

Statement of Environmental Effects

Low Darling Road, Wentworth

May 2022

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Introduction

Development approval is sought for works associated with development and operation of an irrigation pump station on the northern bank of the Darling River. This infrastructure will service a new irrigation development to produce wine grapes on the adjoining land.

The land subject to the development of the pump station is currently used for similar infrastructure however for different entities who benefit from easements through land owned by the proponent of this application. For the establishment of a horticultural enterprise, it is of the utmost importance to have a reliable irrigation pump site to irrigate the plantings. For this development WaterNSW have issued a Water Supply Works and Use Approval benefiting the land.

The proposed site is located on the northern bank of Darling River approximately 17 kilometres north of the township of Wentworth. The selected pump site is located on the bank of river at Lot 5 DP 1253993 which is owned by the proponent and can be accessed through an existing farm access from the Low Darling Road.

Following consideration of the Wentworth LEP, relevant SEPP's, integrated approval requirements and other documents, the proposal to install the new pump and associated works is worthy of support.

Adjoining land is developed for horticultural production which includes their own separate pump stations. The closest pump station to the proposed site is located 20m to the west. The new works have been designed and located to minimise any negative impacts upon the environment.

There are two easements for existing operational pump stations and pipelines benefiting the infrastructure affect the southern part of the property owned by the proponent.

The proposal is consistent with Wentworth LEP and should be supported through the issue of a development consent.



Figure 1 Site of the pump station



Figure 2 Other pump stations located nearby

Proposal

Project justification

The aim of the project is to construct and operate a pump station in order to supply irrigation water to vineyards which the proponents are planning to establish to the western side of Low Darling Road.

The pump station will consist of two floating pontoons, each of which will house two pumps and a suction. The control room will be installed behind the platform of the pump station where the floating pontoon will connect. The pump installed will be powered by the electric supply available immediately behind the proposed location. The control room will be located on a raised platform. The control room will be designed and constructed at a level to ensure the pump remains operational in the 1:100-year flood event.



Figure 5 Location plan

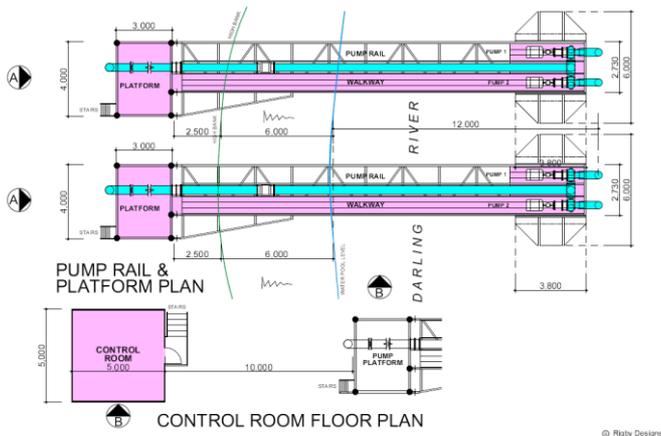


Figure 3 Pump rail and platform plan view

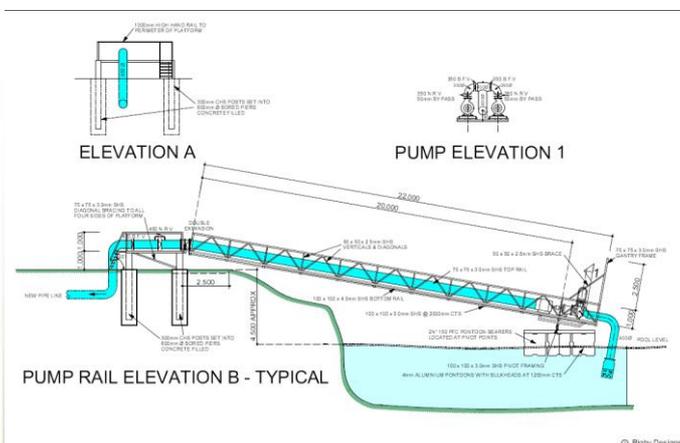


Figure 4 Pump Rail elevation

Construction plan

Works at the site will broadly follow the outline below:

- ◆ The structural elements will be fabricated offsite. Other modular elements will be purchased and fitted out as required.
- ◆ Bore holes will be drilled at the top of the riverbank and poured with concrete to provide a support for the raised platform.
- ◆ The pontoon will be lifted into place and tethered.
- ◆ The prefabricated gantry will be lifted into position and affixed to the pontoon and to the elevated platform.
- ◆ The pumps, suctions and delivery mains will be installed.
- ◆ The works will be energised and commissioned.

Access

The site can be accessed via a private track off the Low Darling Road. There is ample room available for vehicles parking on site. Therefore, no additional access tracks or parking areas will be required or be created for parking contractors' vehicles.



Figure 7 Site of the proposed pump station



Figure 6 Access to site via private track off Low Darling Road



Figure 8 Parking space clear of vegetation

Planning controls

Table 1 Planning controls for the land

Type	Planning Control
Local Environment Plan	Wentworth LEP 2011
Land Zoning	W1 – Natural Waterways Zone
	RU1 – Primary production
Minimum lot size	10,000 ha
Terrestrial Biodiversity	Terrestrial Biodiversity

Definition

The works are defined as a Water Supply System for which the LEP provides the definition as:

any of the following:

- (a) a water reticulation system,
- (b) a water storage facility,
- (c) a water treatment facility,
- (d) a building or place that is a combination of any of the things referred to in paragraphs (a)–(c).

Zoning

In accordance with the Wentworth LEP zoning maps the land is contained within W1 Zone – Waterways and RU1 – Primary production.

Waterways

The objectives of zone W1 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.

Development consent is required under zone W1 for the Water Supply System.

Primary production

The objectives of zone RU1 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 ensure the protection of both mixed dryland and irrigation agricultural land uses that together form the distinctive rural character of Wentworth.
- ♦ To ensure land is available for intensive plant agricultural activities.
- ♦ To encourage diversity and promote employment opportunities related to primary industry enterprises, including those that require smaller holdings or are more intensive in nature.

Development consent is required under zone RU1 for the Water Supply System.

Additional Local Provisions

Other relevant clauses from the LEP are as follows:

- ♦ 7.1 Earthworks
- ♦ 7.4 Terrestrial Biodiversity
- ♦ 7.5 Wetlands
- ♦ 7.6 Development on riverfront areas
- ♦ 7.7 Riparian land and Murray River and other watercourses – general principles

An assessment of the relevant clauses is outlined below.



Figure 9 Zone map

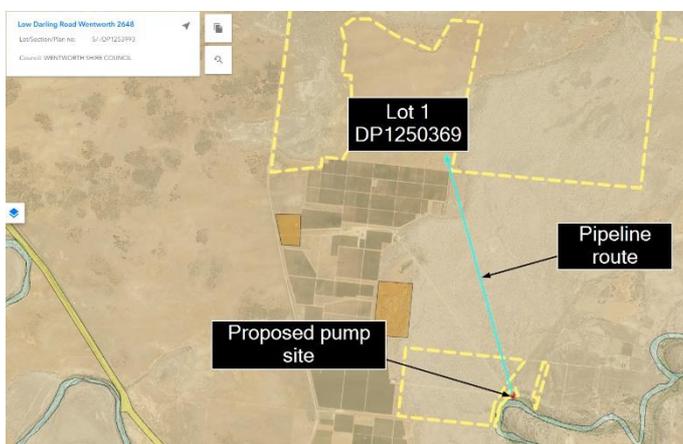


Figure 10 Zone Map with proposed pipeline and pump station

Water Management Act

A controlled activity approval authorises its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land. Under the Water Management Act 2000 (WM Act), a controlled activity means:

- ◆ *the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or*
- ◆ *the removal of material (whether extractive material) or vegetation from land, whether by way of excavation or otherwise, or*
- ◆ *the deposition of material (whether extractive material) on land, whether by way of landfill operations or otherwise, or*
- ◆ *the carrying out of any other activity that affects the quantity or flow of water in a water source.*

Additional Planning Controls

The land is affected by the following mapping in addition to the zoning of the land:

- ◆ Riparian lands and watercourse
- ◆ Terrestrial biodiversity
- ◆ Wetlands

Aboriginal cultural heritage

All Aboriginal cultural heritage is protected by the NSW National Parks and Wildlife Act 1974. Responsibility rests with the proponent of a development to demonstrate that due care and diligence have been taken to identify and avoid impacts on archaeological sites through construction works.

An AHIMS search has been undertaken which confirms there is no aboriginal sites, and the result of the search is detailed below.

Site and surrounding area

Subject site

The site of the proposed pump station is on the northern bank of Darling River at Wentworth. The site is accessed via a private track off the Low Darling Road. The site is located on the riverbank at Lot 5 DP1253993 which is a freehold land.

The closest pump station to the site is approximately 20 meters downstream which supplies irrigation water to the adjoining established vineyards.

There are parcels of land both on north and south of subject land which are already developed for permanent plantings.



Figure 12 View looking upstream of the river



Figure 13 View looking downstream of the river



Figure 11 Aerial view of the surrounding area

The trees at the riverbank include *Eucalyptus coolabah* and the vegetation away from site includes understorey cover of noxious weeds, *Phragmites australis* and salt bush. No trees would be harmed while installing the pontoon, gantry, and other ancillary infrastructure at the riverfront. The site for pump station has been chosen carefully between two Coolibah trees so that there is no harm to large native trees.

The design of the infrastructure is a pontoon and gantry which does not require clearing any trees at the sloping riverbank.



Figure 14 View looking towards the pump site



Figure 15 View looking away from pump site



Figure 16 Looking at the pipeline alignment from pump station



Figure 17 Pump stations adjacent to the proposed site

Locality

The pump station will service a vineyard production enterprise that proponents are establishing on the western side of Low Darling Road, Wentworth.

The locality is used for agricultural pursuits with the predominant use being dryland grazing. Due to the proximity of the Darling River (being in the weir pool), suitable land has been developed for horticultural purposes mainly consisting of permanent plantings.



Figure 18 Aerial image of pump site and locality

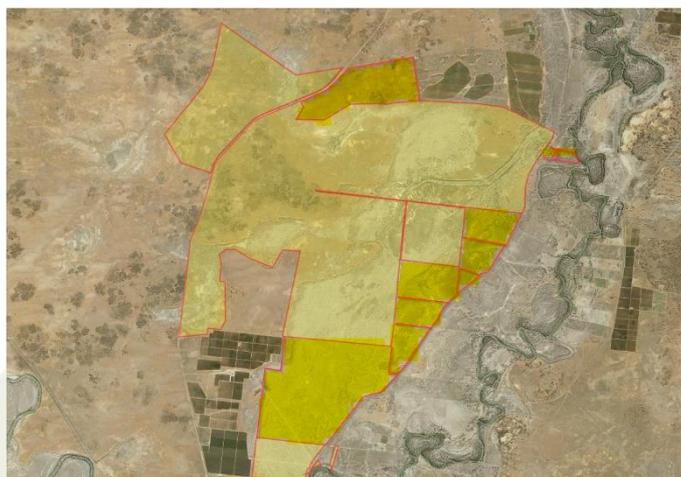


Figure 19 Aerial image of the landholding

Planning assessment

Policy context

The works subject to approval in this application constitute the smaller portion of a much larger overall project. The greater part of the works associated with this project are located on the land proper in terms of where the plantings are located to be irrigated. The necessary investigations into soils, hydrology, flora and fauna are presently being undertaken in order to enable the development.

The proponent has engaged a number of suitably qualified persons to undertake assessments of and provide expert opinion on a number of aspects concerning this application. These include the impacts on soils, irrigation and cultural heritage.

The results of these assessments were used to justify the project scope and were incorporated early on in the design and planning phase of the project.

Aboriginal Cultural Heritage

A due diligence assessment is being undertaken on the land where plantings are being undertaken in order to consider any possible Aboriginal cultural heritage issues which may require consideration through the project.

A search of AHIMS database was undertaken and it revealed that there are no aboriginal cultural heritage sites recorded at or close to site location.

The raised platforms will be constructed by piledriving the piers into the ground which does not involve digging and excavation. If there is interaction with any possible aboriginal cultural heritage items, all the works will be paused immediately and relevant authorised will be notified. An archaeologist has conducted a due diligence for the location of proposed pump site and the pipeline. The findings of the report suggests that the site is devoid of any cultural heritage items and is also previously disturbed.

Fauna

The design of the pump station is a pontoon and gantry system. The pumps and rising main will be supported by the pontoon. As a result of this design, there are no contact with the riverbed or the riverbank.

The pump intake will be fitted with mesh exclusion screens to prevent the ingress of macroinvertebrates and other aquatic species into the pumping system.

Consequently, there will be no impact on aquatic or terrestrial habitat and no impact on the faunal species is likely to occur at the site.



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

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

Figure 20 AHIMS search for the pump site

Wentworth LEP

The site is in Zone W1 Natural Waterways. The proposed works are consistent with the relevant objectives of this zone, including:

- ♦ To protect the ecological and scenic values of natural waterways

There are existing operational pump stations both upstream and downstream to irrigate the respective benefiting land. The proposed development will have no additional impact on the ecological values of the immediate region. The design siting and layout of the facility has considered impacts as necessary. The works have been cited in an area which is devoid of large trees and has been previously disturbed by agricultural activities undertaken on the land.

The works site is a private property owned by the proponent and has no significant ecological value as habitat. The aquatic habitat will not be interfered with as there is no contact with the bed of the river. No snags will

be removed from the river through the installation of the pontoon.

- ♦ *To prevent development that would have an adverse effect on the natural values of waterways in this zone*

The proposed development has been designed carefully to use the required amount of water for the growth of horticultural crops which proponent is planning to establish. There will be no significant impacts resulting from the proposal.

- ♦ *To provide for sustainable fishing industries and recreational fishing*

There will be no adverse impacts on fishing as a result of the proposed development.

A small portion of the works are included within Zone RU1. The proposed pump station is consistent with the objectives of the zone primarily through it being required to support the approved development of the land for the production of wine grapes.

- ♦ *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 ensure the protection of both mixed dryland and irrigation agricultural land uses that together form the distinctive rural character of Wentworth.*
- ♦ *To ensure land is available for intensive plant agricultural activities.*
- ♦ *To encourage diversity and promote employment opportunities related to primary industry enterprises, including those that require smaller holdings or are more intensive in nature.*

Sustainable primary industry is encouraged through the zone which is being undertaken on the land.

The development being enabled will establish further diversity in primary production which is dominated by dryland farming enterprises. The proposal will introduce irrigated horticulture to the locality being a form of intensive farming enabled by the proximity of the land to

the Darling River which is within the weir pool therefore securing the required water source for the plantings.

Land use conflict will be minimised due to the lack of sensitive uses adjoining the land.

Employment will be created through the development being undertaken. Employment opportunities will primarily be on farm relating to the operation of the vineyard.

Site Constraints

The principal site constraint is that the entire site is located on the sloping bank of the Darling River. The locality has number of fully grown large trees. Thus, the site has been carefully chosen to have no effect on native trees.

The slope of the riverbank presents additional complexities that have been accounted for both in the project design and the proposed works plan.

Potential Impacts

Potential impacts on the site as result of this proposal have been identified through a process involving consultation with expert consultants, visits to the site, and negotiation with various consent authorities and service providers.

Below is a list of the potential impacts that have been identified during the planning phase for this project. The issues identified also includes the necessary steps that have been identified to minimise the impacts.

Tree removal or damage

The site is largely devoid of vegetation so impacts to vegetation will be minimal. There will be no need to remove, lop or cause any harm to larger trees at the site. The only vegetation required to remove will be the groundcover consisting of noxious weeds and bush to establish the pump station and related infrastructure immediately behind the pump station location.

Visual and aesthetic impact

The site has been carefully nestled among two large Coolibah trees. Siting of the pump station in this location ensures maximum opportunity for screening of the works from the existing vegetation. Accordingly, there will be minimal changes to the site's visual environment.

An appropriate colour palette (including muted tones) will be used for all site infrastructure to ensure that it blends into the setting as much as possible.

Traffic impacts

There will be a small amount of additional traffic generated through the works of establishing the pump station. There will be a minor increase in traffic volume during the short period of construction, but this will be confined to the period of installing pump station which will be 2-3 weeks.

Impact on flow paths

There will be no impacts on any flows as a result of this proposal.

Waste management

The production of waste will be limited to the construction phase of the project. During construction, the management of waste will be a priority. Workers at the site will be required to remove all waste materials from the site at the conclusion of each working day.

The operational pump station will produce no onsite waste.

Siting impacts

The pump station will not interrupt views of, or disrupt access to, the river and its environs. The infrastructure owner is in the process of obtaining a Crown Lands Licence for the site.

Visual appearance

The visual impact of the infrastructure at the site will reflect its function. The appearance will be attenuated as far as possible through the careful choice of materials and colours where scope to do so exists.

Design impacts

There will be minimal changes to the site's appearance. The site will be developed for a pump station and the infrastructure at the site will reflect this use.

Noise, vibration, and dust

The pump station is in a relatively remote area of New South Wales. There are no residences that are close enough to detect noise from the operating pump station. There will be no detectable vibration or dust or any other type of emissions from the operating pump station.

Impact Minimisation

The proposal to install a new pump station has been chosen carefully to have a minimum impact on both river and its environs.

- ◆ No contact with the riverbank or riverbed. The gantry spans the riverbank and eliminates impacts with the bank and riverbed.
- ◆ Reduced maintenance and service callouts. The newly designed pumps have increased service intervals and require less maintenance.
- ◆ Safe access to the pumps. The pumps are easily and safely accessed via the gangway on the gantry.
- ◆ The pumps will automatically respond to the changes in the river levels. The floating pontoon means that there is no need for workers to attend the site and manually reposition the pump to ensure that pumping can continue each time there are changes to river heights.
- ◆ The pumping design and siting offer reliability and efficiency ensuring that the vineyard has sufficient irrigation water during peak demand times and river flow regimes.

Construction Impact

The proponent will implement several control measures to ensure that the potential impacts to the site because of construction activity will be controlled and minimised. These include the following:

Silt fencing

If required, silt fencing will be erected at the site. The first fence will be placed along the riverbank, close to the water's edge. This will prevent any loose soil or any other debris from entering the river. Any material trapped by the fence will be picked up by and removed from the site.

Vegetation impact

The project will have minimal impact on vegetation. No large trees will be cleared, trimmed, or lopped at any time during construction. The only vegetation required to remove will be the groundcover constituting noxious weeds, saltbush.

Fauna impact

Impacts on faunal species because of the projects design and siting will be minimal. No snags or logs will be removed from the water. The pumps' suction intakes will be fitted with exclusion screens to prevent organisms being drawn into the pumps.

Rubbish and waste

Contractors will be required to remove all wastes from the site each day. No waste of any type will be permitted to be stored at the site.

Noise

Noise generated during construction will be general construction noise. Construction hours will be confined to the EPA recommended times.

The chosen assets have lower noise levels than comparable options. The noise produced from the machinery will commensurate the primary production operations of the land and the adjoining land. Many similar activities are allowable under the zone where land is identified and promoted for agricultural activities.

Dust, vibration, and other emissions

It is not expected that construction activity will result in emissions of dust, vibration, or any other type of emissions. The operational pump station will have none of these impacts.



Conclusion

In conclusion, it is considered for the reasons outlined above, the development responds well to the opportunities and constraints of the site and is consistent with the relevant provisions.

The proposal is appropriate for the site for the following reasons:

- ♦ The proposal is consistent with Wentworth LEP.
- ♦ The proposal supports primary production industry in the region with the attendant benefits this brings to the wider region.
- ♦ There will be no loss of native trees and no other substantial impact on ecological or biodiversity values of the locality.
- ♦ The impacts to cultural heritage items if any have been considered through the design of the infrastructure.
- ♦ The proposal responds well to the site's characteristics and opportunities and has considered the potential impacts upon the locality and particularly this section of the Darling River.

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ASSESSMENT



DRAFT REPORT

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24 May 2022



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DOCUMENT INFORMATION

Project:	Junction vineyards, Wentworth
Services required:	ACHDDA
Client:	James Golsworthy Consulting
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Project number:	22039

DOCUMENT HISTORY AND APPROVAL STATUS

Version No.	Version Type	Issue Date	Authored by	Approved by	Date Approved
1	Draft	13/05/2022	SP, CB	ALH	18/05/2022
2	Final	23/05/2022	SP	ALH	24/05/2022

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Version No.	Quantity	Issue date	Issued to
1	1	18/5/2022	James Golsworthy Consulting
2	1	24/05/2022	James Golsworthy Consulting

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EXECUTIVE SUMMARY

This report has been prepared for James Golsworthy Consulting and details the Aboriginal Cultural Heritage Due Diligence Assessment (ACHDDA) of the proposed development of the property at Junction Vineyards, Wentworth, New South Wales (NSW) [the study area], within the Wentworth Local Government Areas (LGA).

This ACHDDA was undertaken to assess the archaeological potential for Aboriginal material to be impacted as part of a business case being prepared by James Golsworthy Consulting for the case to be considered by Wentworth Shire Council, WaterNSW, Crown Land NSW and other state agencies to determine the feasibility of the projects. The ACHDDA has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (Department of Environment Climate Change and Water NSW 2010) [the Code].

The study area is situated within the geographical region of the Darling River and its floodplains which are considered very important for the past Aboriginal occupation of the region. A search of previously registered sites resulted in 55 known sites within a 20 kilometre radius of the study area. These sites mainly consist of artefacts, shell midden sites, hearths, culturally modified scarred trees and burials.

The visual inspection of the study area did not identify any potential areas for the presence of Aboriginal heritage. As the major portion of the study area (pipeline route) is a part of Darling River floodplains with greyish cracking soils, it is not considered conducive for Aboriginal occupation sites. A major portion of the main site within Lot 1 will not be subject to development through the currently proposed works as a result, similar cultural landscapes will not be impacted and preserved.

It is recommended that:

1. The proposed works can progress with caution.
2. All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.
3. Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity, you must:
 - immediately cease all work at that location and not further move or disturb the remains
 - notify the NSW Police and Heritage NSW's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location
 - not recommence work at that location unless authorised in writing by Heritage NSW.

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1 INTRODUCTION

Austral Archaeology Pty Ltd (Austral) has been engaged by James Golsworthy Consulting (JGC) to provide Aboriginal Cultural Heritage Due Diligence Advice (ACHDDA) for the proposed main site and pump site along with a pipeline for the Junction Vineyards project near High Darling Road and Low Darling Road, Wentworth, New South Wales (NSW) [the study area] (Lot 1 DP1250369, Lot 7 DP1010380 and Lot 5 DP1253993). This advice is intended to assist JGC in determining their obligations with regard to the *National Parks and Wildlife Act 1974* (NPW Act) and to determine whether the project will involve activities that may harm Aboriginal objects or places.

The study area is shown in Figure 1.1 and comprises two sections, the main site and the pump station along with the pipeline route. The main site is located within Lot 1DP1250369 while the Pipeline route along with the pump station area is located within Lot 7 DP 1010380 and Lot 5 DP 1253993. The main site is approximately 130 hectares in area, and the proposed development will involve soil assessment by the excavation of holes on a 75x75 metre grid. In addition, permanent plantings of wine grapes will be established on the lot.

The pump site is located along a bend of the Darling River, and the proposed development will involve the installation of a pump station. These works will include groundworks to be able to install the pump station, as well as additional infrastructure. A pipeline will be installed between the main site and the pump site.

The proposed works within the study area will include the following activities:

- Construction of a pump station on the bank of Darling River within Lot 5DP 1253993. The pump station will have a floating pontoon that will pump water from the Darling River to be connected to a pipeline leading to the Main site within the study area.
- The pipeline disturbance will be approximately four kilometres in length and two metres wide.
- The main site will be developed into a permanent planting of wine grapes. It will have high impact works including laying a drip line and irrigation mains, and installation of posts and trellis to support the plantings.

1.1 ASSESSMENT OBJECTIVES

Section 87 of the NPW Act makes it a strict liability offence to knowingly or unknowingly harm Aboriginal objects or declared Aboriginal places without an Aboriginal Heritage Impact Permit (AHIP). Harm is defined under the NPW Act as “*any act or omission that destroys, defaces or damages the object or place or in relation to an object, moves the object from the land on which it had been situated*”. The NPW Act allows for a person or organisation to exercise due diligence in determining whether their actions will or are likely to impact upon Aboriginal objects or places. Any person or organisation who can demonstrate that they have exercised due diligence has a defence against prosecution under the strict liability provisions of the NPW Act. Where an activity is likely to harm Aboriginal objects or places, consent in the form of an AHIP is required

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

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

This advice has been formulated to provide a robust assessment that will identify whether Aboriginal objects or places are present or are likely to be present within the study area. This has

been achieved through the completion of a desktop review of the study area. The Code provides a series of questions that clarify whether it is applicable to a proposed project. These questions are addressed in Section 2.

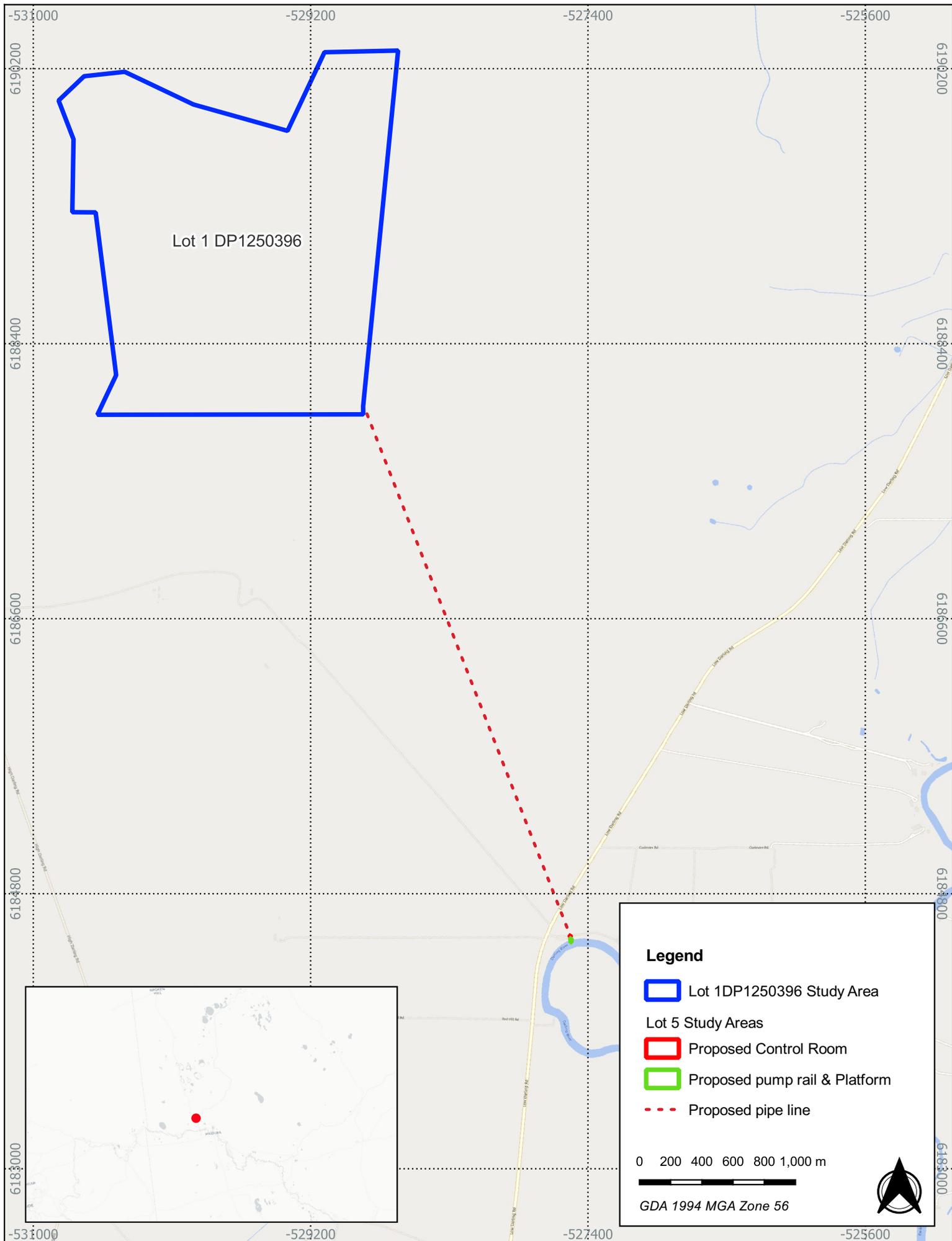


Figure 1.1- Location overview of the study area

22039 - High Darling Road and Low Darling Road, Wentworth - ACHDDA



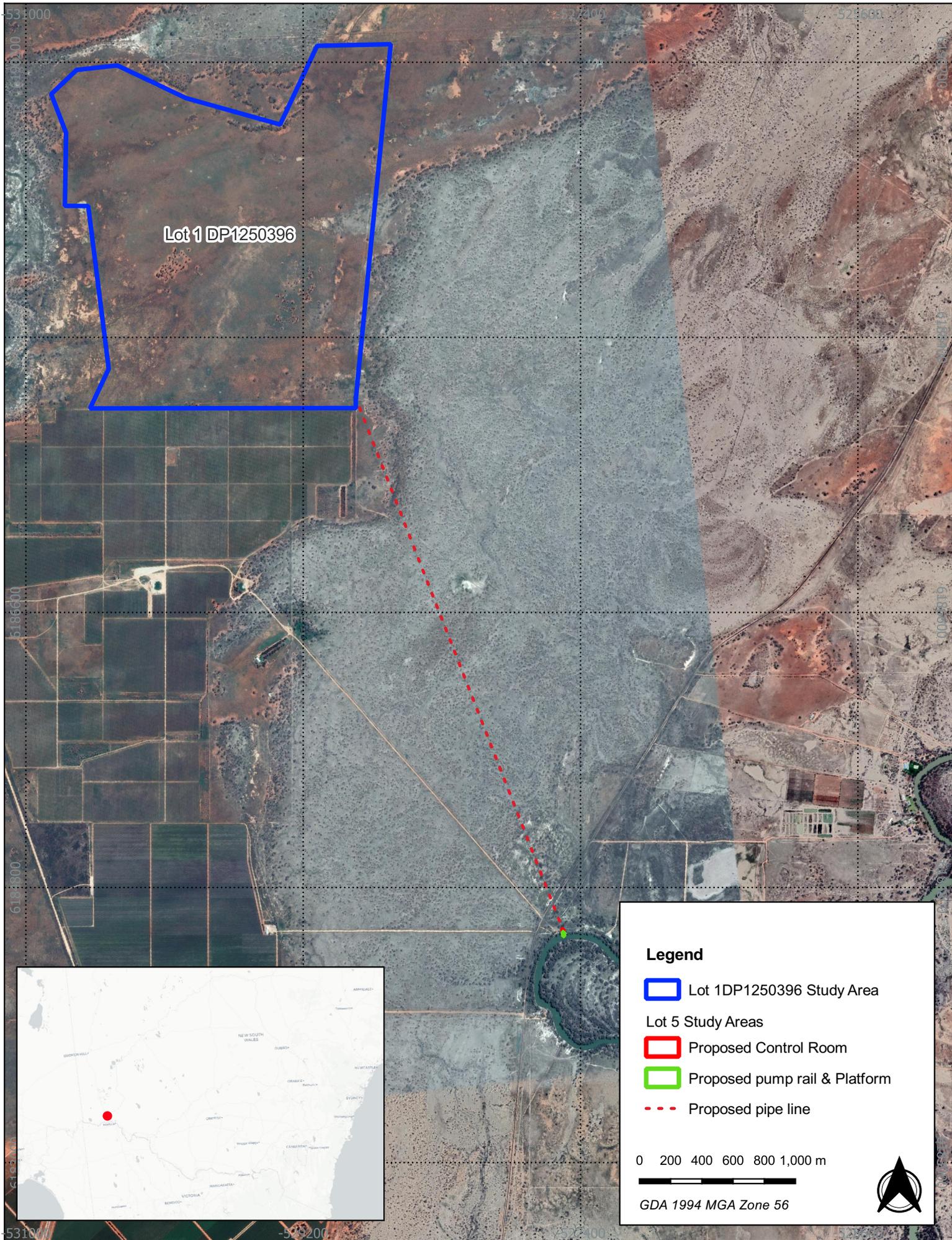


Figure 1.2- Detailed aerial of the study area

22039 - High Darling Road and Low Darling Road, Wentworth - ACHDDA

Source: Google maps

Drawn by: ARH Date: 2022-05-02



A U S T R A L
ARCHAEOLOGY

1.2 PROJECT TEAM AND QUALIFICATIONS

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

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

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

SEJAL PANDYA (MA. ARCH, GRAD DIP ARCHAEOLOGY)

Sejal Pandya is an Archaeologist at Austral having 10 years of experience in the completion of Aboriginal projects and other archaeological projects in India and Australia. Sejal has contributed to reports completed in accordance with the NPW Act and the Victorian Aboriginal Heritage Act 2006 and the Aboriginal Heritage Regulations 2018. Through the completion of these projects, Sejal has developed relationships with Aboriginal Stakeholders, Heritage NSW and First Nations-State Relations (Aboriginal Victoria). She has worked on some of the major projects by Vic Roads, GWM water pipeline developments, Western port survey and Archaeological assessment of Lake Menindee and Lake Victoria in NSW.

CARMEN BAULCH (STUDENT IN BACHELOR OF ARTS/SCIENCE (ARCH/ZOO))

Carmen Baulch is a Student Archaeologist at Austral, currently studying a Bachelor of Arts/Science at La Trobe University, majoring in Archaeology and Zoology. Carmen joined Austral in January 2022 and has been involved in background research for sites, as well as archaeological excavations ran by Austral.

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

1.3 ABBREVIATIONS

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

Burra Charter	<i>Burra Charter: Australia ICOMOS Charter for Places of Cultural Significance 2013</i>
ACHA	Aboriginal Cultural Heritage Assessment
ACHDDA	Aboriginal Cultural Heritage Due Diligence Assessment
AHIP	Aboriginal Heritage Impact Permit
LGA	Local Government Area
NPW Act	<i>National Parks and Wildlife Act 1974</i>
The Proponent	James Golsworthy Consulting
Study Area	Lot 1 DP 1250369, Lot 7 DP 1010380 Lot 5 DP1253993, Junction Vineyards, Wentworth NSW

2 DUE DILIGENCE ASSESSMENT

The Code consists of a series of 5 steps outlined below

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

The proposed works within the study area include the installation of a pipeline, development of the main site into a vineyard and construction of a pump station. The proposed activity will cause significant ground disturbance within the study area, which is partially disturbed by past land-use practices.

The activity will disturb the ground surface and/or any culturally modified trees and therefore consideration of steps 2a and 2b of the Code is required.

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

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) database was conducted on 28 April 2022 (Client service ID: 678167). The search identified 55 Aboriginal archaeological sites within a 20-kilometre search area centred on the proposed study area. None of these registered sites are located within the study area. The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports where available. These descriptions and maps were relied where notable discrepancies occurred.

Table 1 AHIMS sites identified within 20 kilometres of the study area.

Site type	Occurrence	Percentage Frequency (%)
Artefact	17	30.91
Shell	11	20.00
Hearth	8	14.55
Artefact, Hearth	5	9.09
Modified Tree (Carved or Scarred)	5	9.09
Artefact, Shell	2	3.64
Burial	1	1.82
Burial, Shell	1	1.82
Artefact, Burial, Hearth, Shell	1	1.82
Modified Tree (Carved or Scarred), Hearth, Shell	1	1.82
Artefact, Hearth, Non-Human Bone and Organic Material, Shell	1	1.82
Artefact, Shell, Aboriginal Resource and Gathering, Hearth, Potential Archaeological Deposit (PAD)	1	1.82
Artefact, Hearth, Non-Human Bone and Organic Material, Potential Archaeological Deposit (PAD), Shell	1	1.82
Total	55	100

From the results of the table above it can be concluded that the most prominent site types within 20 kilometres of the study area are artefact sites (making up 30.91% of the total site types). Shell was the next most common site type, with a percentage frequency of 20.00%, followed by hearth (14.55%), artefact-hearth (9.09%), and modified tree (carved or scarred) (9.09%) and artefact-shell (3.64%). Burial, burial-shell, artefact-burial-hearth-shell, modified tree (carved or scarred)-hearth-shell, artefact-hearth-nonhuman bone and organic material-shell, artefact-shell, Aboriginal resource and gathering-hearth-PAD and artefact-hearth-nonhuman bone and organic material-PAD-shell were equally less common, each with a percentage frequency of 1.82%.

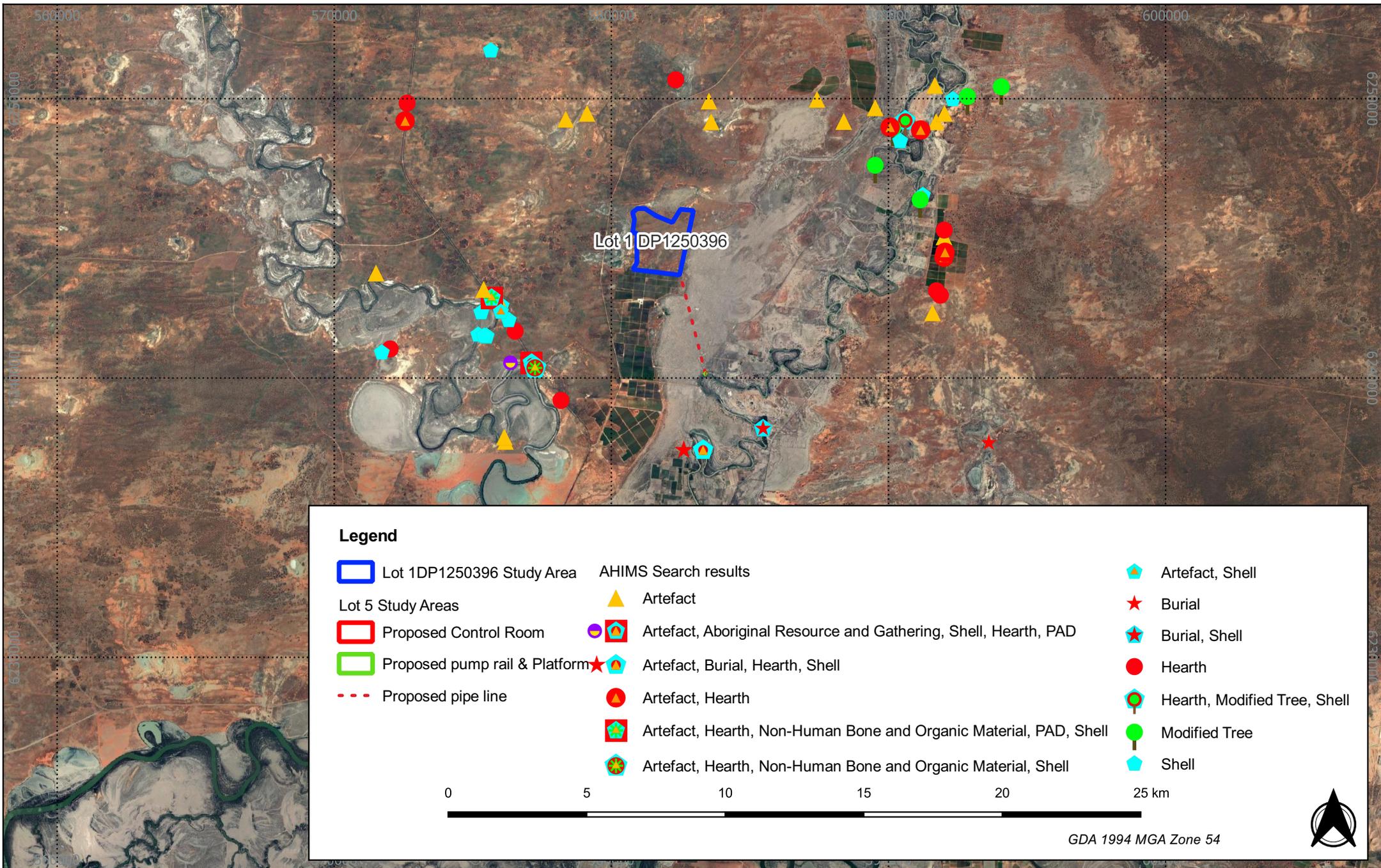


Figure 2.1 - AHIMS Search results within 20km of the study area

22039 - High Darling Road and Low Darling Road, Wentworth - ACHDDA

Source: Google Maps

Drawn by: ARH Date: 2022-05-02



A U S T R A L
A R C H A E O L O G Y

2.1 LOCAL ARCHAEOLOGICAL CONTEXT

Archaeological investigations of the Lower Darling region are generally conducted as a part of development assessments or in response to impacted cultural heritage or concerning the study of the Riverine plains.

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

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

Author	Year	Details
Bonhomme	1987	<p>Assessments included a report on the location and distribution of Aboriginal burials within sand dunes of the Riverine Plain region of NSW, in order to recognise patterns in relation to Aboriginal burial sites. The archaeological assessment occurred within the vicinity of the study area, and a burial site named 'Spectacle Lake' (AHIMS #39-6-0018) was discovered approximately 13.4 km south-east of the proposed Junction Vineyards Site.</p> <p>Bonhomme concludes that Aboriginal burials will be more common in lunettes, bouldering dunes, current levees, former levees and channels, remnants of alluvial fans and sandplains, as well as reworked dune sets (Bonhomme 1987, p.56).</p> <p>Bonhomme's analysis of burials in the Riverine Plain can be applicable to the identification of burials within the current study area.</p>
Edmonds	1999	<p>Archaeological assessment approximately 9.5 km north-east of the study area for the subdivision on Avoca Station. Edmonds aimed to perform an archaeological survey to locate and record Aboriginal or non-Aboriginal sites and/or objects.</p> <p>Edmonds located 12 Aboriginal archaeological sites within the study area, including more than "20 scarred trees (only three were recorded), 8 shell middens, 2 open campsites and a complex of hearths" (Edmonds 1999, p.3).</p> <p>It was concluded that all of the Aboriginal sites were located along or near a source of water, suggesting that water was an important gathering point for Aboriginals in the past.</p>
Cupper	2001	<p>The works by Cupper included archaeological assessments for similar developments within a similar geographical area. Assessments included an archaeological field survey approximately 10 km east of the study area, at a proposed vineyard site near the Darling River. Cupper aimed to identify any Aboriginal and/or historic sites/artefacts within the development area.</p> <p>Cupper located 10 archaeological sites which included four hearth sites, two open camp sites, two scarred trees, one isolated find (silcrete core) and one freshwater mussel shell midden site.</p> <p>Cupper concluded that the sites were small and in poor condition. All of the sites located were described to be of low scientific significance and moderate Aboriginal significance. Viticulture works proceeded with caution after this study.</p>
Edmonds	2002	<p>Aboriginal Cultural Heritage Assessment was conducted approximately 9.2 km north-east of the study area. This ACHA aimed to assess the land on which a transmission line was to be built.</p> <p>Edmonds located 80 new Aboriginal sites, which comprised of 31 shell middens, 28 scarred trees and 8 hearths. In addition, 4 hearth complexes were discovered that had 4 associated burials and 6 isolated stone artefacts.</p> <p>It was concluded that all of the new sites were located near a source of water, such as a river, lake, or swamp, suggesting a close association with water in the past.</p>

Author	Year	Details
(Jacobs Pty Limited 2019)	2019	An archaeological desktop assessment of a transmission line that passed through approximately 11 kilometres north-east of the study area. (Jacobs Pty Limited 2019) established that there were several regions of Aboriginal cultural sensitivity within the proposed study area. The predictive modelling for the archaeological assessments concluded that the Aboriginal sites were generally clustered around the major waterways and lakes and have a high potential for sites such as open cap sties, surface finds, shell middens, scarred trees, burials near river & creek margins, scalded plains & levees, floodplain around Darling land system.

2.2 ETHNOHISTORY

Traditionally, the region of the study area was occupied by a Paakantyi speaking group known as the Maraura people (Tindale 1974, p.130). They were located along the Murray River from Wentworth to Paringa and along the western side of the Darling River. The Aboriginal people that occupied the lower reaches of the Darling River had a shared spirituality, believing that the river, which they called *Barka*, was the ‘mother’ (Norman 2020). The earliest European exploration of the area was completed by Charles Sturt who, between 1828 and 1829, discovered the Darling River (Sturt 1849). Sturt observed the rapid flooding of the river during this time and noted the “anxiety” of the Aboriginal Australians due to the overflow from Darling’s banks (Sturt 1849).

Aboriginal occupation along the Murray River, a similar watercourse to the Darling River, has been described by a European settler named Edward Curr. He stated that the Aboriginal men wore “possum skin cloaks and had necklaces of small reeds hung on twine made from flax”, they used “kangaroo skin bags” to “carry shields, waddies and utensils”, and that they “carried their spears and throwing sticks in their hands” (Curr 1883, p. 85).

The earlier archaeological report records food collection through hunting and gathering activities as the main subsistence pattern within the Aboriginal community of the region. The available food sources to the Aboriginal people mainly comprised freshwater fish, crayfish, shellfish, waterfowl and eggs. Fish were caught through nets and spears, by the construction of weirs and dams. Possums, kangaroos, emus, and reptiles were available around the year near the water sources but anemia was observed on the skeletal remains indicating a scarcity of red meat (cited in (Edmonds, Vanessa 1999).

This ethnographic information suggests that the Darling River was very important to the local Aboriginal community and that the material culture in the area is very rich. Therefore, it indicates that material culture may be found near the Darling River and associated watercourses.

2.3 TOPOGRAPHY AND HYDROLOGY

The study area is located within the Darling River Plains which is characterised by narrow floodplains, sand plains and dune fields. The maximum elevation recorded within the study area is approximately 45 metres AHD. The study area rises moving north-west while the area including the pump station and the pipeline route is a flattish floodplain with yellowish-grey cracking clays and sandy clay.

In terms of hydrological features, the southern end of the study area is situated on the bank of the Darling River which is the permanent freshwater source. The study area also has an unnamed water source located at a distance of 1.2 kilometres towards the western side of the main site to be developed as vineyards.

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

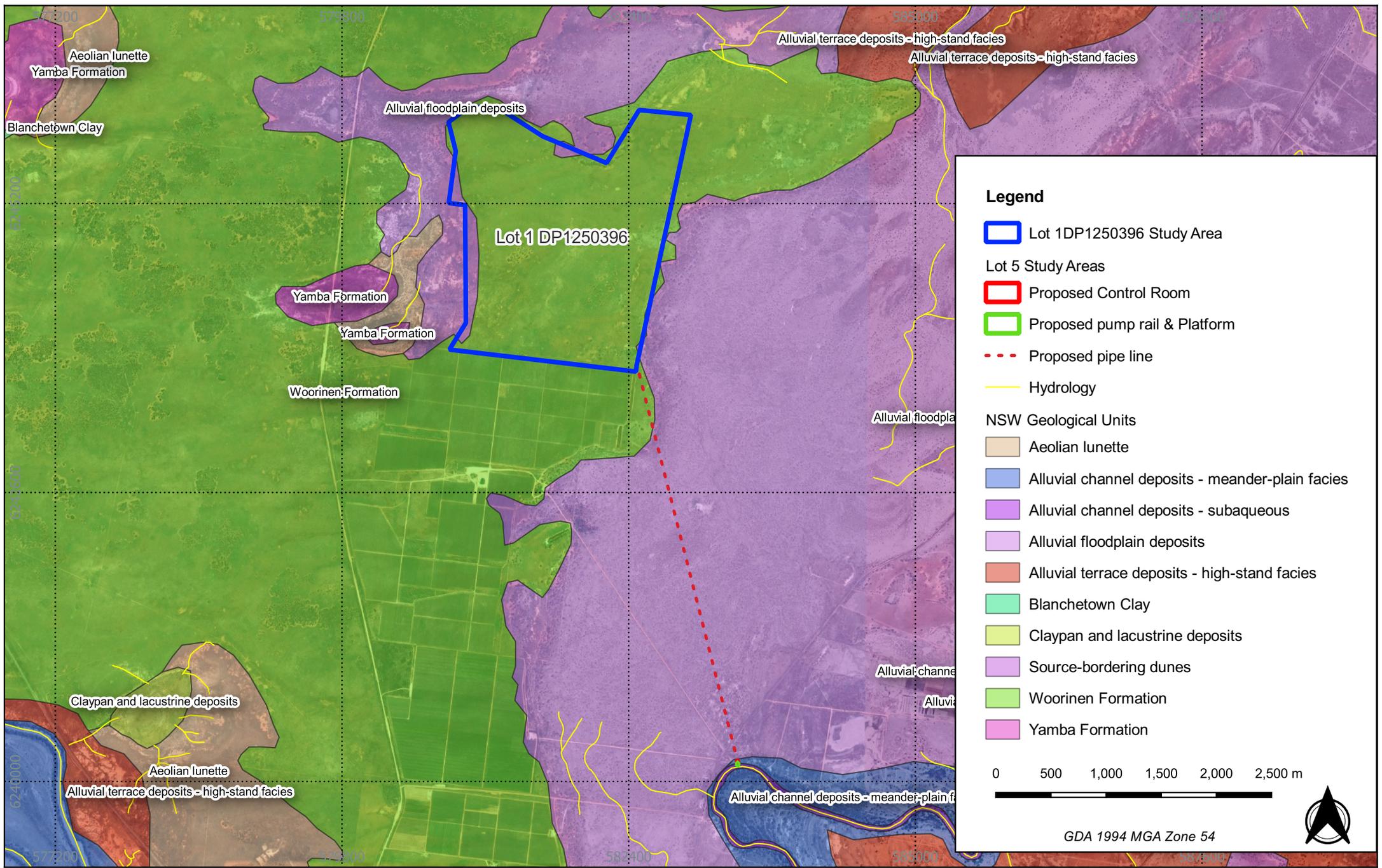


Figure 2.2 - Geology and Hydrology of the study area

22039 - High Darling Road and Low Darling Road, Wentworth - ACHDDA

Source: Google Maps

Drawn by: ARH Date: 2022-05-03



A U S T R A L
A R C H A E O L O G Y

2.4 GEOLOGY AND SOILS

The main study area, and part of the proposed pipeline, fall within the Woorinen Formation (*QH_w*) geological unit (Colquhoun et al. 2019)(Figure 2.2) This geological unit is of the Holocene epoch and is characterised by fossilised dune fields of widely spaced linear dunes running from east to west on the surface, and underlying silty clay and pedogenically modified carbonate regolith (Colquhoun et al. 2019).

The majority of the proposed pipeline falls within the Alluvial Floodplain Deposits (*Q_af*) geological unit (Colquhoun et al. 2019)(Figure 2.2). This geological unit is of the Quaternary period and is characterised by clay, silt and fine to medium-grained quartz-rich sand (Colquhoun et al. 2019). This could suggest the presence of quartz surface, and subsurface artefacts.

The proposed control room and the proposed pump rail and platform falls within the Alluvial Channel Deposits – Meander-Plain Facies (*Q_acm*) geological unit (Colquhoun et al. 2019). This Quaternary period geological unit is comprised of loose clay and sand which overlies a layer of brown silty clay (Colquhoun et al. 2019). The close proximity to the Darling River, suggests the likelihood of shell middens, campsites or scarred trees within the study area.

The main study area, and part of the proposed pipeline, falls within the Scotia Sandplains (*Sts*) Mitchell's Landscape unit (Mitchell 2002) (Figure 5). This soil unit is characterised by slightly rippling sandplains with sand dunes running from east to west. The plains are comprised of brown calcium-rich solonized soils, the dunes are made up of brown, red and earthy sands, and the depressions are characterised by their clays that do not crack (Mitchell 2002).

The majority of the proposed pipeline, the proposed control room and the proposed pump rail and platform fall within the Lower Darling Channels and Floodplains (*Ldc*) landscape unit (Mitchell 2002)(Figure 2.3). This soil unit is characterised by its sinuous anabranches, narrow plains, channel loops, billabongs, swamps, plains, flood-outs and lunettes. The channel loops are comprised of dense grey cracking clays, the plains are characterised by grey self-mulching clays and scalded red soils, the lunettes are made up of siliceous sands as well as coarse clay, and the sand hills and levees are comprised of silty clays, red sand and calcareous loam (Mitchell 2002).

This suggests that subsurface artefact if any may be in relatively good condition due to the excellent preservation conditions provided by the alkaline soils.

Mitchell's landscape units identified within the study area are seen in Figure 2.3.

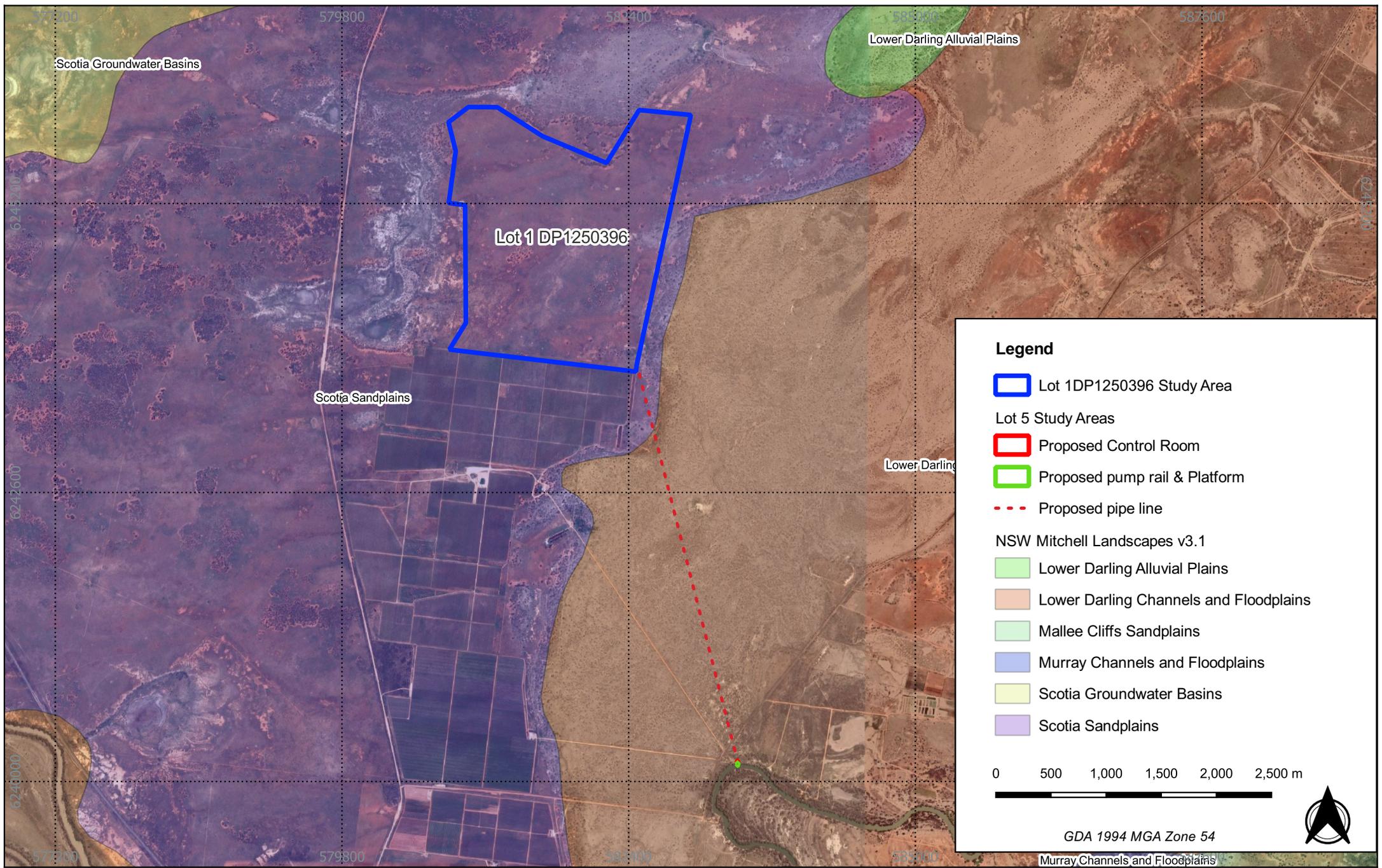


Figure 2.3 - Mitchells Landscape of the surrounding study area

22039 - High Darling Road and Low Darling Road, Wentworth - ACHDDA

Source: Google Maps

Drawn by: ARH Date: 2022-05-03



A U S T R A L
A R C H A E O L O G Y

2.5 LANDFORMS

The study area is characterised mainly by two types of landform elements as discussed earlier namely flat floodplain and gentle lower slope towards the northwest to the central portion of the study area. The sandplain landform covers the entire main site measuring about 3.9 kilometres square area while the pipeline route forms the flat plain landform within the study area.

Sandplain landform consists of E-W linear sand dunes of the Woorinen Formation, measuring from 3 metres up to 10 metres in height. They are generally considered sensitive to the presence of Aboriginal heritage. The area of the main site also has gentle elevation over the surrounding landform indicating its importance for hunting-gathering activities. Dunes are also considered very sensitive for the presence of Aboriginal burials as understood based on previous archaeological research works within a similar geographical region.

Therefore the main site area can be considered as the potential for having the Aboriginal burial, which might not be *in-situ* or in its primary context due to the erosional nature of the dunes.

2.6 LANDSCAPE RESOURCES

The Darling River system would have provided a wide range of resources for Aboriginal people. Flora and fauna were not only a necessity to the Aboriginal diet, but were also important for clothing, ornamentation, and medicines.

The main study area is comprised of a variety of vegetation types, including porcupine grass (*Triodia irritans*), bladder saltbush (*Atriplex vesicaria*), native cherry (*Exocarpus cupressiformis*), white cypress pine (*Callitris glaucophylla*), turpentine (*Ermophila sturtii*) and belah (*Casuarina cristata*) (Mitchell 2002).

The area of the proposed pipeline, the proposed control room and the proposed pump rail and platform is dominated by coolabah (*Eucalyptus microtheca*), saltbush (*Atriplex* sp.), lignum (*Muehlenbeckia cunninghamii*), prickly wattle (*Acacia victoriae*), river red gum (*Eucalyptus camaldulensis*), bluebush (*Maireana* sp.) and black box (*Eucalyptus largiflorens*) (Mitchell 2002).

During the warmer periods of the year, the Darling River was inundated with fresh water, which resulted in an increase in fauna travelling to the river. These faunas would have contributed to the diet of the Maraura people (Allen 1974, p. 311). During this time, various food-collecting strategies would have been used, including the use of nets for fish and ducks, diving for fish and mussels, using nooses for emus and adopting traps for small mammals (Bowler 1970, Balme 1995).

During drier periods of the year, when the Darling River was low, the Maraura people adopted stone traps to catch large quantities of fish, using a “quite elaborate system of pens, opening into another, so that once in, there was little chance of the fish escaping before they were caught or speared” (Newland 1888, p. 24). If resources were scarce, the Maraura people would have travelled into the desert to reach standing water, or to access water from the roots of trees (Allen 1974). Although, it has been stated that, the further away from a water source, the less archaeological potential (Pardoe 2003, p. 46).

2.7 PAST LAND USE PRACTICES

The study area used to be part of the Avoca station. European occupation in the region began around the 1840s. In the past, the area was part of Tapio Station until in 1871 Daniel Cudmore purchased the western half of the Tapio station and called it Avoca after his hometown in Ireland. With the squatters established in the area, it was used for livestock grazing and the growth of crops. Sheep grazing was one of the major practices within the region.

In about the 1950s irrigation practices were introduced within the Wentworth Shire. Regular riverboat trade activities also intensified around the major rivers such as the Darling and the Murray Rivers. These grazing activities along with the rabbit plague caused much soil erosion, land degeneration and landscape modifications. Due to the development of irrigation areas by the construction of locks and weirs, intricate channel system, orchards and vine plantation became another past land use practice within the region (Hassell Planning Consultants Pty Ltd 1989).

The study area has been used for grazing and it also has the potential of clearing vegetation during the early European settlement. Construction of tanks, vehicular tracks and fences surrounding the area are other past land-use practices observed within the study area. These activities would have

affected the native vegetation. Grazing and agriculture would have greatly contributed to the loosening of the soils resulting in the soil erosion resulting in the likelihood of finding artefacts on the surface itself rather than within the subsurface deposition.

2.8 PREDICTIVE STATEMENTS

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

The main trends broadly seen within south-western NSW are that:

- Archaeological sites occur on most landforms.
- Site frequency and density are dependent on their location in the landscape.
- There is a dominance of modified trees, artefact scatters and shell features at sites.
- Artefact scatters are commonly located in close proximity to permanent water sources along creek banks, alluvial flats and low slopes. More complex sites are usually located close to major water sources. Due to the antiquity of Aboriginal heritage in western NSW, paleo-channels and past waterways should be also considered as having archaeological potential.
- The dominant raw material used in artefact manufacture is silcrete and fine-grained siliceous material with smaller quantities of chert, quartz and volcanic stone seen.
- Artefact assemblages usually comprise a proportion of formal tool types with the majority of assemblages dominated by flakes and debitage.
- Aboriginal scarred trees may be present in areas where remnant old growth vegetation exists.

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

- Aboriginal heritage sites are likely to occur within 200 metres of past or current water sources.
- Artefact scatters are a common site type in the area and are most likely to occur on raised, level ground, near sources of freshwater or wetlands, or along spur crests or ridgelines.
- Hearths most frequently occur on the Darling River soil landscapes and within 250 metres of water on well-drained and raised, level ground, near sources of freshwater, or in wetlands, or along spur crest or ridgelines.
- Archaeological material is also present beyond the immediate river surroundings in decreasing artefact densities.
- Low lying wetland areas subject to constant inundation will be unlikely to contain Aboriginal occupation.

The predictive modelling developed for the study area based on the AHIMS results is as below:

No.	Site ID	Site feature	Landform	Geounit_na	Mitchell Landscapes
1.	39-6-0018	Burial	Flat	Alluvial terrace deposits - high-stand facies	Lower Darling Alluvial Plains
2.	39-6-0020	Modified Tree	Flat	Source-bordering dunes	Lower Darling Alluvial Plains
3.	39-5-0015	Hearth, Modified Tree, Shell	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
4.	39-5-0037	Modified Tree	Flat	Alluvial floodplain deposits	Lower Darling Channels and Floodplains
5.	39-5-0038	Shell	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
6.	39-5-0012	Artefact	Shoulder	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
7.	39-5-0013	Modified Tree	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
8.	39-5-0046	Artefact, Shell	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
9.	39-5-0051	Artefact, Hearth	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
10.	39-5-0040	Artefact	Footslope	Source-bordering dunes	Lower Darling Channels and Floodplains
11.	39-6-0032	Modified Tree	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
12.	39-5-0041	Shell	Footslope	Alluvial channel deposits - subaqueous	Lower Darling Channels and Floodplains
13.	39-5-0098	Artefact, Hearth	Flat	Alluvial floodplain deposits	Lower Darling Channels and Floodplains
14.	39-5-0071	Artefact	Footslope	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
15.	39-5-0070	Artefact	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
16.	39-5-0045	Modified Tree	Shoulder	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
17.	39-5-0112	Shell	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
18.	39-5-0113	Shell	Shoulder	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
19.	39-5-0114	Hearth	Flat	Woorinen Formation	Lower Darling Channels and Floodplains

20	39-5-0115	Shell	Flat	Woorinen Formation	Lower Darling Channels and Floodplains
21	39-5-0116	Shell	Shoulder	Woorinen Formation	Lower Darling Channels and Floodplains
22	39-5-0117	Shell	Slope	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
23	46-2-0287	Artefact, Burial, Hearth, Shell	Flat	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
24	39-5-0146	Burial, Shell	Shoulder	Alluvial channel deposits - meander-plain facies	Lower Darling Channels and Floodplains
25	39-5-0154	Artefact, Aboriginal Resource and Gathering, Shell, Hearth, PAD	Flat	Alluvial terrace deposits - high-stand facies	Lower Darling Channels and Floodplains
26	39-5-0159	Artefact, Hearth, Non-Human Bone and Organic Material, Shell	Shoulder	Alluvial terrace deposits - high-stand facies	Lower Darling Channels and Floodplains
27	39-5-0047	Artefact	Flat	Alluvial terrace deposits - high-stand facies	Mallee Cliffs Sandplains
28	39-5-0011	Artefact	Flat	Source-bordering dunes	Mallee Cliffs Sandplains
29	39-5-0042	Hearth	Flat	Source-bordering dunes	Mallee Cliffs Sandplains
30	39-5-0048	Hearth	Flat	Alluvial terrace deposits - high-stand facies	Mallee Cliffs Sandplains
31	39-5-0049	Artefact, Hearth	Flat	Source-bordering dunes	Mallee Cliffs Sandplains
32	39-5-0043	Artefact	Flat	Source-bordering dunes	Mallee Cliffs Sandplains
33	39-5-0044	Hearth	Flat	Source-bordering dunes	Mallee Cliffs Sandplains
34	39-5-0050	Artefact, Hearth	Flat	Source-bordering dunes	Mallee Cliffs Sandplains
35	39-5-0029	Artefact	Flat	Aeolian lunette	Scotia Groundwater Basins
36	39-5-0020	Artefact	Flat	Yamba Formation	Scotia Groundwater Basins
37	39-5-0035	Artefact	Flat	Woorinen Formation	Scotia Sandplains
38	39-5-0039	Artefact	Flat	Alluvial floodplain deposits	Scotia Sandplains
39	39-5-0019	Artefact	Flat	Alluvial terrace deposits - high-stand facies	Scotia Sandplains
40	39-5-0026	Artefact	Flat	Alluvial floodplain deposits	Scotia Sandplains
41	39-5-0014	Hearth	Flat	Woorinen Formation	Scotia Sandplains
42	39-5-0086	Artefact	Flat	Woorinen Formation	Scotia Sandplains
43	39-5-0087	Shell	Flat	Woorinen Formation	Scotia Sandplains

44	39-5-0064	Artefact	Flat	Woorinen Formation	Scotia Sandplains
45	39-5-0111	Shell	Flat	Woorinen Formation	Scotia Sandplains
46	50-2-0030	Shell	Flat	Woorinen Formation	Scotia Sandplains
47	39-5-0144	Artefact, Hearth	Flat	Woorinen Formation	Scotia Sandplains
48	39-5-0137	Hearth	Flat	Woorinen Formation	Scotia Sandplains
49	39-5-0138	Artefact, Hearth, Non-Human Bone and Organic Material, PAD, Shell	Valley	Woorinen Formation	Scotia Sandplains
50	39-5-0139	Hearth	Flat	Aeolian lunette	Scotia Sandplains
51	39-5-0140	Hearth	Flat	Woorinen Formation	Scotia Sandplains
52	39-5-0141	Shell	Flat	Woorinen Formation	Scotia Sandplains
53	39-5-0143	Artefact, Shell	Flat	Woorinen Formation	Scotia Sandplains
54	39-5-0157	Artefact	Flat	Woorinen Formation	Scotia Sandplains
55	39-5-0198	Artefact	Flat	Woorinen Formation	Scotia Sandplain

Based on the above table below predictions can be observed for the presence of Aboriginal heritage surrounding the study area:

- The majority of the Aboriginal heritage within the region consists of Artefact sites (n=17), Shell sites (n=11), hearths (n=8), culturally modified trees (n=6), burial sites (n=3), artefact and hearth sites (n=7), Artefact and shell sites (n=2).
- Four major types of landforms are identified surrounding the study area. They are flat plains, slopes, shoulders and valleys. Flat plains have recorded all types of Aboriginal heritage site types such as artefact scatters, shell midden sites, hearths, burials and PADs.
- Aboriginal sites are recorded in association with these landforms. Flat plains have recorded n=44, Shoulder landforms have recorded n=6 sites, slopes have recorded n=4 and valleys have recorded n=1.
- The two major types of Mitchell landscapes identified surrounding the study area include Lower Darling Channels and Floodplains and Scotia Sandplains. The highest number of sites n=24 are recorded in association with Lower Darling Channels and Floodplains while a relatively lower number n=19 are registered within Scotia Sandplains. Seven sites are registered with Mallee Cliffs Sandplains while two each are recorded in association with Lower Darling Alluvial plains and Scotia Groundwater Basins.

- A higher number of sites n=35 are recorded closer to the perennial source of water but a considerable number of sites n=20 have been recorded closer to the non-perennial source of water.
- Thus it can be concluded that Aboriginal heritage site types such as artefacts and shell sites have higher chances of existence within the study area.

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

Table 3 Landscape features in the Code that indicate the likely existence of Aboriginal objects.

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

The study area is located on a floodplain associated with the Darling River, which is within 200 meters of the southern end of the study area. There are no significant ridges or depressions within the area, but the area is gently undulating to flat moving north-west. There are vehicular tracks, historical disturbances such as a fence, cattle yards, and tanks that cover a large percentage of the study area and the development surrounding such as a vineyard, clearing of vegetation as led to the study area being moderately disturbed.

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

The main site to be developed as a vineyard is located on the border of floodplains and sandhill landform. It is adjoining the fenced area within Lot 1 DP1250369 area where the disturbance will be taking place. Near the Pump station site, there is an existing pump station, vehicle tracks, powerlines and an underground pipeline. Therefore, the disturbance will not harm any known objects, modified trees or landforms.

STEP 4. DESKTOP ASSESSMENT AND VISUAL INSPECTION

In order to ground-truth the desktop assessment, a visual inspection of the study area was undertaken on 4 and 5 May 2022 by Sejal Pandya (Senior Archaeologist, Austral). The visual inspection consisted of a systematic survey of the study area to identify and record any Aboriginal archaeological sites visible on the surface or areas of Aboriginal archaeological potential and cultural sensitivity. The archaeological survey was conducted on foot. The methods used during the visual inspection conformed to requirements 5 to 8 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b).

A key survey variable is ground visibility, which considers the amount of ground surface which is not covered by any vegetation; and exposure, which defines areas where dispersed surface soils and vegetative matter afford a clear assessment of the ground, were assessed across the study area and within each landform element. Note that the effectiveness of the field survey was largely dependent on the degree of ground surface visibility. Where surface visibility was restricted by dense vegetation cover, the potential for PADs was assessed, particularly in association with those landforms identified within the predictive model as more likely to contain Aboriginal archaeological sites. The potential of these areas and all landform elements within the study area was considered against available evidence of land disturbance.

Photographs were taken of all survey units and landforms as well as representative surface visibility, and where present, surface exposures, soil profiles and disturbances relevant to the interpretation of the stratigraphic conditions and archaeological potential within each survey unit.

The visual inspection consisted of two pedestrian transects from the pump station to the Main site along the pipeline route. The first transect was walking north-west towards the main area while the second transect consisted of walking south-east back from the main area towards the pump station. This was to ensure that the study area (Pump station and pipeline route) was thoroughly surveyed and that no cultural material or site was overlooked. The average ground surface visibility was 70% for the southern half of the study area, with the visibility dropping to 60% towards the end of the pipeline route (Figure 2.5, Figure 2.6 and Figure 2.7). The landform that the pump station is located on the Darling River bank while the pipeline route is located within the Darling River floodplain consisting of a very flat plain, gently rising towards the north-western end of the pipeline route. The entire alignment consisted of whitish to greyish cracking clay. The average exposure across the study area was 60% caused by soil erosion, receded vegetation, and informal vehicular tracks. The area of the pump station was heavily disturbed by vehicular movement towards the property on the neighbouring block, fencing, power cables and underground pipelines (Figure 2.8). The proposed works are located in an area with an existing pump station (Figure 2.9).

Along the riverbank, is eucalyptus and acacia regrowth and woody shrubland, in areas where the access roads are not located. There were few mature trees on either side of the vehicular tracks and along the river bank. They were inspected for any cultural scarring, but none had signs of any cultural scars on them.

Throughout the main site, to be developed for the vineyard, a moderate level of disturbance was observed in the form of cattle-yard, water tank, fencing and vehicular tracks (Figure 2.9, Figure 2.10 and Figure 2.11).

The average ground surface visibility within the study area of the main site was 60%. The exposure within this area was 60% due to soil erosion and vegetation clearing, mainly seen around the fenced area and clay pans (Figure 2.12). A majority of the study area consisted of yellowish red sandy clay along with patches of greyish cracking clay occasionally seen with white calcrete chalky rocks. Vegetation within this area consisted of grass with saltbush and young mallee BlackBox trees. Towards the southern side of the property are the developed vineyards with modified vegetation.

Landforms identified during the survey of the main area are as below:

Gently undulating Plain

The landform of the main area consists of a gently undulating plain, having a maximum elevation towards the centre portion (approximately 48). It rises from the southeast to the northwest and becomes very flat towards the western side of the study area. The area has been historically used as a grazing paddock.

During the survey, no cultural modifications were observed on identified mature trees. No cultural material or sites were identified in this survey. There is a moderate level of disturbance within the main site, pipeline route and pump station locations of the study area. It is determined that the study area despite having moderate potential for the presence of Aboriginal heritage based on the predictive modelling, has low archaeological potential due to the disturbance observed (around the river bank and the main area to be developed as a vineyard within Lot 1 DP DP1250369). The disturbance and natural soil erosion would have disrupted the primary context of any Archaeological material if any present within the area.

The development of a pump station near the river bank is also located within areas of moderate disturbance and will have structures that will not impact the river bank as it will have a floating pontoon. A site visit to the area with a similar structural development in the form of a floating pontoon and pump station with Vasu Singla (Environmental Consultant, James Golsworthy) helped to better understand the proposed development. Proposed works will have a pump station and floating pontoon which will not impact the river bank as shown in Figure 2.13. The area within Lot 1 DP 1250369 to be developed within the main site is shown in Figure 2.15.



Figure 2.4: Facing North from the southern end of the Study area showing pipeline route



Figure 2.5 Facing north-west at the midpoint of the study area, decreased visibility along the pipeline route.



Figure 2.6: Facing west near the end of the pipeline route



Figure 2.7 Facing east showing signage for underground cables, electric poles and vehicular track



Figure 2.8 Facing south-west from the pump station site showing the existing pump station adjacent to the riverbank



Figure 2.9 Facing west, cattle yard with the study area- Main site



Figure 2.10 Facing North, vehicular track and fencing within the main site, study area



Figure 2.11 Facing east, water tank immediately outside the fencing of the study area



Figure 2.12 Facing north, claypan within the main site having high visibility and vehicle track mark.



Figure 2.13 Developmental structures similar to proposed works



Figure 2.14 Aerial view of the proposed pump station site

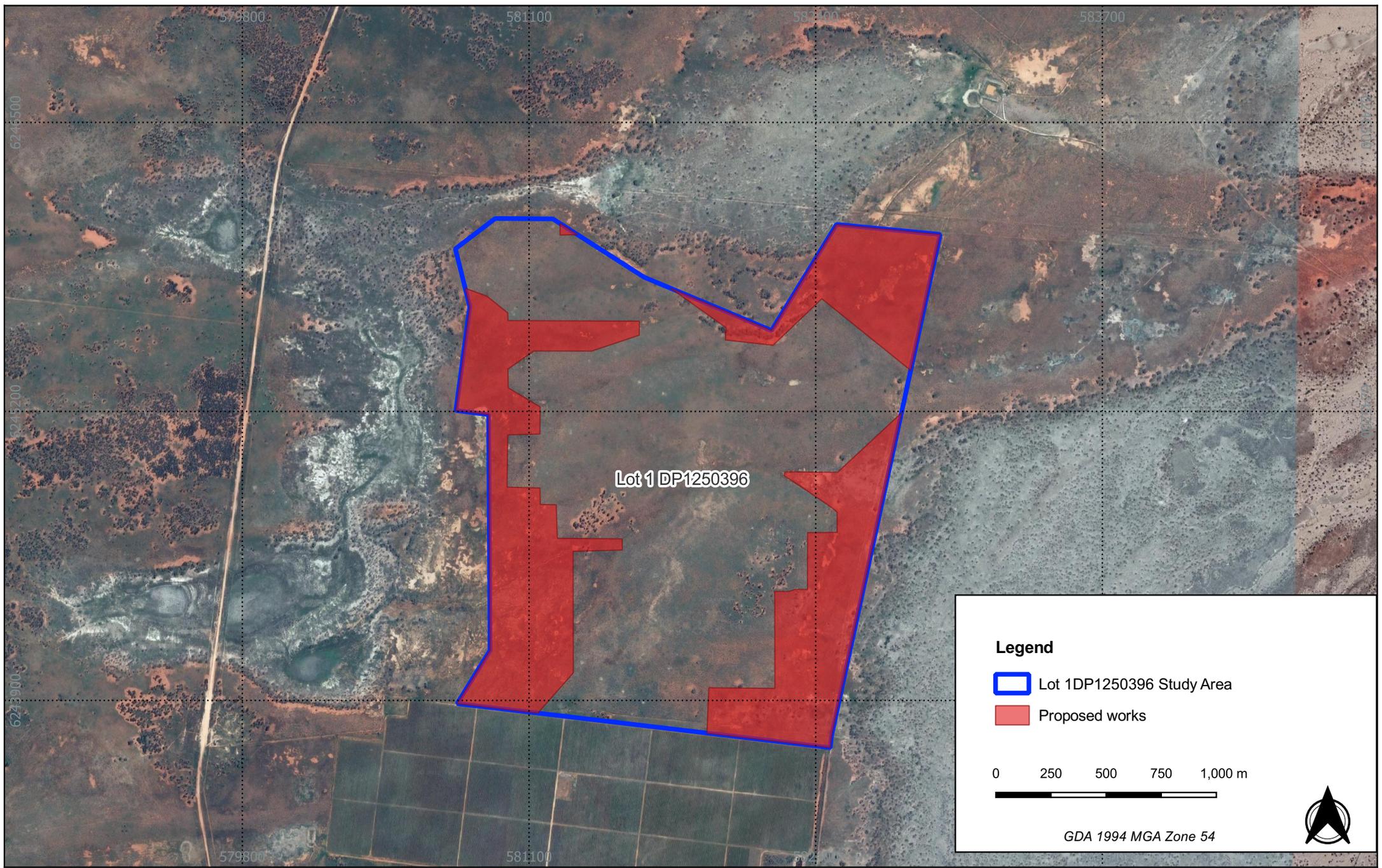


Figure 2.15 - Proposed works within the Main site of study area

22039 - High Darling Road and Low Darling Road, Wentworth - ACHDDA

Source: Google Maps

Drawn by: ARH Date: 2022-05-24



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STEP 5. FURTHER INVESTIGATIONS AND IMPACT ASSESSMENT

Based upon the outcome of Steps 1 to 4 of the code, further assessment is not warranted based. As such the project may proceed with caution. The following recommendations apply:

1. The proposed works can proceed with caution.
2. All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.
3. Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity, you must:
 - immediately cease all work at that location and not further move or disturb the remains
 - notify the NSW Police and Heritage NSW's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location
 - not recommence work at that location unless authorised in writing by Heritage NSW.

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

Yours sincerely,



Sejal Pandya

Senior Archaeologist

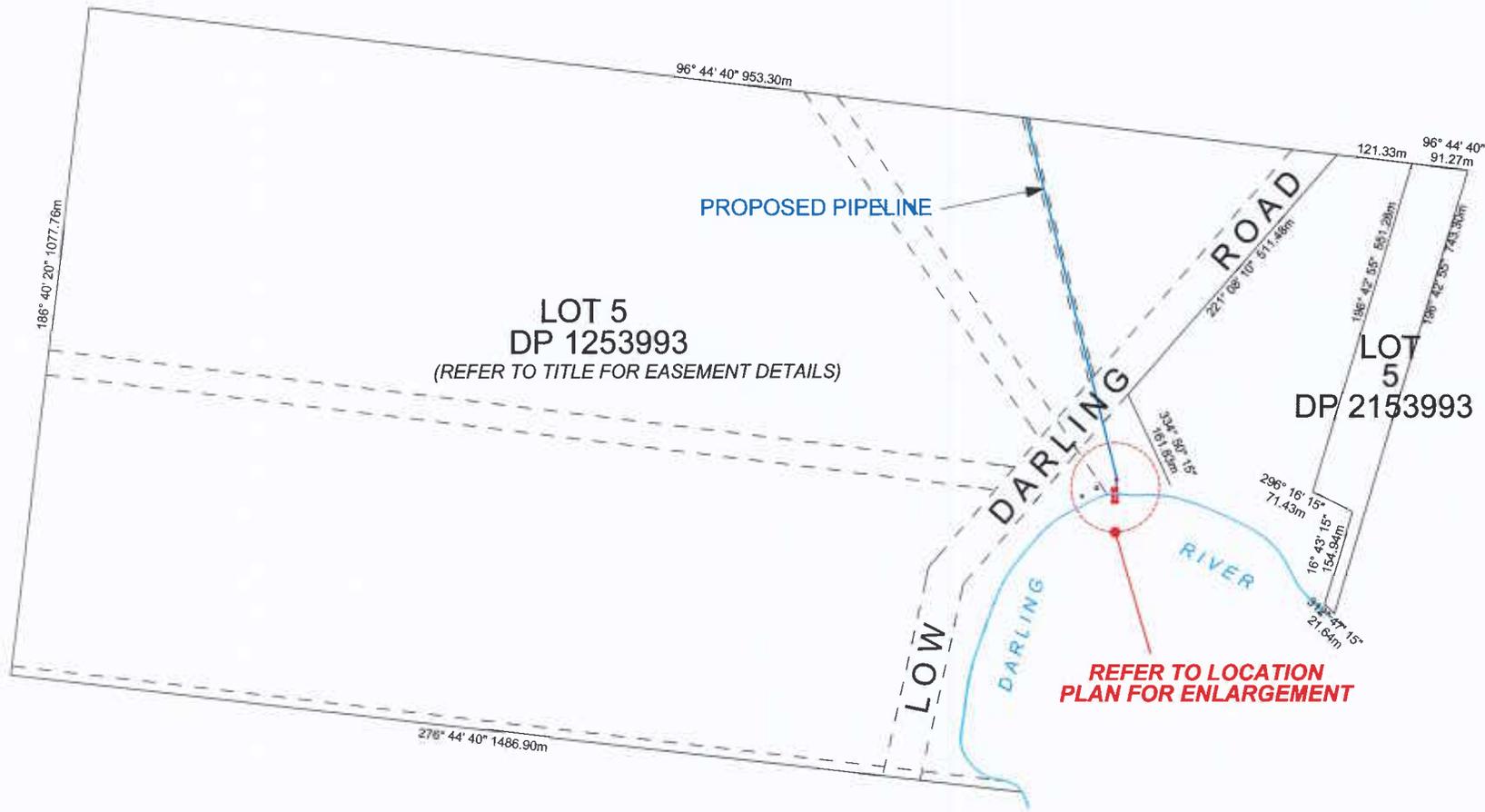
Austral Archaeology

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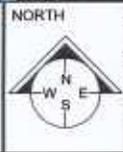
OVERALL SITE PLAN

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 ADDRESS : RAIL & CONTROL ROOM
 AT LOT 5 IN DP 1253993
 LOW DARLING ROAD, WENTWORTH
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LOCATION PLAN

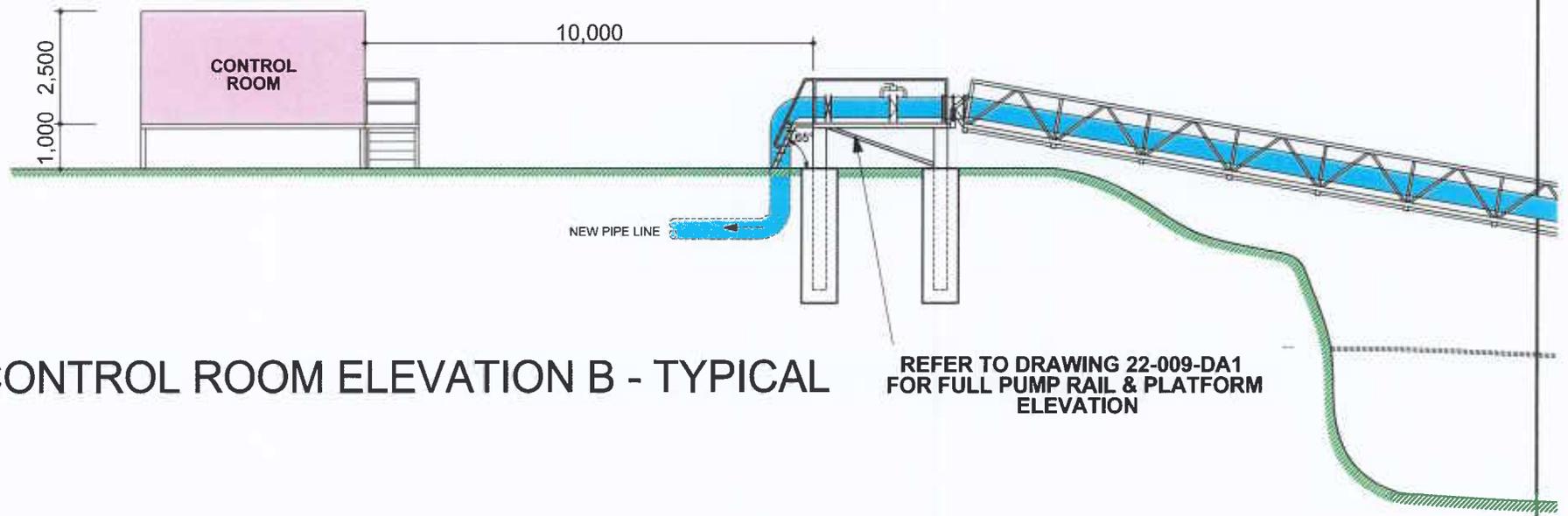
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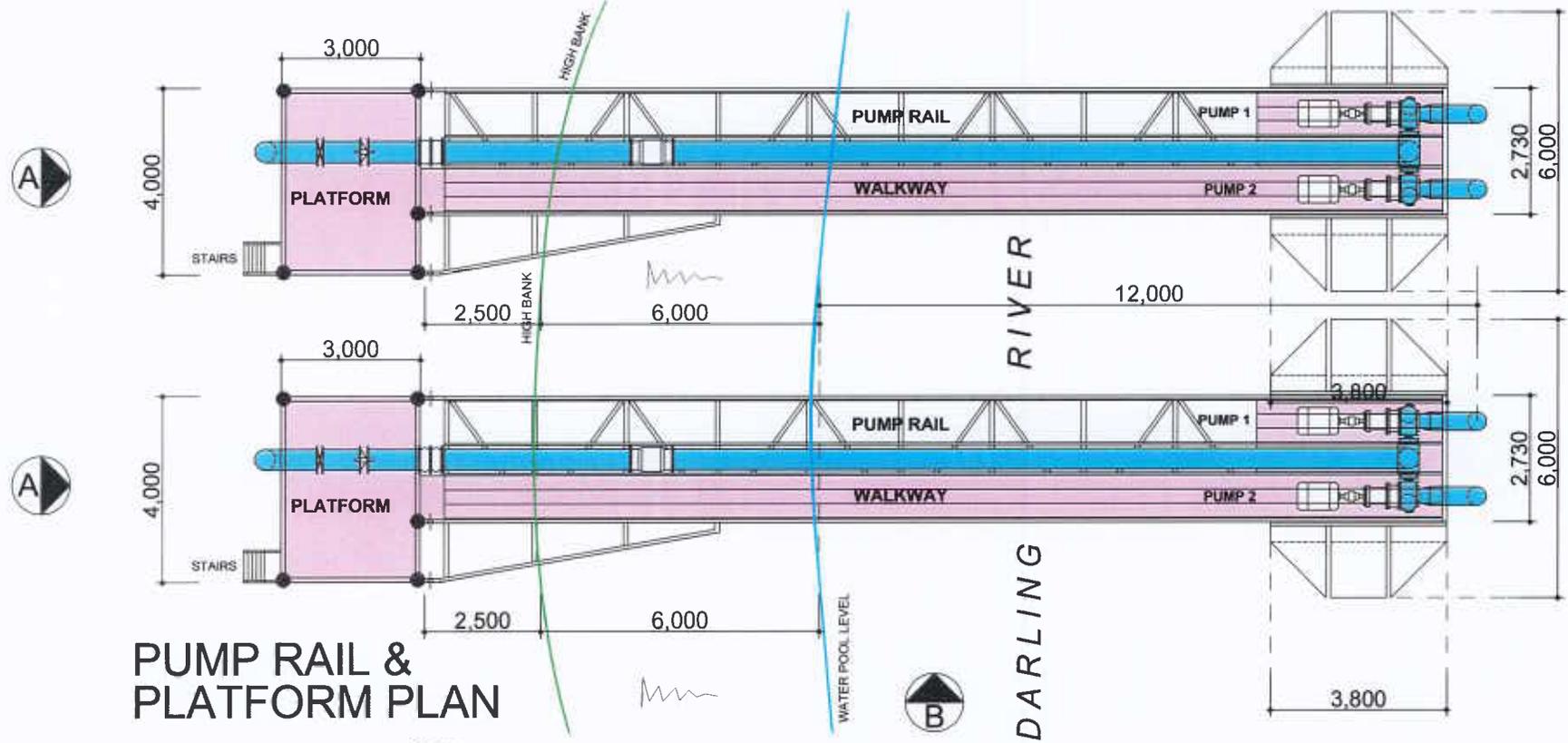


CONTROL ROOM ELEVATION B - TYPICAL

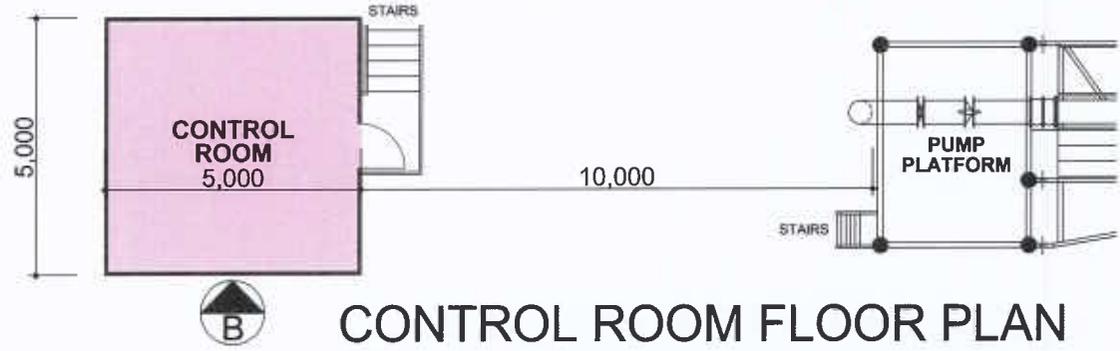
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FOR FULL PUMP RAIL & PLATFORM
ELEVATION**

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PUMP RAIL & PLATFORM PLAN



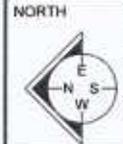
CONTROL ROOM FLOOR PLAN

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