Statement of Environmental Effects: Pump Station and suction lines

2875 Weimby Road Balranald NSW, 2715

For 5 Ways Land Holding Pty Ltd

greenedge environmental

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1.0 The proposal

1.1 Locality

This Statement of Environmental Effects (SEE) has been prepared to support a Development Application (DA) for a pump station and suction lines on the southern side of the Murray River at Narrung. The application is accompanied by design plans (Appendix A).

The proposal is located at 2875 Weimby Road Balranald, NSW, 2715. Access to the proposed site is via the Murray Valley Highway an existing gravel farm track; approximately 200m from the from the Murray Valley Highway in Victoria (refer to Appendix A).

The subject allotment is adjacent to Lot 2/-/DP1182350. The lot is located within the Balranald Shire Council (BSC) Local Government Area, the allotment is zoned RU1 – Primary Production zone under the Balranald Local Environmental Plan 2010.

1.2 Objective of the proposal

The objective of this proposal is to install a pump station and suction lines (4) on five (5) driven piles into the Murray Riverbank. The power kiosk and delivery rising mains (x2) will be in the State of Victoria and subject to those approval processes. The project is required so irrigation can be drawn from the Murray River and delivered to nearby land.

The proposed development has the following characteristics (refer Table 1).

Table 1: Site details

Name	Address	Lot and DP	Zoning	Minimum lot size	Waterway
5 Ways Land Holdings Pty Ltd	2875 Weimby Road Balranald, NSW, 2715	Adjacent Lot 2/-/DP1182350	RU1- Primary Production:	40ha	Murray River

1.3 Description of the development

The proposal is located on the southern bank of the Murray River. The riverine environmental including River Red Gums and clay soils.

1.4 Site lay out plans

The site layout is presented in Appendix A.

1.5 Site preparation

Site preparation for the proposed development will consist of:

- formally marking the proposed development areas (including 'no go' zones) using flagging or bunting. No vehicles or machinery will traverse outside of this area
- levelling the existing site access track
- development of hard stands and work site area (in Victoria)
- pile driving and concreting of footings and pylons.

1.6 Infrastructure considerations

The pump station and suction lines will be permanent. No temporary infrastructure will be required to facilitate the development. No other facilities, car parking, storage etc are required in NSW.

1.7 Rehabilitation

Rehabilitation will ensure pile driving and excavations within the bank are stable and resistant to erosion. The small scale of the works in an existing modified area ensures a small rehabilitation footprint.

1.8 Previous and existing operations

The site has been distributed though recreation and river modification. No other existing operations occur at the site.

1.9 Timeline

The proposed life of the pump station and suction is 30 years. The proposed timeline for installation is in 2023 and will take approximately eight (8) weeks to construct.

1.10 Consideration of the alternatives and justification

All viable alternatives have been considered, including:

- Building a pump station and suction at other locations, both upstream and downstream
- Not building a pump station.

All above options have been considered and costed. The preferred option is presented in this SEE. The option relevant to this proposal is favoured, as it:

- will utilise existing tracks
- utilise existing disturbed area in the riverbank
- allows water to be extracted near to where it will be used, minimising additional inefficient pumping infrastructure
- is small scale and provides the best environmental outcome.

No other existing or likely future uses or activities on or near the site would be disadvantaged by this proposal. The proposal will not affect any world heritage properties, national heritage places, wetlands of international importance (Ramsar sites) or Commonwealth marine areas.

2.0 Planning context

2.1 Purpose of this report

This SEE has been prepared by Green Edge Environmental on behalf of 5 Ways Land Holding Pty Ltd who are the proponents. A Development Application (DA) will be lodged with the consent authority, BSC under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Environmental Planning and Assessment Act

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.

The proposal requires approval under Part 4 of the EP&A Act and is permissible with the consent of council under the Balranald Local Environmental Plan 2010.

Table 2: Section 79C of EP&A Act- matters for consideration

Matters for Consideration		Section where 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 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 4
(c)	The suitability of the site for development	Section 4
(d)	Any submissions made in accordance with this Act or the regulations	Noted
(e)	The public interest	Noted

2.2 Legal permissibility

The BSC are the consent authority to which this SEE will be lodged. The proposed location is in southern New South Wales.

2.2.1 Crown Land Management Act 2016

New South Wales Department of Planning, Industry and Environment (DPIE) – Crown Lands are the licensing authority for crown land. Under Division 5.6 of the *Crown Land Management Act 2016,* landowners' consent is required from the Department prior to lodging a DA and a licence for the structure will be applied for as Integrated Development.

2.2.2 Local Lands Services Act 2013

The objects of this Act are as follows:

> (a) to establish a statutory corporation with responsibility for management and delivery of local land services in the social, economic and environmental interests of the State in accordance with any State priorities for local land services
>
> (b) to establish a governance framework to provide for the proper and efficient management and delivery of local land services
>
> (c) to establish local boards for the purpose of devolving management and planning functions to regional levels to facilitate targeted local delivery of programs and services to meet community, client and customer needs
>
> (d) to require decisions taken at a regional level to take account of State priorities for local land services
>
> (e) to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistently with the principles of ecologically sustainable development (described in section 6 (2) of the Protection of the Environment Administration Act 1991)
>
> (f) to apply sound scientific knowledge to achieve a fully functioning and productive landscape,
>
> (g) to encourage collaboration and shared responsibility by involving communities, industries and non-government organisations in making the best use of local knowledge and expertise in relation to the provision of local land services
>
> (h) to establish mechanisms for the charging of rates, levies and contributions on landholders and fees for services
>
> (i) to provide a framework for financial assistance and incentives to landholders, including, but not limited to, incentives that promote land and biodiversity conservation.

Part 5A deals with Land Management (Native Vegetation), which is not relevant to the project as no native vegetation is proposed to be removed. The project does not impact on a Travelling Stock Route (TSR), so no formal concurrence is required of the LLS is required.

2.2.2 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 Assessment 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. An Assessment of Significance was conducted to characterise the significance of any potential impacts within Appendix C and 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 (BOS). In this case the BOS is **not** triggered as:

- No native vegetation will be cleared, therefore does not exceed the area threshold
- the area is mapped on the Biodiversity Values (BV) Map published by the Environment Agency Head, but the development within areas on the BV Map does not involve clearing native vegetation (including groundcover, trees and understorey plants) or a prescribed impact (as set out in clause 6.1 of the Biodiversity Conservation Regulation 2017) within the mapped area, the Biodiversity Offsets Scheme (BOS) i**s not applied** based on the BV Map.

- However, the proponent must also consider other criteria for the BOS:
    - whether the area of native vegetation clearing in areas not on the BV Map exceeds the clearing area thresholds as specified in clause 7.2 of the Biodiversity Conservation Regulation 2017
    - whether the proposed development or activity is likely to significantly affect threatened species, or ecological communities or their habitats based on the test of significance in section 7.3 of the BC Act (Appendix C).

2.2.3 Fisheries Management Act 1994

Under Section 198A of the *Fisheries Management Act 199*4, 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:

a) whether permanently or intermittently; or

b) whether forming an artificial or natural body of water.

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

Section 4 of the SEE includes an assessment of the impacts of the proposed development.

The development complies with the requirements of the F*isheries Management Act*, including the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A. No Part 2 or 7 Permit is required as the works are authorised under the *Crown Lands Management Act 2016* or by a relevant public authority (not a local government authority ie Crown Lands).

2.2.4 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act), administered by the DPIE - Environment, Energy and Science (EES), is the primary legislation for the protection of some aspects of Aboriginal cultural heritage in New South Wales.

Part 6 of the NPW Act provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. There are a number of defences and exemptions to the offence of harming an Aboriginal object or Aboriginal place. One of the defences is that the harm was carried out under an Aboriginal Heritage Impact Permit (AHIP).

This project has assessed that an AHIP is not required (refer to section 4.9).

2.2.5 Heritage Act 1977

The *Heritage Act 1977* identifies and protects heritage items, administered by the NSW Office of Environment and Heritage. Any developments which would impact on an item listed on the State Heritage Register would require approval from the Heritage Council under section 60 of the Act.

No items listed on the State Heritage Register are located within the immediate vicinity of the proposal.

2.2.6 Water Management Act 2000

The *Water Management Act 2000* (WM Act) is administered by the DPE -Water. The object of the Water Management Act is the sustainable and integrated management of the state's water for the benefit of both present and future generations. The works will occur within 40m of a waterway.

The objectives of the WM Act are to provide for the sustainable and integrated management of the water sources of NSW for the benefit of both present and future generations. One key aim is to integrate the management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna.

The Water Management (General) Regulation 2011 sets out a number of exemptions in relation to controlled activities. Under Part 3, Division 2, Subdivision 4 and Schedule 5, Part 2 of the regulations, a controlled activity approval is not required if the controlled activity is to be undertaken in accordance with any mining, Crown lands or western lands lease, licence, permit.

2.2.7 Protection of the Environment Operations Act 1997

The object of the *Protection of the Environment Operations Act 1997* is to achieve the protection, restoration and enhancement of the quality of the NSW environment. The Act provides for the issuing of three types of environment protection notices: clean-up, prevention and prohibition notices.

Clean-up notices can be issued to deal with pollution incidents (e.g. a spill of pollutants). Prevention notices can be issued where an activity is being carried out in an

environmentally unsatisfactory manner. Clean-up and prevention notices are issued by the regulatory authority for the activity or premises concerned. In emergencies, the EPA can issue a clean-up notice even though it is not the regulatory authority in the circumstances.

2.2.8 Environmental Protection and Biodiversity Conservation Act 1999

Under the federally administered *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), actions which are likely to have a significant impact on matters of National Environmental Significance (NES) require approval from the Commonwealth Minister for Environment and Heritage. Matters of NES include:

- 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.

No matters of NES will be impacted upon by the proposed project.

2.3 Local environmental plan

Balranald Shire Local Environmental Plan (LEP) 2010

The site is located within the Balranald Shire Local Government area and as such the Balranald Shire Local Environmental Plan (LEP) 2010 applies. Under the Balranald Shire LEP, the area is zoned primary production (RU1) and natural waterway (W1). The proposed development area is also subject to the land subject to inundation, biodiversity value, bushfire prone land, riparian lands and watercourses and wetlands.

The following sections of the LEP are also relevant to this project:

5.10 Heritage conservation

(1) Objectives The objectives of this clause are as follows—

(a) to conserve the environmental heritage of Balranald,

(b) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,

(c) to conserve archaeological sites,

(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.

(2) Requirement for consent Development consent is required for any of the following—

(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance)—

(i) a heritage item,

(ii) an Aboriginal object,

(iii) a building, work, relic or tree within a heritage conservation area,

(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,

(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,

(d) disturbing or excavating an Aboriginal place of heritage significance,

(e) erecting a building on land—

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,

(f) subdividing land—

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

The proposed works will not impact upon any known cultural heritage sites (refer to Section 4.7).

6.1 Biodiversity protection

Clause 6.1 of the LEP, aims of the plan:

(1) The objectives of this clause are to manage and maintain the integrity of identified areas of terrestrial and aquatic biodiversity significance, including—

(a) the biological diversity of native flora and fauna and their habitats, and

(b) the ecological processes necessary for ecosystems health.

(2) This clause applies to development on land that is identified on the Natural Resources Sensitivity—Biodiversity Map.

(3) Before determining a development application for land to which this clause applies, the consent authority must consider any adverse impact from the proposed development on—

(a) native flora and fauna, their habitat, and their interrelationship with the environment, and

(b) the movement and dispersal of native flora and fauna, and

(c) the physical and biological functions of the ecosystem.

(4) Before granting development consent to development on land to which this clause applies, the consent authority must be satisfied that the development is designed, sited and managed to minimise, remedy or mitigate those impacts identified in subclause (3) as much as practicable.

An assessment of the likely impacts of the proposal is located in Section 4.

6.2 Riparian land, waterways and groundwater vulnerability

(1) The objectives of this clause are as follows—

(a) to manage and maintain the integrity of identified riparian land and waterways, including protecting water quality within waterways,

(b) to manage and maintain the hydrological functions of key groundwater systems and to protect vulnerable groundwater resources from contamination as a result of inappropriate development.

(2) This clause applies to land identified on the Riparian Land Map, Waterways Map and

Groundwater Vulnerability Map.

(3) Before determining a development application on land identified as riparian land or waterways, the consent authority must consider whether the proposed development will have an adverse effect on the following—

(a) the quantity of natural water flows to receiving waters,

(b) the water quality of receiving waters, including aquifers,

(c) the waterway's natural flow paths,

(d) the stability of the waterway's bed, shore or banks,

6.4 Flood planning

(1) The objectives of this clause are as follows—

(a) to minimise the flood risk to life and property associated with the use of land,

(b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,

(c) to avoid significant adverse impacts on flood behaviour and the environment.

(2) This clause applies to—

(a) land that is shown as "Flood planning area" on the Flood Planning Area Map, and

(b) other land at or below the flood planning level.

(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development—

(a) is compatible with the flood hazard of the land, and

(b) will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and

(c) incorporates appropriate measures to manage risk to life from flood, and

(d) will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and

(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding.

(4) A word or expression used in this clause has the same meaning as it has in the NSW Government's Floodplain Development Manual published in 2005, unless it is otherwise defined in this clause.

6.5 Development on river front areas

(1) The objectives of this clause are to—

(a) support the natural riverine processes, including the migration of the river channel, and

(b) protect and improve the bed and bank stability of rivers, and

(c) manage and maintain the water quality of rivers, and

(d) protect the amenity, scenic landscape values, cultural heritage of rivers and public access to riverine corridors, and

(e) conserve and protect riverine corridors, including wildlife habitat.

(2) Despite any other provision of this Plan, development may only be carried out on land in the river front area for the following purposes (provided that the purpose is permitted in the zone in which the river front area is located)—

(a) a boat launching ramp, boat repair facility, boat shed, charter and tourism boating facility, marina or water recreation structure,

(b) the extension or alteration of an existing building that is wholly or partly in the river front area (provided that the extension or alteration will be located no closer to the river bank than the existing building),

(c) environmental protection works,

(d) extensive agriculture and intensive plant agriculture,

(e) cycleways, picnic facilities, environmental facilities, recreation facilities and recreation facilities (outdoors) (provided any associated buildings will not be located within the river front area).

(3) If development consent is required for development for a purpose referred to in subclause (2), the development consent must not be granted under subclause (2) unless the consent authority is satisfied that—

(a) the appearance of the development, from both the river and adjacent river front area, will be compatible with the surrounding area, and

(b) the development is not likely to cause environmental harm such as—

(i) pollution or siltation of the river, or

(ii) an adverse effect on surrounding uses, riverine habitat, wetland areas, flora or fauna habitats, or

(iii) an adverse effect on drainage patterns, and

(c) the development will only cause minimal visual disturbance to the existing landscape, and

(d) continuous public access, and opportunities to provide continuous public access, along the river front and to the river will not be compromised, and

(e) any historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of the land on which the development is to be carried out and of surrounding land will be maintained.

6.6 Development on riverbeds and banks

(1) The objectives of this clause are as follows—

(a) to manage and maintain the quality of water in rivers,

(b) to protect the environmental values, scenic amenity and cultural heritage of rivers,

(c) to protect the stability of the bed and bank of rivers,

(d) to limit the impact of structures in rivers on natural riverine processes and navigability of rivers.

(2) Development consent must not be granted for development on waterfront land, unless the consent authority is satisfied that—

(a) the development will contribute to achieving the objectives of the zone in which the land is located, and Balranald Local Environmental Plan 2010 [NSW]

(b) the development, or use of the development, will not increase erosion, and

(c) any proposed structure will not be located on an outside bend of the river, and

(d) the appearance of any proposed structure, from both the watercourse and the adjacent land, will be compatible with the surrounding area, and

(e) the development will not cause an adverse effect on riverine habitat or flora and fauna habitat, and

(f) the development will not cause an adverse effect on drainage or flow patterns, and

(g) no more than one mooring per lot or holding will be established.

2.4 Relevant guidelines

A number of guidelines were consulted during the preparation of this SEE including:

- DPI Fisheries (2013), Policy and guidelines for fish habitat conservation and management. State of New South Wales through Department of Trade and Investment, Regional Infrastructure and Services.
- DPI Water (2013). Controlled Activities on Waterfront Land - Retaining walls on inland waterways. State of New South Wales through the Department of Trade and Investment, Regional Infrastructure and Services.
- DPI Water (2012). Controlled Activities on Waterfront Land - Guidelines for instream works on waterfront land. Department of Primary Industries, a division of NSW Department of Trade and Investment, Regional Infrastructure and Services.

2.5 Zoning

Under the Balranald LEP, the proposed allotment is zoned 'primary production zone (RU1).' However, the waterway where the proposed work are to occur is Natural Waterways (W1)

The objectives of RU1 zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base
- To encourage diversity in primary industry enterprises and systems appropriate for the area
- To minimise the fragmentation and alienation of resource lands
- To minimise conflict between land uses within this zone and land uses within adjoining zones
- To encourage development that is in accordance with sound management and land capability practices, and that takes into account the environmental sensitivity and biodiversity of the locality
- To support rural communities
- To ensure the provision of accommodation for itinerant workers.

The objectives of W1 zone are:

- To protect the ecological and scenic values of natural waterways.
- To prevent development that would have an adverse effect on the natural values of waterways in this zone.
- To provide for sustainable fishing industries and recreational fishing.

Water supply systems are permitted with consent in both zones.

2.6 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 2021 lists all development which falls under 'designated development'. As this proposal does not describe works listed in Schedule 3, a SEE is required to be submitted with the development application.

2.7 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 and the approvals outlined in Table 3.

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 3: Approvals required for the project

Act	Provision	Approval/concurrence
Environmental Planning and Assessment Act 1979	Part 4- Development Consent	Balranald Shire Council
Crown Lands Management Act 2016	Division 5.6	Crown consent required from landowner and a Crown licence for the infrastructure

Water Management Act 2000	Part 3, Chapter 3	Controlled activity approval not required as a Crown Licence will be in place
Fisheries Management Act 1999	Section 201	Not required, concurrence from fisheries required as a Crown Licence will be in place.

2.8 Determining authority

The determining authority is the Balranald Shire Council.

3.0 Location

3.1 Site description

The proposed project is located within on the southern bank of the Murray River and into the waterway. The area has been impacted due to a long history of disturbance from recreational activities and grazing.

One plant community type (PCT) occurs on site which meet the floristic criteria of the community type, which is:

- River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (PCT11)

3.2 Land systems and geology

The proposed project is located within the Murray Basin Geological province. Quaternary material covers almost all of the area. Quaternary alluvial deposits comprise the riverine plain. Scattered aeolian (windblown) deposits also occur throughout (Cunningham et al 1992).

The Murray Basin is a shallow depression filled with marine and terrestrial sediments to a maximum depth of 600m over the last 50-60 million years. Shallow seas have moved back and forth across the plains several times, leaving traces of parallel beach ridges and limestone sediments under the dunefields. At one stage, the coast reached as far inland as Balranald (OEH, 2011).

The works will occur within the Murray River, part of the Murray Darling Basin.

3.3 Hydrology and geomorphology

The proposed activity is located within a relatively straight section of the Murray River between two bends. The water within this section is controlled by lock and weir 15 downstream at Euston. As the works are minor in nature and build above but close to the bank they are not expected to impact adversely on the hydrology and geomorphology of the site.

3.4 Soil

Soils in the depositional basin are deep red sands with variable sandy profiles under dunes, and gradational profiles in the sandplains. Most soils have a moderate to high level of calcium carbonate in the profile (ANRA, 2009).

Modern river channels consist mostly of sandy soils and more saline heavy grey and brown clays towards the outer perimeter of the floodplains on the higher rarely flooded terraces (ANRA, 2009). As soil and water salinity increase downstream on the Murrumbidgee, saline clays become evident on lake floors. The red-brown and grey clays in the bioregion support grassland communities that are nationally significant. Calcareous, sandy soils, that tend to be feature of adjacent bioregions are also present in the Riverina and support mallee communities (ANRA, 2009).

Vegetation communities on site are linked to soil type. The grey cracking clays of the banks of the Murrumbidgee River support River Red Gum (*Eucalyptus camaldulensis*)

and River Cooba (*Acacia stenophylla*) trees while the wetter bed of the river supports sedges (*Juncus* spp.).

3.5 Climate

The annual mean minimum temperature recorded from the Balranald (RSL) (049002) is 10ºC, monthly values varying from 3.5ºC during July to 33.1ºC during January. The annual average maximum temperature is 24.4 deg C - monthly values vary from 16.6ºC in July to 33.1ºC in January (Bureau of Meteorology, 2022).

The annual rainfall total of 322.7mm is fairly evenly distributed throughout the year. The month of May is on average the wettest, receiving 31.2mm (see Table 4). By contrast, the year's driest month, March, receiving only 22mm (Bureau of Meteorology, 2022).

Table 4: Balranald rainfall data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean monthly rainfall (mm)	22.4	24.9	22	23.7	31.2	29.3	26.4	29.3	28.9	30	28.6	26
Highest monthly rainfall (mm)	137.6	141.5	133.3	125.7	117.4	137.5	82.3	85.2	106.6	130	125	145.3
Lowest monthly rainfall (mm)	0	0	0	0	0	0.5	0	0.4	0.5	0	0	0

4.0 Environmental impacts and management

This section outlines the environmental impacts of the proposed works and any mitigation measures that reduce potential impacts.

4.1 Land use

4.1.1 Existing environment

The Murray River Basin has been highly modified through adjacent recreation and flow modification and regulation since European settlement. The bank at this location has been used for a long period of time for grazing and recreation.

4.1.2 Impact assessment

The proposed pump station and suctions will cause minor impacts to the bank and bed of the Murray River. Piles will be driven from a pile driving machine from the top of the bank. No machinery will be required to ender the lower bank of waterway. All impacts are considered low in nature and can be mitigated by the following measures.

4.1.3 Mitigation measures

- use existing tracks to access the site
- maintain a rubbish free and tidy work area
- work area delineated with high visibility flagging or fencing.

4.2 Hydrology and geomorphology

This bioregion is dominated by river channels, floodplains, back plains, swamps, lakes and lunettes that are all of Quaternary age. The region comprises three overlapping alluvial fans centred on the eastern half of the Murray Basin. Features of each fan differ slightly because of differences in the discharge of the streams (OEH, 2011).

From its source high in the Australian Alps, the Murrumbidgee River winds through the alpine regions of Kosciuszko National Park and the Monaro High Plains, and then through the Australian Capital Territory. Once the river reaches the south-west slopes of New South Wales it heads west across the riverine plains to its confluence with the River Murray near Balranald. The Tumut River is the largest tributary of the Murrumbidgee, and it also has its headwaters in the Australian Alps (MDBA. 2020).

Surface water and groundwater systems in the catchment range from being highly connected to permanently disconnected. The interaction between the sources is influenced by extraction of surface and groundwater use, seasonal conditions and frequency, significance and duration of floods. Most upland streams receive flow from fractured rock aquifers.

4.2.1 Impact assessment

The following works are proposed:

- Leveling the existing track
- Driving piles for the pump station and suction offtakes
- Construction of the pipe and electrical works to the pumpstation

The proposed development has been designed to not impact flood flows or cause flooding impacts in other areas. The design plans are shown in Appendix A and minimise impact to the hydrogeology of the river.

The works are minor in nature, and they are not expected to impact the hydrology and geomorphology of the site.

4.2.2 Mitigation measures

- No new river bank accesses to be created
- Site remediation to ensure loose soils are compacted to match surrounding soils
- All works to be carried out in accordance with the controlled activities guidelines.

4.3 Water quality, erosion and sedimentation

4.3.1 Existing environment

Groundwater in the catchment is contained in the Murray Alluvium and fractured rock aquifers beneath the Murray and Darling geological basins.

Water quality is variable, depending on the origin of the water. Groundwater quality generally ranges from 25-50,000 (µS/cm) and surface water quality is highly variable and can range into the 1,000's (µS/cm). Under current high flow conditions in the river system, lots of sedimentation and erosion is occurring.

4.3.2 Impact assessment

The works will occur when the river system returns to managed water levels or on flood recession, water quality will not be impacted. Erosion and sediment will be managed by ensuring excavations are compacted and match in with the existing river bed and banks.

4.3.3 Mitigation measures

- refuelling of small plant would only take place on level ground and in bunded areas which is at a distance no less than 40m from drainage lines and waterways
- spill containment measures (such as drip trays and bunds) to be used when refuelling within 40m of a waterway is required

4.4 Soils

4.4.1 Existing environment

The soils associated with the subject land are predominately grey, brown silty clays. These soils are common on the riverine environment and are derived from alluvial material. Topographical variation is moderate over the majority of the area, and consistent with upstream and downstream banks of the Murray River.

The project areas contain generally heavy clay soil and the topography of the land system is generally flat.

A search of the NSW EPA Contaminated Land Register (1 November 2022) did not identify any contaminated lands on or adjacent to the project area.

A search of the Australian Soil Resource Information System (ASRIS) was conducted on 1 November 2022, the area of the proposed works is mapped as *Extremely Low Probability of Occurrence* (CSIRO, 2022).

4.4.2 Impact assessment

The proposed works would not pose any major impact to landform or geology. Some soil disturbances would occur during excavation of the foundations and pile installation, vehicle and plant access tracks to access the site. Minor erosion and scouring could occur if there is a substantial flood event during, or soon after construction, before the area has been re-stabilised. The risk of sedimentation to the waterways will be managed through appropriate erosion and sediment controls listed below.

Fuel and oil from the construction plant and the ancillary facilities are potential sources of pollution. Any spills could potentially be transported into the waterway/ nearby drainage systems and impact water quality. Mitigation measures would be implemented to reduce the impacts associated with works. No significant changes to the topography, geology and soils will occur, as works proposed are on an existing structure.

The characteristics of the soils mean they become very sticky when it rains (even a small amount), which could result in difficulties accessing the site and ultimately result in scouring and damage to roads.

4.4.3 Mitigation measures

- minimising the movement of machinery along the bank, particularly after rainfall
- ceasing works during heavy rainfall
- appropriate erosion and sediment controls would be installed prior to the commencement of works in accordance with the technical document, Landcom (2006) Edition 4 'Managing Urban Stormwater: Soils and Construction' (the Blue Book), where the disturbed catchment exceeds 250m² and when soil is likely to be left exposed for more than two weeks
- Spill kits would be available with each refueling area and all staff would be trained in their use
- Spill containment measures (such as drip trays) to be used when refueling within 40 metres of a waterway is required, where possible refueling should occur greater than 40 meters from a waterway
- Inspection and maintenance of sediment and erosion controls until site has been stabilised post construction
- Soil/silt to be removed from the site and legally disposed of as per the NSW waste classification guidelines.

4.5 Flora

4.5.1 Existing environment

The proposed project area is located in the Riverina Bioregion and the Murray Fans sub region, 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 occur within the works area:

- River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (PCT11)

Details of this PCT are shown in Table 5.

Table 5: PCT characteristics

PCT	PCT name	Description
11	River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (PCT11)	Tall open forest or woodland with trees to about 20 m high, dominated by River Red Gum (Eucalyptus camaldulensis) to 20 m high with patches of River Cooba (Acacia stenophylla), Lignum (Muehlenbeckia florulenta) and Nitre Goosefoot (Chenopodium nitrariaceum) as a shrub understorey. Black Box (Eucalyptus largiflorens) is sometimes present. Ground cover is usually mid-dense or sparse and is dominated by Warrego Grass (Paspalidium jubiflorum) and forb species such as Pratia concolor, Alternanthera denticulata, Wahlenbergia fluminalis, Chenopodium pumilio, Brachyscome basaltica var. gracilis, Eclipta platyglossa, Senecio quadridentatus, Asperula gemella, Euchiton sphaericus, Minuria integerrima, Rorippa laciniata, Centipeda minima var. minima, Rumex tenax, Damasonium minus and Ranunculus undosus. The sedge Cyperus gymnocaulos is commonly present. Occurs on heavy grey clay soil in drainage depressions and flood-outs of major water courses on the floodplains along western sections of Murray, Murrumbidgee and Lachlan Rivers and extending up the Darling River to Wilcannia. Mainly in the Riverina and Murray-Darling Depression Bioregions of the semi-arid (warm) climate zone. Reasonable stands remain and the greatest threat is over-grazing, changed flooding regimes and extended drought. Tree dieback from drought has increased since 2000.

The project area is mapped as 'Category 2 Vulnerable Regulated Land (as per the Native Vegetation Regulatory Map, refer Appendix A) – rural land where clearing of native vegetation is more restricted than on other Category 2 land. This includes steep and highly erodible lands, riparian land and special category land.

4.5.2 Threatened species

A database search was undertaken on 1 November 2022 of the NSW Department of Planning and Environment – Environment, Energy and Science (EES) (BioNet Atlas of NSW Wildlife) and the Department of Climate Change, Energy the Environment and Water (DCCEEW) 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:

- DPE EES BioNet Atlas of NSW Wildlife (refer to Appendix B)
- DCCEEW Protected Matters Report (refer to Appendix B).

Nine threatened flora species were identified in search area and the Protected Matters Search Tool. Table 6 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 at the site, they were not observed on site, and are unlikely to occur under future management scenarios. None of these species was subject to the 'assessment of significance', as set out in Section 7.3 of the BC Act.

Table 6: Threatened flora from database searches

Scientific name	Common name	Level of threat		Suitable habitat
		State	Federal	
Austrostipa metatoris			V	No potential habitat. Grows in sandy areas of the Murray Valley; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils. Not observed on site.
Austrostipa wakoolica			E	No potential habitat, grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise. Associated species include *Callitris glaucophylla, Eucalyptus microcarpa, E. populnea, Austrostipa eremophila, A. drummondii, Austrodanthonia eriantha and Einadia nutans.*
Brachyscome papillosa	Mossgiel Daisy			No potential habitat, Recorded primarily in clay soils on Bladder Saltbush (*Atriplex vesicaria*) and Leafless Bluebush (*Maireana aphylla*) plains, but also in grassland and in Inland Grey Box (*Eucalyptus microcarpa*) - Cypress Pine (*Callitris spp.*) woodland.
Eriocaulon australasicum	Aistral Pipewort	E	E	No potential habitat, known from very few collections, with the type habitat described as "wet places along the Murray towards junction of Murrumbidgee". In populations near Braidwood and in the Pilliga, it grows in mud in ephemeral water bodies
Lepidium monoplocoides	Winged Pepper-cress		E	Unlikely habitat. 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). Not observed on site.
Maireana cheelii	Chariot Wheels		V	No habitat, usually found on heavier, grey clay soils with Atriplex vesicaria (*Bladder Saltbush*). Recorded

Scientific name	Common name	Level of threat		Suitable habitat
		State	Federal	
				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.
Solanum karsense	Menindee Nightshade		V	Potential habitat. Grows in occasionally flooded depressions with heavy soil, including level river floodplains of grey clay with Black Box and Old Man Saltbush, and open treeless plains with solonized brown soils. Not observed on site.
Swainsona murrayana	Slender Darling Pea	E	V	No habitat. Usually grows in mallee communities. Generally, grows in gravely and sandy loam soils on dunes, in open woodland and tall shrubland. Also recorded in sand in spinifex-shrub steppe. Not observed on site.
Swainsona pyrophila	Yellow Swainson-pea	V	V	No habitat. Grows in mallee scrub on sandy or loamy soil, usually found only after fire.

Note V=vulnerable, E/E1=endangered

4.5.3 Threatened communities

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

- Acacia loderi shrublands
- Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions
- Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions
- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
- Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions
- Tecticornia lylei, Wiry Glasswort, low open-shrubland in the Murray Darling Depression Bioregion
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and
- Mallee Bird Community of the Murray Darling Depression Bioregion

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

Under the *Fisheries Management Act 1994* (Part 3 of Schedule 4) the following endangered ecological community is listed:

- The aquatic ecological community in the natural drainage system of the lower Murray River catchment.

Priority actions to improve the habitat of the endangered ecological community include:

- Review regulatory and voluntary incentive-based mechanisms available in the EEC to enhance protection for key habitat areas and apply as required. This may include the use of critical habitat provisions, aquatic reserves, environmentally sensitive land provisions, voluntary conservation agreements etc.

4.5.4 Impact assessment

A general flora assessment was conducted across the proposed project site and the surrounding area on 7 August 2022 by Chris Alderton (B App Sci). The two-hour assessment, adhering to Table 5.1 Survey Effort (DEC, 2004), focused on areas of likely higher vegetation values and active searches of likely habitat for reptiles and small

mammals. Weather conditions were a clear sky, maximum temperature of 16ºC and slight breeze.

One vegetation stratification units occur within the assessment (works footprint) area (Appendix A). Eight native flora species were observed within the assessment footprint.

The assessment area does form part of a vegetation corridor along the Murray River, which will not be impacted by the proposed development. Hollow and nest bearing trees were observed within the study area but will not be impacted.

The flora assessment revealed no vegetation species; populations or communities, that are of local, regional or state conservation significance (refer to Table 7).

Table 7: Flora species recorded on-site

Scientific name	Common name	Threatened/Status
Acacia stenophylla	River Coooba	No
Atriplex vesicaria	Bladder saltbush	No
Duma florulenta	Lignum	No
Enchylaena tomentosa	Ruby saltbush	No
Eucalyptus camaldulensis	River Red Gum	No
Nitraria billardierei	Dillon bush	No
Rhagodia spinescens	Hedge Saltbush	No
Salsola australis	Roly poly	No
# Hordeum leporinum	Barley grass	No
# Lactuca serriola	Prickly lettuce	No
# Lippia sp.	Lippia	No
# Sisymbrium irio	London rocket	No
# Trifolium sp.	Clover	No
#Malveace sp.	Mallows	No
#Medicargo minima	Small-wooly burr-medic	No
#Vetch sp	Vetch	No

4.5.5 Mitigation measures

- no new bank accesses to be created
- the tree retention zone (12x Diameter at Breast Height) shall be cordoned off and no parking or stockpiling will occur within this zone

4.6 Fauna

4.6.1 Threatened species

A database search was undertaken on 1 November 2022 of the NSW Department of Planning and Environment – Environment, Energy and Science (EES) (BioNet Atlas of NSW Wildlife) and the DCCEEW 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:

- DPE EES BioNet Atlas of NSW Wildlife (refer to Appendix B)
- DCCEEW Protected Matters Report (refer to Appendix B).

None of these species were recorded during site assessments on 7 August 2022.

Table 8 lists the fauna species with state and national conservation significance that have potential to occur within the study area. The column in Table 8 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. One of the identified species, Grey Snake, has been assessed under the 'test of significance', as set out in Section 7.3 of the BC Act (refer Appendix C).

Table 8: Listed fauna species from databases

Class	Species name	Common name	State	National	Comment
Fish	*Maccullochella peelii*	Murray Cod		V	Minor aquatic habitat through pile driving, mitigation measures in place to protect this habitat during construction and fish screens during operations.
Fish	*Maccullochella macquariensis*	Trout Cod	E		Minor aquatic habitat through pile driving, mitigation measures in place to protect this habitat during construction and fish screens during operations.
Fish	*Macquaria australasica*	Macquarie perch		V	Minor aquatic habitat through pile driving, mitigation measures in place to protect this habitat during construction and fish screens during operations.
Fish	*Craterocephalus fluviatilis*	Murray Hardyhead		E	Minor aquatic habitat through pile driving, mitigation measures in place to protect this habitat during construction and fish screens during operations.
Fish	*Bidyanus bidyanus*	Silver Perch	CE		Minor aquatic habitat through pile driving, mitigation measures in place to protect this habitat during construction and fish screens during operations.
Fish	*Galaxias rostratus*	Flathead Galaxis		CE	Minor aquatic habitat through pile driving, mitigation measures in place to protect this habitat during construction and fish screens during operations.
Frog	*Litoria raniformis*	Southern Bell Frog	E1,P	V	Unlikely habitat. Mainly found in shallow wetlands (less than 1m deep) with dense growth of rushes or sedges. Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. None of this habitat is proposed to be impacted.
Reptile	*Hemiaspis damelii*	Grey Snake		E1	Potential habitat, in the Lowbidgee floodplain region of NSW it has been recorded exclusively from the

Class	Species name	Common name	State	National	Comment
					margins of ephemeral wetlands within River Red Gum *Eucalyptus camuldulensis* and Black Box E. largiflorens vegetation communities and from Tangled Lignum *Duma florulenta* swamps
Aves	*Leipoa ocellata*	Malleefowl	E1,P	V	No habitat, predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Requires large areas of unburnt mallee.
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*.). But as these habitats will not be impacted and the short duration of the project, no impacts are expected.
Aves	*Falco hypoleucos*	Grey Falcon	E1,P,2		Potential habitat but no habit to be impacted., 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. Also occurs near wetlands where surface water attracts prey.
Aves	*Rostratula australis*	Australian Painted Snipe	E1,P	E	Unlikely habitat, prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.
Aves	*Calidris ferruginea*	Curlew Sandpiper	P	CE	No habitat. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland.
Aves	*Polytelis anthopeplus monarchoides*	Regent Parrot (eastern subspecies)	E1,P,3	V	Potential habitat, but no habit to be impacted., the species nests within River Red Gum forests along the Murray, Wakool and lower Murrumbidgee Rivers, and possibly the Darling River downstream of Pooncarie. Typical nest trees are large, mature healthy trees with many spouts (though dead trees are used) and are usually located close to a watercourse.

Class	Species name	Common name	State	National	Comment
Aves	*Manorina melanotis*	Black-eared Miner	E		No habitat, inhabiting mature and old-growth mallee that has not been burnt for more than 50 years
Aves	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		No habitat. Found in mallee and River Red Gum 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.
Aves	*Numerius madagascariensis*	Eastern Curlew		CE	No 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	*Pedionomus torquatus*	Plains-wanderer		CE	No 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	*Grantiella picta*	Painted Honeyeater	V,P	V	No habitat. Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests.
Aves	*Daphoenositta chrysoptera*	Varied Sittella	V,P		Unlikely habitat. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.
Mammal	*Notomys mitchellii*	Mitchells Hopping mouse	E		No habitat, Mallee shrubland associations are the typical habitat of *N. mitchelli*, especially areas with sandy soils and slight sand dune formations.
Mammal	*Nyctophilus corbeni*	Corben's Long-eared Bat	V,P	V	Unlikely habitat. Inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina leuhmanni* and box eucalypt

Class	Species name	Common name	State	National	Comment
					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.
Marsupial	*Phascolarctos cinereus*	Koala		V	Potential habitat but will not be impacted, listed feed tree species are in the area.

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*

4.6.2 Impact assessment

A general fauna assessment was conducted across the proposed works area, including nearby areas of intact vegetation and instream habitat, by Chris Alderton (B App Sci). The assessment also focused on the access to the site and surrounding habitats. It was noted that no nests and hollows exist within the area proposed for the activity (only outside of the work footprint).

The fauna assessment revealed no species; population or communities, which are of local, regional or state conservation significance. Three species were assessed for significance (Appendix D), which concluded no further species impact statement (SIS) was required.

The native fauna species that were recorded moving across the site include, Western Grey Kangaroo (*Macropus fuliginosus*) and Galah (*Eolophus roseicapilla*).

4.6.3 Mitigation measures

- ensure sediment fences are in place until the bank is stable, during and following construction
- profiles of threatened species that have potential to inhabit the site will be kept on site

4.7 Heritage

4.7.1 Existing environment

The proposed work site is in an area previously impacted by recreation, grazing and vehicle access. This has caused a significant modification of the site and good ground visibility, via the modification to native vegetation.

4.7.2 Impact assessment

A Due Diligence assessment has been prepared by Jo Bell Heritage Services Pty Ltd for a proposed new pumping station on Murray River, crown water frontage (CA18A) near Narrung, Victoria. The activity area is located approximately 300 metres east of the confluence of Wakool Creek and the Murray River. Narrung is located within the municipal boundaries of the Swan Hill Rural City Council. The pumps and associated infrastructure will be partially located below the high-water mark of the Murray River and will therefore be within the New South Wales state boundary. The aim of constructing the pumping station is for water extraction from the Murray River to supply the needs of a proposed irrigation project in Victoria from the river.

The activity area comprises an area no greater than 150 square metres (sqm) from the high-water mark to the low-water mark of the river. The bulk of the works will be undertaken from within Victoria and the only impacts to the land in NSW will be the exit point of the underground boring and the installation of 10 pile-driven supports for the pumping infrastructure. The activity area is comprised of Crown Reserve land.

The proposed activity is likely to, or may include the following:

- Construction of a pumping station attached to an under-bored pipe
- It will be constructed entirely on pile-driven supports
- Removal of some vegetation within the pumping station footprint
- All works will be undertaken from the Victorian bank including the pile-driving of the support pylons.

Recommendations from the cultural heritage due diligence assessment:

No Aboriginal cultural heritage was identified during the visual inspection undertaken for the preparation of this Due Diligence Assessment. It is unlikely that the activity area contains any landforms that may still contain buried deposits of Aboriginal cultural heritage. Based on the results of this assessment, there is no requirement for any further archaeological works to be undertaken.

4.7.3 Other cultural heritage

The State Heritage Register (NSW Environment and Heritage) database was used to determine if any areas of historic value were located on or nearby the proposed project site. There are no other known heritage sites within the proposed project area. A search of the Balranald Local Environment Plan, Schedule 5, for local heritage revealed:

- no listed local heritage items
- no listed state heritage items

Additionally, there are no World Heritage or National Heritage items and/or places within 10 kilometres of proposed work site.

4.7.4 Mitigation measures

- The NPW Act requires that, if a person finds an Aboriginal object on land and the object is not already recorded on AHIMS, they are legally bound under s.89A of the NPW Act to notify DPE as soon as possible of the object's location. In the event that new Aboriginal objects are found during the conduct of the activity, then the following must occur:
  - a) The person who discovers Aboriginal object/s during the activity will immediately notify the person in charge of the activity;
  - b) The person in charge of the activity must then suspend any relevant works at the location of the discovery and within 5m of the relevant site boundary;
  - c) In order to prevent any further disturbance, the location will be isolated by safety webbing or an equivalent barrier and works may recommence outside the area of exclusion;
  - d) The person in charge of the activity must contact an archaeologist within 48hrs;
  - e) The archaeologist must contact the DPIE (formerly OEH) Regional Aboriginal Heritage Division (Southern Region);
  - f) Within a reasonable period, a decision/recommendation will be made by the archaeologist in consultation with the relevant Aboriginal stakeholder group(s) and DPIE as to the process to be followed to manage the Aboriginal object/s in a culturally appropriate manner, and how to proceed with the works;
  - g) Options for management may include:
    - i. Recording the site and submitting the relevant forms to the AHIMS Registrar
    - ii. Developing a strategy to avoid harm to the site; and/or

- iii. If avoiding harm is not possible, further investigation, an impact assessment and an AHIP may be required.

- h) A separate contingency plan has been developed in the event that suspected human remains are discovered during the conduct of the activity.

- Aboriginal cultural heritage encompasses all aspects of Aboriginal culture, including tangible evidence such as stone artefacts, shell middens and ancestral remains, intangible evidence such as oral histories and song lines as well as living culture. While not all aspects of Aboriginal culture are considered sensitive, especially evidence of activities of daily living, there are some aspects that may relate to ceremony, ritual or ancestral remains that are of a particularly sensitive nature. Culturally sensitive information is inherently bound up with cultural significance. 'If we accept that cultural significance is not an inherent quality of a place, but a social outcome resulting from people's interactions with a place, then the community itself must be the most important source of significance' (Burke & Smith 2004:245).
    - In the event that further Aboriginal cultural material is identified *during the conduct of the activity*, the archaeologist must ensure that any investigations undertaken in relation to the Aboriginal objects are carried out in a culturally sensitive manner, which may include limiting access to the objects during investigations and further advising the proponent/contractors/employees of their obligations in relation to the culturally sensitive nature of the heritage and their obligations in relation to the relevant legislation.
- Notification of the Discovery of Skeletal Remains during the carrying out of the Activity
    - 1. Discovery:
        - a) If suspected human remains are discovered, all activity in the vicinity must stop to ensure minimal damage is caused to the remains, and,
        - b) The remains must be left in place and protected from unauthorised access and harm or damage.
    - 2. Notification:
        - a) Once suspected human skeletal remains have been found, New South Wales Police (use the local number) must be notified immediately;
        - b) If there is reasonable grounds to believe that the remains could be Aboriginal, the NPWS Head Office must be immediately notified on (02) 9585 6444 or contact the Aboriginal Heritage Officer at the Heritage Branch on (02) 9873 8500 for further advice;
        - c) All details of the location and nature of the human remains must be provided to the relevant authorities; and
        - d) The remains should also be reported to the relevant Traditional Owners.

4.8 Air quality

4.8.1 Existing Environment

The nearest permanent residence and receptor is located approximately 160m west of the proposed works site. The nearest public road is approximately 210m south.

4.8.2 Impact assessment

Due to the remoteness of the areas, there will only be minimal impact from the expected minor raised dust along access tracks that may occur from time to time during heavy vehicle movements. Due to the minor nature of the works, no air impacts are expected at the works site.

Practices associated with the project that could affect air quality include exhaust emissions from vehicles and plant and windblown dust during the activity.

4.8.3 Mitigation measures

- No burning of timber or other combustible materials will occur on-site
- Adherence to appropriate Australian Standards
- Minimise works during windy periods to minimise dust creation to ensure no dust impacts are occurring along public roads or at sensitive receivers
- Ensure all plant and equipment complies with part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002

4.9 Socio and economic

4.9.1 Existing environment

The development will allow the irrigation of crops to be planted, in turn will create jobs and economic benefits for the region.

4.9.2 Impact assessment

The proposal is considered unlikely to result in any adverse social or economic impacts due to the small scale of the project.

4.9.3 Economic assessment

The expected capital expenditure of the upgrade is approximately $200,000, completed by local contractors where possible. This will have important flow on effects to other service providers within the area.

4.9.4 Social assessment

The proposal will not disadvantage any individuals or communities and consultation with all known affected groups has been undertaken.

As required by any work site in NSW, appropriate signage will be placed around the work area, including PPE and general safety signs.

4.9.5 Impact on the community

Although the character of the area would be slightly affected through the proposed works, by minimising the extent of the impact and undertaking rehabilitation, there will be minimal long-term impacts.

4.9.6 Visual impact

The proposed project will have low visual impact due to it being in a regional area and only minor work being undertaken.

4.9.7 Mitigation measures

- Appropriate signage as required under legislation and adherence with best practice management
- to ensure neighbouring properties and general usage of the area will not be affected throughout the proposed works, the neighbouring residents will be continually consulted.

4.10 Transport

4.10.1 Existing environment

The proposed site is on the bank of the Murray River, with access via existing farm tracks and the Murray Valley Highway.

4.10.2 Impact assessment

The proposed project will utilise existing tracks to access the site; no new tracks will be created.

This project will be undertaken with adherence to relevant legislation and best practice management.

It is expected that a contractor will travel to the site each day (up to two light vehicles) between 6.30am and 7.30am. There may be up to three truck movements for the length of the project and the contractor staff will leave the site between 4pm and 6pm each evening. The project is expected to last up to four weeks.

These additional short-term vehicle movements will not impact the existing traffic mix.

4.10.3 Mitigation measures

- Staff shall be trained in firefighting techniques in the event of a bushfire, or fire on plant or equipment
- Minimising the movement of machinery along the bank, particularly after rainfall
- Communication with landholders.

4.11 Noise and vibration

4.11.1 Existing environment

The acoustic environment of the proposed site is considered typical for a river frontage regional farming area. Noise sources that exist within the proposed site are vehicle movements along the track and general farming practices.

4.11.2 Impact assessment

The main source of noise may arise from the use of heavy machinery during construction. Considering the distance of the project area from the nearest residence (receptor) is over 160m away; and the hours of operation (7am to 6pm Monday to Friday and 8am to 12noon Saturday), any noise created will not cause a significant detrimental impact on the surrounding land users.

Table 9 is adapted from Bassett Acoustics (2007) in the Northern Expressway Noise and Vibration Technical Paper, which predicts noise levels without mitigation in urban environments. In rural environments, 50dB is acceptable. Noise decreases with distance, so with the nearest receptor 50km away the predicted dB will be below acceptable limits.

Table 9: Predicted dB(A) noise levels at various distances

Plant type	7m	25m	50m	100m	200m
Front end loader	88	77	71	65	59
Road truck	83	72	66	60	54

Major sources of ground vibration include front end loaders and truck movements during work. Vibrations generated from construction and earthmoving activities are expected to be similar in magnitude as those generated from the operation of similar equipment to be used.

Ground vibration impacts at specific levels of magnitude may either:

- disturb occupants of buildings
- disturb contents of buildings by rattling, shaking or movements
- affect structural integrity of a building.

Table 10 indicates the approximate vibration levels that may be expected for various vibration sources (Bassett Acoustics, 2007). Due to the nearest receptor being over 160m away, no vibration is expected due to the large distance between activity and receptor.

Table 10: Approximate generated ground vibration levels (mm/s) for various sources

Activity	Typical levels of ground vibration
Hydraulic rock breakers/Excavators	4.5mm/s @5m 1.30mm/s @10m 0.4mm/s @20m 0.10mm/s @50m
Truck traffic (irregular surfaces)	0.1-2.0mm/s at footings of buildings 10-20m from a road way

4.11.3 Mitigation measures

- Works would be undertaken during standard working hours only.
  - Monday to Friday 7 am to 6 pm
  - Saturday 8 am to 1 pm
  - No work on Sundays or public holidays
- Operate plant and equipment in a quiet and efficient manner, including:
  - off plant and equipment that is not being used

- Ensure plant is regularly maintained and any equipment that becomes noisy is repaired or replaced.

4.12 Bushfire hazards

4.12.1 Existing environment

The works area is in a rural environment where existing bushfire hazards exist.

4.12.2 Imapct assessment

Due to the nature of the proposal and the composition of vegetation species at the site, it is highly unlikely that the vegetation would carry a fire. The wide spacing of individual trees and the limited amount of dry matter or grass species present (due to the arid climate, recreation and native and non-native grazing) would not be conducive to the spread of fire.

4.12.3 Mitigation measures

- No burning of timber or other combustible materials will occur on site
- All plant and equipment will be equipped with fire extinguishers
- Staff shall be trained in firefighting techniques in the event of a bushfire, or fire on plant or equipment
- All vehicles and plant will be regularly serviced, be in good working order and emissions to be kept within manufacturers standards.

4.13 Chemical and hazardous substance management

4.13.1 Existing environment

The existing site is not known to be contaminated and does not appear in the Balranald LEP or EPA register of contaminated sites.

4.13.2 Impact assessment

No hazardous substances will be stored on site. Limited hazardous substances will be brought on site, in particular fuels and lubricants, e.g oil, grease and distillate, as the fuel for heavy equipment will be transported as required on utility, trailer or fuel truck. Best management practices will be followed when these substances are transferred and in use as stipulated by the contactors work practices. Empty containers will be taken off the site and suitably disposed of to landfill or for recycling.

4.13.3 Mitigation measures

- Staff trained in best practice in chemical and hazardous substance management
- All vehicles and machinery to be regularly serviced, be in good working order and emissions to be kept within manufacturers standards
- Staff shall be trained in firefighting techniques in the event of a bushfire, or fire on plant or equipment
- All vehicles serviced off-site
- refuelling of small plant would only take place on level ground and in bunded areas which are at a distance no less than 40m from drainage lines and waterways
- spill containment measures (such as drip trays and bunds) to be used where refuelling within 40m of a waterway
- No fuels or lubricants to be stored on site

- In the event of unexpected breakdown of heavy machinery on the site, the spill kit will be used to prevent leakage of petroleum products to the soil - should soil contamination occur, soil will be removed to a licensed facility as per EPA guidelines
- Any discarded oils, worn machinery parts, damaged tyres, broken hoses or empty containers will be removed to a waste storage area on the day they are generated.
- Copy of all safe work method statements/JSA to be stored onsite and easily accessible.

4.14 Waste minimisation and management

4.14.1 Existing environment

Waste management shall be undertaken in accordance with the *Waste Avoidance and Resource Recovery Act (2001)*. The objectives of this Act are:

(a) to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development

(b) to ensure that resource management options are considered against a hierarchy of the following order:

(i) avoidance of unnecessary resource consumption

(ii)resource recovery (including reuse, reprocessing, recycling and energy recovery)

(iii) disposal

(c)to provide for the continual reduction in waste generation

(d) to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste

(e) to ensure that industry shares with the community the responsibility for reducing and dealing with waste

(f) to ensure the efficient funding of waste and resource management planning, programs and service delivery

(g) to achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis

(h) to assist in the achievement of the objectives of the *Protection of the Environment Operations Act 1997.*

4.14.2 Impact assessment

The work site will operate in a tidy, rubbish-free state. Small quantities of waste (packaging, consumables etc) will be generated from the works, including general construction waste and materials. No servicing of vehicles and machinery will occur on site other than minor repairs following breakdown. It is not likely that there will be any problems associated with the disposal of these wastes. Where materials cannot be recycled, wastes should be legally disposed of at an appropriate landfill.

4.14.3 Mitigation measures

- All waste generated by the proposal would be classified in accordance with the NSW Waste Classification Guidelines Part 1: Classifying Wastes (EPA 2014)

- All waste generated on site is to be transported off site and disposed of at landfill site approved to accept General Solid Waste (non-putrescible)
- Resource management hierarchy principles are to be followed:
    - Avoid unnecessary resource consumption as a priority
    - Avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery)
    - Disposal is undertaken as a last resort.
- Waste material is not to be left on site once the works have been completed
- Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.

4.15 Cumulative environmental impacts

The cumulative environmental impacts of the proposal will be minimal. As stated throughout Section 4, each identified impact has been assessed for its potential threat to the environment. Mitigation measures will help minimise the impact on the proposed project area, as well as off-site impacts (as summarised in Table 11).

Table 11: Mitigation measures

Issue	Mitigation measure
Land Use	• use existing tracks to access the site • maintain a rubbish free and tidy work area • work area delineated with high visibility flagging or fencing
Hydrology and geomorphology	• no new river bank accesses to be created • site remediation to ensure loose soils are compacted to match surrounding soils • ensure sediment fences are in place until the bank is stable, during and following construction • All works to be carried out in accordance with the controlled activities guidelines.
Water quality, erosion and sedimentation	• refuelling of small plant would only take place on level ground and in bunded areas which are at a distance no less than 40m from drainage lines and waterways • spill containment measures (such as drip trays and bunds) to be used where refuelling within 40m of a waterway
Soil and silt	• minimising the movement of machinery along the bank, particularly after rainfall • ceasing works during heavy rainfall • Appropriate erosion and sediment controls would be installed prior to the commencement of works in accordance with the technical document, Landcom (2006) Edition 4 'Managing Urban Stormwater: Soils and Construction' (the Blue Book), where the disturbed catchment exceeds 250m² and when soil is likely to be left exposed for more than two weeks. • Spill kits would be available with each refuelling area and all staff would be trained in their use. • Spill containment measures (such as drip trays) to be used where refuelling within 40 metres of a waterway is required. Where possible, refuelling should occur greater than 40 meters from a waterway.

Issue	Mitigation measure
	• Inspection and maintenance of sediment and erosion controls until site has been stabilised post construction
Flora	• no new river bank accesses to be created • the tree retention zone (12x Diameter at Breast Height) shall be cordoned off and no parking or stockpiling will occur within this zone
Fauna	• ensure sediment fences are in place until the bank is stable, during and following construction. • profiles of threatened species that have potential to inhabit the site will be kept on site
Heritage	In the event that new Aboriginal objects are found during the conduct of the activity, then the following must occur: • a) The person who discovers Aboriginal object/s during the activity will immediately notify the person in charge of the activity; • b) The person in charge of the activity must then suspend any relevant works at the location of the discovery and within 5m of the relevant site boundary; • c) In order to prevent any further disturbance, the location will be isolated by safety webbing or an equivalent barrier and works may recommence outside the area of exclusion; • d) The person in charge of the activity must contact an archaeologist within 48hrs; • e) The archaeologist must contact the DPIE (formerly OEH) Regional Aboriginal Heritage Division (Southern Region); • f) Within a reasonable period, a decision/recommendation will be made by the archaeologist in consultation with the relevant Aboriginal stakeholder group(s) and DPIE as to the process to be followed to manage the Aboriginal object/s in a culturally appropriate manner, and how to proceed with the works; • g) Options for management may include: • i. Recording the site and submitting the relevant forms to the AHIMS Registrar • ii. Developing a strategy to avoid harm to the site; and/or • iii. If avoiding harm is not possible, further investigation, an impact assessment and an AHIP may be required. • h) A separate contingency plan has been developed in the event that suspected human remains are discovered during the conduct of the activity. • Aboriginal cultural heritage encompasses all aspects of Aboriginal culture, including tangible evidence such as stone artefacts, shell middens and ancestral remains, intangible evidence such as oral histories and song lines as well as living culture. While not all aspects of Aboriginal culture are considered sensitive, especially evidence of activities of daily living, there are some aspects that may relate to ceremony, ritual or ancestral remains that are of a particularly sensitive nature. Culturally sensitive information is inherently bound up with cultural significance. 'If we accept that cultural significance is not an inherent quality of a place, but a social outcome resulting from people's interactions with a place, then the community itself must be the most important source of significance' (Burke & Smith 2004:245).

Issue	Mitigation measure
	• In the event that further Aboriginal cultural material is identified during the conduct of the activity, the archaeologist must ensure that any investigations undertaken in relation to the Aboriginal objects are carried out in a culturally sensitive manner, which may include limiting access to the objects during investigations and further advising the proponent/contractors/employees of their obligations in relation to the culturally sensitive nature of the heritage and their obligations in relation to the relevant legislation. • Notification of the Discovery of Skeletal Remains during the carrying out of the Activity • 1. Discovery: a) If suspected human remains are discovered, all activity in the vicinity must stop to ensure minimal damage is caused to the remains, and, b) The remains must be left in place and protected from unauthorised access and harm or damage. • 2. Notification: a) Once suspected human skeletal remains have been found, New South Wales Police (use the local number) must be notified immediately; b) If there is reasonable grounds to believe that the remains could be Aboriginal, the NPWS Head Office must be immediately notified on (02) 9585 6444 or contact the Aboriginal Heritage Officer at the Heritage Branch on (02) 9873 8500 for further advice; c) All details of the location and nature of the human remains must be provided to the relevant authorities; and d) The remains should also be reported to the relevant Traditional Owners.
Air quality	• No burning of timber or other combustible materials will occur on-site • Adherence to appropriate Australian Standards • Minimise works during windy periods to minimise dust creation to ensure no dust impacts are occurring along public roads or at sensitive receivers • Ensure all plant and equipment complies with part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002
Socio and economic	• appropriate signage as required under legislation and adherence with best practice management • to ensure neighbouring properties and general usage of the area will not be affected throughout the proposed upgrade, the neighbouring residents will be continually consulted.
Transport	• staff shall be trained in firefighting techniques in the event of a bushfire, or fire on plant or equipment • minimising the movement of machinery along the bank, particularly after rainfall • communication with landholders.

Noise and vibration	• works would be undertaken during standard working hours only.
	  ○ Monday to Friday 7 am to 6 pm
	  ○ Saturday 8 am to 1 pm

Issue	Mitigation measure
	○ No work on Sundays or public holidays • Operate plant and equipment in a quiet and efficient manner, including: ○ Turn off plant and equipment that is not being used ○ Ensure plant is regularly maintained and any equipment that becomes noisy is repaired or replaced.
Bushfire hazards	• no burning of timber or other combustible materials will occur on site • all plant and equipment will be equipped with fire extinguishers • staff shall be trained in firefighting techniques in the event of a bushfire, or fire on plant or equipment • all vehicles and plant will be regularly serviced, be in good working order and emissions to be kept within manufacturers standards.
Chemical and hazardous substances	• staff trained in best practice in chemical and hazardous substance management • all vehicles and machinery to be regularly serviced, be in good working order and emissions to be kept within manufacturers standards • staff shall be trained in fire-fighting techniques in the event of a bushfire, or fire on plant or equipment • all vehicles serviced off-site • refuelling of small plant would only take place on level ground and in bunded areas which are at a distance no less than 40m from drainage lines and waterways • spill containment measures (such as drip trays and bunds) to be used where refuelling within 40m of a waterway • no fuels or lubricants to be stored on site • in the event of unexpected breakdown of heavy machinery on the site, the spill kit will be used to prevent leakage of petroleum products to the soil - should soil contamination occur, soil will be removed to a licensed facility as per EPA guidelines • any discarded oils, worn machinery parts, damaged tyres, broken hoses or empty containers will be removed to a waste storage area on the day they are generated • Copy of all safe work method statements/JSA to be stored onsite and easily accessible.
Waste minimisation and management	• all waste generated by the proposal would be classified in accordance with the NSW Waste Classification Guidelines Part 1: Classifying Wastes (DECCW 2008). • all waste generated on site is to be transported off site and disposed of at landfill site approved to accept General Solid Waste (non-putrescible). • resource management hierarchy principles are to be followed: • avoid unnecessary resource consumption as a priority • avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery) • disposal is undertaken as a last resort • waste material is not to be left on site once the works have been completed

Issue	Mitigation measure
	• working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.

5.0 Summary of mitigation measures

A range of mitigation measures have been devised to ensure the proposal has minimal impact on the environment, both on site and off site.

Table 12 provides an overview of the risks associated with the proposed project. The table should be read down the left-hand side column to identify the issues at the site and then the activities, processes or facilities are listed across the top of the table.

The table has been completed using a risk assessment of low (L), medium (M) and high (H) and not applicable (n/a).

Table 12: Environmental Risk Identification Matrix

Issue	Activity/process										
	Land preparation, vegetation & topsoil stripping	Earth moving	Use/maintenance of roads, tracks and vehicles	water management including storm event contingencies	Hazardous materials & fuel, handling/spills management	Sewerage	Other infrastructure use and operation	Rubbish disposal	Rehabilitation activities	Rehabilitation maintenance, pending self-sustainability	Rehabilitated land and remaining features
Land use	L	L	L	L	L	n/a	L	L	L	L	L
Hydrology and geomorphology	L	L	L	L	L	n/a	L	L	L	L	L
Water quality, erosion and sedimentation	L	L	L	L	L	n/a	L	L	L	L	L
Soils	L	L	L	L	L	n/a	L	L	L	L	L
Flora	L	L	L	L	L	n/a	L	L	L	L	L
Fauna	L	L	L	L	L	n/a	L	L	L	L	L
Weeds and pests	L	L	L	L	L	n/a	L	L	L	L	L
Heritage	L	L	L	L	L	n/a	L	L	L	L	L
Air quality	L	L	L	L	L	n/a	L	L	L	L	L
Socio and economic	L	L	L	L	L	n/a	L	L	L	L	L
Transport	L	L	L	L	L	n/a	L	L	L	L	L
Noise and vibration	L	L	L	L	L	n/a	L	L	L	L	L
Bushfire hazards	L	L	L	L	L	n/a	L	L	L	L	L
Chemical and hazardous substance management	L	L	L	L	L	n/a	L	L	L	L	L
Waste minimisation and mgt	L	L	L	L	L	n/a	L	L	L	L	L

Legend – L=Low, M=medium, n/a not applicable

6.0 Conclusion

6.1 Justification for the proposed project

The project has been proposed to ensure to allow the taking of water to irrigate crops. The pump and suction have been designed to minimise impacts to the environmental and cultural heritage assets, utilising existing disturbed areas and farmland.

This report aims to assess the proposed works against applicable legislation in the areas of environmental, cultural and historic requirements.

The proposed works are justified and where additional permits are required there are processes that need to be followed to allow the works to proceed.

6.2 Principles of ESD

6.2.1 The precautionary principle

This SEE has been prepared using the Ecologically Sustainable Development (ESD) precautionary principle. If threats are perceived that could lead to serious or irreversible environmental damage, then action such as not proceeding or modifying the project will occur to ensure that such threats do not exist. This approach has been used in relation to mitigation measures outlined above in Section 4.

6.2.2 Inter-generational equity

The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. The proposed works would not impact on natural or cultural features to a level that would compromise the health, diversity or productivity of the environment for future generations.

6.2.3 Conservation of biological diversity and ecological integrity

The proposed works would not impact on threatened species or their habitats. The assessment has identified that the works would not impact significantly on the biological diversity and ecological integrity of the locality.

Furthermore, mitigation measures have been developed that would assist in protecting aquatic habitats.

6.2.4 Appropriate valuation of environmental factors

This principle relates to giving monetary values to environmental resources. The proposed works would assist in improving fish passage with other benefits such as recreation and education benefits. These factors ensure that the development would conform to the principles of "ecologically sustainable development".

6.3 Summary of assessment

This SEE has been prepared in accordance with the provisions of Section 4 of the EP&A Act, taking into account the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

This SEE has considered and assessed these impacts in accordance with the EP&A Regulation and the requirements of the EPBC Act. Based on the assessment contained in

this SEE, it is considered that the proposal is not likely to have a significant impact upon the environment or Matters of National Environmental Significance, with the application of recommended mitigation measures in Table 11.

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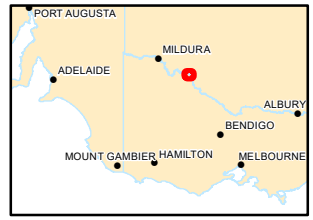
Appendix A: Map series



LEGEND

Site Extent

Main Highway

N

0 250 500 750 1,000 m

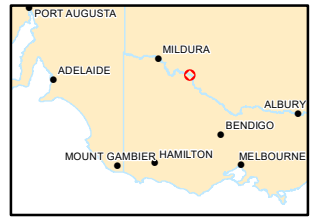
Scale 1:55,000 @ A4

Coordinate System: GDA 1994 MGA Zone 54

greenedge environmental

Figure **1**

Narrung Pipeline Location Map



LEGEND

- Proposed Pipe
- Pump
- NSW/Vic Border
- Main Highway
- Lot

N

0 20 40 60 80 m

Scale 1:3,000 @ A4

Coordinate System: GDA 1994 MGA Zone 54

greenedge environmental

Figure **2**

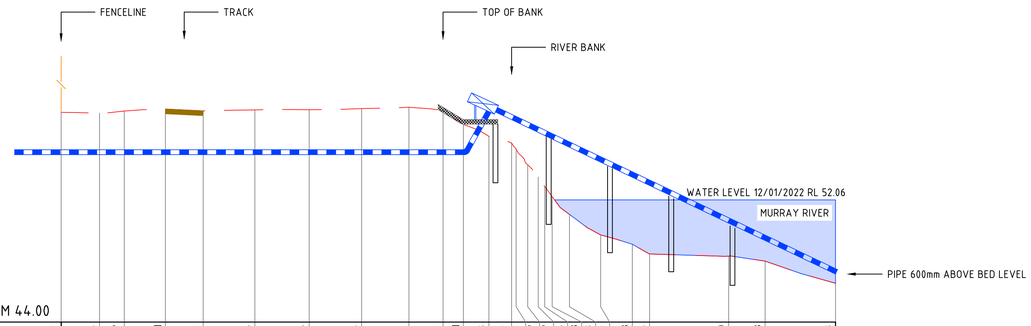
Narrung Pipeline
Site Map

CONCEPT LAYOUT PLAN

NOT TO SCALE

LOCALITY PLAN

NOT TO SCALE



DATUM 44.00

EXISTING SURFACE LEVEL	57.69	57.64	57.77	57.91	57.79	57.85	57.86	57.94	58.02	57.82	56.91	56.13	55.69	55.29	54.27	53.47	52.86	52.18	51.03	49.69	49.08	48.44	48.30	47.98	46.53
CHAINAGE	0.000	3.134	5.154	8.509	11.592	15.816	20.246	24.531	28.390	31.178	32.835	34.925	36.777	37.146	38.080	38.948	39.474	40.090	41.498	44.047	46.627	48.038	54.492	57.462	63.213

SECTION A - A

H 1:250, V 1:200

LEGEND

- PIPE (PROPOSED)
- PUMP (PROPOSED)
- POWER KIOSK (PROPOSED)
- FENCE (EXISTING)
- MAJOR CONTOUR 2.5m (EXISTING)
- MINOR CONTOUR 0.5m (EXISTING)
- TOP OF RIVER BANK (EXISTING)
- SECTION

ISSUE	DESCRIPTION	DATE
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
A	CONCEPT LAYOUT	22/06/22

NOTATIONS:

LEVELS ARE IN A.H.D

LENGTHS ARE SHOWN IN METRES

CONTOUR INTERVAL IS 0.50m

INFORMATION

N

0 2.5 5 10 15

H 1:250 @A1

CONSULTING

abn: 37 160 560 556
a: 38 Wyndham Street, Shepparton
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t: 03 5831 3347
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e: info@cafconsulting.com.au
w: cafconsulting.com.au

Client: 5 WAYS LAND HOLDING PTY LTD

Project Name: NARRUNG PROPOSED PUMP SITE

Location: 7912 MURRAY VALLEY HIGHWAY
BOUNDARY BEND, VIC 3599

Property: ALLOTMENT 1G
1G\PP3283

Title: LAYOUT AND CROSS SECTION

Surveyed:	OTHERS
Drawn:	N. RICHARDSON 22/06/22
Designed:	----
Approved:	----
Cad File:	3868 C01.DWG
Size:	A1
Scale:	SCALE AS SHOWN
Drawing No:	3868 / C01
Sht:	01 of 1
Issue:	A

23/06/2022 5:03:21 PM 3868 C01.DWG

23/06/2022 5:03:22 PM 3868 C01.DWG

ISSUE	DESCRIPTION	DATE
-	-	-
-	-	-
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-	-	-
-	-	-
A	CONCEPT LAYOUT	22/06/22

NOTATIONS:

LEVELS ARE IN A.H.D

LENGTHS ARE SHOWN IN METRES

CONTOUR INTERVAL IS 0.50m

INFORMATION

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CONSULTING

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Client:	5 WAYS LAND HOLDING PTY LTD
Project Name:	NARRUNG PROPOSED PUMP SITE
Location:	7912 MURRAY VALLEY HIGHWAY BOUNDARY BEND, VIC 3599
Property:	ALLOTMENT 1G 1G\PP3283
Title:	EASEMENT PLAN

Surveyed:	OTHERS ----	Drawn	N. RICHARDSON 22/06/22
Designed:	---- ----	Approved:	---- ----
Cad File:	3868 C01.DWG		Size: A1
Scale:	SCALE AS SHOWN		
Drawing No:	3868 / C02	Sht:	02 of 1
		Issue:	A

Appendix B: Threatened species searches

Threatened NSW Flora

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Plants in selected area [North: -34.71 West: 143.17 East: 143.27 South: -34.81] returned a total of 159 records of 78 species.
Report generated on 1/11/2022 2:29 PM

Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records	Info
Plantae	Flora	Eriocaulaceae	2667	*Eriocaulon australasicum*	Austral Pipewort	E1	E	1	

NSW threatened Fauna

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Animals in selected area [North: -34.71 West: 143.17 East: 143.27 South: -34.81] returned a total of 67 records of 44 species.

Report generated on 1/11/2022 2:26 PM

Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records	Info
Animalia	Aves	Psittacidae	0709	*^^Polytelis anthopeplus monarchoides*	Regent Parrot (eastern subspecies)	E1,P,3	V	9	
Animalia	Aves	Climacteridae	8127	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		2	
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*	Varied Sittella	V,P		1	
Animalia	Mammalia	Muridae	1480	*Notomys mitchellii*	Mitchell's Hopping-mouse	E4,P		1	

NSW Endangered Ecological Communities

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C.
Search criteria : Public Report of all Valid Records of Communities in selected area [North: -34.71 West: 143.17 East: 143.27 South: -34.81] returned 0 records for 11 entities.
Report generated on 1/11/2022 2:29 PM

Kingdom	Scientific Name	Common Name	NSW status	Comm. status	Records	Info
Community	*Acacia loderi shrublands*	Acacia loderi shrublands	E3		K	
Community	*Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions*	Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	E3		K	
Community	*Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions*	Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions	E3		K	
Community	*Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions*	Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions		E	K	
Community	*Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions*	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	E3		K	
Community	*Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions*	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	E3		K	
Community	*Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions*	Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions		CE	K	
Community	*Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions*	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	E3		K	
Community	*Tecticornia lylei, Wiry Glasswort, low open-shrubland in the Murray Darling Depression Bioregion*	Tecticornia lylei, Wiry Glasswort, low open-shrubland in the Murray Darling Depression Bioregion	E3		K	
Community	*Weeping Myall Woodlands*	Weeping Myall Woodlands		E	K	
Community	*White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and*	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and	E4B		K	

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. Please see the caveat for interpretation of information provided here.

Report created: 01-Nov-2022

Summary

Matters of National Environment 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:	None
Wetlands of International Importance (Ramsar	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	29
Listed Migratory Species:	10

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 https://www.dcceew.gov.au/parks-heritage/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 Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	3
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	200 - 300km upstream from Ramsar site	In feature area
Hattah-kulkyne lakes	50 - 100km upstream from Ramsar site	In feature area
Riverland	200 - 300km upstream from Ramsar site	In feature area
The coorong, and lakes alexandrina and albert wetland	300 - 400km upstream from Ramsar site	In feature area

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.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area	In feature area
Mallee Bird Community of the Murray Darling Depression Bioregion	Endangered	Community likely to occur within area	In buffer area only
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered	Community likely to occur within area	In feature area
Weeping Myall Woodlands	Endangered	Community may occur within area	In buffer area only

Listed Threatened Species			[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Botaurus poiciloptilus](#) Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Falco hypoleucos](#) Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Grantiella picta](#) Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Leipoa ocellata](#) Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Manorina melanotis](#) Black-eared Miner [449]	Endangered	Species or species habitat may occur within area	In buffer area only
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Pedionomus torquatus](#) Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Pezoporus occidentalis](#) Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
[Polytelis anthopeplus monarchoides](#) Regent Parrot (eastern) [59612]	Vulnerable	Breeding likely to occur within area	In feature area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
FISH			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Bidyanus bidyanus](#) Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Craterocephalus fluviatilis](#) Murray Hardyhead [56791]	Endangered	Species or species habitat likely to occur within area	In feature area
[Galaxias rostratus](#) Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
[Maccullochella macquariensis](#) Trout Cod [26171]	Endangered	Species or species habitat may occur within area	In feature area
[Maccullochella peelii](#) Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Macquaria australasica](#) Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
FROG			
[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	In feature area
MAMMAL			
[Nyctophilus corbeni](#) Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area	In feature 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]	Endangered	Species or species habitat may occur within area	In feature area
PLANT			
[Austrostipa metatoris](#) [66704]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area	In buffer area only
Brachyscome papillosa Mossgiel Daisy [6625]	Vulnerable	Species or species habitat may occur within area	In feature area
Lepidium monoplocoides Winged Pepper-cress [9190]	Endangered	Species or species habitat likely to occur within area	In feature area
Maireana cheelii Chariot Wheels [8008]	Vulnerable	Species or species habitat may occur within area	In feature area
Solanum karsense Menindee Nightshade [7776]	Vulnerable	Species or species habitat may occur within area	In feature area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Swainsona pyrophila Yellow Swainson-pea [56344]	Vulnerable	Species or species habitat may occur within area	In buffer area only
REPTILE			
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Myiagra cyanoleuca			
Satin Flycatcher [612]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Heywood Lake W.R.	Natural Features Reserve	VIC	In feature area
Passage Camp N.C.R.	Natural Features Reserve	VIC	In buffer area only
River Murray Reserve	Natural Features Reserve	VIC	In feature area

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Heywoods Lake	VIC	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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.

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Appendix C: Test of significance

Test of significance for Pump station and suctions lines

Introduction

This test of significance is part of the statement of environmental effects for a pump station and suctions lines at Narrung.

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

- Grey snake (*Hemiaspis damelii*) (Endangered–Commonwealth)

Grey snake

(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**
In the Lowbidgee floodplain region of NSW it has been recorded exclusively from the margins of ephemeral wetlands within River Red Gum *Eucalyptus camuldulensis* and Black Box *E. largiflorens* vegetation communities and from Tangled Lignum *Duma florulenta* swamps. In recent times, Grey Snakes in the Lowbidgee region have only been sighted from wetlands that have received environmental water flows. No snakes have been detected from dry phase wetlands suggesting its detectability may be related to wetland inundation regimes as well as suitable weather conditions.

Seasonally inundated floodplains and associated wetlands, swamps or lake systems with cracking clay soils and frog diversity within the species known and likely distribution. Where any of the above habitats are discovered within the may occur distribution of the species, these should be surveyed for the Grey Snake and where any new populations of the species are discovered, the habitat also be considered critical to its survival.

Due to the small nature of the proposal, and the availability of surrounding habitat, no impacts to the specie are expected. No local viable populations of the species are known from this area that could be placed at risk of extinction due to the large area of potential habitat available.

(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
N/A – Grey snake 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 – Grey snake 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

Due to the small nature of the proposal, only minor modification to potential foraging habitat and no existing nesting sites will be impacted.

(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
The proposal will not cause fragmentation or isolations from other potential foraging 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 area proposed for the works is not mapped as an area of outstanding biodiversity value (OBV), the nearest area mapped is the Murray River to the north, with no indirect impacts expected.

(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 constitute part of the following key threatening processes as listed in the BC Act 2016 Schedule 4.

Conclusions

The assessment of significance for:

- Grey snake

revealed that the potential impacts of the proposal on the threatened species or communities are extremely unlikely and where there could be potential impacts, they will be very low. Potential minor impacts resulting from the proposed works 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, including pre construction, construction, operation and maintenance phases
- 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.

Appendix D: Cultural Heritage Due Diligence Assessment

Proposed Pumping Station, Narrung, Victoria
Due Diligence Assessment Report

Report Commissioned by: Cramenton Pty Ltd

Name of Proponent: Five Ways Landholdings Pty Ltd

Name of Archaeologist: Neil Fenley

Name of Authors: Neil Fenley and Joanne Bell

Date of Completion: 25 October 2022

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EXECUTIVE SUMMARY

This Due Diligence assessment has been prepared for a new pumping station on Murray River crown water frontage (CA18A) near Narrung, Victoria. Narrung is located within the boundaries of the Swan Hill Rural City Council. The pumps and associated infrastructure will be partially located below the high-water mark of the Murray River and will therefore be within the New South Wales state boundary. The aim of constructing the pumping station is for water extraction from the Murray River to supply the needs of a proposed irrigation project in Victoria from the river.

The activity area comprises an area no greater than 150 square metres from the high-water mark to the low-water mark of the river. Access to the location is via an unnamed track that services a fisherman's camp situated approximately 200 metres southeast of the confluence of Wakool Creek and the Murray River. The bulk of the works will be undertaken from within Victoria and the only works in NSW will be the exit point of the underground boring and the installation of 10 pile-driven supports for the pumping infrastructure. The activity area is comprised of Crown Reserve land.

The proponent undertaking the activity is Five Ways Holdings Pty Ltd. The Due Diligence assessment has been commissioned by Cramenton Pty Ltd on behalf of the proponent. The project manager is Russell Hilton, Executive Director, Cramenton Pty Ltd.

The activity area lies within the boundaries of the Balranald Local Aboriginal Land Council (BLALC). A request to BLALC to supply a field officer for the due diligence inspection was made without receiving a response. A further telephone call was made to Louise Murray (BLALC) on 2 August 2022 requesting a representative. On Thursday 4 August Neil Fenley (Jo Bell Heritage Services [JBHS]) and Neville Murray (BLALC) conducted a visual inspection of the area to determine the potential for cultural heritage material to be present.

A desktop (background) study and a visual inspection were carried out as part of this Due Diligence assessment.

The activity area has not been subject to previous archaeological investigation. There are no previously recorded Aboriginal sites or places in the vicinity of the activity area.

No Aboriginal cultural heritage or objects were identified in or close to the activity area during the visual inspection.

The nature of the activity area suggests the likelihood of finding sub-surface Aboriginal objects within the activity area is low and identifying intact, *in situ,* Aboriginal objects is extremely low.

Given the results of the due diligence assessment, no further investigation, impact assessment, or an AHIP is required for the activity.

Contingency Arrangements

In the event new Aboriginal objects are found during the conduct of the activity, relevant contingency arrangements, as outlined in this report, must be followed. This applies both during and after the activity. These contingency arrangements are set out in Section 9 and include:

- Management and Notification of Aboriginal objects found during the activity; and
- Notification of the discovery of skeletal remains during the carrying out of the activity.

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ACKNOWLEDGEMENTS

Jo Bell Heritage Services Pty. Ltd. would like to acknowledge the following people in the preparation of this CHMP:

Russell Hilton	Cramenton Pty Ltd
Neville Murray	Balranald Local Aboriginal Land Council
Jo Bell	Director & Archaeologist, JBHS: background research, fieldwork, GIS mapping, reporting & editing
Neil Fenley	Archaeologist, JBHS: fieldwork and reporting
Tina Brown	Administration Assistant, JBHS: background research, editing
Matilda Gall	GIS Officer, JBHS: GIS mapping

1.0 INTRODUCTION

1.1 Activity Description and Extent of Activity Area

This Due Diligence assessment has been prepared for a proposed new pumping station on Murray River, crown water frontage (CA18A) near Narrung, Victoria. The activity area is located approximately 300 metres east of the confluence of Wakool Creek and the Murray River. Narrung is located within the municipal boundaries of the Swan Hill Rural City Council. The pumps and associated infrastructure will be partially located below the high-water mark of the Murray River and will therefore be within the New South Wales state boundary. The aim of constructing the pumping station is for water extraction from the Murray River to supply the needs of a proposed irrigation project in Victoria from the river (Map 1).

The activity area comprises an area no greater than 150 square metres (sqm) from the high-water mark to the low-water mark of the river. The bulk of the works will be undertaken from within Victoria and the only impacts to the land in NSW will be the exit point of the underground boring and the installation of 10 pile-driven supports for the pumping infrastructure. The activity area is comprised of Crown Reserve land.

The proposed activity is likely to, or may include, the following:

- Construction of a pumping station attached to an under-bored pipe;
- It will be constructed entirely on pile-driven supports;
- Removal of some vegetation within the pumping station footprint; and
- All works will be undertaken from the Victorian bank including the pile-driving of the support pylons.

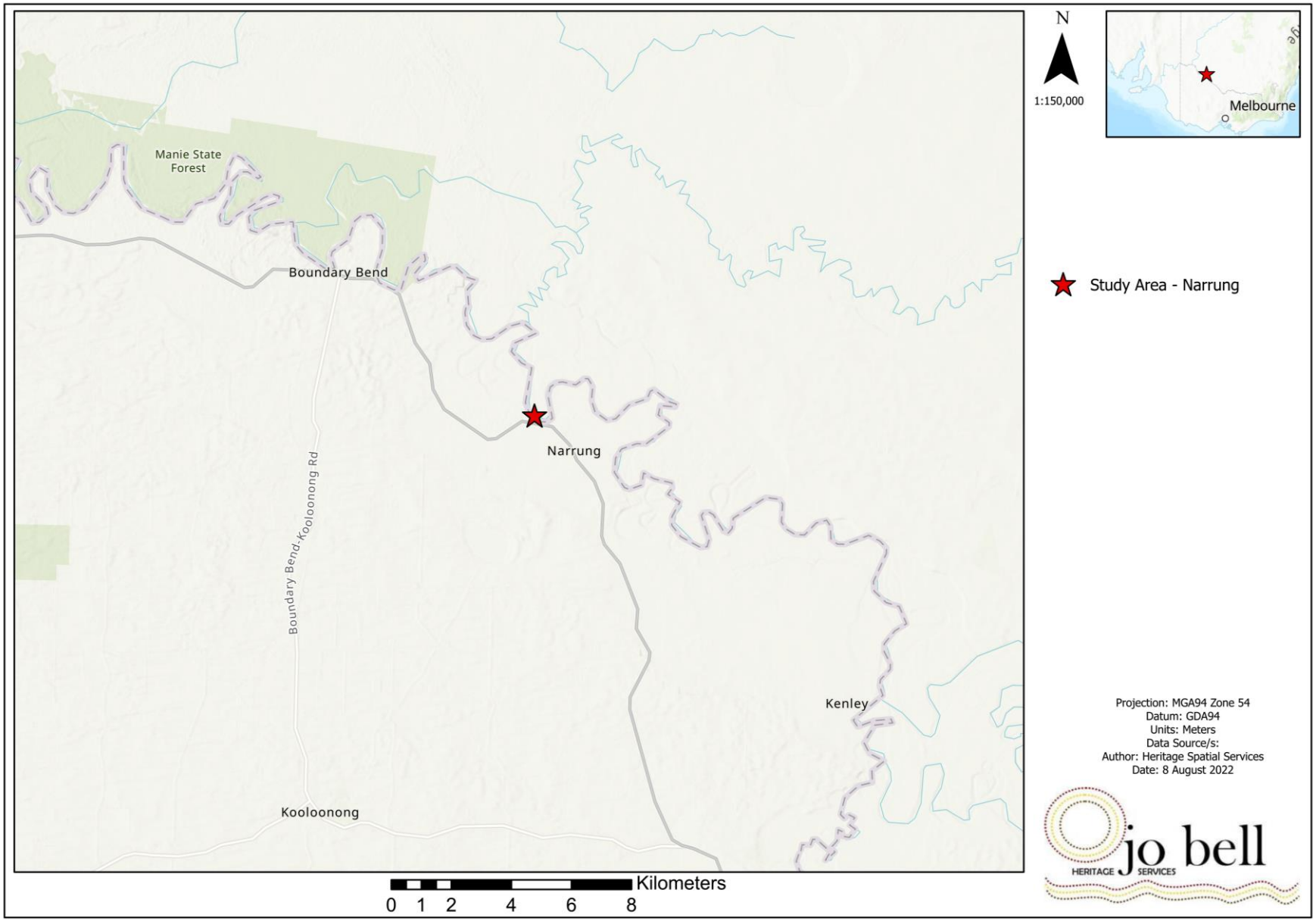
A draft concept design for the proposed pumping station is provided in Appendix 1.

1.2 Proponent

The proponent undertaking the activity is Five Ways Holdings Pty. Ltd. The Due Diligence assessment has been commissioned by Cramenton Pty. Ltd. on behalf of the proponent. The project manager is Russell Hilton, Executive Director, Cramenton Pty. Ltd.

1.3 Archaeologist

The archaeologist commissioned to undertake this Due Diligence is Joanne Bell, Director, Jo Bell Heritage Services Pty. Ltd. The author of this report is Neil Fenley. Jo has a BA (Hons) in Archaeology and over 20 years professional experience in the cultural heritage industry. Neil has a BArch (Hons) in Archaeology and 15 years professional experience in the cultural heritage industry (see Appendix 2).



Map 1: Location of the Activity Area

2.0 LIKELY IMPACT OF THE PROPOSED ACTIVITY

Step 1 of the Due Diligence process (DECCW 2010:11) is to consider 'will the activity disturb the ground surface or any culturally modified trees?' If an activity will disturb the ground surface, there is a higher likelihood that Aboriginal objects will be harmed.

As discussed in Section 1.1 the proposed activity is likely to include disturbance to the ground surface. This will include the exit point of the under-bored pipe and the installation of pylons. All other works will be conducted exclusively in Victoria.

According to the NSW *Due Diligence Code of Practice* (DECCW 2010:11), if the activity will disturb the ground surface, then Step 2a of the Due Diligence process is required.

3.0 DOCUMENTATION OF CONSULTATION

Consultation with the Aboriginal community is not a formal requirement of the Due Diligence process, however, the archaeologist has taken steps to contact the relevant Local Aboriginal Land Council.

A phone call to BLALC was made on 1 August 2022, with a further follow-up with Louise Murray (BLALC) on 2 August 2022 outlining the project and requesting the assistance of a field officer. On 4 August Neil Fenley (JBHS) and Neville Murray (BLALC) undertook a visual inspection of the proposed activity area.

A copy of this report (final) will be forwarded to BLALC for their records.

4.0 AHIMS DATABASE & LANDSCAPE FEATURES

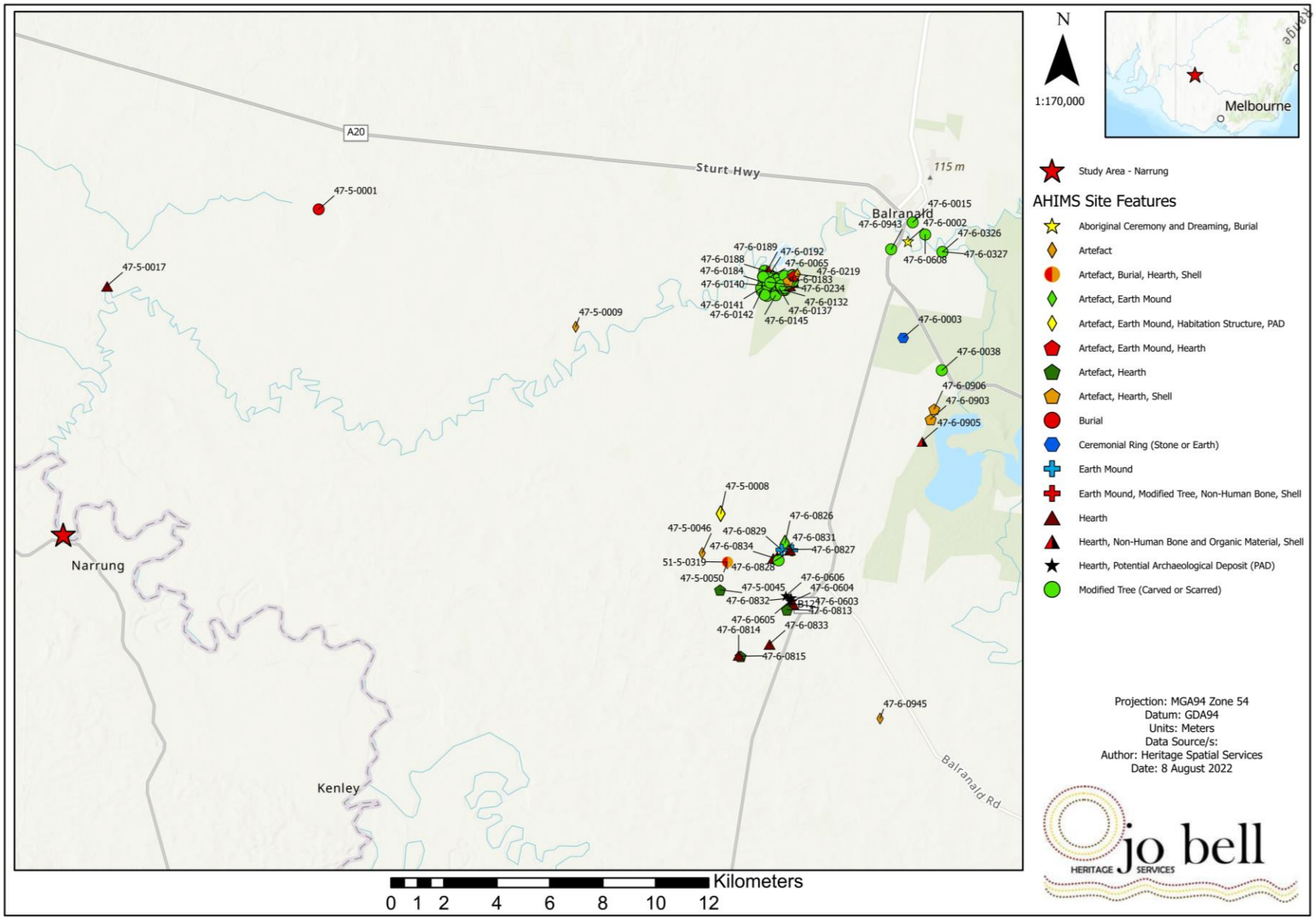
Steps 2a and 2b of the NSW *Due Diligence Code of Practice* (DECCW 2010) require consideration of whether Aboriginal objects have been recorded on AHIMS and the likelihood that Aboriginal objects are present in the activity area, given the landscape features of the area.

4.1 AHIMS Database Search

Step 2a of the Due Diligence process is to search the AHIMS database and check whether any Aboriginal sites have been recorded in the area of the proposed activity.

A Basic Search of the Aboriginal Heritage Information Management System (AHIMS) was conducted on 5 August 2022 by Neil Fenley. The results are shown in Map 2. The results indicated that there were 114 Aboriginal places or sites within or near the activity area (Table 1). An extensive search (Client ID:705970) was also undertaken with the same results (Appendix 3).

There were 17 different site types recorded, the most common were scarred or modified trees (n=72 or 63.16%). Hearths were the next most common (n=12 or 10.51%), followed by artefacts (n=7 or 6.14%), and artefact/hearth (n=5 or 4.38%). The remaining 13 site types accounted for the remaining 18 sites recorded.



Map 2: Results of AHIMS search

Site Type	Frequency	Percentage
Aboriginal Ceremony and Dreaming, Burial	1	0.88
Artefact	7	6.14
Artefact, Earth Mound	1	0.88
Artefact, Earth Mound, Habitation Structure, Potential Archaeological Deposit (PAD)	1	0.88
Artefact, Earth Mound, Hearth	1	0.88
Artefact, Hearth	5	4.38
Artefact, Hearth, Shell	2	1.75
Burial	1	0.88
Burial, Artefact, Hearth, Shell	1	0.88
Ceremonial Ring (Stone or Earth)	1	0.88
Earth Mound	2	1.75
Earth Mound, Non-Human Bone and Organic Mater, Shell, Modified Tree (Carved or Scarred)	1	0.88
Hearth	12	10.51
Heart, Non-Human Bone and Organic Material, Shell	1	0.88
Hearth, Potential Archaeological Deposit (PAD)	4	3.51
Modified Tree (Carved or Scarred)	72	63.16
Shell, Artefact, Hearth	1	0.88
TOTAL	**114**	**100**

Table 1: Results of AHIMS search

4.2 Landscape Features or Landforms Likely to Contain Aboriginal Objects in the Activity Area

Step 2b in the Due Diligence process requires a consideration of the landscape features or landforms in the activity area and whether they may indicate the presence of Aboriginal objects.

Aboriginal objects are often associated with particular landscape features or landforms as a result of Aboriginal people's use of those features in their everyday lives and for traditional cultural activities. Landscape features that are considered as likely to contain Aboriginal places or sites include:

- Watercourses (or within 200m of);
- A sand dune system;
- A ridge top, ridge line, or headland;
- A cliff face (or within 200m of); and
- A cave, rock shelter, or a cave mouth (or within 20m of).

The NSW *Due Diligence Code of Practice* (DECCW 2010) specifies that if the activity area contains any of the above landforms and is also on land that is not disturbed land then the Due Diligence must proceed to Step 3.

The activity area comprises riverbank landforms. The activity centres on the Murray River. Under the Code of Practice (CoP), the activity area contains landforms likely to contain Aboriginal objects. Therefore, Step 3 in the Due Diligence process is required.

5.0 AVOIDANCE OF LANDSCAPE FEATURES

Step 3 is a consideration of whether disturbance to the landscape features that are likely to contain Aboriginal objects can be avoided.

The NSW *Due Diligence Code of Practice* (DECCW 2010:12) specifies that:

> 'where as a result of Step 2b you have concluded that the landscape features listed are present, you need to decide whether you can move your activity away from the area with the landscape feature(s) so as to avoid disturbing any Aboriginal objects which may be present'.

The activity is the construction of a pumping station on the bank of the Murray River. As such, there is no scope to amend the activity area to avoid the landscape features likely to contain Aboriginal objects.

The NSW *Due Diligence Code of Practice* (DECCW 2010:12) specifies that when disturbance of the landscape feature(s) cannot be avoided the Due Diligence must proceed to Step 4.

6.0 DESKTOP ASSESSMENT

Step 4 of the Due Diligence process is a desktop assessment and a visual inspection. This section of the plan sets out the methodology and results of the desktop assessment.

The aim of a desktop assessment is to examine and collate the available information relating to the Aboriginal history and land use of the activity area and the general area in which it is located. This information, together with the results of the visual inspection will be used to produce a predictive model about the likelihood of Aboriginal objects occurring in the activity area. This predictive model is then used to determine the requirement for further steps in the Due Diligence process.

The following section of the report provides the results of the desktop assessment.

6.1 Geology, Landforms, and Geomorphology

Although this report is for the portion of the activity area deemed to be within New South Wales, all data related to the geology, landforms, and geomorphology is more accurately represented by utilising data from Victoria. The following information is derived from Bell & Edwards (2012:18).

The activity area is situated within the Murray Basin Plain geomorphic Division of Victoria and lies entirely within the Riverine plain (Cochrane *et al* 1995:65-66).

The Riverine Plain is predominantly fluvial in origin. There are two main levels of the plain: an older and higher-level floodplain known as the Shepparton Formation, and a younger, lower-level floodplain, associated with current river channels (Cochrane *et al* 1995:76).

The activity area is situated on the River Plain Present Floodplain – the Murray land system (see Prendergast *et al* 2009). This geomorphological unit (GMU 4.1.1) is defined as a 'meander belt below plain level, sometimes source-bordering dunes' and is entirely comprised of present floodplain landforms (GeoVic Online 2011; DSE Online 2011). This formation is dated to the late Quaternary period (Holocene) and is an active floodplain. Lithology is characterised by fluvial/lacustrine sediments, namely grey clays, sands, and sandy clay soils.

A stylised geology of the activity area is provided in Map 3.

6.2 Climate and Hydrology

The weather for the general area is based on the readings from the nearest official weather station located at Swan Hill Post Office from 1884 until 1996. The region experiences cool winters with a July average minimum and maximum of 4.1 and 14.4 degrees Celsius respectively, and a January average minimum and maximum of 15.4 and 31.4 degrees Celsius respectively. The area has an average rainfall of 347.8 millimetres per year with monthly totals varying between 21.7 millimetres in February and 35.9 millimetres in August (BOM 2022).

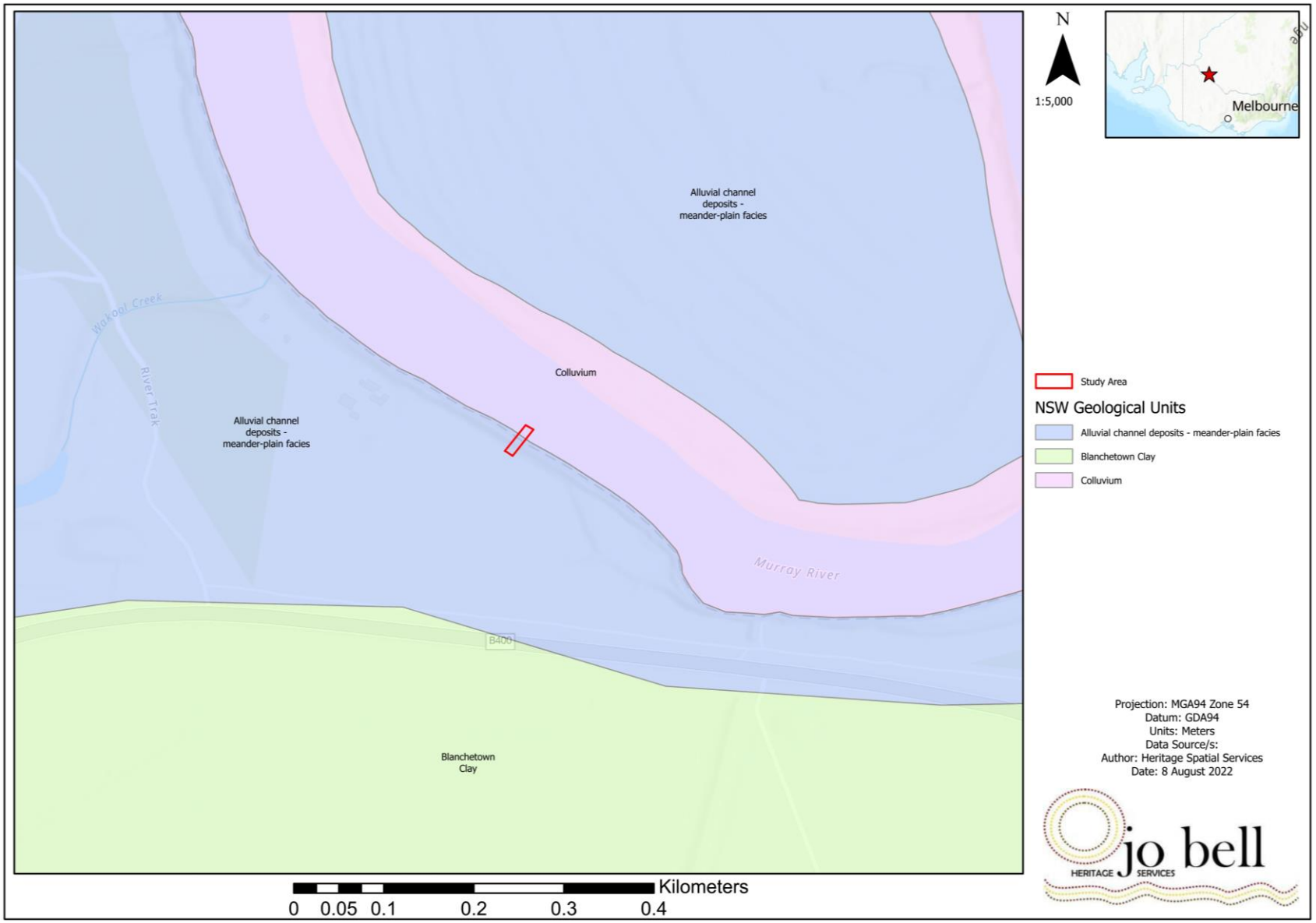
6.3 Vegetation

The activity area lies within the Murray Fans Bioregion.

Pre-1750, the mapping indicates the activity area would have been within a single vegetation community: Riverine Chenopod Woodland (EVC 103). The current EVC mapping indicates little remnant vegetation within the surrounding Farming Zone, with intact remnant vegetation within the River Murray Reserve adjacent the river (DELWP: NatureKit 2022).

Riverine Chenopod Woodland is described as 'a Eucalypt woodland to 15m tall with a diverse shrubby and grassy understorey occurring on most elevated riverine terraces. Confined to heavy clay soils on higher level terraces or former floodplains' (DSE EVC / Bioregion Benchmark Fact Sheet).

According to the Victorian State Government, the vegetation within EVC 103 – Riverine Chenopod Woodland is endangered. Canopy species present within or adjacent to the activity area are River Red Gum (*Eucalyptus camaldulensis*), Black Box (*E. largiflorens*), and River Coobah (*Acacia stenophylla*) with an understory of Hedge Saltbush (*Rhagodia spinescens*). There are also introduced grasses and plants present including vetch.



Map 3: Geology of the Activity Area

6.4 Aboriginal History

The following sections are taken from Bell & Edwards (2012:20-24).

6.4.1 Recording of Ethnography and Historical Documents

There is debate amongst ethnographers and discrepancies in the historical documents, about most regions of Victoria and NSW and the identity of traditional Aboriginal owners or custodians.

In the first instance, it should be noted that many of the first Europeans to explore or settle the Port Phillip District had little interest in, or training for, recording much about the society they encountered or displaced. The information provided by early ethnographers is generally steeped in bias and their observations are often affected by inconsistencies in nomenclature in addition to the cultural differences themselves. Care must be taken when reading accounts.

In the second instance, the physical boundaries of Aboriginal language groups appear to have been somewhat fluid and may have been impacted by such things as disease, warfare and population pressure due to environmental (or other) change. What has been recorded in the past and from which we draw our assumptions, may or may not have been a true reflection of the situation twenty or indeed fifty years prior to the time the information was written down.

It should also be noted that while the author has attempted to provide information from most 'camps', these again may not represent the perspective of the Native Title Claimant groups or other Aboriginal groups with an interest in the cultural heritage of the activity area.

The majority of historical information comes from journals and memoirs of early pioneers and settlers, such as Curr and Beveridge; from early ethnographers such as Tindale and Howitt; and from government appointed employees such as G.A. Robinson, the Protector of Aborigines and his Assistant Protectors (under the Board for the Protection of Aborigines).

6.4.2 The People

During his exploration of the Narrung area during 1836, Major Thomas Mitchell came across '*some natives running away from their camp fires…and a gin left a heavy bag near us'* (11 June 1836). His journal carries other entries about interactions or sightings of people at Narrung:

'*From the number of huts along the river bank it was obvious that the inhabitants were numerous and I was therefore more surprised that our depot could have continued so long near them without their discovering it'* (11 June 1836).

'*I crossed early in the morning and found the opposite bank very favourable for the cattle to get out, this being an object of much importance. I was met as favourably by the natives on this first passage of the Murray as I had been on our approach to the Murrumbidgee. A small tribe came forward and laid a number of newly made nets at my feet, I declined accepting anything however, save a beautifully wrought bag. Telling the owner, through Piper, that when the party should have passed to that side I would give him a tomahawk for it'* (13 June 1836).

'*The natives beyond the Murray were differently behaved people from those on the Darling, for although one group sat beside that portion of our party which was still on the right bank, another at point of the opposite shore to the eastward of our new camp and a third near my camp on the neck of the peninsular, on which I found we had landed. Not one of them caused us any anxiety or trouble. It was to the last party I owed the Tomahawk and I went up with it as they sat at their fires, they were in number about twenty and unaccompanied by any gins, the man who had given me the bag seemed to express gratitude for the tomahawk by offering me another net, also one which he wore on his head and he presented to me his son…'* (13 June 1836) (see Fisher 2004).

The discrepancies between ethnographers as to which tribal group occupied which area is illustrated in the tribal boundary mapping available. In 1892, Dr. John Fraser produced a map (Figure 1) that shows the Laci Laci, Tatati, Yittha, Yari-yari & c. occupy lands on both the NSW and Victorian sides of the Murray River.

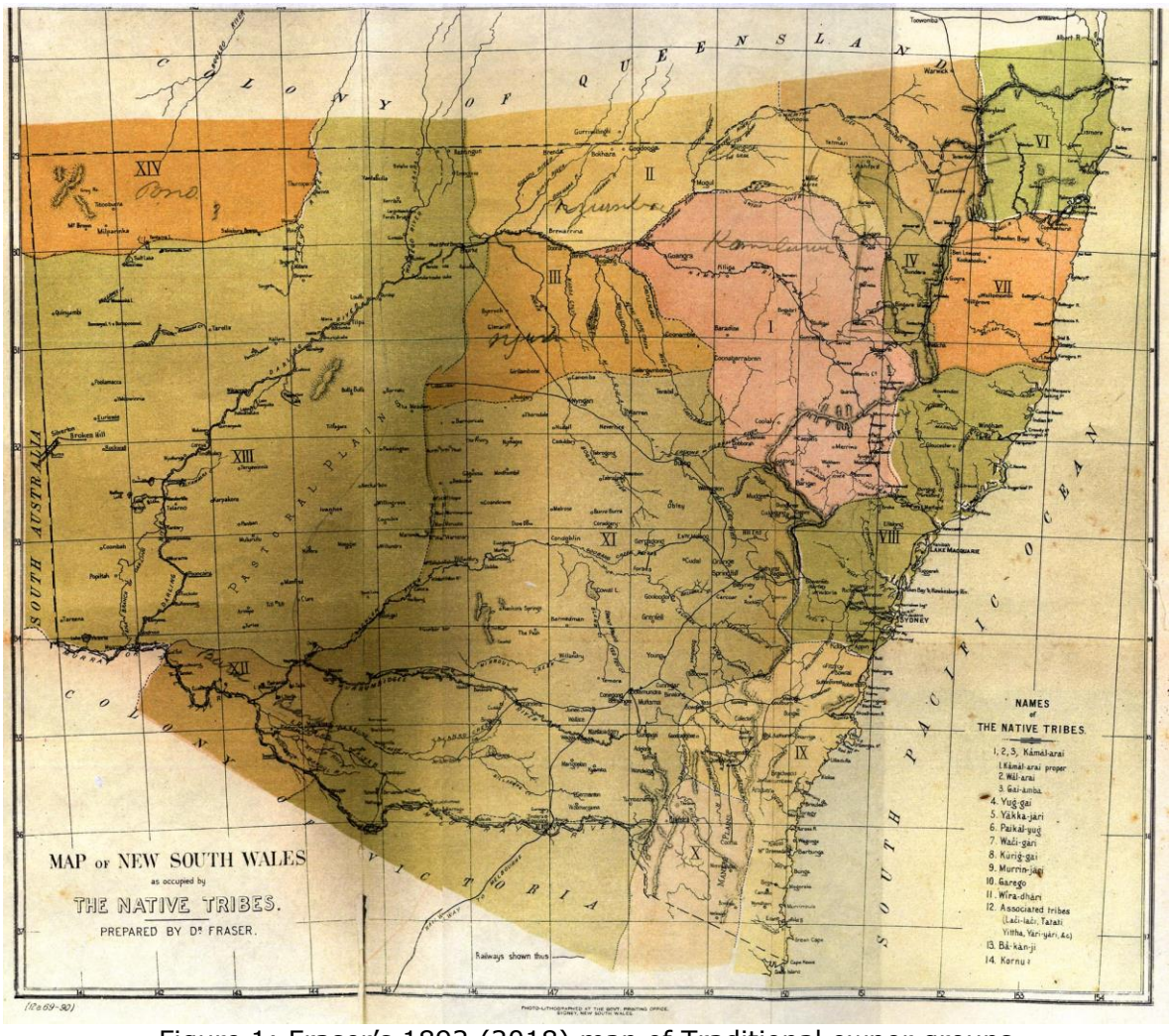


Figure 1: Fraser's 1892 (2018) map of Traditional owner groups

According to Howitt's (1904) mapping, the region falls within the traditional lands of the Leitchi Leitchi language group (Figure 2), although Tindale (1974:198) places it within the boundaries of Tati Tati country on the Victorian side of the river and the Kureinji on the NSW side (Figure 3). However, there is no clear consensus among early scholars of definitive tribal boundaries or spelling of group names.

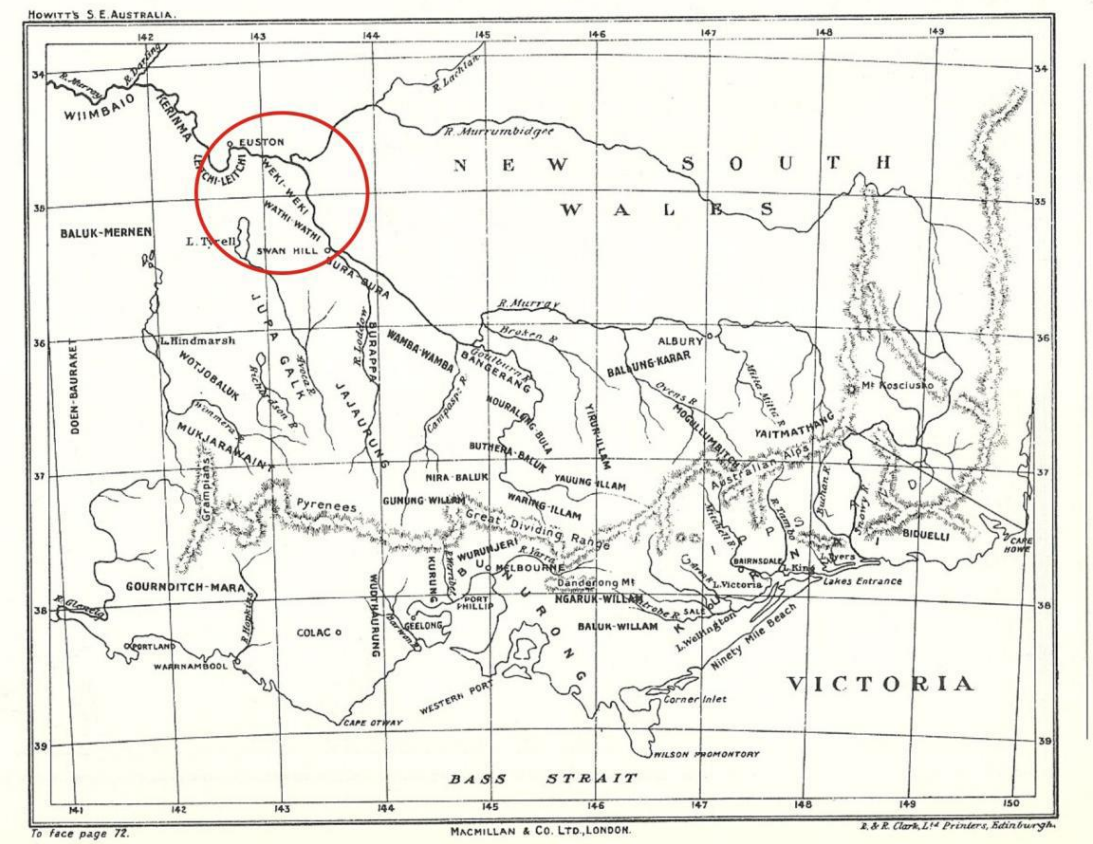


Figure 2: Howitt's 'Native Tribes of South East Australia' – Victoria (Source: Howitt 1904)

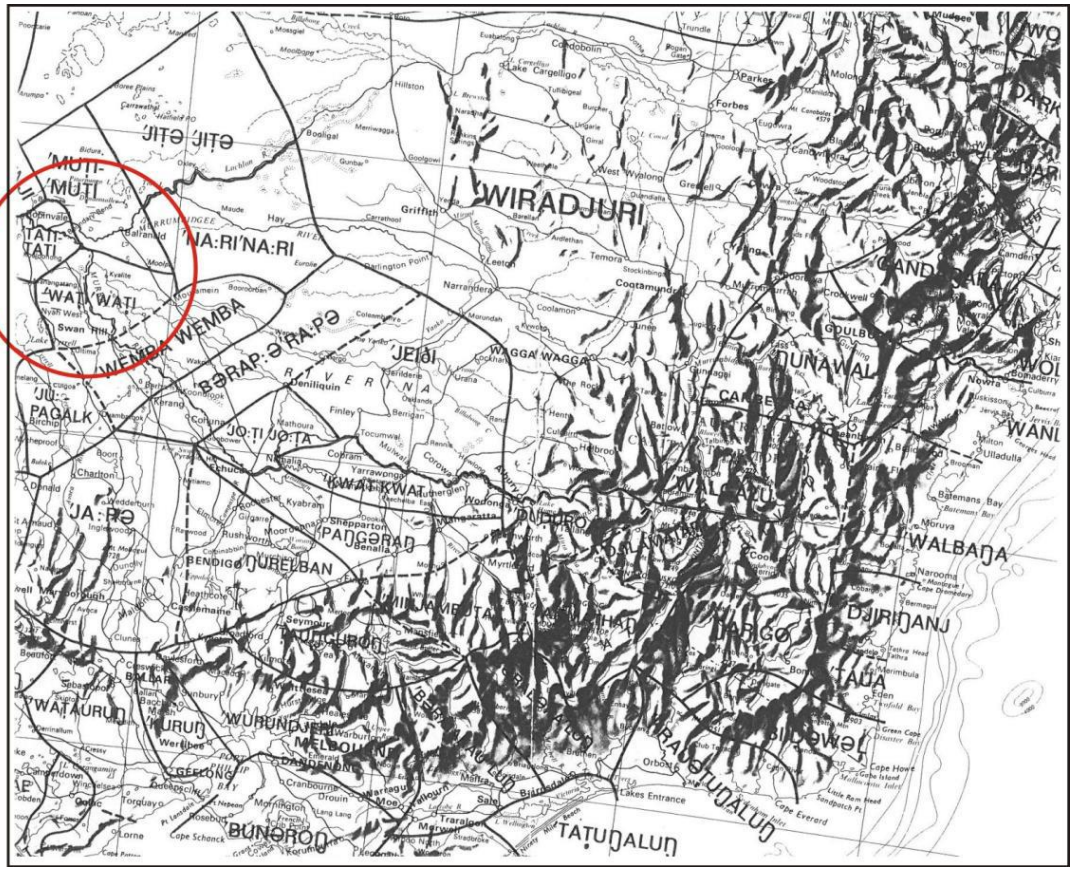


Figure 3: Excerpt from Tindale's Map of the Aboriginal Tribes of Australia (Source: Tindale 1974)

More recently, Clark (1990:394-5) has cited a number of informants for the location of Dadidadi (Tati Tati), placing them anywhere from Lake Benanee, Menindee, Pooncarie and Balranald in NSW to Moornpal Lakes and Boundary Bend in Victoria. Similarly, he has cited a number of informants for the location of Ladjiladji (Latji Latji), placing them between the north bank of the Murrumbidgee and the Darling River, near Euston, on the Murray between Waiky waiky and Yarry yarry tribes, at Kulkyne, at Bumbang, in the neighbourhood of Tyntynder, south as far as Lake Lalbert and at Chalka Creek (Clark 1990:402).

Clark's locational information is based on early ethnographic information, the memoirs and journals of early settlers, the journals and returns of Assistant Protector Edward Parker Stone and more recent linguistic information. It clearly illustrates the discrepancies in the historical documents.

6.4.3 Social Organisation

Generally speaking, and irrespective of the specific language group name, Aboriginal people occupied all aspects of the Victorian and NSW landscape, governed by a distinct system of land ownership. Aboriginal social organisation was extremely complex with marriage, social and intergroup relationships based on the tribe (language group), descent, clan and moiety. The Language group was the largest unit of division and consisted of people who shared a common language. Members of the same language group also shared the same rules of descent (either matrilineal or patrilineal) and claimed ownership of a particular region. Clans claimed common descent from ancestors (individual branches of a family tree) and these smaller groups also held particular tracts of land. Moieties divided the entire language group into complementary social groups, governing not only the social and ceremonial status of individuals but also their marriageability. Intermarriage of persons from the same moiety was not allowed (Bell 2000:7; after Coutts 1981:viii, after Howitt 1904).

6.4.4 Economy

According to Atkinson & Berryman, 'The general Aboriginal Australian pattern of group dispersal during times of food scarcity and group congregation in times of plenty, is held for the Murray Valley. The extremes of this pattern are avoided because Riverina environments support comparatively larger and more sedentary populations with their relative abundance of food' (1983:18, after Curr 1868:242; Kirk 1981:73). They go on further, 'Seasons determined the availability of food with groups following a cyclical course in its pursuit. The warm months on the rivers were the most productive whilst the few colder months encouraged dispersal, in smaller groups, to areas away from the main water bodies (Beveridge 1889:27; Kirk 1981:73-75). Details (Beveridge 1889) about the seasonal habits of the people foraging for such food as the sweet, insect secretion lerp, which was to be found in the mallee over a few short weeks (126), the 8-9 month dependence on the river principally for fish (10-11, 19), the drainage channel fish traps associated with the flood period (63-64, 35-36, 80-84), the seasonal duck hunts (76-78) and the spring egg harvest (19) suggest that food foraging was scheduled in accordance with seasons' (Atkinson & Berryman 1983:19).

People generally tended to be hunter-gatherers with a relatively clear distinction between the roles played by different genders. Generally speaking, men hunted the larger animals while the women gathered and processed plant foods and probably killed smaller animals as well. According to Zola & Gott (1992), Aboriginal women provided 50% to 80% of the family's food. A most common staple was *Murnong*, or Yam Daisy (*Microseris lanceolata* or *M.scapigera*), which grew abundantly from the

lowlands to the eastern highlands and which women collected. The tubers can be eaten raw but were most often cooked in baskets. More common in the activity area is *Nardoo* (*Marsilea drummondii*), which grows prolifically on the floodplain. The women roasted the spore cases, ground them and then made a cake with the flour (Zola & Gott 1992:27).

Generally speaking, utilitarian items were made from resources obtained from the surrounding landscape. Bark from mature Eucalypts was used to make shelters, carrying containers and canoes. Bark and sap (or gum) from specific trees also provided medicine. Wood was required to make a range of hunting and fighting implements and women's digging sticks. Grasses and reeds were used to weave baskets, and nets were manufactured from a cord made from the stringy-bark tree. Possums and kangaroos not only provided a meat source, but also provided raw materials from which clothing (cloaks), body decoration (jewellery) and other items could be made, including tools. Resin from the Grass tree (*Xanthorrhoea*) was used to bind handles to axes and spear points to spears. Flakeable stone from which to manufacture tools, if not available on country could be traded for at corroborees (see McBryde 1978; 1979).

6.5 Archaeological Reports

The AHIMS database was searched for existing archaeological investigation reports that related to the activity area. The results indicate that the activity area has not been subject to any previous archaeological investigation.

A review of the AHIMS register indicates there is a paucity of reports undertaken nearby to the activity area. The most relevant reports available on the AHIMS database have been reviewed below.

Edmonds, V. 1993 An Archaeological Survey for the Proposed Bridge and Road Approaches at Yanga Creek, Near Balranald, Western NSW.

Vanessa Edmonds undertook a survey approximately 33 km east of the activity area. The survey was approximately 84,000 sqm and was comprise of a linear portion 1.4 kilometres in length and 60 metres in width for a new bridge alignment and two storage areas 5,000 sqm on a predominately Alluvial Plains - *Riverland* landform. This consisted of floodplains with billabongs, channels, levees, lunettes and swamps. The sites recorded during the survey were four scarred trees, all on black box trees and two midden sites: one small and one large of indeterminate size. Edmonds concluded that there is potential for other subsurface sites to be present, and these would likely be midden deposits.

Edmonds, V. 2003 Sub-surface Testing Robinvale Bridge Replacement, NSW Floodplain, Near Euston.

During previous assessments for the proposed works located approximately 53 km to the northwest of the current activity area, Vanessa Edmonds identified three Indigenous heritage sites and three areas of potential archaeological deposits (PADs). The areas of PAD have the potential to contain middens, surface scatters, burials, hearths and scarred trees. Testing involved drilling a series of 18 x 50 mm auger holes across selected areas of PAD. This resulted in no cultural material being recorded from any hole and the study concluded there were no archaeological constraints for the proposed development.

Edmonds, V. 2003 Cultural Heritage Assessment for the Euston Levee, Western NSW

Edmonds undertook background studies for this project located approximately 57 km northwest of the activity area for the repair or replacement of the existing levee bank at Euston. These studies resulted in a predictive model suggesting the most likely site type in the study area will be scar trees and that these will be located on the high bank or upper terrace of the river. A survey was undertaken for the proposed works area, and this recorded four new Aboriginal sites: three scar trees and one midden site. Of the three scars trees, two were located on upper terraces and one on the floodplain. The locations of these fall within the predictive model. It was recommended that the scarred trees recorded be protected and that if this was not possible an Aboriginal Heritage Impact Permit (AHIP) would need to be applied for. The shell midden was outside the proposed impact area and no further works were required. In areas where deep fill was present, up top two metres in depth, then monitoring of works in these sections was recommended to be undertaken.

AECOM 2014 Tooleybuc Bridge Replacement Appendix B, Aboriginal Cultural Heritage Constraints Report.

AECOM prepared a report which investigated three proposed relocation sites for the Tooleybuc bridge. As part of the report they produced an extensive site prediction model that stated mounds or the remnants of destroyed mounds are likely to be located, middens will be present, modified (scarred) trees may be in uncleared areas, and stone artefacts may be present as either scatters or isolated artefacts and that it is likely there are burials in the area. Areas of potential archaeological sensitivity were defined as being within 200 metres of the Murray River, the banks of Lake Coomaroop and a lunette landform on the NSW side.

Vehicular and pedestrian surveys recorded two new sites, a scarred tree and a partial mound site on the Victorian side and 15 other sites on the NSW side. The NSW sites consisted of middens, scarred trees and mounds however, these were all outside the study area. AECOM, further identified three areas of high archaeological sensitivity within the proposed activity area. The results of the survey supported the predictive model. It was recommended that areas where known sites and sensitivity are located, should be avoided and if this was not possible then sub-surfaces testing should be undertaken.

6.6 Land Use History

The following sections are taken from Edwards & Bell (2012:33-39).

6.6.1 Early Explorers

The Narrung area was first traversed by (European) Captain Charles Sturt in 1830 on his journey to discover where all the rivers (Hume (Murray), Lachlan and Murrumbidgee) flowed. During his famous 'Murray River Voyage', Sturt navigated the Murrumbidgee River and on 14 January 1830, negotiated the Murrumbidgee / Murray River junction:

> *"Suddenly the Murrumbidgee took a southern direction but in its tortuous (sic) course swept round to every point of the compass with the greatest irregularity. We were carried at a fearful rate down it's gloomy and contracted banks. At 3 p.m., Hopkinson called out that we were approaching a junction, and in less than a minute afterwards we were hurried into a broad and noble river."*
>
> Charles Sturt 1830 (www.murrayriver.com.au).

In 1836, Major Thomas Mitchell set out on his third expedition to the interior, to determine whether the Darling drained into a lake or another river. He travelled overland down the northern bank of the Murrumbidgee before setting up camp a few miles downstream of the Murrumbidgee / Murray River junction. Leaving Stapleton and half of his party at this camp, he continued overland along the northern bank of the Murray to the Murray-Darling junction. Returning to Stapleton's camp (known as Passage Camp), he crossed the Murray to the southern side and continued his exploration upstream and into the area now known as Narrung (Fisher 2004:3-4) (Figure 4).

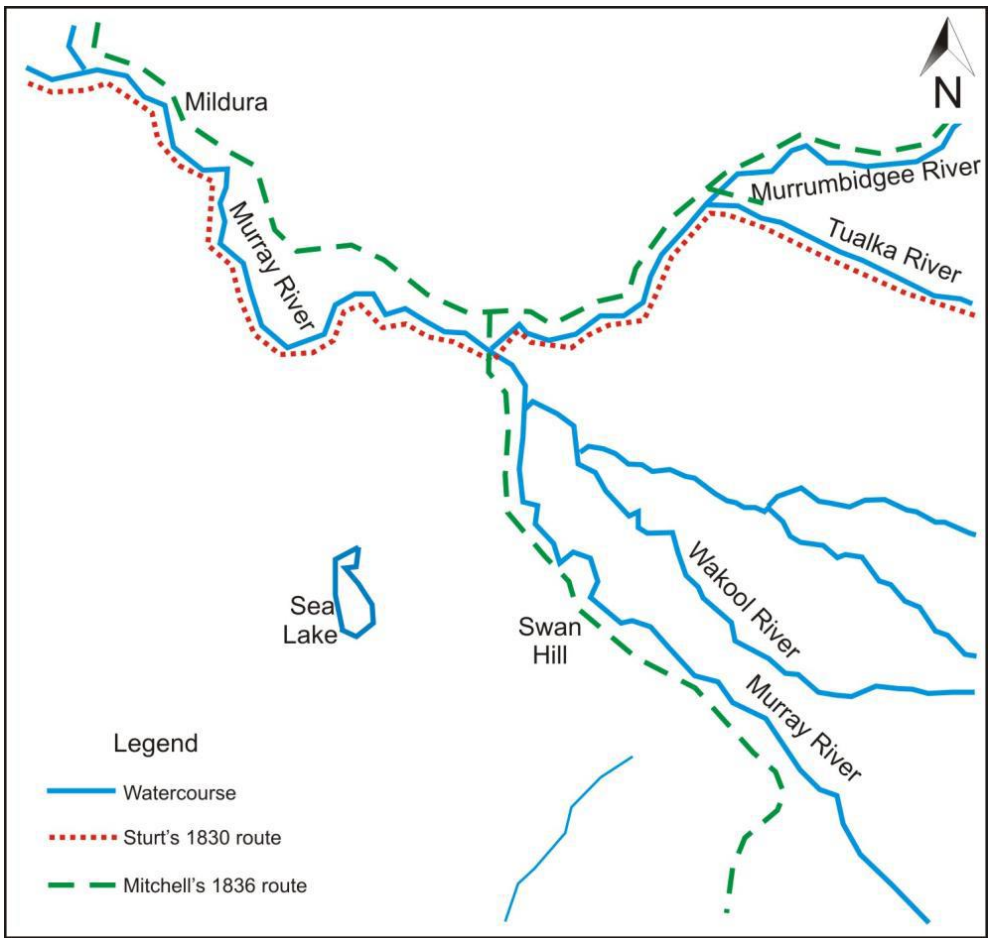


Figure 4: The exploration routes taken by Sturt and Mitchell, after Fisher 2004 (Source: Fisher 2004)

6.6.2 Overlanding and Squatting Period

Following the raving reviews of Sturt and Mitchell, drovers commenced overlanding stock from the Riverina and Goulburn Valley across to the Adelaide market, assured of a food supply *en route*. Joseph Hawdon, among others, was one of the first overlanders, taking 340 head of cattle across during early 1838, making more than one trip. According to Fisher, 'Hawdon wrote of camping about a mile below the Junction of the Murray and Murrumbidgee while droving sheep and cattle to Adelaide' (Fisher 2004:8).

Within 10 years of Mitchell's third expedition, the area was taken up by squatting runs.

Narong, Narrung or Neroney run (including the activity area) was originally taken up by Donald J. McLeod (Figure 5). It was gazetted on 19 July 1848, although it was licensed 12 months prior to the NSW Orders-In-Council (October 1847). The run had an original estimated area of 15,360 acres (Spreadborough & Anderson 1983: 234). The boundaries were formally described by McLeod in his application for lease as,

> *'…bounded on the North and N.E. by the Murray River and on the South and S.W. by the Mally – an impenetrable scrub. In about the South east direction I am joined by Mr W Coghill and on the N.W. by Alexander MacCallum, Esq'.*

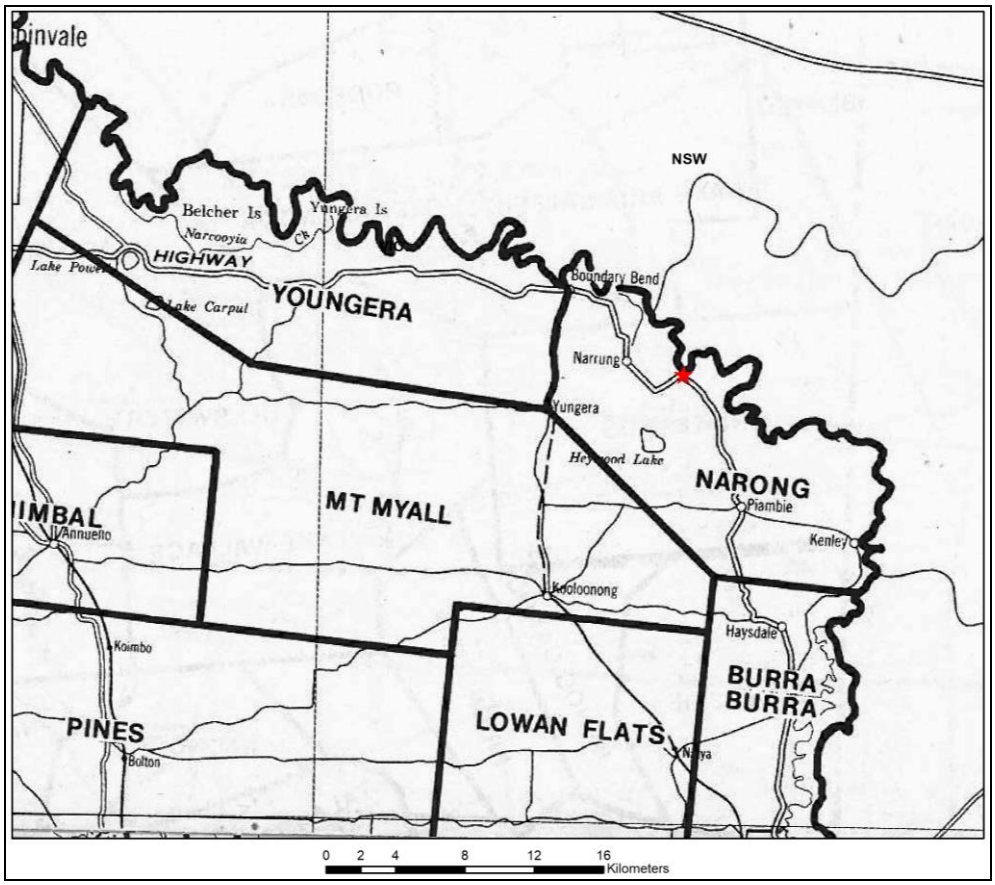


Figure 5: Squatting runs of the region (Source: Spreadborough and Anderson 1983)

In 1848, McLeod ran 900 head of cattle and 6,000 sheep on the run.

In 1851, the run was transferred to James Hamilton who, on 23 August 1859, exercised his pre-emptive right under the 1847 Regulation, and applied to purchase 320 acres of his pastoral licence land at 1 pound per acre. The Narrung P.R. is located some distance to the east of the current activity area. During his time at Narrung, Hamilton ran 250 head of cattle and 8,000 sheep (Fisher 2004:22).

Following Hamilton's purchase of 320 acres around his homestead, the remainder of the run was transferred to William Walker, William Sloane, James How and Alexander Thomson in 1860, William Sloane & Co. in 1862, William Hamilton in 1865 and the Oriental Bank Corporation in 1870. The licence was forfeited in 1883 (Spreadborough & Anderson 1983: 234).

6.6.3 Closer Settlement and Agriculture

Following the Land Acts of the 1850s – 1870s, all the large squatting and pastoral runs were subdivided into smaller agricultural allotments. In 1884, the original squatting run was divided into three parcels, all of which were bought by the Creswick family and run under the Narrung Pastoral Licence until the lease was cancelled in 1919 (Figure 6) (Fisher 2004:22).

The Narrung Junction Inn was, (according to Fisher 2004:31) constructed by a Mr Wishart in 1844, located approximately 300 metres northwest of the proposed pumping station site. The inn provided accommodation and meals and was the only hotel between Swan Hill and Euston. There were four separate buildings in a square, the bar room had a cellar and was constructed using the drop log method. The hotel also acted as a Post Office from 1865. The Post Office also acted as a store, and was a coach stop and horse changing area with stalls for the horses. The Junction Hotel liquor licence was active from 21/12/1886 until 24/11/1925.

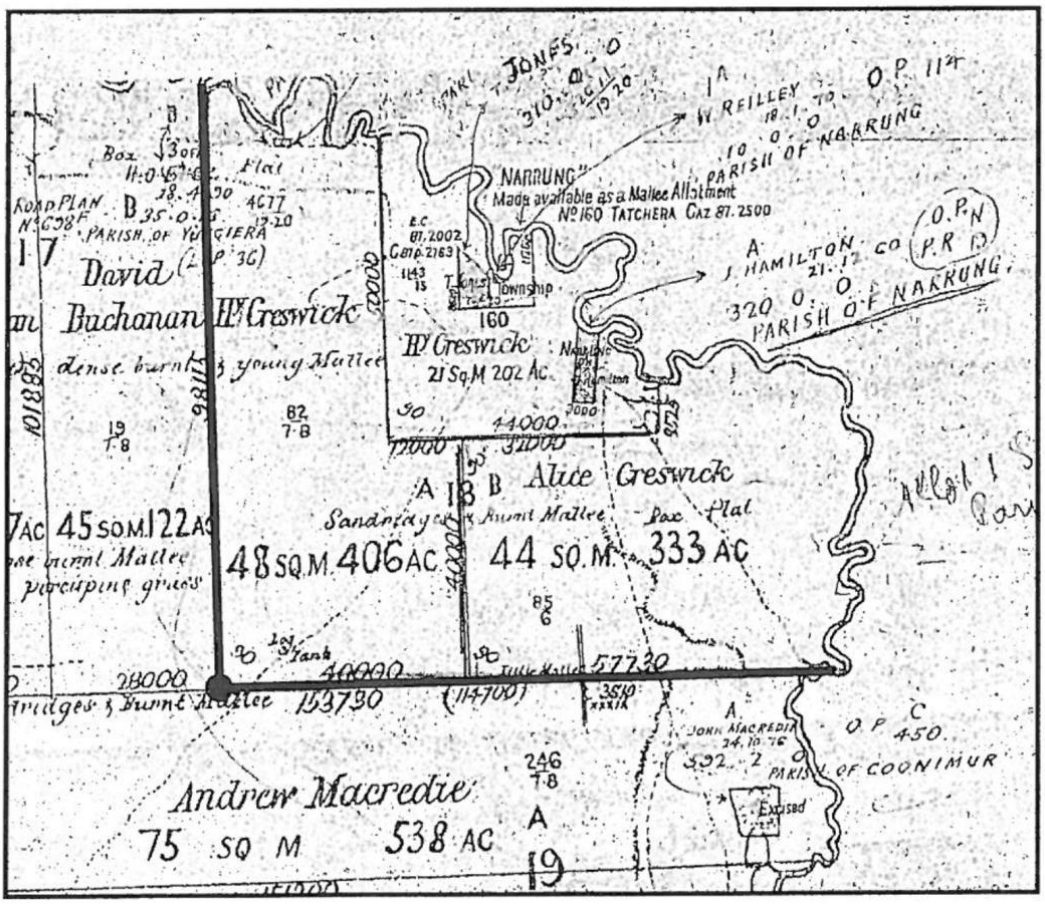


Figure 6: An 1890 map of the Narrung Pastoral Licence showing the 1884 subdivision into 3 blocks (Source: Fisher 2004:22)

6.6.4 Historic Plans

The State Library of Victoria and the Public Records Office were visited to review any historic plans relevant to the activity area. The historic parish plan shows Narrung (east of Wakool Creek) as a crossed through township reserve and while the date is illegible, this must date to the 1900s (Figure 7).

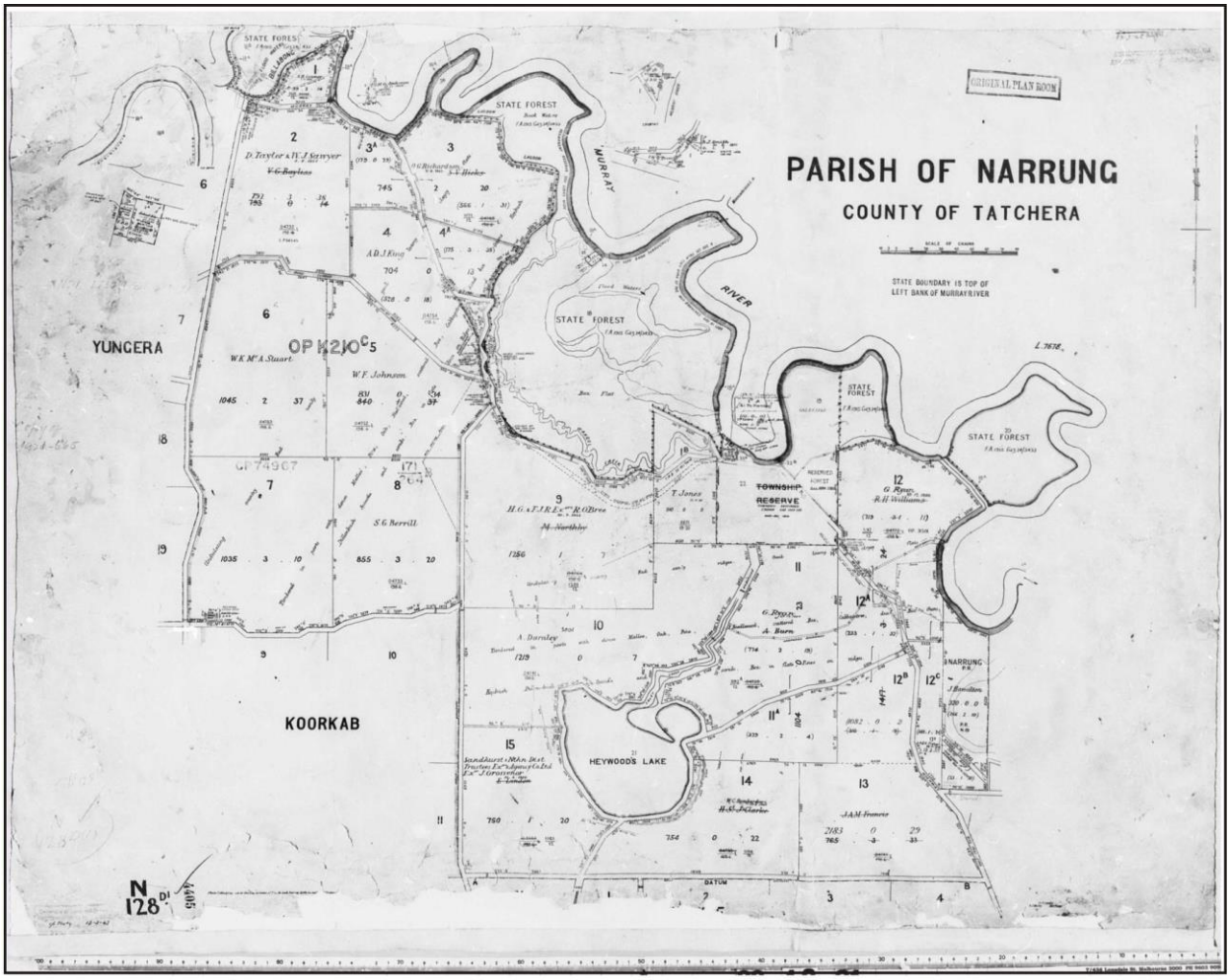


Figure 7: Parish Plan illegible date (Source: SLV)

6.7 Site Prediction Model

Aboriginal places are expected to be situated close to either an ephemeral or permanent water source, with the location providing adequate shelter from both the elements, and rising floodwaters and have access to a food source. Additionally, for Aboriginal places to remain in these situations through time, the landscape will not have sustained significant ground disturbance activities.

The Murray River, its prior channels, lagoons and floodways are known to have been well-utilised by Aboriginal people in the past and there is evidence to suggest that people inhabiting the River Murray zone were far more sedentary than their counterparts living on the more arid plains to the west.

Site prediction modelling should take into consideration information from both sides of the river, since the River Murray was not seen as a boundary to people in the past.

The most likely site types found on the NSW side include scarred or modified trees, followed by artefacts and hearths.

Aboriginal places within a 10km radius to the activity area on the Victorian side include earth features, scarred or modified trees, artefact scatters, Aboriginal ancestral remains and shell middens.

Based on the Register reviews and the landforms in the activity area, the most likely Aboriginal sites to be identified within the activity area are:

- Scarred or modified trees – on Red Gums and Box species on the top of the river bank;
- Shell middens – in areas along the banks of the river; and
- Isolated artefacts.

It is unlikely that artefact scatters, earth features or ancestral remains will be present due to the location of the activity area on a highly eroded riverbank.

6.8 Summary

The results of the desktop assessment indicate that the activity area comprises entirely of Murray River flood plain and steep riverbank. The activity area therefore contains landscape features or landforms that are likely to contain Aboriginal objects.

Historical and ethnographic evidence suggests that Aboriginal people were likely to be present in the landscape before and after the arrival of European explorers and pastoralists in the area.

The land use history suggests native vegetation removal from the general area for pastoral use. Furthermore, a not inconsiderable flood history, including associated erosion of the outside bends (Victorian side) has been exacted on the Murray River.

The results of the desktop assessment suggests that while the activity area may exhibit landforms that have the potential to contain Aboriginal objects, these have been highly disturbed through previous flooding and erosional events. The activity area is situated on a convex curve in the river indicating an erosive bank. It is highly likely that floods have been eroding the bank since pre-European times, subsequently removing any cultural material present along the edge of the river. Additionally, early land clearing would have further disturbed any cultural material which may have been present. A visual inspection of the activity area was undertaken to verify these results.

7.0 VISUAL INSPECTION

The second component of Step 4 of the Due Diligence process is a visual inspection. The purpose of a visual inspection of the activity area is to verify whether Aboriginal objects may be identified or are likely to be present on or below the surface.

7.1 Methodology

The activity area was systematically surveyed during the inspection. This methodology was to include the targeted inspection of all mature Eucalypts and landscape features or landforms likely to contain Aboriginal objects. It was proposed to record any Aboriginal sites or places and to note any landforms that were likely to contain Aboriginal objects.

7.2 Results

The visual inspection was undertaken on 4 August 2022 by Neil Fenley (Archaeologist) of Jo Bell Heritage Services Pty Ltd and Neville Murray (BLALC). The existing conditions of the assessment are shown in Map 4. The results are described below and visually indicated in the series of plates.

A 30m radius of the proposed pump station location was subject to a foot survey with mature trees and areas of good ground surface visibility targeted (Plate 1). Additionally, the potential access into the site was also assessed. The activity area comprised of a small section of floodplain (adjacent to the high water mark) and the riverbank itself (Plate 2).

The flood plain has been cleared, laser-levelled and is presently agricultural land.

The steep riverbank has been subjected to erosion from previous flooding and it is therefore likely that the edge of the bank in pre-European times was a considerable distance north of its present location. There was no cultural heritage material present on the ground surface and the exposed riverbank did not indicate any potential for cultural heritage material to be present. Neville Murray (BLALC) stated the most likely area to contain cultural heritage material would be further back on the floodplain in Victoria. He further stated that he could see no constraints to the proposed development occurring in NSW.

No undisturbed landscape features or landforms likely to contain Aboriginal objects were identified within the activity area during the visual inspection.

The ground visibility was 70% with exposure at 50%, therefore, allowing a thorough assessment of the activity area (Plates 3-4).

7.3 Summary

No Aboriginal cultural heritage or objects were identified in or close to the activity area during the visual inspection.

Given the eroded nature of the majority of the activity area, the likelihood of finding sub surface Aboriginal objects within the activity area is low and identifying intact, *in situ* Aboriginal objects extremely low.

Plate 1: Overview of proposed pumping station location, showing the erosional nature of the riverbank, facing northeast (Photo: N.Fenley 4Aug22)

Plate 2: Proposed pumping station site facing southeast from the river (Neville Murray and Russel Hilton on the top of the riverbank) (Photo: N.Fenley 4Aug22)

Map 4: Existing Conditions of the Activity Area

Plate 3: Activity Area facing southwest (Photo: N.Fenley 4Aug22)

Plate 4: Activity area facing northwest from the top of the riverbank (Photo: N.Fenley 4Aug22)

8.0 RECOMMENDATIONS

No Aboriginal cultural heritage was identified during the visual inspection undertaken for the preparation of this Due Diligence Assessment. It is unlikely that the activity area contains any landforms that may still contain buried deposits of Aboriginal cultural heritage. Based on the results of this assessment, there is no requirement for any further archaeological works to be undertaken.

9.0 CONTINGENCY PLANS

Aboriginal sites in NSW are primarily protected under the *National Parks and Wildlife (NPW) Act* 1974. In the event that Aboriginal objects are found during the conduct of the activity, contingency measures are set out below. The contingency measures set out the proponent's requirements in the event Aboriginal objects are identified during the conduct of the activity.

9.1 Management and Notification of Aboriginal Objects found during the Activity

The NPW Act requires that, if a person finds an Aboriginal object on land and the object is not already recorded on AHIMS, they are legally bound under s.89A of the NPW Act to notify DECCW as soon as possible of the object's location.

In the event that new Aboriginal objects are found during the conduct of the activity, then the following must occur:

a) The person who discovers Aboriginal object/s during the activity will immediately notify the person in charge of the activity;

b) The person in charge of the activity must then suspend any relevant works at the location of the discovery and within 5m of the relevant site boundary;

c) In order to prevent any further disturbance, the location will be isolated by safety webbing or an equivalent barrier and works may recommence outside the area of exclusion;

d) The person in charge of the activity must contact an archaeologist within 48hrs;

e) The archaeologist must contact the DPIE (formerly OEH) Regional Aboriginal Heritage Division (Southern Region);

f) Within a reasonable period, a decision/recommendation will be made by the archaeologist in consultation with the relevant Aboriginal stakeholder group(s) and DPIE as to the process to be followed to manage the Aboriginal object/s in a culturally appropriate manner, and how to proceed with the works;

g) Options for management may include:

   i. Recording the site and submitting the relevant forms to the AHIMS Registrar;

   ii. Developing a strategy to avoid harm to the site; and/or

   iii. If avoiding harm is not possible, further investigation, an impact assessment and an AHIP may be required.

h) A separate contingency plan has been developed in the event that suspected human remains are discovered during the conduct of the activity.

9.1.1 Protocols for handling sensitive information

Aboriginal cultural heritage encompasses all aspects of Aboriginal culture, including tangible evidence such as stone artefacts, shell middens and ancestral remains, intangible evidence such as oral histories and song lines as well as living culture. While not all aspects of Aboriginal culture are considered sensitive, especially evidence of activities of daily living, there are some aspects that may relate to ceremony, ritual or ancestral remains that are of a particularly sensitive nature. Culturally sensitive information is inherently bound up with cultural significance. 'If we accept that cultural significance is not an inherent quality of a place, but a social outcome resulting from people's interactions with a place, then the community itself must be the most important source of significance' (Burke & Smith 2004:245).

In the event that further Aboriginal cultural material is identified *during the conduct of the activity*, the archaeologist must ensure that any investigations undertaken in relation to the Aboriginal objects are carried out in a culturally sensitive manner, which may include limiting access to the objects during investigations and further advising the proponent/contractors/employees of their obligations in relation to the culturally sensitive nature of the heritage and their obligations in relation to the relevant legislation.

9.2 Notification of the Discovery of Skeletal Remains during the carrying out of the Activity

1. Discovery:
    a) If suspected human remains are discovered, all activity in the vicinity must ***stop*** to ensure minimal damage is caused to the remains, and,
    b) The remains must be left in place and protected from unauthorised access and harm or damage.
2. Notification:
    a) Once suspected human skeletal remains have been found, New South Wales Police (use the local number) must be notified immediately;
    b) If there is reasonable grounds to believe that the remains could be Aboriginal, the NPWS Head Office must be immediately notified on (02) 9585 6444 or contact the Aboriginal Heritage Officer at the Heritage Branch on (02) 9873 8500 for further advice;
    c) All details of the location and nature of the human remains must be provided to the relevant authorities; and
    d) The remains should also be reported to the relevant Traditional Owners.

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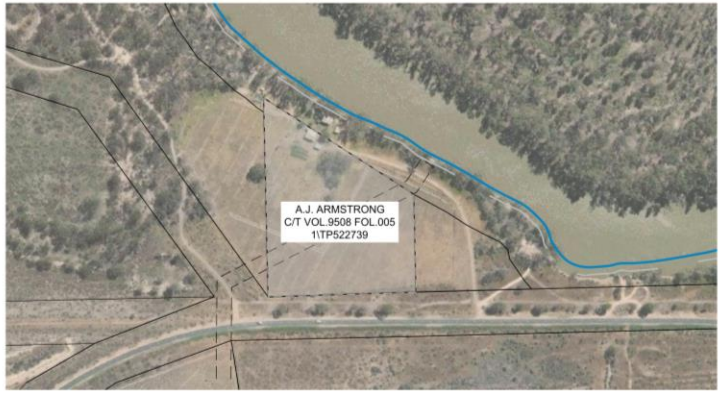
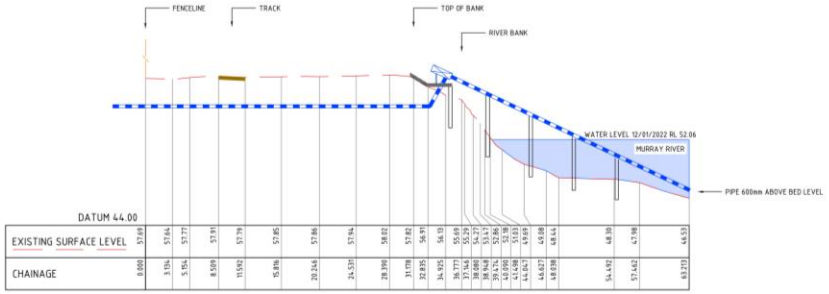
11.0 APPENDICES

Appendix 1: Narrung Pump Site Concept Design

CONCEPT LAYOUT PLAN
NOT TO SCALE



LOCALITY PLAN
NOT TO SCALE



SECTION A - A
H 1:250, V 1:200

LEGEND

- PIPE (PROPOSED)
- PUMP (PROPOSED)
- POWER KIOSK (PROPOSED)
- FENCE (EXISTING)
- MAJOR CONTOUR 2.5m (EXISTING)
- MINOR CONTOUR 0.5m (EXISTING)
- TOP OF RIVER BANK (EXISTING)
- SECTION

ISSUE	DESCRIPTION	DATE
A	CONCEPT LAYOUT	22/06/22

NOTATIONS

LEVELS ARE IN A.H.D
LENGTHS ARE SHOWN IN METRES
CONTOUR INTERVAL IS 0.50m

INFORMATION

N

0 2.5 5 10 15
H 1:250 (A1)

CAF CONSULTING
abn: 37 160 560 556
a: 38 Wyndham Street, Shepparton
p: P.O. Box 1948, Shepparton, VIC 3632
t: 03 5831 3347
f: 03 5831 3343
e: info@cafconsulting.com.au
w: cafconsulting.com.au

Client: 5 WAYS LAND HOLDING PTY LTD
Project Name: NARRUNG PROPOSED PUMP SITE
Location: 7912 MURRAY VALLEY HIGHWAY
BOUNDARY BEND, VIC 3599
Property: ALLOTMENT 15
10\PP3283
Title: LAYOUT AND CROSS SECTION

Surveyed: OTHERS
Designed: ----
Drawn: N. RICHARDSON 22/06/22
Approved: ----
Cad File: 3868 C01.DWG
Scale: SCALE AS SHOWN
Size: A1
Drawing No.: 3868 / C01
Sht: 01 of 1
Issue: A

Appendix 2: Qualifications of Archaeologist

Neil Fenley
Archaeologist
Jo Bell Heritage Services Pty. Ltd.

Qualifications:
Bachelor of Archaeology (Hons) La Trobe University, Bundoora, 2007

Neil is qualified in Indigenous Australian prehistory and non-Indigenous historic archaeology. He has over 15 years professional experience in heritage management and has worked extensively in remote locations throughout Australia Fields of research include Australian Indigenous archaeology, Australian historic archaeology and stone artefact analysis.

Joanne Bell
Director
Jo Bell Heritage Services Pty. Ltd.

Qualifications:
BA (Hons) Archaeology, La Trobe University, Bundoora, 2000
Cert. IV Training and Assessment, ECEC 2006

Joanne is qualified in Indigenous Australian prehistory and non-Indigenous historic archaeology. She has over twenty years' professional experience in heritage management, including development and research projects. Fields of research include Australian Indigenous archaeology, Australian historic archaeology, stone artefact analysis, cultural heritage management and heritage training.

Appendix 3: AHIMS Extensive Search

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-6-0142	Lower Boundary 24	GDA	54	729817	6160884	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells,Mr.Jesse Charles					**Permits**		
47-6-0184	Lower Boundary 33	GDA	54	729891	6161203	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0140	Lower Boundary 22	GDA	54	729986	6161065	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells,Mr.Jesse Charles					**Permits**		
47-6-0065	Lower Boundary 04	GDA	54	730020	6161351	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Damien Charles,Mr.Daniel Kelly,Mr.David RMB Crew					**Permits**		
47-6-0183	Lower Boundary 32	GDA	54	730039	6161221	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Malcolm Ridges					**Permits**		
47-6-0192	Lower Boundary 41	GDA	54	730120	6161531	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0062	Lower Boundary 01	GDA	54	730172	6161148	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Damien Charles,Mr.Daniel Kelly,Mr.David RMB Crew					**Permits**		
47-6-0138	Lower Boundary 20	GDA	54	730169	6160899	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells					**Permits**		
47-6-0252	Lower Boundary 75	GDA	54	730206	6161366	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0250	Lower Boundary 73	GDA	54	730227	6161393	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0245	Lower Boundary 68	GDA	54	730313	6161296	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Shannon Kelly					**Permits**		

Report generated by AHIMS Web Service on 05/08/2022 for Neil Fenley for the following area at Lat, Long From : -34.8577, 143.0894 - Lat, Long To : -34.6433, 143.5838. Number of Aboriginal sites and Aboriginal objects found is 114

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-6-0244	Lower Boundary 67	GDA	54	730439	6161217	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Shannon Kelly					**Permits**		
47-6-0137	Lower Boundary 19	GDA	54	730470	6161007	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells,Mr.Jesse Charles					**Permits**		
47-6-0234	Lower Boundary 57	GDA	54	730498	6161063	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0237	Lower Boundary 60	GDA	54	730504	6161147	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Shannon Kelly					**Permits**		
47-6-0236	Lower Boundary 59	GDA	54	730510	6161110	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Shannon Kelly					**Permits**		
47-6-0132	Lower Boundary 14	GDA	54	730683	6160910	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0606	Transmission Line 6	GDA	54	730733	6149341	Open site	Destroyed	Hearth : -, Potential Archaeological Deposit (PAD) : -		104164
	Contact	**Recorders**	ERM Brisbane,Mr.Giles Hamm,Miss.Amelia Murden					**Permits**		
47-6-0905	Regatta Beach Rd HTH SHL 2	GDA	54	735883	6155196	Open site	Partially Destroyed	Hearth : -, Non-Human Bone and Organic Material : -, Shell : -		
	Contact	**Recorders**	Niche Environment and Heritage,Niche Environment and Heritage,Niche Environm					**Permits**	4596,4717	
47-5-0046	Limondale 9	GDA	54	727568	6150960	Open site	Destroyed	Artefact : -		104164
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,ERM Brisbane,Mrs.Samantha Keats,Miss.Amelia Murde					**Permits**		
47-6-0188	Lower Boundary 37	GDA	54	729923	6161646	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Malcolm Ridges					**Permits**		
47-6-0189	Lower Boundary 38	GDA	54	729997	6161601	Open site	Valid	Artefact : -, Hearth : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		

Report generated by AHIMS Web Service on 05/08/2022 for Neil Fenley for the following area at Lat, Long From : -34.8577, 143.0894 - Lat, Long To : -34.6433, 143.5838. Number of Aboriginal sites and Aboriginal objects found is 114

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-6-0144	Lower Boundary 26	GDA	54	730019	6160693	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells,Mr.Jesse Charles					**Permits**		
47-6-0063	Lower Boundary 02	GDA	54	730144	6161142	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Damien Charles,Mr.Daniel Kelly,Mr.David RMB Crew					**Permits**		
47-6-0248	Lower Boundary 71	GDA	54	730226	6161400	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0145	Lower Boundary 27	GDA	54	730346	6160719	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells,Mr.Jesse Charles					**Permits**		
47-6-0241	Lower Boundary 64	GDA	54	730437	6161195	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Shannon Kelly					**Permits**		
47-6-0242	Lower Boundary 65	GDA	54	730441	6161200	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Shannon Kelly					**Permits**		
47-6-0131	Lower Boundary 13	GDA	54	730628	6160922	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0831	Limondale 7	GDA	54	730403	6150846	Open site	Valid	Hearth : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
47-6-0130	Lower Boundary 12	GDA	54	730684	6160997	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0604	Transmission Line 4	GDA	54	730957	6149121	Open site	Valid	Hearth : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Giles Hamm					**Permits**		
47-6-0141	Lower Boundary 23	GDA	54	729798	6160988	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells,Mr.Jesse Charles					**Permits**		

Report generated by AHIMS Web Service on 05/08/2022 for Neil Fenley for the following area at Lat, Long From : -34.8577, 143.0894 - Lat, Long To : -34.6433, 143.5838. Number of Aboriginal sites and Aboriginal objects found is 114

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-6-0187	Lower Boundary 36	GDA	54	729868	6161428	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0191	Lower Boundary 40	GDA	54	730067	6161594	Open site	Valid	Earth Mound : -, Non-Human Bone and Organic Material : -, Shell : -, Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0249	Lower Boundary 72	GDA	54	730230	6161398	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Shannon Kelly					**Permits**		
47-6-0247	Lower Boundary 70	GDA	54	730299	6161396	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0243	Lower Boundary 66	GDA	54	730432	6161215	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0240	Lower Boundary 63	GDA	54	730447	6161169	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Shannon Kelly					**Permits**		
47-6-0239	Lower Boundary 62	GDA	54	730448	6161179	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0235	Lower Boundary 58	GDA	54	730501	6161112	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0126	Lower Boundary 8	GDA	54	730713	6161337	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0128	Lower Boundary 10	GDA	54	730832	6161166	Open site	Partially Destroyed	Modified Tree (Carved or Scarred) : -		

Report generated by AHIMS Web Service on 05/08/2022 for Neil Fenley for the following area at Lat, Long From : -34.8577, 143.0894 - Lat, Long To : -34.6433, 143.5838. Number of Aboriginal sites and Aboriginal objects found is 114

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0826	Limondale 2	GDA	54	730696	6151333	Open site	Valid	Artefact : -, Earth Mound : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
47-6-0828	Limondale 4	GDA	54	730967	6151066	Open site	Valid	Earth Mound : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
47-6-0608	Balranald Common Canoe Tree 1	GDA	54	735996	6163016	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Ray Mitchell					**Permits**		
47-6-0903	Regatta Beach Road Midden	GDA	54	736199	6156024	Open site	Partially Destroyed	Shell : 1, Artefact : -, Hearth : -		
	Contact	**Recorders**	Niche Environment and Heritage,Niche Environment and Heritage,Niche Environm					**Permits**	4596,4717	
47-5-0045	Limondale 1	GDA	54	728244	6149569	Open site	Destroyed	Artefact : -, Hearth : -		104164
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,ERM Brisbane,Mrs.Samantha Keats,Miss.Amelia Murde					**Permits**		
47-6-0185	Lower Boundary 34	GDA	54	729937	6161349	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Malcolm Ridges					**Permits**		
47-6-0190	Lower Boundary 39	GDA	54	730009	6161595	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0251	Lower Boundary 74	GDA	54	730214	6161392	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0180	Lower Boundary 29	GDA	54	730215	6161073	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Malcolm Ridges					**Permits**		
47-6-0246	Lower Boundary 69	GDA	54	730320	6161329	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0136	Lower Boundary 18	GDA	54	730493	6161066	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Mark Brettschneider					**Permits**		
47-6-0135	Lower Boundary 17	GDA	54	730524	6161027	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		

Report generated by AHIMS Web Service on 05/08/2022 for Neil Fenley for the following area at Lat, Long From : -34.8577, 143.0894 - Lat, Long To : -34.6433, 143.5838. Number of Aboriginal sites and Aboriginal objects found is 114

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-6-0219	Lower Boundary 42	GDA	54	731163	6161519	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Malcolm Ridges,Mr.Michael Kelly,Mr.Mark Brettschneider					**Permits**		
47-6-0832	Limondale 12	GDA	54	730930	6149261	Open site	Valid	Hearth : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
47-6-0326	LALC Scar Tree	GDA	54	736646	6162361	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0327	Island Scar Tree	GDA	54	736646	6162361	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0038	YANGA CREEK POISON TREES	AGD	54	736500	6157700	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Ms.Vanessa Edmonds					**Permits**		
47-6-0139	Lower Boundary 21	GDA	54	730023	6161043	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells,Mr.Jesse Charles					**Permits**		
47-6-0066	Lower Boundary 05	GDA	54	730050	6161356	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Damien Charles,Mr.Daniel Kelly,Mr.David RMB Crew					**Permits**		
47-6-0067	Lower Boundary 06	GDA	54	730060	6161393	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Damien Charles,Mr.Daniel Kelly,Mr.David RMB Crew					**Permits**		
47-6-0181	Lower Boundary 30	GDA	54	730113	6161112	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Malcolm Ridges					**Permits**		
47-6-0179	Lower Boundary 28	GDA	54	730392	6161104	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0238	Lower Boundary 61	GDA	54	730455	6161186	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		

Report generated by AHIMS Web Service on 05/08/2022 for Neil Fenley for the following area at Lat, Long From : -34.8577, 143.0894 - Lat, Long To : -34.6433, 143.5838. Number of Aboriginal sites and Aboriginal objects found is 114

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-6-0833	Limondale 11	GDA	54	730115	6147521	Open site	Destroyed	Hearth : -		104164
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,ERM Brisbane,Mrs.Samantha Keats,Miss.Amelia Murde					**Permits**		
47-6-0134	Lower Boundary 16	GDA	54	730530	6161048	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0133	Lower Boundary 15	GDA	54	730618	6160986	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0129	Lower Boundary 11	GDA	54	730693	6160998	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0225	Lower Boundary 48	GDA	54	730986	6161487	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0223	Lower Boundary 46	GDA	54	730999	6161454	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0232	Lower Boundary 55	GDA	54	731000	6161251	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0061	Lower Boundary 0	GDA	54	731163	6161519	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Malcolm Ridges,Mr.Michael Kelly,Mr.Mark Brettschneider					**Permits**		
47-6-0603	Transmission Line 3	GDA	54	731013	6149039	Open site	Valid	Hearth : -		
	Contact	**Recorders**	Mr.Giles Hamm					**Permits**		
47-6-0943	BD-ST-001	GDA	54	734708	6162460	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Kayandel Archaeological Services,Ms.Natalie Stiles					**Permits**		
47-6-0015	Police Paddock Scarred Tree;	AGD	54	735400	6163300	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1216
	Contact	**Recorders**	Bonhomme Craib & Associates					**Permits**		
47-6-0946	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Niche Environment and Heritage,Ms.Yolanda Pavincich					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-6-0186	Lower Boundary 35	GDA	54	729876	6161418	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke					**Permits**		
47-6-0182	Lower Boundary 31	GDA	54	730047	6161103	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Lawrence Clarke,Mr.Malcolm Ridges					**Permits**		
47-6-0227	Lower Boundary 50	GDA	54	730861	6161366	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0230	Lower Boundary 53	GDA	54	730890	6161092	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0226	Lower Boundary 49	GDA	54	730899	6161406	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0231	Lower Boundary 54	GDA	54	730996	6161245	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0813	Sunraysia Solar Open Site 1	GDA	54	730773	6148818	Open site	Valid	Artefact : -, Hearth : -		
	Contact	**Recorders**	Mr.Matthew Barber,NGH Heritage - Fyshwick					**Permits**		
47-6-0827	Limondale 3	GDA	54	730885	6151093	Open site	Valid	Hearth : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
47-6-0605	Transmission Line 5	GDA	54	730892	6149146	Open site	Destroyed	Hearth : -, Potential Archaeological Deposit (PAD) : -		104164
	Contact	**Recorders**	ERM Brisbane,Mr.Giles Hamm,Miss.Amelia Murden					**Permits**		
47-6-0945	Burrawong 1	GDA	54	734289	6144697	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Matthew Barber,NGH Heritage - Fyshwick					**Permits**		
47-5-0017	Waldaira 2	GDA	54	705089	6161076	Open site	Valid	Hearth : -		
	Contact	**Recorders**	RPS East Australia Pty Ltd - Echuca Victoria,Doctor.Coral Montero-Lopez					**Permits**	3974	
47-5-0001	Lake Waldaira;	AGD	54	712960	6163793	Open site	Valid	Burial : -	Burial/s	
	Contact	**Recorders**	ASRSYS					**Permits**		
47-5-0009	Transmission Line 8	GDA	54	722789	6159521	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Giles Hamm					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-5-0008	Transmission Line 7	GDA	54	728267	6152450	Open site	Valid	Artefact : -, Earth Mound : -, Habitation Structure : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Giles Hamm					**Permits**		
47-5-0050	LSF2021-Artefact Repatriation Site	GDA	54	728517	6150573	Open site	Valid	Artefact : -		
	Contact	**Recorders**	EMM Consulting - St Leonards - Individual users,Ms.Taylar Reid					**Permits**		
47-6-0815	Sunraysia Solar Oven 1	GDA	54	729022	6147057	Open site	Valid	Artefact : -, Hearth : -		
	Contact	**Recorders**	Mr.Matthew Barber,NGH Heritage - Fyshwick					**Permits**		
47-6-0125	Lower Boundary 7	GDA	54	730680	6161449	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0127	Lower Boundary 9	GDA	54	730750	6161132	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
47-6-0229	Lower Boundary 52	GDA	54	730856	6161179	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0221	Lower Boundary 44	GDA	54	731030	6161478	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0003	Balranald Dippo Ceremonial Ground	AGD	54	735041	6158924	Open site	Valid	Ceremonial Ring (Stone or Earth) : -	Bora/Ceremonial	
	Contact	**Recorders**	ASRSYS					**Permits**		
47-6-0002	Balranald Mission Cemetery and Island	AGD	54	735223	6162576	Open site	Valid	Aboriginal Ceremony and Dreaming : -, Burial : -		
	Contact	**Recorders**	Harry Creamer,Ray Kelly,NPWS - Blackheath Office,Alexandra Kelly					**Permits**		
47-6-0906	Regatta Beach Rd AFT HTH SHL 1	GDA	54	736336	6156412	Open site	Partially Destroyed	Artefact : -, Hearth : -, Shell : -		
	Contact	**Recorders**	Niche Environment and Heritage,Niche Environment and Heritage,Niche Environm					**Permits**	4596,4717	
51-5-0319	Limondale Burial 1	GDA	54	728526	6150619	Closed site	Valid	Burial : 1, Artefact : 1, Hearth : 1, Shell : 1		
	Contact	**Recorders**	ERM Brisbane,Mr.Ryan Desic,Miss.Amelia Murden					**Permits**		
47-6-0814	Sunraysia Solar Oven 2	GDA	54	728948	6147109	Open site	Valid	Hearth : -		
	Contact	**Recorders**	Mr.Matthew Barber,NGH Heritage - Fyshwick					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Narrung
Client Service ID : 705970

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
47-6-0143	Lower Boundary 25	GDA	54	729933	6160731	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider,Mr.Jared Ells,Mr.Jesse Charles					**Permits**		
47-6-0064	Lower Boundary 03	GDA	54	730140	6161192	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Damien Charles,Mr.Daniel Kelly,Mr.David RMB Crew					**Permits**		
47-6-0834	Limondale 8	GDA	54	730257	6150783	Open site	Valid	Hearth : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
47-6-0233	Lower Boundary 56	GDA	54	730552	6161093	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Tanya Charles,Ms.Cheryl Brown,Mr.Michael Kelly,Mr.Shannon Kelly					**Permits**		
47-6-0830	Limondale 6	GDA	54	730457	6150682	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
47-6-0829	Limondale 5	GDA	54	730567	6151085	Open site	Valid	Earth Mound : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
47-6-0228	Lower Boundary 51	GDA	54	730828	6161265	Open site	Valid	Artefact : -, Hearth : -, Shell : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0224	Lower Boundary 47	GDA	54	730988	6161477	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0222	Lower Boundary 45	GDA	54	731021	6161458	Open site	Valid	Artefact : -, Earth Mound : -, Hearth : -		
	Contact Searle	**Recorders**	Mr.Joe Xie,Mr.Michael Kelly					**Permits**		
47-6-0816	Sunraysia Solar Open Site Complex 1	GDA	54	730773	6148818	Open site	Valid	Artefact : -, Hearth : -		
	Contact	**Recorders**	Mr.Matthew Barber,NGH Heritage - Fyshwick					**Permits**		
47-6-0220	Lower Boundary 43	GDA	54	731164	6161519	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Mr.Michael Kelly					**Permits**		

**** Site Status**
Valid - The site has been recorded and accepted onto the system as valid
Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.
Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground
Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 05/08/2022 for Neil Fenley for the following area at Lat, Long From : -34.8577, 143.0894 - Lat, Long To : -34.6433, 143.5838. Number of Aboriginal sites and Aboriginal objects found is 114

This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

Appendix 4: Glossary

Activity

The development or use of land

Activity Area

The area or areas to be used or developed for an activity

Archaeology

The study of the past through the systematic recovery and analysis of material culture.

Artefact Scatter

A group of stone artefacts found scattered on the ground surface.

Assemblage

A collection of artefacts that are derived from the same Aboriginal place.

Burial (Human skeletal remains)

Usually represented by a concentration of human bones or teeth. Burials can be associated with charcoal or ochre, shell, animal bone or stone tools. They tend to be located in sandy areas, which were easy to dig or in rock shelters or tree hollows. They are usually exposed through earthworks or erosion.

Earth Feature

Includes mounds, rings, hearths, post holes and ovens.

Excavation

The systematic recovery of archaeological data through the exposure of buried sites and artefacts.

Material culture

The tangible evidence or cultural remains that are produced by human activity.

Quarry

A location from which Aboriginal people have extracted stone for making stone artefacts or mineral such as ochre for use in painting.

Rock Art

Paintings or engravings on the surface of caves or rock shelters, created by Aboriginal people in the past.

Scarred Tree

Trees from which bark has been removed for the manufacture of utilitarian items such as containers, shelter sheets, canoes or medicine.

Shell Midden

A midden is the remains of a meal. In the case of shell middens, marine or freshwater molluscs are the dominant component.

Appendix E: Site photos

	
Photo 1 – View towards the river where the piles will be driven	Photo 2 – Close up of the existing ground conditions
	
Photo 3 –View downstream from the proposed pump site	Photo 4 – View directly above the proposed suction lines on piles are proposed
	
Photo 5 – View upstream of the proposed pump station	Photo 6 – General landscape of the proposed pump station