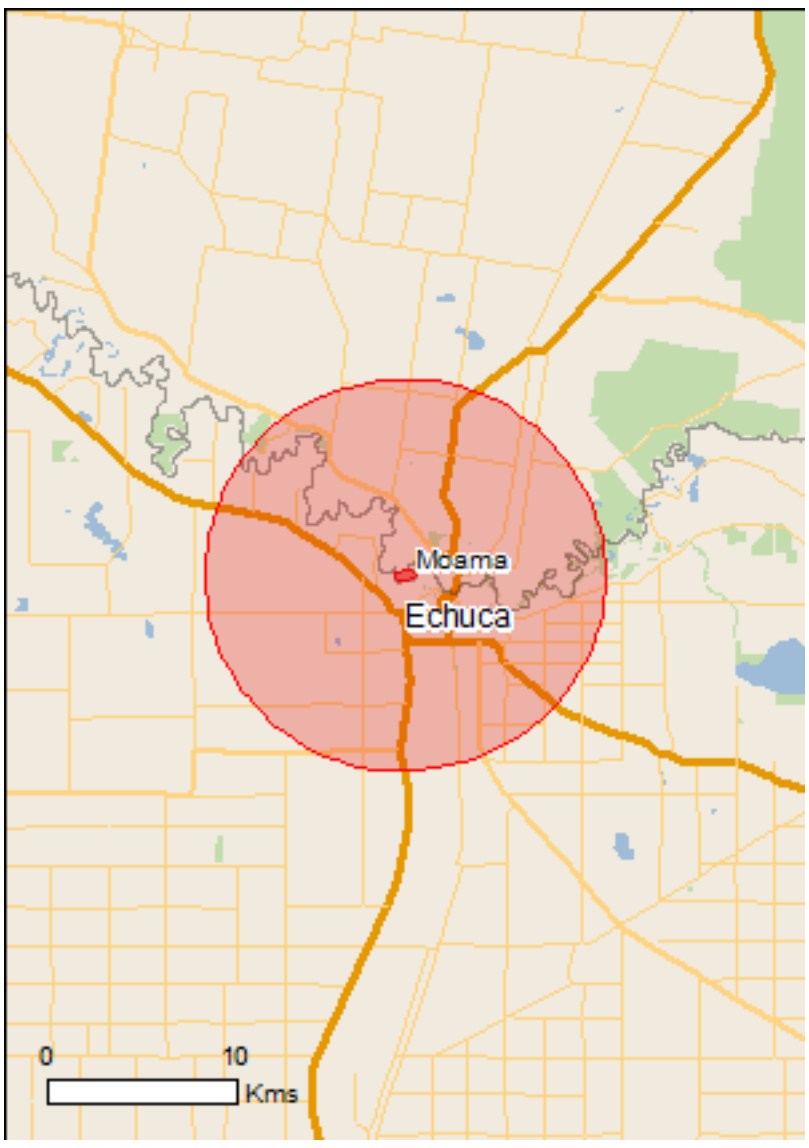
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

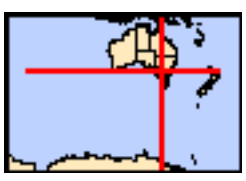
Report created: 09/12/21 15:08:31



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	6
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	33
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Regional Forest Agreements:	None
Invasive Species:	31
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Historic		
Echuca Wharf	VIC	Listed place

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Banrock station wetland complex	400 - 500km upstream
Gunbower forest	10 - 20km upstream
Hattah-kulkyne lakes	200 - 300km upstream
Nsw central murray state forests	Within 10km of Ramsar
Riverland	400 - 500km upstream
The coorong, and lakes alexandrina and albert wetland	400 - 500km upstream

Listed Threatened Ecological Communities		[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Mallee Bird Community of the Murray Darling Depression Bioregion	Endangered	Community may occur within area
Natural Grasslands of the Murray Valley Plains	Critically Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pedionomus torquatus](#) Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
[Pezoporus occidentalis](#) Night Parrot [59350]	Endangered	Extinct within area
[Polytelis swainsonii](#) Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
[Bidyanus bidyanus](#) Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat known to occur within area
[Craterocephalus fluviatilis](#) Murray Hardyhead [56791]	Endangered	Species or species habitat may occur within area
[Galaxias rostratus](#) Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat known to occur within area
[Maccullochella macquariensis](#) Trout Cod [26171]	Endangered	Species or species habitat known to occur within area
[Maccullochella peelii](#) Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
[Macquaria australasica](#) Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
[Crinia sloanei](#) Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area
[Litoria raniformis](#) Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Insects		
[Synemon plana](#) Golden Sun Moth [25234]	Vulnerable	Species or species habitat known to occur within area
Mammals		
[Nyctophilus corbeni](#) Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
[Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)](#) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat likely to occur within area
[Pteropus poliocephalus](#) Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or

Name	Status	Type of Presence
		related behaviour may occur within area
Plants		
Amphibromus fluitans		
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat known to occur within area
Brachyscome muelleroides		
Mueller Daisy [15572]	Vulnerable	Species or species habitat may occur within area
Lepidium monoplocoides		
Winged Pepper-cress [9190]	Endangered	Species or species habitat likely to occur within area
Maireana cheelii		
Chariot Wheels [8008]	Vulnerable	Species or species habitat may occur within area
Pimelea spinescens subsp. spinescens		
Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat known to occur within area
Pterostylis despectans		
Lowly Greenhood [6272]	Endangered	Species or species habitat may occur within area
Sclerolaena napiformis		
Turnip Copperburr [11742]	Endangered	Species or species habitat known to occur within area
Swainsona murrayana		
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Swainsona plagiotropis		
Red Darling-pea, Red Swainson-pea [10804]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Delma impar		
Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		

Name	Threatened	Type of Presence
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Corporation
Defence - BOBDUBI BARRACKS - ECHUCA

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Chrysococcyx osculans](#) Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat likely to occur within area
[Neophema chrysostoma](#) Blue-winged Parrot [726]		Species or species habitat likely to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat may occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Echuca West B.R.	VIC
Murray Valley	NSW
River Murray Reserve	VIC
River Murray Reserve (non-PV)	VIC
Wharparilla B.R	VIC

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-36.11392 144.725919,-36.113452 144.732635,-36.115809 144.734888,-36.116676 144.733558,-36.11723 144.726949,-36.11593 144.72579,-36.113972 144.725876,-36.11392 144.725919

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

© Commonwealth of Australia
Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

APPENDIX D

Aboriginal Heritage Due Diligence Assessment Report

AUSTRAL ARCHAEOLOGY PTY LTD
ABN: 55 629 860 975
Info@australarch.com.au
www.australarchaeology.com.au

MEROOL HOLIDAY PARK – MOAMA NEW SOUTH WALES

ABORIGINAL CULTURAL HERITAGE DUE DILIGENCE ASSESSMENT

FINAL REPORT

FIFTEEN50

29 November 2021

DOCUMENT INFORMATION

Project:	MEROOL HOLIDAY PARK – MOAMA
Services required:	ACHDDA
Client:	Fifteen50
Prepared by:	Nicole Monk
Project number:	21128

DOCUMENT HISTORY AND APPROVAL STATUS

Version No.	Version Type	Issue Date	Authored by	Approved by	Date Approved
1	Draft	28/09/2021	NM	NF	28/10/2021
2	Final	29/11/2021	NM	NF	29/11/2021

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Version No.	Quantity	Issue date	Issued to
1	1	28/10/2021	Fifteen50
2	1	29/11/2021	Fifteen50

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In the preparation of this report historical sources and other reference materials are acknowledged in text citations and in a separate section at the end of the report. Reasonable effort has been made to acknowledge and obtain permission from the relevant copyright owners.

EXECUTIVE SUMMARY

This report has been prepared for Fifteen50 and details the Aboriginal Cultural Heritage Due Diligence Assessment (ACHDDA) of the proposed bank works at Merool Holiday Park, Moama, New South Wales (NSW) [the study area], within the Moama Local Government Areas (LGA). The study area assessed in this report includes approximately 1.6 kilometres of riverbank with a 550 metre section of bank that is heavily eroded.

This ACHDDA was undertaken to assess the archaeological potential for Aboriginal material to be impacted during the proposed works being prepared by the proponent to determine the feasibility of the project. The ACHDDA has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (Department of Environment Climate Change and Water NSW 2010) [the Code].

The Murray River and its floodplains are extremely rich in Aboriginal heritage objects and sites. A search of the previously registered sites on the AHIMS register resulted in 23 known sites within proximity to the study area, however, no sites were located within the study area. These sites include a large range of site types with the most prominent being modified trees followed by earth mound-shell-artefact, burial, shell and shell-artefact-hearth. The Murray River has been subject to many archaeological assessments, with a few completed in close proximity to the study area. However, in the wider area, there is limited understanding of the Aboriginal heritage.

It is recommended that:

1 No further archaeological investigations will be required before commencing the works.

2 All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without an AHIP issued by Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

3 Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity, you must:

- immediately cease all work at that location and not further move or disturb the remains
- notify the NSW Police and Heritage NSW's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location
- not recommence work at that location unless authorised in writing by Heritage NSW.

CONTENTS

FIGURES

TABLES

1 INTRODUCTION

Austral Archaeology Pty Ltd (Austral) has been engaged by Fifteen50 on behalf of Tasman Tourism to provide Aboriginal Cultural Heritage Due Diligence Advice (ACHDDA) for the proposed bank stabilisation works at 131 Merool Road, Moama, New South Wales (NSW) [the study area]. This advice is intended to assist Tasman Tourism in determining their obligations with regard to the *National Parks and Wildlife Act 1974* (NPW Act) and to determine whether the project will involve activities that may harm Aboriginal objects or places.

The study area is shown in Figure 1.1 and comprises an approximately 1.6 kilometre stretch of riverbank and is located adjacent to the Murray River, within the Merool Holiday Park, Moama (study area). The riverbank is divided into different condition levels, with good forming approximately 925 metres of the bank, fair forming 128 metres of the bank and poor condition forming 550 metres off the bank. The riverbank within the study area is heavily eroding and encroaching on the cabin footings within the park. The exact nature of the works have not yet been determined but will be a combination of bank shaping, rock beaching, vegetation planting, rock gabions and short retaining walls.

1.1 ASSESSMENT OBJECTIVES

The NPW Act allows for a person or organisation to exercise due diligence in determining whether their actions will or are likely to impact upon Aboriginal objects or places. Any person or organisation who can demonstrate that they have exercised due diligence has a defence against prosecution under the strict liability provisions of the NPW Act. Where an activity is likely to harm Aboriginal objects or places, consent in the form of an AHIP is required

Section 87 of the NPW Act makes it a strict liability offence to knowingly or unknowingly harm Aboriginal objects or declared Aboriginal places without an Aboriginal Heritage Impact Permit (AHIP). Harm is defined under the NPW Act as "*any act or omission that destroys, defaces or damages the object or place or in relation to an object, moves the object from the land on which it had been situated*".

The *National Parks and Wildlife Regulation 2009* adopted the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) [the Code] as guidance on reasonable and practicable steps which individuals and organisations need to take to:

- Identify whether Aboriginal objects are, or are likely to be, present within the study area.
- If Aboriginal objects are, or are likely to be present, determine whether their activities are likely to cause harm.
- Determine whether further assessment or an AHIP application is required for the activity to proceed.

This advice has been formulated to provide a robust assessment that will identify whether Aboriginal objects or places are present or are likely to be present within the study area. This has been achieved through the completion of a desktop review and survey of the study area. The Code provides a series of questions that clarify whether it is applicable to a proposed project. These questions are addressed in Section 2.

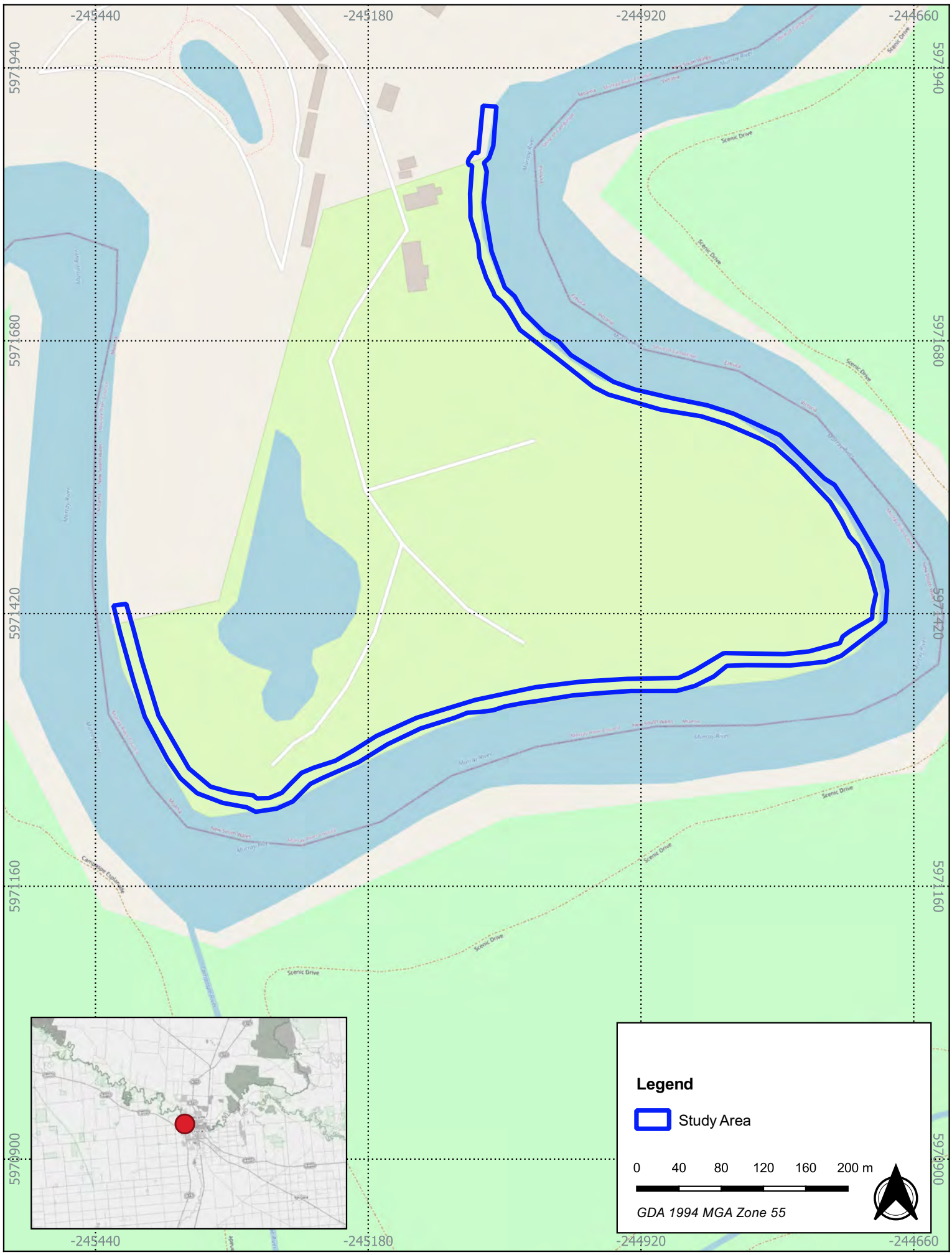

Figure 1 - Location of the study area

21128 - 131 Merool Road, Moama - ACHDDA

Source: OSM

Drawn by: ARH Date: 2021-10-01

AUSTRAL ARCHAEOLOGY

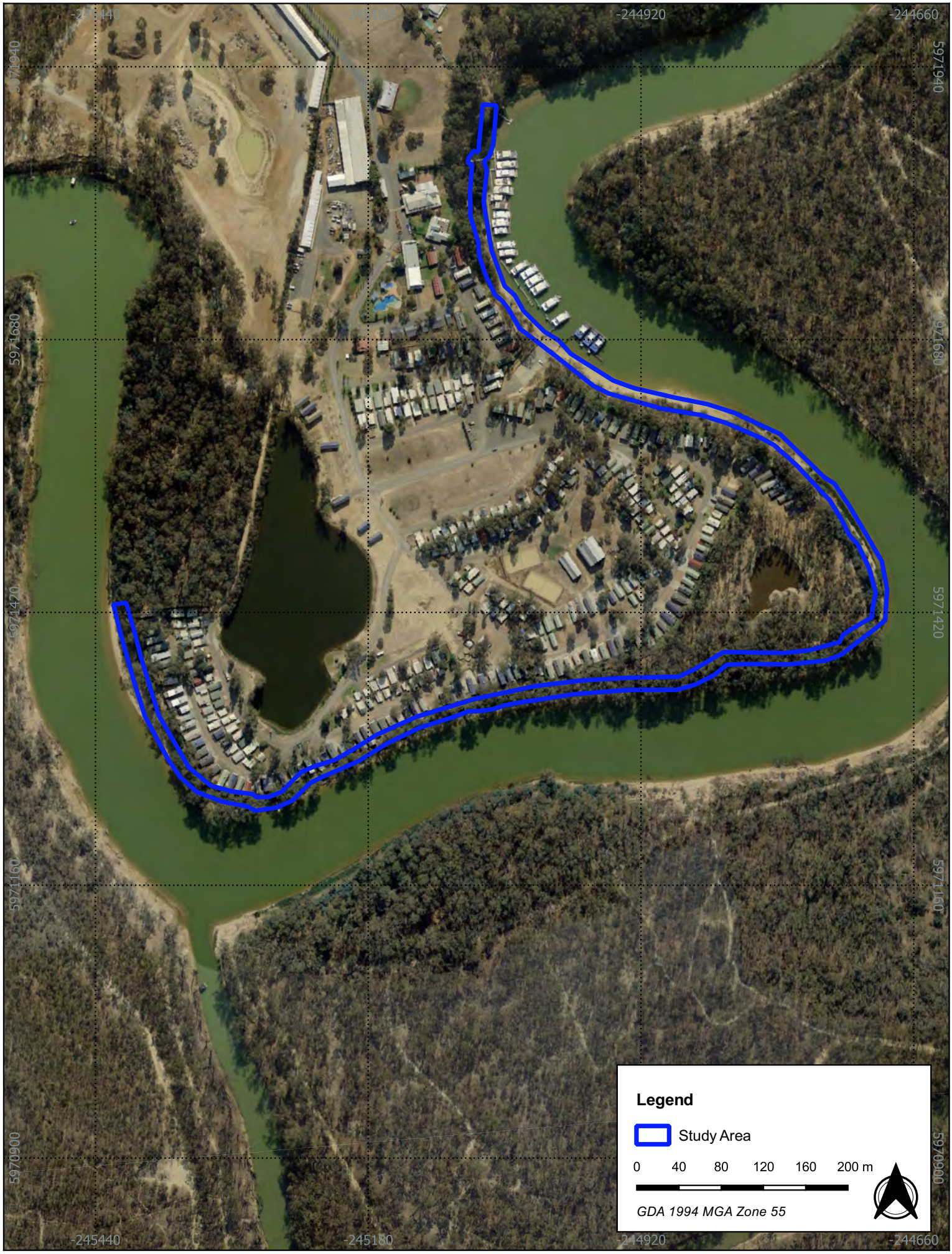

Figure 2 - Detailed aerial of the study area

21128 - 131 Merool Road, Moama - ACHDDA

Source: NSW LPI Aerial *Drawn by: ARH Date: 2021-10-01*

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1.2 PROJECT TEAM AND QUALIFICATIONS

The following personnel have been involved in the preparation of this ACHDDA.

AMANDA HANSFORD (BA (ARCH/PALEO), GRAD DIP. ARCH)

Amanda brings unrivalled experience in the practical issues of heritage management, archaeological survey and excavation, especially in the lower Murray regions. Amanda is a Director of Austral and specialises in Aboriginal heritage. Amanda has worked on many of major lacustrine projects in the region including Lake Victoria and Willandra Lakes. Amanda began her career in 2007 and has developed a strong understanding of the technical aspects of Australian archaeology as well as legislative processes and consultation with Aboriginal communities.

NICOLE MONK (B ARCH, GRAD DIP. ARCH)

Nicole is an archaeologist with 2 years' experience. Nicole has successfully authored approved Cultural Heritage Management Plans (CHMPs) in Victoria and has co-authored Aboriginal Cultural Heritage Assessments (ACHAs) in NSW. Nicole has experience on complex fieldwork projects including the Menindee Lakes Water Infrastructure Project and has begun leading field teams on small surveys and excavation programs.

Amanda has reviewed this report for quality assurance and technical adequacy and had input into the management recommendations.

1.3 ABBREVIATIONS

The following are common abbreviations that are used within this report:

Burra Charter	*Burra Charter: Australia ICOMOS Charter for Places of Cultural Significance 2013*
ACHA	Aboriginal Cultural Heritage Assessment
ACHDDA	Aboriginal Cultural Heritage Due Diligence Assessment
A**HIP**	Aboriginal Heritage Impact Permit
LGA	Local Government Area
NPW Act	*National Parks and Wildlife Act 1974*
The Proponent	Fifteen50
RNE	Register of the National Estate
Study Area	Merool Holiday Park

2 DUE DILIGENCE ASSESSMENT

As none of the questions outlined in Table 2.3 apply to the project, due diligence must be established through using the Code. The Code consists of a series of 5 steps outlined below

STEP 1. WILL THE ACTIVITY DISTURB THE GROUND SURFACE OR ANY CULTURALLY MODIFIED TREES?

The proposed works involve stabilisation activities to protect the bank from further erosion. As part of this process bank shaping activities will be implemented. These include vegetation planting and rock gabion and short retaining wall installations bank shaping, rock beaching, vegetation planting, rock gabions and short retaining walls.

Therefore, in these areas, any sites that may be present adjacent to or within the river channel have the potential to be displaced or destroyed. As the activity has the potential to disturb the ground surface and any culturally modified trees, should they be present, consideration of steps 2a and 2b of the Code is required.

STEP 2A. SEARCH THE ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM (AHIMS) DATABASE AND USE ANY OTHER SOURCES OF INFORMATION OF WHICH YOU ARE ALREADY AWARE

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) database was conducted on 30 September 2021 (Client service ID: 626904). The search identified 23 Aboriginal archaeological sites within a 12 kilometre by 10 kilometre search of the proposed study area (Lat, Long from: -33.13, 144.69 - Lat, Long to: -36.06, 144.82). None of these registered sites are located within the study area.

Spatial information for this report is displayed using the GDA94 Datum. Where AHIMS site records were provided on a different datum, they were converted using standard functions in QGIS software.

Table 1 AHIMS sites identified within 15 kilometres of the study area.

Site type	Occurrence
Modified Tree (Carved or Scarred)	16
Earth Mound, Shell, Artefact	3
Burial	2
Shell	1
Shell, Artefact, Hearth	1
Total	**23**

In NSW, there is a strong correlation between proximity to water and the presence of Aboriginal sites. The data in Table 1 shows a variety of site types associated with the Murray River at Moama, with the most common site type being modified trees. There are 3 earth mound – shell – artefact sites and 2 burials along with one shell-artefact-hearth site and one shell site. The closest site type identified was the earth mound-shell-artefact which was located approximately 336 metres east of the current study area.

A review of the reports held on the AHIMS database identified several archaeological studies undertaken in the general locality of the study area and these are summarised in Table 2. Austral has also undertaken a review of information to identify whether the activity is located within landscape features likely to contain Aboriginal objects. This includes an assessment of ethnographic information, soils, geology, landform, disturbance and resource information pertinent to the study area. The outcome of this review is outlined in the remainder of Section 2.

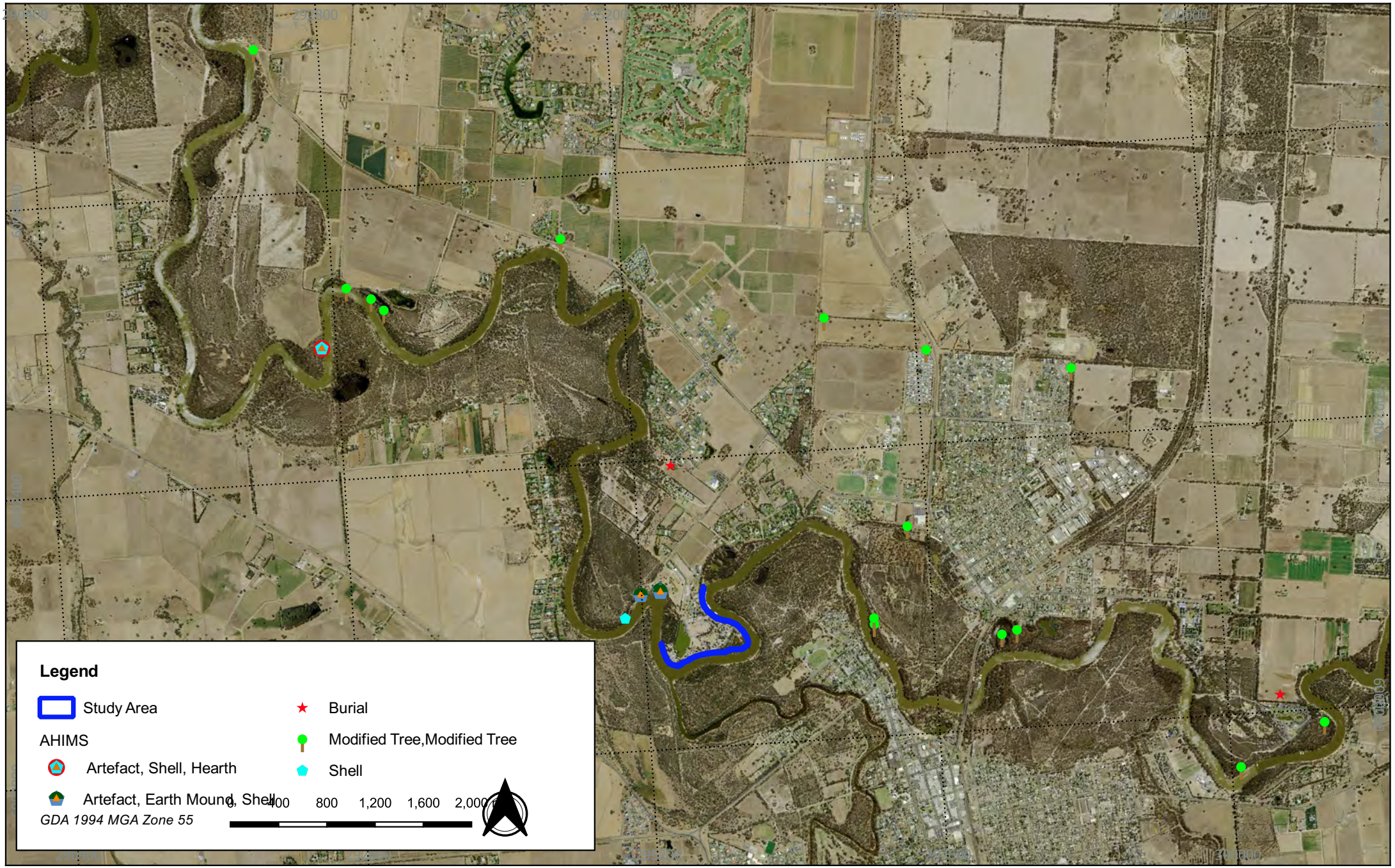

Figure 3 - AHIMS sites in relation to the study area

21128 - 131 Merool Road, Moama - ACHDDA

Source: NSW LPI Aerial

Drawn by: ARH Date: 2021-10-19

AUSTRAL ARCHAEOLOGY

2.1 LOCAL ARCHAEOLOGICAL CONTEXT

Archaeological investigations in the central Murray, and in particular in the vicinity of Echuca and Moama, have been conducted in response to developments and within the framework of academic enquiries. The limited ethnographic accounts of early settlers and explorers were once considered the primary source for archaeological enquiry.

The major studies which have contributed to our understanding of the Central Murray, and those with direct relevance to the study area, are outlined in Table 2. Reference is made to the main trends garnered from these investigations which serve to provide a broad framework in which to base the current study.

Table 2 Summary of past reports within the vicinity of the study area.

Author	Year	Details
Atkinson & Berryman	1983	Attempted to document the Aboriginal association with the Murray Valley through ethnographic material. The report talks about the Aboriginal material culture, social organisation and mythology of the region based on archaeological, historical and oral history records. It further observes the economy, material culture, social organisation and intertribal relations within the Murray Valley region. It documents the early contact history between the traditional communities and European settlers within the region. According to the report, the study area was a part of the Pangerang, Yorta Yorta and Kwat Kwat tribes, who are collectively referred to as the Bangerang group and who occupied an area of 56,000 km^2 over the heartlands of the Murray and Riverina ecological zones, which includes the outflows of different rivers like the Avoca, Loddon, Campaspe, Goulburn and Broken rivers.
Beesley	1987	Completed a site inspection of 2 scarred trees at Barmah and Grasmere, approximately 23km north-east of the current study area. Within the Barmah property the scarred tree was located within the cattle yards and identified as a yellow box (*Eucalyptus melliodora*). This tree was described as a canoe tree. The Grasmere tree was an unknown species and was located in a paddock. No details regarding the scarring were provided. Management recommendations were suggested for the tree.
Bonhomme	1990	Completed an archaeological survey of the Barmah Forest, approximately 26km north-east of the current study area. The survey aimed to document archaeological evidence of Aboriginal occupation in the area, make a recording of the Aboriginal cultural sites, evaluate the significance of the sites identified, and prepare draft management recommendations for the recorded sites. 182 sites (172 intact sites and 10 destroyed locations) were recorded. These sites included 86 earthen mounds, 88 scarred trees, 5 middens, 1 burial and 2 open artefact scatters. 17% of sites were associated with the river and creek margins, 32% of sites were located on the floodplain and 38% were located on the plain.
Craib	1991	Completed a study of the Moria-Millewa state forest, situated approximately 8km north-east of the study area. As a result of the survey, 168 sites were recorded. The sites recorded included scarred trees (n=77), cultural deposits (n=68), shell midden material (n=15) and burial (n=8).
Pardoe	1985	Pardoe studied the burial grounds in the Murray-Darling River system. He systematically studied reports of Aboriginal cemeteries and found that burial grounds occur near the River Murray. He concluded, cemeteries are distinct entities in Aboriginal culture. He identified cemeteries first emerging around 13,000 BP and their spread in the Murray River corridor could be seen around 6,000 – 7,000 BP, with significant increases around 4,000 BP
Heritage Insight	2015	Completed a cultural heritage report for the Echuca-Moama Bridge, situated approximately 2km east of the study area. During the desktop assessment, 6 previously registered scarred trees were identified and a further 3 scarred trees were recorded during the Victorian portion survey (VAHR 7825-0480, 7825-0481 and 7825-0482). Subsurface testing was completed at the location of the Bridge pylons and identified a further 2 sites (VAHR 7825-0485 and 7825-0486). 7825-0486 was recorded as an isolated stone artefact and 7825-0486 was a sub-surface deposit of stone artefacts. A majority of the scarred trees were located between the Murray Valley Highway and the Campaspe River and 2 scarred trees were near the base of the north side of a sandhill.

2.2 ETHNOHISTORY

According to Tindale, the Aboriginal custodians of the study area are the Joti Jota (alternatively spelled Yorta Yorta and Yotayota) people (Tindale 1974). The geographic location of the Joti Jota extended from the junction of the Murray River and Goulburn River, west of Echuca, to the east of Cobram/Tocumwal and south-east along the Goulburn River to the Mooroopna-Shepparton area (Tindale 1974, Horton 1994, Clark 2002). The Joti Jota group share their boundary with the Wiradjuri to the north, Pangerang (Berrigan), the Waveroo to the east, the Ngurraiilam to the south and the Barapa Barapa on the north-west (Tindale 1974).

Population numbers at the time of contact are often difficult to determine as prior to record-keeping, European disease and occupation resulted in decimated population numbers. At the time of European contact, Curr estimated that some of the local groups had population numbers around 1,200, however, he believed that these numbers were reduced due to the presence of abandoned mounds in the region at the time of his settlement in the area (Curr 1883).

Pre-contact, Aboriginal people in the area were seasonal hunter and gatherers who would have utilised the arid interior and riverine environments (Mitchell 1839, p.307, Pardoe 2003). Depending on whether there were droughts or floods, people would have used both environments for resource gathering, but in areas around the Murray River, Aboriginal people were considered less nomadic than tribes that relied solely on one form of sustenance (Mitchell 1839, p.307, Buchan 1974, p.20, Pardoe 2003). Due to the variety of resources in this area and the permanent water supply, local people's diet would have included animals such as fish, shellfish and water birds from the river and kangaroo, wallaby and lizards from the interior. Flora was also an important part of Aboriginal diet and comprised vegetable foods and roots, such as bulrush, sow thistle, dandelion, manna gum and wild fruit (Buchan 1974, p.25).

As part of these resource gathering processes, people would have used fishing and hunting spears, nets and coolamons. Spears were often assembled using the stalks of reeds around the Murray, such as the common reed (typha sp.), but bone and wood could also be used, depending on the spear (Buchan 1974, p.26). When making nets, people would use chewed fibre from common reeds and mesh and often traded them with other groups away from the Murray (Beveridge 1889). Canoes were also used for fishing in the river with people diving for fish during the day and at night. where people would light fires on clay plates in the canoes as a source of light (Beveridge 1889, Coutts et al. 1977).

Beveridge has also given details about the ovens used by the Aboriginal community along the Murray River. As per his writings, the ovens were made by excavating a hole that was generally 3 feet (0.91 metres) in diameter and 18 inches (450 millimetres) deep. Clay balls, about the size of a cricket ball, were carefully placed on one side of the hole. These nodules were baked until they were red hot. They were later removed with a wood stick. Once the clay balls were removed, the hole was swept out and a moistened layer of grass was placed over the bottom and around the hole. Over them, the hot clay nodules were spread equally. Food was added to cook and the entire oven was then covered with the fine earth (Beveridge 1889, Coutts et al. 1977). During wetter periods, crabholes (holes in the ground formed from burrowing water species) and small depressions in the ground surface were filled with water for weeks on end, enabling oven mounds to be situated further away from permanent water sources.

The above ethnohistory should be employed with caution though, and Hiscock (2008, p.17) has argued that even very early historical accounts may not be a suitable basis for analogy. As Aboriginal groups had to change their economic, cultural and political practices to cope with the social impacts of disease decimating the population before any observations and subsequent historical accounts were recorded. He also argues that it is likely that similar drastic changes happened in response to "altered cultural and environmental circumstances" following the arrival of Europeans (Hiscock 2008, p.17).

2.3 TOPOGRAPHY AND HYDROLOGY

The major hydrological system associated with and adjacent to the study area is the Murray River, located in the south-eastern part of the Murray Basin. The Murray River has its major headwaters in the Australian Alps and runs approximately 3,750 kilometres to the Southern Ocean at Goolwa, South Australia. This permanent freshwater source has many tributaries including other rivers, streams, paleo-channels, creeks, billabongs, swamps that feed into the main river.

Prior to European settlement and large scale infrastructure, the Murray River would have flooded seasonally each year (Coutts et al. 1979, p.29). During these periods of flooding, the areas of inundation would have supported a number of food resources for Aboriginal people, such as fish, shellfish other aquatic animals and water birds (Pardoe 2014, p.114).

The hydrological systems identified within and in the locality of the study area are identified in Figure 2.2.

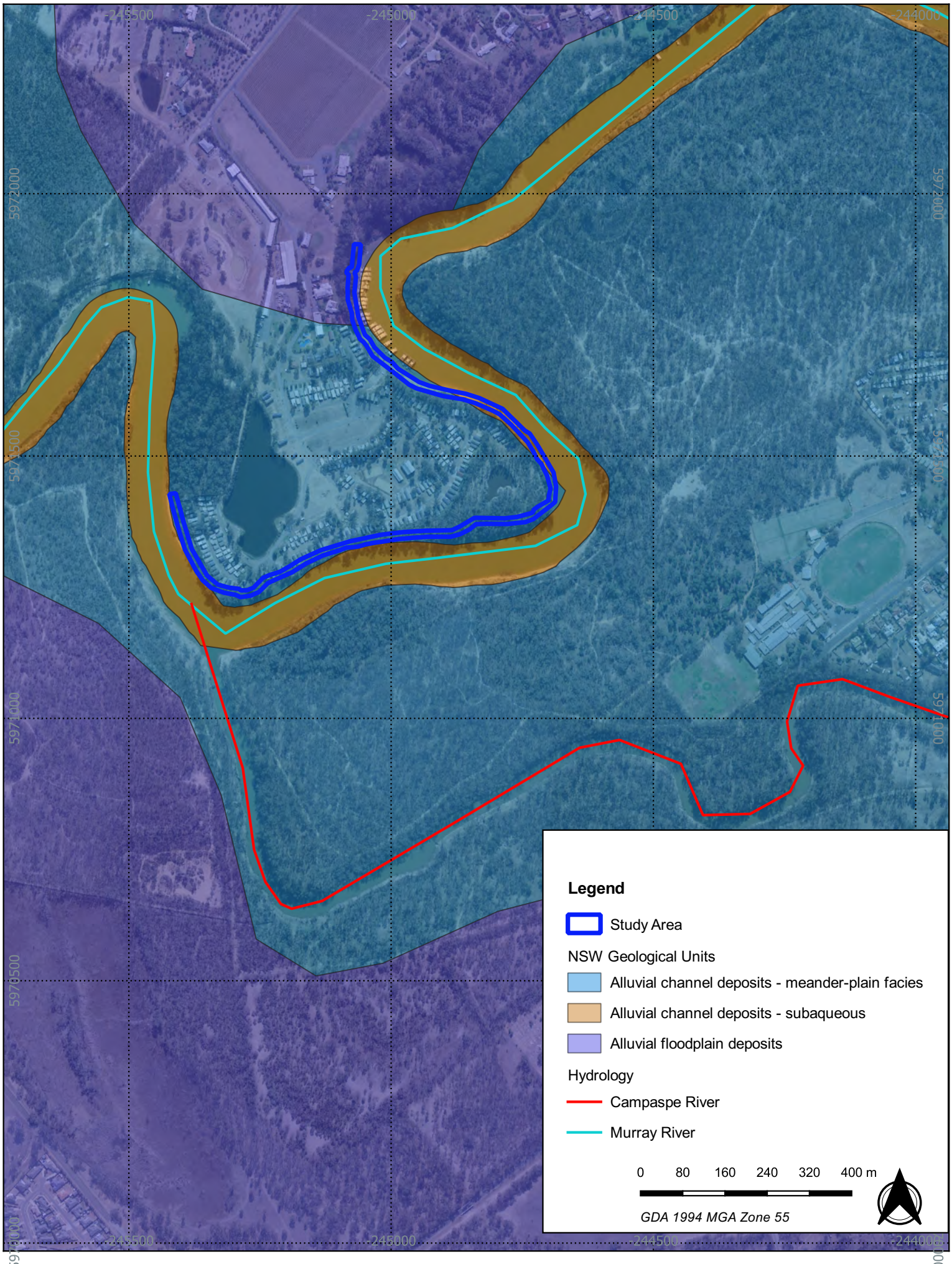

Figure 4 Geology and hydrology of the study area

21128 - 131 Merool Road, Moama - ACHDDA

Source: NSW LPI Aerial, NSW Geological units

Drawn by: ARH Date: 2021-10-19

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2.4 GEOLOGY AND SOILS

The study area consists of the geological formation 'Alluvial channel deposits - meander-plain facies', which are deep alluvium soils that have accumulated and relocated or meandered from water movement and that have travelled (Williams 2011). Stone artefacts made from silcrete, quartzite and sandstone materials have been identified in these areas (Landskape 2008).

The geological units identified within the study area are identified in Figure 2.2.

The study area is characterised by Murray Channels and Floodplains (Figure 2.3). These soil types are associated with active channels and seasonally inundated floodplains (Mitchell 2002). This indicates that site types likely to be identified would be modified trees, earth mounds, shell middens and artefact scatters as a result of long term use of these areas and the resources available close to permanent freshwater.

2.5 LANDFORMS

The study area is located on the Murray River bank and within 200 metres of water. These areas, within 200 metres of water, are often associated with Aboriginal people's occupation of the area and traditional activities, which can result in the presence of Aboriginal objects (DECCW 2010a, p.12).

The study area is in the Murray Channels and Floodplains, which are active channels and seasonally inundated floodplains (Figure 2.3). The channel banks of the Murray are grey and brown clays and are located in (Mitchell 2002, p.103).

2.6 LANDSCAPE RESOURCES

Depending on the season and the flow and level of water in the Murray River, the ecological diversity between the river and semi-arid environment would have provided a wide range of resources for Aboriginal people. Flora and fauna were not only a necessity to Aboriginal diet but were also important for making resources, ornaments, clothing and medicine. Today, animals and plants that were once located in the wider region may be extinct or extinct from the region.

Prior to the removal of the natural vegetation, the ecological diversity of the area would have provided a wide range of resources for Aboriginal people. The study area is the part of Riverina Bioregion. Commonly seen trees are red gum (*Eucalyptus camaldulensis)* and river cooba (*Acacia stenophylla)* communities. The understorey of red gum in the region of sandy soils mainly consists of herbaceous perennials. Near the outer perimeter of the floodplains, commonly seen species are black-box (*Eucalyptus largiflorens),* salt-tolerant grasses, saltbushes and daisies as the understorey.

Nets made of plant fibres and three-pronged spears made from reeds were used for fishing (Beveridge 1889). Curr recorded the fish trapping process within the region. He reported construction of earthen banks in streams and lagoons to trap floodwaters and wooden stakes were driven between the banks to trap fish (Curr 1883).

Important faunal species seen in and around the study area that would have been important to Aboriginal diet include reptiles species, such as the sand goanna (*Varanus gouldii*), blue tongued lizard (*Tiliqua species*), stump-tailed lizard (*Tiliqua rugosa*); snakes; tortoises; fish and shellfish, including the Murray cod (*Maccullochella peelii*), perch (*Perca sp.*) and yabbies (*Cherax destructor*); as well as waterfowl, such as cockatoos (*Cacatuidae*) and ducks (*Anas platyrhynchos*). Mammals that would have also been present in the study area include kangaroos, (*Macropodidae sp.*), wallabies (*Macropodidae sp.*), mice (*Pseudomys delicatulus*), bats (*Pteropus alecto*), wombats *(Vombatus ursinus*) and possums (*Trichosurus vulpecula*) [Buchan 1974, p.15].

As well as being important food sources, animal products were also utilised for tool making and the production of ceremonial items. Animals such as brush-tailed possums were highly prized for their fur, with possum-skin cloaks a common item made by Aboriginal people (Beveridge 1889). Curr also reported that the fur of the possum was spun and used as a neck ornament by women (Curr 1883).

2.7 PAST LAND USE PRACTICES

By 1961, large land clearing activities surrounded the study area and the Holiday Park, possibly as a result of farming and by 1976 several trees surrounding the study area had been cleared. At this time, it appears that land clearing had not impacted the study area itself. The Merool Caravan Park was established in 1983 and the location remains largely the same since then. The construction of the caravan park would have resulted in significant levels of disturbance from the development of the cabins, land clearing and the introduction and building up of land as well as the development of dams. This may have led to Aboriginal cultural material being harmed.

Water diversion and irrigation activities, including dam and weir constructions, further along the Murray, have also had a significant impact on land usage over time. The construction of water management infrastructure has resulted in impacts to the flow regime of the Murray River, and overall regime of flooding in the region. This, in turn, has resulted in changes to soil erosion and deposition patterns, as well as altering the natural wetting and drying pattern. In the Central Murray region, the major problems seen as a result of such land-use practices is salinization, channel erosion, and the decline of native plants and animals (Walker & Thomas 1993).

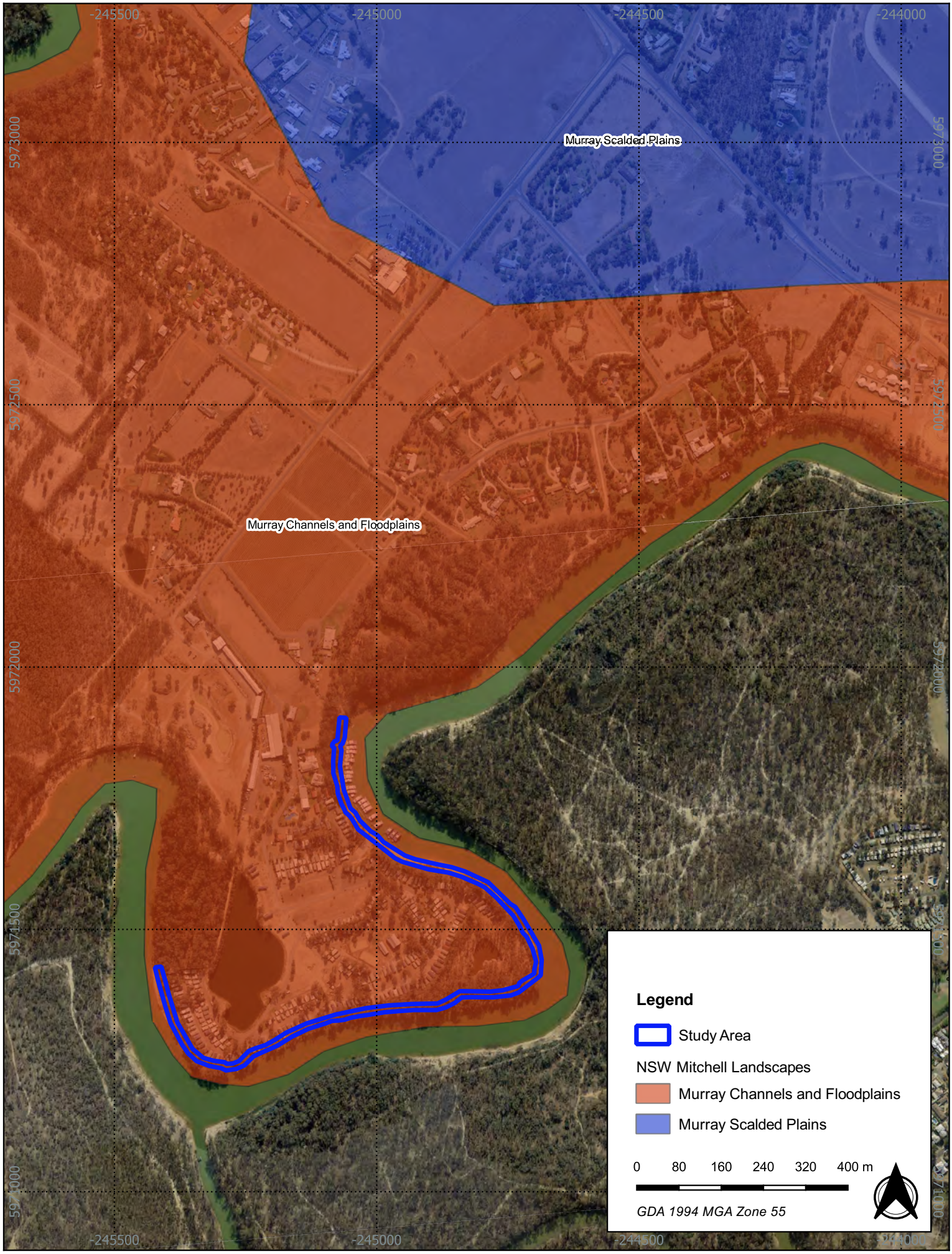

Figure 5 Mitchell Landscapes associated with the study area

21128 - 131 Merool Road, Moama - ACHDDA

Source: NSW LPI Aerial, Mitchells landscape

Drawn by: ARH Date: 2021-10-01

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2.8 PREDICTIVE STATEMENTS

In general, an archaeological predictive statement for any study area draws on surrounding environmental data, previous archaeological research and predictive models for Aboriginal occupation. Another essential aspect to predicting the archaeological integrity of a site and something that must be considered is previous land uses of the study area and degree of disturbance.

The main trends broadly in along the central section of the Murray River are that:

- Archaeological sites occur on most landforms.
- Site frequency and density are dependent on their location in the landscape.
- There is a dominance of hearths, ovens and small artefact scatters.
- Source bordering dunes and sand hills have high sensitivity and high potential to contain Aboriginal heritage sites including burial sites.
- Artefact scatters are commonly located in close proximity to permanent water sources along creek banks, alluvial flats and low slopes. More complex sites are usually located close to major water sources.
- The dominant raw material used in artefact manufacture is silcrete and fine grained silicious material with smaller quantities of chert, quartz and volcanic stone seen.
- Artefact assemblages usually comprise a proportion of formal tool types with the majority of assemblages dominated by flakes and debitage.
- While surface artefact scatters may indicate the presence of subsurface archaeological deposits, surface artefact distribution and density may not accurately reflect those of subsurface archaeological deposits.
- Aboriginal scarred trees may be present in areas where remnant old growth vegetation exists.

While these statements provide an adaptable framework for applying a predictive model to the study area, the Murray River and its floodplains are rich in archaeological material and all Aboriginal heritage sites types can be located within the region. The general studies of the south-western region, the specific investigations surrounding the study area and the search of the AHIMS database have helped to predict what certain site types can be expected within the study area. Based upon the results of these background studies Austral has been able to develop a series of predictive statements relating to the type and character of Aboriginal cultural heritage sites that are likely to exist in the study area and where they are more likely to be located. These predictive statements indicate that:

- Site types with the potential to occur include ovens, scarred trees, middens, burials and artefacts.
- Shell middens, ovens and scarred trees are the most frequently occurring site type and are often identified on the banks of rivers or creeks.
- Middens are generally located near water and resource collection, although are in locations that do not flood.
- Scarred trees are often located in the flood plain river corridor.
- Burials are likely to be found in sandy deposits, along watercourses, in well-drained areas;
- Artefact scatters are most likely to occur on well-drained and raised, level ground, near sources of freshwater or wetlands, or along spur crest or ridgelines.

STEP 2B. ACTIVITIES IN AREAS WHERE LANDSCAPE FEATURES INDICATE THE PRESENCE OF ABORIGINAL OBJECTS

Table 2.3 Landscape features in the Code that indicate the likely existence of Aboriginal objects.

Question	Response
Is the activity within 200 metres of 'waters'?	Yes
Is the activity within a sand dune system?	No
Is the activity located on a ridge top, ridge line or headland?	No
Is the activity located within 200 metres below or above a cliff face?	No
Is the activity within 20 metres of or in a cave, rock shelter or cave mouth?	No
Is the activity (or any part of it) on land that is disturbed?	Yes
Do the predictive statements of 2A indicate Aboriginal Objects or places are likely to occur on any of the topographic elements of the activity area?	Yes

The proposed works are being undertaken along the Murray River near the township of Moama. This area is considered archaeologically sensitive as previous research has identified that areas within 200 metres of water are likely to contain evidence of Aboriginal cultural material. Although the study area is approximately 1.6 kilometres long, the main areas of impact will be confined to the south-western and north-eastern portions of the study area where heavy erosion has occurred. The land within the study area is currently disturbed from the construction and maintenance works for the holiday park, the construction of a dam and the construction of the pontoons. Areas that have not been as heavily disturbed may contain previously unrecorded cultural material.

STEP 3. CAN YOU AVOID HARM TO THE OBJECT OR DISTURBANCE OF THE LANDSCAPE FEATURE?

As the works will include maintenance works for the bank, harm cannot be avoided. Therefore, both the river and the landforms will be impacted by the proposed upgrades to the bank.

STEP 4. DESKTOP ASSESSMENT AND VISUAL INSPECTION

A visual inspection of the study area was undertaken on 15 October 2021 by Neil Fenley (Senior Archaeologist, Austral) and Nicole Monk (Archaeologist, Austral). The inspection consisted of a systematic survey of the study area to identify and record any Aboriginal archaeological sites visible on the surface or areas of Aboriginal archaeological potential and cultural sensitivity. The archaeological survey was conducted on foot. The methods used during the visual inspection conformed to requirements 5 to 8 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b).

In general, the inspection confirmed that the study area was located on a built up riverbank that is eroding and has been heavily modified with the construction of terraces, pontoons and stairs (Figure 6 and Figure 7). Vegetation within the study area included River Red Gum trees (*Eucalyptus camaldulensis*), Black Wattle (*Acacia mearnsii*) and Common Nettle (*Urtica dioica*). Visibility was low at 5% with landscaped gardens and compact grass limiting visibility and exposure was also recorded as low at 5%.

During the inspection, it was identified that there was heavy disturbance to the riverbank. This was evident by the height of the bank, which was significantly higher than the surrounding land, with some areas around the cabins up to 3 metres higher than other areas (Figure 9). This may have been built up during the levelling of the park and the excavation of the dams, which are located near the south-eastern section of the study area. Other disturbances in the study area were often associated with the cabins and access to the rivers and included decking, pipelines, pontoons, fencing and stairs (Figure 6 to Figure 9).

A majority of the study area has been disturbed through the previous developments, maintenance activities and the ongoing use of the study area as a holiday park. Despite Aboriginal sites being associated with the Murray River, the inspection noted that there was no identified Aboriginal heritage located within the study area. The results of the visual inspection are outlined in Figure 10.

Figure 6 **North facing view of disturbance to riverbank**

Figure 7 **West facing photograph of riverbank and pontoons**

Figure 8 **South-west of riverbank with a rock embankment**

Figure 9 **East facing view of the disparity between the riverbank and the holiday park**

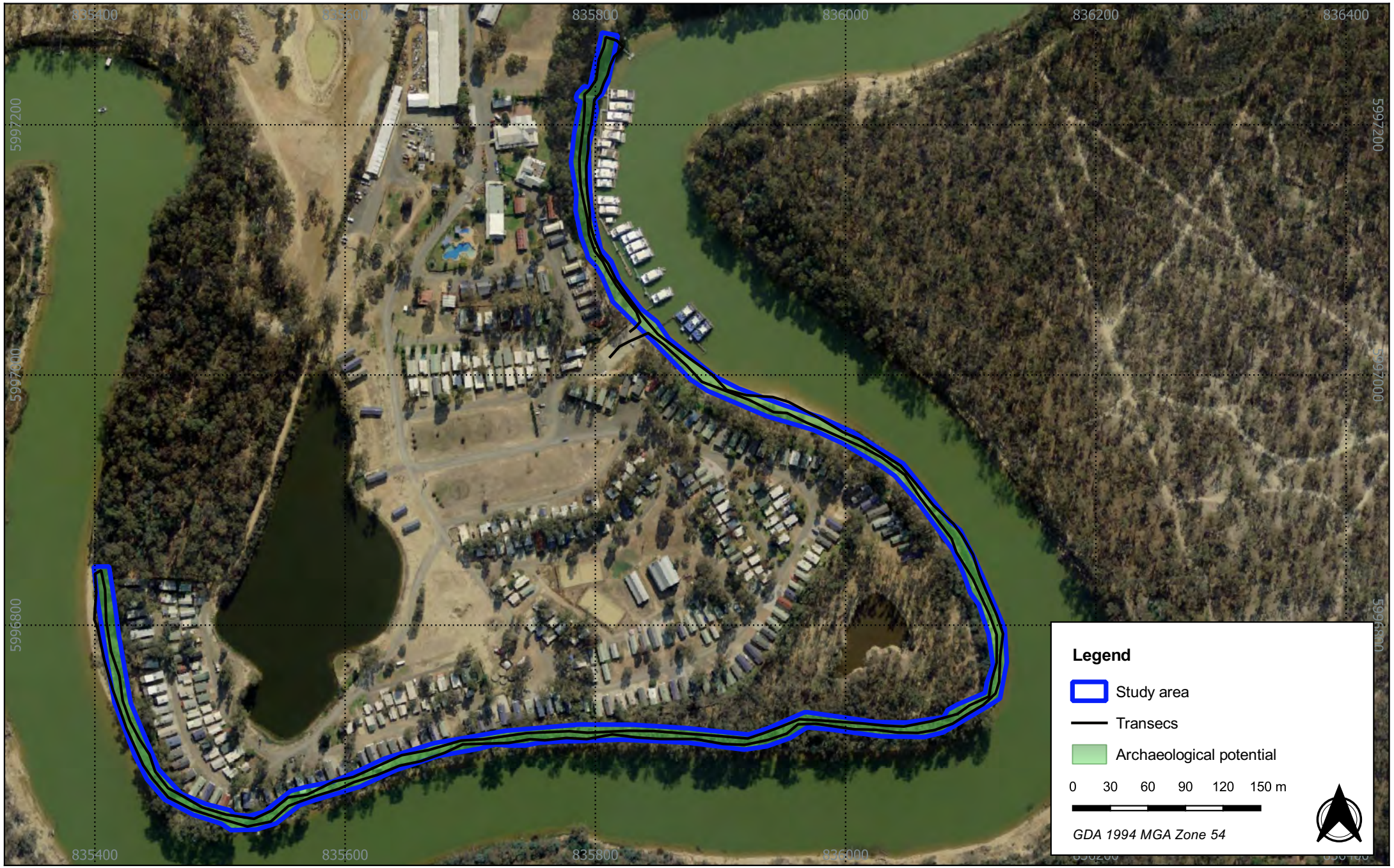

Figure 10 Archaeological Potential and survey tracks within the study area

21128 - 131 Merool Road, Moama - ACHDDA

Source: NSW LPI Aerial

Drawn by: ARH Date: 2021-10-21

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STEP 5. FURTHER INVESTIGATIONS AND IMPACT ASSESSMENT

Based upon the outcome of Steps 1 to 4 of the code, no further assessment is warranted.

The following recommendations are derived from the findings described in this ACHDDA. The recommendations have been developed after considering the archaeological context and environmental information.

It is recommended that:

1 No further archaeological investigations will be required before commencing the works

2 All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without an AHIP issued by Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

3 Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity, you must:

- immediately cease all work at that location and not further move or disturb the remains
- notify the NSW Police and Heritage NSW's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location
- not recommence work at that location unless authorised in writing by Heritage NSW.

If you have any questions regarding the advice within this letter, please do not hesitate to contact me on the details below.

Yours sincerely,

Nicole Monk

Archaeologist

Austral Archaeology

M: 0429 625 098

E: nicolem@australarch.com.au

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APPENDIX E

Moama LALC Site Survey Report

Moama Local Aboriginal Land Council

Cultural Heritage Site Survey Report

(SSR 061)

Prepared for: Fifteen 50

Name: Mr. Sam Wales
Project: Aboriginal Site Survey
Location: Merool Holiday Park
Merool Lane Moama NSW 2731

Prepared by:
Name: Ms Diarna Kerr

On Behalf of:
Moama Local Aboriginal Land Council
Email: admin@moamalalc.com.au
Phone: 03 5482 6071
ABN: 95 659 710 168

Purpose

The purpose of this site survey report is to provide details on the findings and recommendations relating site surveys conduct at Merool Holiday Park, Merool Lane Moama NSW 2731This report is intended for the purpose of informing your organization of the site survey findings and recommendations as to what future action that Moama LALC believes should be taken in respect to this project. This report is not intended for the purpose of providing your organization with approval to harm (destroy, deface, or damage) or desecrate an Aboriginal object or Aboriginal place, or in relation to an object, move the object from the land on which is has been situated which is an offence under the *National Parks and Wildlife Act 1974*.

Background

The Moama LALC was contacted by Mr. Sam Wales on the 22/11/2021 to conduct site survey investigations at Merool Holiday Park, Merool Lane Moama NSW 2731 The following members were involved in the Sites Work Surveys:

Name	**Title (Position)**	**Date(s) on Site**	**Location(s)**
Diarna Kerr	Site Officer	23/11/2021	Merool Holiday Park, Merool Lane Moama NSW 2731

The total sites work costs for the project(s) was $450 plus $500 for this report excluding GST, total cost $950 plus GST – ($1,045.00)

Site Work Summary

1. Provide a general description of the landscape and known local history of the area surveyed. Insert maps if available.

2. Provide a general description of the type of investigations conducted (e.g. Walk Overs, Sub Surface Testing, Archeological Survey's, and Research – Knowledge Holders etc.).

3. Provide a description of any issues, limitations or difficulties that were experienced during the project.

Findings

During the sites work investigation the Moama LALC made the following findings:

Finding #1	
Site Discovered	Not known
Located by	Visual Inspection
Inspected by	Diarna Kerr
Type and Details of Site / Possible Site	Riverbank, unable to visually see any findings due to vertical scale of riverbank. (Very high)
Details of any Disturbance / Action	Disturbed land / Holiday Park
Site Risks and Required Protective Measures	Shell midden disturbance a very high possibility due to erosion on riverbank, also skeletal remails may be sighted. No works to be carried out on Riverbank without a minimum of one Cultural Heritage Officer at all times.
Location / GPS	Merool Holiday Park, Merool Lane Moama
DECCW Notified	N/A
Site Registered	TBA
Picture	N/A
Further Details	Moama Local Aboriginal Land Council 0354 826 071

High possibility of Shell Midden, Ancestral Remains, Earth Mounds discovery due to location of proposed works along the riverbank. This site has been disturbed and our recommendations are that there be at least one MLALC Cultural Heritage Officers to be always on-site during riverbank excavation/restoration works.

Green Zones: revegetation of riverbank proposed.
Red/Orange Zones: Riverbank to be strengthened via rock wall. Excavation will need to be always monitored by a Moama LALC Cultural Heritage Officer.

We recommend under no circumstances, that the proposed works to be carried out without Moama Local Aboriginal Land Council Cultural Heritage Officers in attendance at all times.

All Aboriginal cultural places in NSW are protected by law. Aboriginal artefacts are also protected. It is illegal to disturb or destroy an Aboriginal place. Artefacts should not be removed from site.

Recommendation

Evidence Found

Given the findings identified above the Moama LALC has a number of recommendations in relation to those findings as follows:

Finding #1	
Recommendation(s)	Under NO circumstances is the proposed works to be commenced without Moama Local Aboriginal Land Council Cultural Heritage Officer present in all consultations of this project.

However, should Shell Midden, skeletal material or anything of Aboriginal significance be exposed, during ground disturbance, work within the project area must cease immediately and contact made with the Moama LALC initially who will organize a sites worker to be in contact with your organization. As per the *National Parks and Wildlife Act 1974* it is an offence to destroy or remove anything of Aboriginal significance.

In addition to the above recommendations the Moama LALC is willing to provide a brief training session to those who may be working on the site to ensure that they have a nominal understanding of potential Aboriginal objects/places.

Please do not hesitate to contact me if you have any queries regarding the context of this report and I will endeavor to answer them for you. On behalf of Moama LALC, I wish you well with your forthcoming project.

Kind Regards

Site Officer – Ms. Diarna Kerr

Moama Local Aboriginal Land Council

APPENDIX F

Test of Significance

Test of significance for Merool Holiday Park riverbank rehabilitation

Introduction

This test of significance is part of the statement of environmental effects for the Merool Holiday Park riverbank rehabilitation, Moama NSW.

A database search was undertaken on 9 December 2021 of the NSW Environment, Energy and Science (BioNet Atlas) and the Department of Agriculture, Water and Environment websites to identify threatened species that may be found within the proposed project site as listed under the *Biodiversity Conservation Act 2016* and the *Environmental Protection and Biodiversity Act 1999* (EPBC Act).

A desktop search of the online databases was undertaken as follows:

- NSW Environment, Energy and Science BioNet Atlas
- *Fisheries Management Act 1994*
- Department of Agriculture, Water and Environment, Environmental Protection and Biodiversity Conservation (EPBC) Protected Matters Report

The following threatened species has potential to occupy the site and has triggered a test of significance:

- **Sloane's Froglet (*Crinia sloanei*) Endangered NSW**
- **Growling Grass-frog (*Litoria raniformis*) Vulnerable NSW**
- **Silver Perch (*Bidyanus bidyanus*) Vulnerable NSW, Critically endangered Commonwealth**
- **Murray Hardyhead (*Craterocephalus fluviatile*), Endangered Commonwealth**
- **Flathead Galaxias (*Galaxias rostratus*), Critically endangered Commonwealth**
- **Trout Cod (*Maccullochella macquariensis*) Endangered Commonwealth**
- **Murray Cod (*Maccullochella peelii*) Vulnerable Commonwealth**
- **Macquarie Perch (*Macquaria australasica*) Endangered Commonwealth**
- **Murray Crayfish (*Euastacus armatus*) Vulnerable NSW**

Sloane's Froglet (*Crinia sloanei*)

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**

Sloane's Froglet has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales. It has not been recorded recently in the northern part of its range and has only been recorded infrequently in the southern part of its range in NSW. It is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats.

The proposal will not affect the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Sloane's Froglet is not considered an endangered ecological community, but a single species, therefore, no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Sloane's Froglet is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small, localised nature of the proposal, only minor modification to potential habitat will occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential habitats.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The activity area is not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the *BC Act 2016 Schedule 4.*

Growling Grass-frog (*Litoria raniformis*)

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**
The Growling Grass Frogs need still or slow-moving water with emergent vegetation around the edges and mats of floating and submerged plants. They can live in artificial waterbodies, such as farm dams, irrigation channels and disused quarries. Favourable habitat features include abundant aquatic vegetation, minimal tree canopy cover, waterbodies with salinity less than 7.0 mS/cm or (7,000 EC) which hold water for at least six months of the year. A cluster of waterbodies (within 700 m) allows frogs to move between sites as conditions change. They usually move on rainy nights.

It is unlikely that the threatened species will be impacted so that the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. The aim of the project tis to increase available habitat for the species by reducing erosion in the long term.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Growling Grass-frog is not considered an endangered ecological community, but a single species, therefore no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Growling Grass-frog is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small nature project, only minor modification to potential foraging habitat may occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential foraging habitats, rather enhance habitat available.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The area not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the *BC Act 2016 Schedule 4.*

Silver Perch (*Bidyanus bidyanus*)
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**
Silver Perch have been found in a wide range of habitats and climates across the Murray-Darling Basin. They are generally found in faster-flowing water including rapids and races and more open sections of river. Individuals sometimes form large shoals in open water.
They are omnivorous, feeding on a variety of small prey including aquatic insects, molluscs, worms, crustaceans, zooplankton and algae.

The proposal will not affect the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Silver Perch is not considered an endangered ecological community, but a single species, therefore, no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Silver Perch is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small, localised nature of the proposal, only minor modification to potential habitat will occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential habitats.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The activity area is not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the *BC Act 2016 Schedule 4.*

Murray Hardyhead (*Craterocephalus fluviatile*)
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**
Murray hardyhead prefer brackish water but can survive in saline environments. They tend to form schools, and can be found along the sheltered edges of lakes, billabongs, backwaters and wetlands, often in areas with abundant submerged vegetation.

It is unlikely that the threatened species will be impacted so that the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. The aim of the project tis to increase available habitat for the species by reducing erosion in the long term.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Murray Hardyhead is not considered an endangered ecological community, but a single species, therefore no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Murray Hardyhead is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small nature project, only minor modification to potential foraging habitat may occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential foraging habitats, rather enhance habitat available.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The area not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the *BC Act 2016 Schedule 4.*

Flathead Galaxias (*Galaxias rostratus*)
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**
Flathead Galaxias are found in still or slow-moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation. Flathead Galaxias spawn in spring and lay slightly adhesive demersal eggs.

The proposal will not affect the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Flathead Galaxias is not considered an endangered ecological community, but a single species, therefore, no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Flathead Galaxias is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small, localised nature of the proposal, only minor modification to potential habitat will occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential habitats.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The activity area is not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the *BC Act 2016 Schedule 4.*

Trout Cod (*Maccullochella macquariensis*)
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**
The Trout Cod is endemic to the southern Murray-Darling river system, including the Murrumbidgee and Murray Rivers, and the Macquarie River in central NSW. The species was once widespread and abundant in these areas but has undergone dramatic declines in its distribution and abundance over the past century. The last known reproducing population of Trout Cod is confined to the Murray River below Yarrawonga downstream to Tocumwal.

It is unlikely that the threatened species will be impacted so that the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. The aim of the project tis to increase available habitat for the species by reducing erosion in the long term.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Trout Cod is not considered an endangered ecological community, but a single species, therefore no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Trout Cod is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small nature project, only minor modification to potential foraging habitat may occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential foraging habitats, rather enhance habitat available.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The area not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the *BC Act 2016 Schedule 4.*

Murray Cod (*Maccullochella peelii*)
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**
Murray Cod, also referred to as cod or codfish, were once abundant throughout the Murray-Darling river system, but overfishing and environmental changes have drastically reduced its numbers. The species has been selectively stocked in other river systems in NSW, Victoria and Western Australia, but has generally failed to establish itself in those areas. Murray Cod generally prefer slow flowing, turbid water in streams and rivers, favouring deeper water around boulders, undercut banks, overhanging vegetation and logs. Small numbers are still present in the Nepean River and Yarra River.
The proposal will not affect the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Murray Cod is not considered an endangered ecological community, but a single species, therefore, no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Murray Cod is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small, localised nature of the proposal, only minor modification to potential habitat will occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential habitats.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The activity area is not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the *BC Act 2016 Schedule 4.*

Macquarie Perch (*Macquaria australasica*)
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**
Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury/Nepean and Shoalhaven catchments. Macquarie Perch occur in waters with lots of cover such as aquatic vegetation, snags, boulders and overhanging banks.

It is unlikely that the threatened species will be impacted so that the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. The aim of the project tis to increase available habitat for the species by reducing erosion in the long term.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Macquarie Perch is not considered an endangered ecological community, but a single species, therefore no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Macquarie Perch is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small nature project, only minor modification to potential foraging habitat may occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential foraging habitats, rather enhance habitat available.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The area not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the *BC Act 2016 Schedule 4.*

Murray Crayfish (*Euastacus armatus*)
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction**
Murray Crayfish can be found in the Murray River upstream of Mildura, in the Murrumbidgee River and in some dams, and are the only species in the *Euastacus* genus that live in both cold and warm water habitats. Murray Crayfish prefer cool, flowing water that is well oxygenated. The species is tolerant of water temperatures up to 27°C and moderate salinities, but are intolerant to low dissolved oxygen concentrations. They create burrows that vary in complexity, from deep burrows with multiple entrances to simple burrows under a rock or log,

It is unlikely that the threatened species will be impacted so that the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. The aim of the project tis to increase available habitat for the species by reducing erosion in the long term.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
N/A – Murray Crayfish is not considered an endangered ecological community, but a single species, therefore no ecological communities are placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
N/A – Murray Crayfish is not considered an endangered ecological community, but a single species, the development is not likely to substantially and adversely modify the composition of an endangered community, therefore placing it at risk.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
Due to the small nature project, only minor modification to potential foraging habitat may occur.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
The proposal will not cause fragmentation or isolations from other potential foraging habitats, rather enhance habitat available.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
The habitat proposed to be modified is not critical to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)
The area not mapped as an area of outstanding biodiversity value (OBV).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The action does not contravene part of the following key threatening processes as listed in the BC Act 2016 Schedule 4.

Conclusions

The assessment of significance for:

- Sloane's Froglet
- Growling Grass-frog
- Silver Perch
- Murray Hardyhead
- Flathead Galaxias
- Trout Cod
- Murray Cod
- Macquarie Perch
- Murray Crayfish

revealed that the potential impacts of the proposal on the threatened species are extremely unlikely and where there could be potential impacts, they will be very low. Potential minor impacts resulting from the proposed infrastructure install are not expected to increase the likelihood of a threatened or endangered species becoming extinct.

The test of significance for these threatened species does not trigger the requirement for a species impact statement (SIS). The proposal is deemed to be non-significant for the assessed species. In determining the significance of the proposed works on threatened species, the following matters were taken into consideration:

- implementation of the proposed works, installation, new operation and maintenance regimes
- activities to be undertaken in the area following the proposed works
- all direct and indirect impacts, on and off-site impacts through all phases
- the frequency and duration of each known or likely impact/action
- the total impact which can be attributed to that action over the entire geographic area affected initially and over time
- the sensitivity of the receiving environment
- the degree of confidence with which the impacts of the action are known and understood.

References

Department of the Environment and Energy (2021) [Online, accessed 9 December 2021] http://www.environment.gov.au/biodiversity/threatened/

Office of Environment and Heritage (NSW) (2021) BioNet Atlas of NSW Wildlife, [Online, accessed 9 December 2021] http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx