



ALINTA ENERGY REEVES PLAINS POWER STATION

DEVELOPMENT APPLICATION



12 OCTOBER 2017

APPENDIX M – CULTURAL HERITAGE ASSESSMENT

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ACHM
AUSTRALIAN CULTURAL
HERITAGE MANAGEMENT

Cultural Heritage Assessment Report

Cultural Heritage Assessment

Reeves Plains Power Station Project

By: Dr Morgan Disspain and Dr Martin Wimmer

Date: 6 September 2017

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Spatial Data

Spatial data captured by Australian Cultural Heritage Management (Victoria) Pty Ltd in this document for any newly recorded sites has been obtained by using hand held or differential GPS units using the GDA94 co-ordinate system.

Abbreviations

Term	Meaning
ACHM	Australian Cultural Heritage Management Pty Ltd
AHA	<i>Aboriginal Heritage Act 1988</i>
DSD-AAR	Department of State Development - Aboriginal Affairs and Reconciliation
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
KNCHA	Kaurna Nations Cultural Heritage Association
NTA	<i>Native Title Act 1993</i>
NTSA	National Trust of South Australia
RNE	Register of the National Estate

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- Wright, Jenny (KNCHA representative)
- Sam Withers (Arcadis)

Executive Summary

Australian Cultural Heritage Management (ACHM) was engaged by Arcadis to undertake a desktop review of previous reports and heritage literature to establish and describe the Indigenous, European, National and World Heritage values of 1629 Redbanks Road, Mallala, South Australia.

The following information was obtained through searches of the relevant heritage databases, historical and literary research into the Aboriginal occupation of the area, and historical and literary research into the colonial settlement of the area.

- A search of the World Heritage List revealed that no World Heritage sites are located within the survey area.
- A search of Australia's National Heritage list revealed that no National Heritage sites are located within the survey area.
- A search of the Commonwealth Heritage register revealed that no Commonwealth Heritage sites are located within the survey area.
- A search of the South Australian Heritage Register revealed that no State Heritage places are located within the survey area.
- A search of the National Trust of South Australia (NTSA) database revealed that there is no sites are located within the survey area that are managed by the NTSA.
- A search of the archived Register of the National Estate found no places on the register are located within the survey area.
- A query with the Adelaide Plains Council found no places of local significance within the survey area.
- The survey area is located within the area over which one native title claim exists (Kurna Peoples), which has been accepted for registration.
- There are no recorded Aboriginal heritage sites within the designated investigation area according to the Central Archive of the Aboriginal Affairs and Reconciliation Division (AARD) of the Department of the Premier and Cabinet

An Aboriginal cultural heritage assessment (archaeological site survey) was then undertaken by ACHM archaeologist Martin Wimmer and Kurna Nations Cultural Heritage Association (KNCHA) representatives Jenny Wright and Garth Agius on 29 of June 2017. The following observations are noted from the survey:

- The proposed works footprint straddles a highly disturbed pastoral landscape which has been ploughed, trenched, driven across, excavated and built on.
- Sections have been re-planted with *Eucalyptus Porosa* (Mallee Box) and assorted non-indigenous trees and shrubs. These occur mainly along the fencelines and around the homestead
- The soil is thick and loamy and appears to overlay limestone. Many limestone nodules have been churned up by seasonal ploughing and have been cracked by plough impacts
- No Aboriginal artefacts were observed in the paddock earmarked for development and none were observed in the adjoining paddocks or around the homestead
- Very little stone suitable for tool making (quartz or silcrete) was observed
- The re-planted trees are too young and also of a type unsuitable for manufacturing Aboriginal utensils consequently none exhibited cultural scars

The following recommendations have been made for this project:

- Based on the results of the desktop research outlined in this report and archaeological field work carried out across the proposed works footprint, ACHM in consultation with KNCHA have no objection to the project proceeding. It is however recommended that the works be confined to the area archaeologically cleared to avoid impacting any Aboriginal heritage which may be extant on adjoining properties and paddocks that have not been investigated.

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1 Introduction

Australian Cultural Heritage Management Pty Ltd (ACHM) was engaged by Arcadis to undertake a desktop review of previous reports and heritage literature to establish and describe the Indigenous, European, National and World Heritage values of Plan 2848 Allotment 1 on the Gawler/Mallala Rd, Mallala, South Australia. ACHM was further engaged to conduct an archaeological survey across the footprint of the proposed works area in order to determine the presence of extant and as yet unrecorded Aboriginal cultural material.

The purpose of this report is to inform Arcadis of the presence of any previously identified and/or recorded Aboriginal, European, National and World Heritage within the proposed area, which may indicate the likelihood of the presence of unrecorded archaeological sites, and to outline the responsibilities potential future developers have under current heritage protection legislation.

1.1 The Study Area

The study area includes Plan 2848 Allotment 1 on the Gawler/Mallala Rd, Mallala, South Australia. This property is located at 1629 Redbanks Road, Mallala, South Australia (see Map 1-1). The landscape of the survey area appears to consist of cleared farmland with some large trees scattered in the northeast corner near the existent buildings and along road fencelines. The proposed development site lies wholly within the Kurna Native Title Claim SC2000/001 (see Map 1-2).

1.2 The Project

The Reeves Plains Power Station Project involves the construction and operation of a gas fired power station and associated infrastructure (the Project). The project proponent is Alinta Energy (Reeves Plains) Pty Limited (Alinta Energy). The power station will be located at 1629 Redbanks Road on a 41 ha greenfield site located in Reeves Plains, approximately 12 km south-east of Mallala and 50 km north of Adelaide. The power station will operate as a 'peaker', providing electricity during periods of high demand, and is designed to generate up to 300 megawatts (MW) of power and will be delivered in two stages with up to 150MW installed initially with further build out as required by prevailing market conditions. The Project includes the following infrastructure:

- A gas receival station
- Up to six (6) dual fuel (gas and diesel) turbines each capable of generating 50MW of power
- Three (3) transformers designed to convert low voltage electricity into high voltage electricity
- Connection to the electricity network including a new substation, transmission tower and communications tower

Water supply and storage including:

- Water treatment plant
- Water storage tanks
- Firefighting system
- Evaporation pond
- Diesel storage

Also included within the Project are the following:

- Control rooms, workshop and maintenance facilities and administration building
- Security fencing and lighting
- Onsite drainage works
- Upgrade to the Redbanks Road and Day Road intersection and sealing of Day Road from Redbanks Road to the Project entrance
- Carparking for employees and contractors
- Demolition of existing buildings onsite
- Landscaping

The Project is required to obtain development consent from the State Commission Assessment Panel before proceeding. Construction of the Project is scheduled to commence in 2018 with operation of the power station occurring in Q1 2020 at the earliest.



Map 1-1: General location of the Activity Area.



Map 1-2: Location of the Activity Area in relation to the Kurna Peoples Native Title Claim.

2 Methodology

2.1 Desk Top Study

In order to establish and describe the Indigenous, European, National & World Heritage values of the Activity Area, the following research was undertaken:

- A review of the relevant legislation was conducted.
- Aboriginal site discovery and identification protocols are outlined.
- Searches of the World Heritage register, the National Heritage Register, the Commonwealth Heritage register, and the South Australian Heritage places register were performed.
- The archived Register of the National Estate (archive) was searched for any places within the survey area.
- The South Australian National Trust database was searched for any places located within the survey area.
- The Department of State Development - Aboriginal Affairs and Reconciliation were consulted with, and a basic search of the Register of Aboriginal Sites and Objects was requested.
- The National Native Title Tribunal database was searched to identify all Native Title determinations within the survey area.
- The Adelaide Plains council was contacted with an enquiry about the existence of any locally significant cultural heritage places within the survey area.

2.2 Archaeological Survey

The survey team consisted of one archaeologist and two KNCHA representatives. The team spread out at approximately 15 m spacings (see Figure 2-1) and walked across the paddock beginning at the southwest corner of the proposed works area. Once across, the team turned around, shuffled along and walked back to the opposite side along a different line with the same spacings. This process was repeated until the whole paddock was covered effectively and provided a 100% coverage. All ground exposures and large trees were investigated for cultural remains. Observations were recorded into a field notebook and images were recorded using a Panasonic DMC TZ30 digital camera. A Garmin GPSMap 64S was employed to ensure adequate coverage of the survey area and to guide transects and spacings utilising its track log.



Figure 2-1: Jennifer Wright and Garth Agius conducting a pedestrian survey over the proposed works footprint view northwest

3 Cultural Heritage Protection Legislation

The Entire Activity Area is located within the state of South Australia. The following legislation applies to cultural heritage within the study area.

3.1 *Aboriginal and Torres Strait Islander Protection Act 1984 (Cwth)*

The Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984 provides a mechanism for the Commonwealth Minister for Environment to make declarations regarding the protection of an Aboriginal area when the Minister is satisfied that, under State or Territory law, there is ineffective protection of the area from a threat of injury or desecration. Declarations made under this Act may involve restricting activities and/or access to an Aboriginal site.

Under Section 21H of the Aboriginal and Torres Strait Islander Heritage Protection Act 1984 it is an offence to conduct behaviour or partake in an action that contravenes a declaration made by the Minister. Penalties under this section are \$10,000 or imprisonment for 5 years, or both, for an individual, or \$50,000 for a corporate body where an Aboriginal place is concerned, and \$5,000 or imprisonment for 2 years, or both, for an individual or \$25,000 for a corporate body where an Aboriginal object is concerned.

If the requirements of the Aboriginal Heritage Act 1988 are adhered to, the Aboriginal and Torres Strait Islander Heritage Protection Act 1984 will likely have no relevance for any Aboriginal site that may be in the project area.

3.2 *Environment Protection and Biodiversity Conservation Act 1999 (amended 2003)(Cwth)*

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as matters of national environmental significance.

The objectives of the EPBC Act (amended 2003) are to:

- provide for the protection of the environment, especially matters of national environmental significance
- conserve Australian biodiversity
- provide a streamlined national environmental assessment and approvals process
- enhance the protection and management of important natural and cultural places
- control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife
- promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources
- recognise the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity
- promote the use of Indigenous peoples' knowledge of biodiversity with the involvement of, and in cooperation with, the owners of the knowledge.

The protection of heritage places for which the Australian Government is responsible is administered under the EPBC Act. The EPBC Act not only protects heritage from actions by the Commonwealth, it protects places in the National Heritage List, in the Commonwealth Heritage List, and on Commonwealth land.

Under the EPBC Act 1999 (amended 2003) any action that has, will have or is likely to have a significant impact on a place of national cultural and/or environmental significance must be referred to the Minister for the Environment for approval. The EPBC Act 1999 (amended 2003) sets out a procedure for obtaining approval, which may include the need to prepare an environmental impact statement for the proposed action (an action is defined in section 523 to include a project, development, an undertaking or an activity or series of activities).

The EPBC Act 1999 (amended 2003) is only relevant in relation to Aboriginal sites if an Aboriginal site is entered onto the National Heritage List or the Register of the National Estate. If not, there is no current referral process required to the Commonwealth Department for Environment and Heritage under the EPBC Act 1999 (amended 2003), and this Act has little relevance for any Aboriginal site that may be in the project area.

3.3 *Native Title Act 1993 (Cwth)*

The *Native Title Act 1993* (NTA) is a law passed by the Australian Parliament the purpose of which is "to provide a national system for the recognition and protection of native title and for its co-existence with the national land management system". The NTA is administered by the National Native Title Tribunal.

Native title is a form of land title that recognises the unique ties some Aboriginal groups have to land. Australian law recognises that native title exists where Aboriginal people have maintained a traditional connection to their land and waters, since sovereignty, and where acts of government have not removed it.

Native title was first recognised by the High Court of Australia in 1992 with the Mabo decision. It recognised for the first time that indigenous Australians may continue to hold native title and to be uniquely connected to the land.

Aboriginal and Torres Strait Islander people can apply to the courts to have their native title rights recognised under Australian law. Native title holders have the right to be compensated if governments acquire their land or waters for future developments.

Native title can co-exist with other forms of land title (such as pastoral leases) but is extinguished by others (such as freehold).

The native title of a group will depend on the traditional laws and customs of those people. The way native title is recognised and practised may vary from group to group, depending on what is claimed and what is negotiated between all the people and organisations with an interest in that country.

3.4 *Native Title (South Australia) Act 1994*

As stated above, the Commonwealth Native Title Act 1993 is part of the Commonwealth's response to the High Court's decision in *Mabo v Queensland (No. 2)* and adopts the common law definition of native title defined as the rights and interests that are possessed under the traditional laws and customs of Aboriginal people in land and waters, and that are recognised by the common law. Provisions with the Commonwealth NTA allow for the States to develop their own native title legislation provided the State legislation does not conflict with the Commonwealth Act.

South Australia has enacted an alternative State right to negotiate scheme as authorised by the Commonwealth under NTA s. 43. This scheme is operative and to date comprises the Native Title (South Australia) Act 1994; Land Acquisition (Native Title) Amendment Act 1994; Mining (Native Title) Amendment Act 1994; Opal Mining Act 1995 and the Environment, Resources and Development Court (Native Title) Amendment Act 1995. Regulations are in force for all these Acts together with Rules of Court for the Environment, Resources and Development Court (ERD).

3.5 *Aboriginal Heritage Act 1988 (South Australia)*

Sites of significance according to Aboriginal tradition and sites significant to Aboriginal archaeology, anthropology and history are protected in South Australia by the *Aboriginal Heritage Act 1988* (AHA). Earlier this year, the Minister for Aboriginal Affairs and Reconciliation introduced changes to the AHA. The changes are prescribed by the *Aboriginal Heritage (Miscellaneous) Amendment Act 2016*. The amendments have been passed by Parliament and the entirety of the amendments will come into operation once new Regulations and Guidelines that provide practical assistance on the operation of the new arrangements come into effect.

Any Aboriginal site, object or remains, whether previously recorded or not, is covered under the blanket protection of the Aboriginal Heritage Act 1988. The Act provides the following definition of an Aboriginal site in Section 3.

"Aboriginal Site" means an area of land:

- a. That is of significance according to Aboriginal tradition; or
- b. That is of significance according to Aboriginal archaeology, anthropology or history

Section 20 of the AHA requires that any Aboriginal sites, objects or remains, discovered on private land by the owner or occupier, or their employees or agents, are to be reported to the Minister for Aboriginal Affairs and Reconciliation.

It is an offence under Section 23 of the Aboriginal Heritage Act 1988 to damage, disturb or interfere with an Aboriginal site, objects or remains unless written authorisation from the Minister for Aboriginal Affairs and Reconciliation has been obtained. Penalties for an offence under this section are up to \$10,000 or six months imprisonment in the case of an individual, or \$50,000 in the case of a corporate body.

3.6 *Heritage Places Act 1993 (South Australia)*

In South Australia places and objects of state and local heritage are protected under the *Heritage Places Act 1993*. *The Heritage Places Act 1993* is the paramount European heritage protection legislation in South Australia. This Act includes the SA Heritage Register (Part 3 of the Act), which consists of a list of 'State Heritage Places' and 'State Heritage Areas'. Buried cultural material (i.e. archaeological artefacts) have relevance under this Act as a component of a listed 'State Heritage Place' or 'State Heritage Area', and also it is a requirement under Section 27(2) that the discovery of any 'archaeological artefact' of 'heritage significance' is reported to the South Australian Heritage Council. Section 36 makes it an offence to damage a heritage place entered onto the SA Heritage Register.

Section 16 of this Act establishes a set of criteria to be used to assess whether a place qualifies for listing on the SA Heritage Register.:

- demonstrates important aspects of the evolution or pattern of the state's history
- has rare, uncommon or endangered qualities that are of cultural significance
- may yield information that will contribute to an understanding of the state's history, including its natural history
- is an outstanding representative of a particular class of places of cultural significance
- demonstrates a high degree of creative, aesthetic or technical accomplishment or is an outstanding representative of particular construction techniques or design characteristics
- has strong cultural or spiritual associations for the community or a group within it
- has a special association with the life or work of a person or organisation or an event of historical importance.

State heritage places, areas and objects are established through the *Heritage Places Act*.

A place or object may be considered to have local heritage value if it meets one or more of the following criteria:

- displays historical, economic or social themes that are of importance to the local area
- represents customs or ways of life that are characteristic of the local area
- has played an important part in the lives of residents
- displays aesthetic merit, design characteristics or construction techniques of significance to the local area
- is associated with a notable local personality or event
- is a notable landmark in the area
- is a tree of special historical or social significance or importance within the local area.

3.7 Discussion

The central legislation to Aboriginal heritage in the project area is the *Aboriginal Heritage Act 1988*, as the project area may contain Aboriginal sites, objects or remains covered by this Act. The auxiliary application of the *Native Title Act 1993* provides a process for identifying the Native Title claimant group and any subsequent consultation that may need to occur.

Non-Aboriginal heritage (Early Colonial; European) is not afforded the same blanket protection and, as such, potential future developers have no statutory obligation to manage unlisted non-Aboriginal heritage. Should the proposed works affect any places listed, the *Heritage Places Act 1993* would be the applicable legislation. Additionally, in accordance to the *Heritage Places Act 1993*, any site of heritage significance uncovered during development should be reported. It should also be noted that community opinion may be sought for the impacts to non-Aboriginal heritage places and aesthetic values of these places.

The EPBC Act is relevant as it provides protection for Commonwealth listed Heritage sites which are located within the EPBC.

4 Aboriginal Site Discovery and Identification Protocols

It is likely that the survey area has not previously been subjected to rigorous site identification surveys. As such, it is possible that sites may exist there that have not been identified. Should any sites be identified in the process of conducting works in the survey area, they must be reported to the Minister through the Aboriginal Heritage Team at DSD-AAR.

The relevant Aboriginal group (Kurna) should be consulted throughout this process.

Certain landscape features are more likely to either be Aboriginal sites or contain evidence of Aboriginal occupation. The following list provides examples of some landscape features that may occur in the survey area and a description of the types of Aboriginal sites that are often associated with these landscape features.

- Unusual landscape features often have mythological significance.
- Rocky outcrops may contain quarries, rock art, rock holes, stone arrangements, ceremonial sites or stone artefact scatters.
- Craters and sink holes often have mythological significance.
- Areas within 200 metres of the coast and waterways may include campsites, stone artefact scatters, shell middens, mounds, and burials.
- Areas within 100 metres of all other creeks, rivers, watercourses, lakes, waterholes, rock holes, wells and springs, whether permanent, seasonal or ephemeral, may also contain campsites, stone artefact scatters, burials and other signs of Aboriginal occupation, especially in arid zones.
- Bush or forested areas may include stone artefact scatters, campsites and earth ovens.
- Areas of natural vegetation or intact ground surfaces such as parks, open land or road verges may contain artefact scatters or subsurface archaeological material such as burials and earth ovens.

A person who discovers an Aboriginal site, object or remains must not damage, disturb or interfere with the site, object or remains without an authorisation from the Minister. Disturbing Aboriginal sites can cause strong offence to Aboriginal people. The cultural and archaeological values of a site can also be diminished if parts of it are removed or disturbed. Anyone discovering an Aboriginal site, object or remains should take care not to disturb or damage the site, object or remains.

Any activity which may be impacting on a site must stop immediately and contact should be made with the Aboriginal Affairs and Reconciliation, Department of State Development (DSD-AAR) on (08) 8226 8900.

If the site is avoidable, adjust plans and works may continue. It is required under the Act that the site be reported.

If damage is unavoidable, the developer will need to discuss seeking an authorisation under section 23 of the Act.

Records must be kept of what was located and where; map any visible boundaries of the site.

Any skeletal remains found should be left completely undisturbed and the South Australian Police should be notified immediately on 131 444.

Notifications of the discovery of sites, objects or remains can be made to the Minister through the Aboriginal Heritage Team at DSD-AAR on (08) 8226 8900.

The Aboriginal Heritage Team at DSD-AAR provided charts that outline the protocols following the discovery of Aboriginal heritage (see Appendix). The charts differ dependent on whether the proponent holds, or doesn't hold, a section 23 authorisation (see Appendices 10.1-10.3).

5 Heritage Register Searches

Various levels of heritage protection for places in South Australia exist based on the place's significance and attributes. Heritage is made up of aspects of the past and present that are important to preserve for future generations. This can include archaeological sites and artefacts; caves, mines, volcanic features, geological sites and fossils; historical buildings and monuments; relics of agricultural and industrial heritage; lighthouses and whaling stations; and wilderness, coastlines and threatened species.

The distinct types of heritage are managed by various government agencies, local councils, peak bodies and legislation. Registers are maintained to keep publically available lists of heritage sites at international, national, state and local levels.

5.1 World Heritage

World Heritage sites that are nominated for World Heritage listing are inscribed on the list only after they have been carefully assessed as representing the best examples of the world's cultural and natural heritage. Australia currently has 19 properties on the World Heritage List. A search of the World Heritage List revealed that none of these sites are located within the survey area.

5.2 National Heritage

The National Heritage List is Australia's list of natural, historic and Indigenous places of outstanding significance to the nation. There are currently 107 places on Australia's National Heritage list; a search of this list revealed that none of these sites are located within the survey area.

5.3 Commonwealth Heritage

The Commonwealth Heritage List is a list of natural, Indigenous and historic heritage places owned or controlled by the Australian Government. These include places connected to defence, communications, customs and other government activities that also reflect Australia's development as a nation. Australia currently has 397 properties on the Commonwealth Heritage List, 11 of which are in South Australia. A search of this list revealed that none of these places are located within the survey area.

5.4 South Australia State Heritage

The South Australian Heritage Register contains a description or notes with respect to places of heritage value in South Australia. It includes heritage areas, places and related objects of State significance and records other categories of heritage places in South Australia (including local, national and world heritage places) which are protected under legislation.

The Register is administered by the South Australia Heritage Council pursuant to the *Heritage Places Act 1993*.

There are over 2,285 confirmed State heritage places entered in the Register. A search of the SA Heritage Register revealed that none of these places are located within the survey area. However, five State Heritage listed places are located within the wider Mallala region (see Table 5-1).

Table 5-1: South Australian state heritage places within the Mallala region.

Details	Address	Subject Index	Class	State Heritage ID	Heritage Number
Mallala Hotel	Adelaide Road, Mallala	Hotels, motels & accommodation - Hotel	State	11905	13316
Mallala Soldiers Memorial	Cross Road, Mallala	Monuments and memorials - War Memorial	State	12983	13317
Mallala & District Museum (former Flour Mill) and Wall	1 Dublin Road, Mallala	Manufacturing and processing - Flour Mill; Miscellaneous - Fence, Gate or Wall; Recreation and entertainment - Museum; Commerce (retail and wholesale) - Warehouse	State	12981	13314
Mallala Station (Dwelling, Store & Cottage)	Wasleys Road, Mallala	Farming and grazing - Homestead Complex; Education - Primary School	State	12976	13319
Konzag Homestead Complex (including Stone and Pug Cottage, Stone Barn and Thatched Implement Shed)	Wasleys Road, Mallala	Farming and grazing - Farm Group; Farming and grazing - Farm House	State	14216	13318

5.5 National Trust of South Australia Properties

The National Trust of South Australia (NTSA) actively conserves, manages and promotes South Australia's indigenous, natural, built, historic heritage and culture, and does so as a community-based, not-for-profit, non-government organisation. There are no places managed by the NTSA within the survey area.

5.6 Register of the National Estate (Archive)

The Register of the National Estate (RNE) was closed in 2007 and is no longer a statutory list. In 2003, two new heritage lists were created. Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) the National Heritage List includes places of outstanding heritage value to the nation, and the Commonwealth Heritage List includes heritage places owned or controlled by the Commonwealth (as detailed above). The Register of the National Estate is now maintained on a non-statutory basis as a publicly available archive and educational resource. The existence of an entry for a place in the Register of the National Estate does not in itself create a requirement to protect the place under Commonwealth law. Nevertheless, information in the register may continue to be current and may be relevant to statutory decisions about protection. RNE places can be protected under the EPBC Act if they are also included in another Commonwealth statutory heritage list or are owned or leased by the Commonwealth. For example, RNE places owned or leased by the Commonwealth are protected from any action likely to have a significant impact on the environment.

In addition, places in the RNE may be protected under appropriate state, territory or local government heritage legislation. A search of the RNE found that no places on the register are located within the survey area. However, three places are located in the broader Mallala region. These are all "Indicative Properties", which means that data provided to or obtained by the Heritage Branch has been entered into the database. However, a formal nomination has not been made and the Department has not prepared all the data necessary for a nomination.

Table 5-2: Places on the Register of the National Estate (Archive) located within the Mallala region.

Name	List	Class	Legal Status	Location	Place ID	Place File Number
Red Banks Road Bridge, Red Banks Barabba Rd, Red Banks via Mallala, SA, Australia	RNE (Non-statutory archive)	Historic	Indicative Place	About 5km east of Mallala at Red Banks, over the Light River.	15181	3/08/045/0008
St Peters Anglican Church, Aerodrome Rd, Mallala, SA, Australia	RNE (Non-statutory archive)	Historic	Indicative Place	Aerodrome Road, Mallala.	6997	3/08/045/0004
East Brothers Foundry (former), Dublin Rd, Mallala, SA, Australia	RNE (Non-statutory archive)	Historic	Indicative Place	Corner Dublin Road and Railway Road, Mallala.	6998	3/08/045/0005

5.7 Local Council Cultural Heritage

The survey area is located within the Adelaide Plains Council area. The council was contacted in June 2017 to provide information about locally significant sites within the survey area. Their recommendation was to refer to the website for the Mallala Museum (www.mallala.nowandthen.net.au). This website was searched for any information about locally significant places in the survey area. The nearest place indicated on the website is located approximately 1 km to the south west of the survey area. This is the location of the Reeves Plains Primitive Methodist Church, which was built in 1873 and was demolished in 1948, after which time the land was donated to the Reeves Plains Tennis Club.

5.8 Native Title

A native title claimant application is made by a group of people, a native title claim group, who declare they hold rights and interests in an area of land and/or water according to their traditional laws and customs. The members of a native title claim group are seeking a decision from the Court that native title exists, so their rights and interests are recognised by the common law of Australia. This is called a native title determination. A determination is a decision by the Federal Court or High Court of Australia, or a recognised body, that native title either does or does not exist in relation to a particular area of land or waters (National Native Title Tribunal 2017). If the Court finds that native title rights and interests exist, the group must set up a prescribed body corporate to hold the rights and interests, as an agent, or in trust, for the group.

The survey area is located within the Native Title application area of the Kurna peoples. This claim is detailed in Table 3. Map 1-3 shows the location of the claim area The Kurna people are the Indigenous group that should be contacted regarding cultural heritage in the survey area.

Table 5-3: Native title application within the survey area as per federal court (31st May 2017)

Tribunal ID	Name	FC No	Registration Test Status
SC2000/001	Kaurna Peoples Native Title Claim	SAD6001/2000	Accepted for registration

6 Aboriginal Archaeology

6.1 Overview

Aboriginal people had lived in the Adelaide Plains region for many thousands of years prior to European arrival in 1836. At this time, their population was estimated at 300 individuals (Hemming and Clarke 1989). The Adelaide Plains extend from near Crystal Brook in the north, to Cape Jervis in the south, and inland to the Mount Lofty ranges. They were rich in animal and plant food prior to European arrival. Large game, such as emus and kangaroos, were plentiful, along with smaller animals such as bandicoots, possums, rodents, reptiles, and birds. There were also numerous edible plants (Clarke 2013).

The cultural connections of the Kurna Aboriginal people to the environment of the Adelaide Plains are strong and complex. Kurna people managed and preserved their lands. They used fire to clear old grasses and promote fresh plant growth. Fresh water rock holes were covered with slabs of stone or brushwood to keep the water clean and to prevent animals from drinking from them. Track ways were maintained, linking places and people.

Some Aboriginal groups perceived human-like qualities of their landscape, the reasons for which often stated in 'Dreaming' stories (Clarke 1991). The Kurna people's Dreaming of Tjilbruke (creation of the coastal springs) is one of their traditions that is closely tied to the coast and Adelaide Plains (see Figure 6-1). Dreaming stories and the continuity of cultural practices and connections that exist in areas of the Adelaide Plains, despite interference from Europeans, is testament to the strong connections that Kurna people have with the region.

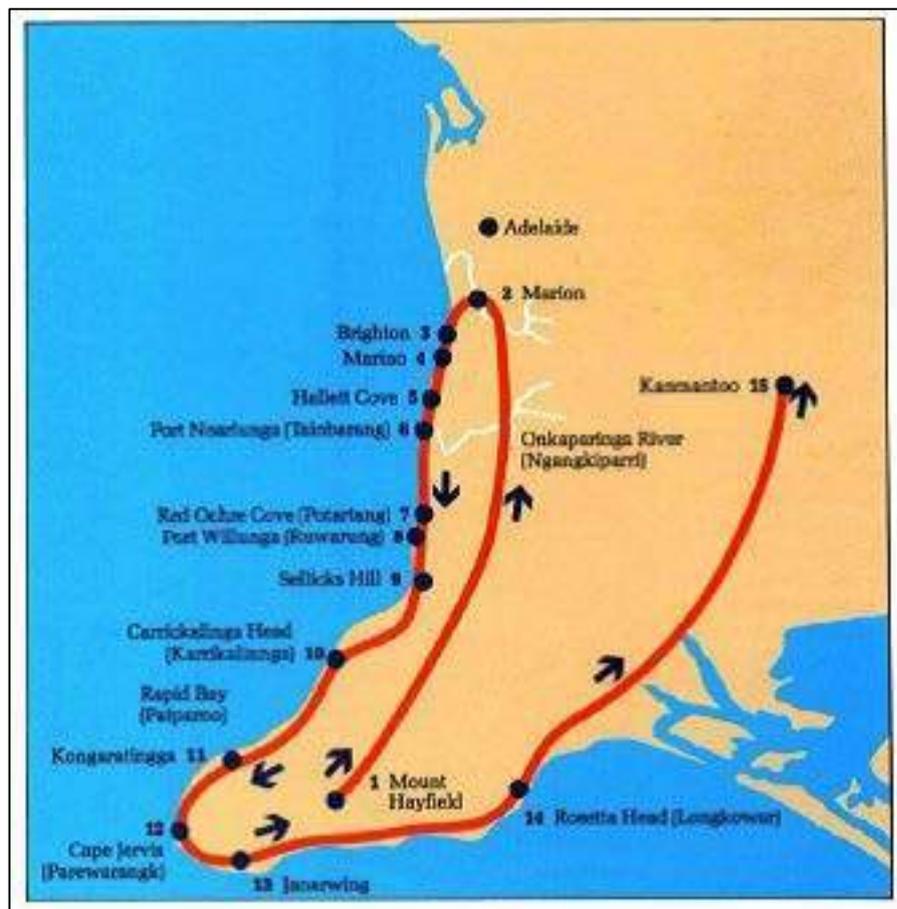


Figure 6-1: The Kurna Dreaming of Tjilbruke: creation of the coastal springs.

6.2 Predictive Modelling

Based on the results of previous archaeological surveys in the Adelaide Plains, it is possible to predict with some certainty the type of sites that may be discovered, their frequency, and where the most likely areas of encountering new sites will be. This modelling allows for a more focused survey of the area; it promotes critical thinking about how people may have utilised an area and how this may manifest in the landscape. Most importantly, it hones the model of where sites may be in this landscape and allows the client to use this information in future planning with a view to avoiding areas that are more likely to contain Aboriginal heritage sites.

Based on the landforms within the project areas, which consist of open farmland with scattered trees, the following Aboriginal site types may be found there:

- Open campsites can contain hundreds of artefacts spread over wide areas. Artefacts and features within open campsites can include faunal remains, hearths, shell artefacts, and stone artefacts. These sites can provide highly significant information about past occupants of an area, their subsistence strategies and movement within the landscape.
- Quarries are places where raw material for the manufacture of stone artefacts has been acquired. They contain material suitable for this purpose and can be identified by outcrops of raw material and high densities of stone artefacts. Where suitable material exists, it is highly possible that this site type will be found within the survey area.
- Middens and mounds are sites where the debris from eating shellfish and other food has accumulated over time. They can contain: shellfish remains, bones of fish, birds, and land and sea mammals used for food, charcoal from campfires, tools made from stone, shell, and bone. Burials can also be found within midden/mound sites. The types of remains in a midden/mound can show the type of marine environment that was used, and the time of year when Aboriginal people used it. They are found throughout Australia, usually close to the food source. Landscapes in which middens/mounds are likely to be found include headlands, sandy beaches or dunes, around estuaries, swamp and tidal creeks and rivers, along the banks of rivers, creeks, and lakes. As the survey area is not directly adjacent to a water source, it is unlikely that middens will be found in the survey area, but cultural mounds may be found in the survey area.
- Rock art is the oldest surviving human art form; images on rocks were an important part of Aboriginal songs, stories, and customs that connected people with the land. There are a number of different styles of rock art used across Australia, including paintings and drawings and rock engravings. Paintings and drawings can still be found where they are protected from direct rain and sun, such as rock caves, rock shelters and cliff faces. Engravings are outlines or filled-in figures, created on rock surfaces by pecking, hammering or scraping. Aboriginal rock art has very high significance and cultural value. Where suitable natural features exist in the survey area, it is possible, but not likely, that rock art will be present.
- Culturally modified trees bear scars resulting from removal of bark or wood by Aboriginal people in the past for the manufacture of canoes, shields and other artefacts. Most 'authentic' Aboriginal scarred trees are now well over a hundred years old and are becoming increasingly less commonplace as the host trees age, die or are removed. Nevertheless, they are still found throughout South Australia, and it is possible that they exist in the survey area.
- Burials and skeletal remains are of great significance to Aboriginal people who feel strongly about the removal of remains from gravesites. Aboriginal remains may be uncovered by natural forces or when sand or soil is being moved during a development, for example, industrial and residential development, road-works, mineral or petroleum exploration and practices associated with agriculture, pastoralism and tourism. Skeletal remains are often found interred within occupation mounds.

6.3 AARD Central Archive

The Central Archive, including the Register of Aboriginal Sites and Objects, maintained by AARD, is a record of previously recorded Aboriginal sites in South Australia. It is a mechanism whereby Aboriginal sites can be identified on a parcel of land prior to the commencement of development activities or ground disturbance work.

Please note that the Central Archive is not a comprehensive record of all Aboriginal sites and objects in a designated area; Aboriginal sites and/or objects may still be present, but may not have been registered. If this is the case, once detected, all Aboriginal sites and objects in South Australia are awarded protection under the *Aboriginal Heritage Act 1988*.

A search of the central archive which includes the Register of Aboriginal Sites and Objects (the Register), administered by the Department of State Development, Aboriginal Affairs and Reconciliation (DSD-AAR), has no entries for Aboriginal sites within the project area. However, sites or objects may exist in the project area, even though the Register does not identify them. All Aboriginal sites and objects are protected under the Aboriginal Heritage Act 1988 (the Act), whether they are listed in the central archive or not. Land within 200 metres of a watercourse (for example the River Murray and its overflow areas) in particular, may contain Aboriginal sites and objects.

7 Heritage Survey and Results

The whole of the farm area was inspected for Indigenous archaeological deposits, this includes all paddocks and the areas immediately around the homestead and equipment sheds. The proposed works site was found to be highly disturbed by pastoral activities such as ploughing, the excavation of dam and refuse pits, construction of various structures, deep rutted tracks, fencelines and by trenching for the placement of utilities (telecommunications cables and a high pressure gas pipe line). Refuse and hardware relating to pastoral activities also litter the ground in places (see Figure 8-1).

Ground visibility was less than 5% in the main paddocks and impaired largely by the remnants of a wheat crop (see Figure 8-2). All exposures were inspected for cultural material. Ground sediments are thick and loamy and are overlain in places by limestone nodules which appear to have been churned up by ploughing (Figure 8-3). Many nodules have been cracked by plough impacts. Only four pieces of quartz and one of silcrete (the material commonly used for stone tool manufacture on the Adelaide Plain) were observed and none had been deliberately culturally modified.

Modern plantings of *Eucalyptus Porosa* (Mallee Box) and a variety non-indigenous trees and shrubs occur along the fencelines and around the homestead. All large trees were inspected for cultural scars which may have resulted from Indigenous utensil manufacture (bowls, shields etc).

No Aboriginal artefacts were located during the archaeological survey. Any which may have been present in pre-colonial times have now been broken up or dispersed by the industry which occurred here in historical times. Given the lack of any artefacts, it appears that at best one or two isolated pieces may have been present rather than large sites or large stone tool assemblages for there would still be some evidence of these on the surface and would have been ploughed up year after year. The survey area with its lens of limestone nodules just below the surface may have been unsuitable for Indigenous uses. The Mallee Box (appears to be a species not suited for utensil production) and only recently planted, exhibited no cultural scarring - nor did any of the exotic trees planted around the homestead.

The whole of the surveyed area is now archaeologically cleared for the works to proceed. See Map Map 7-1 (below).



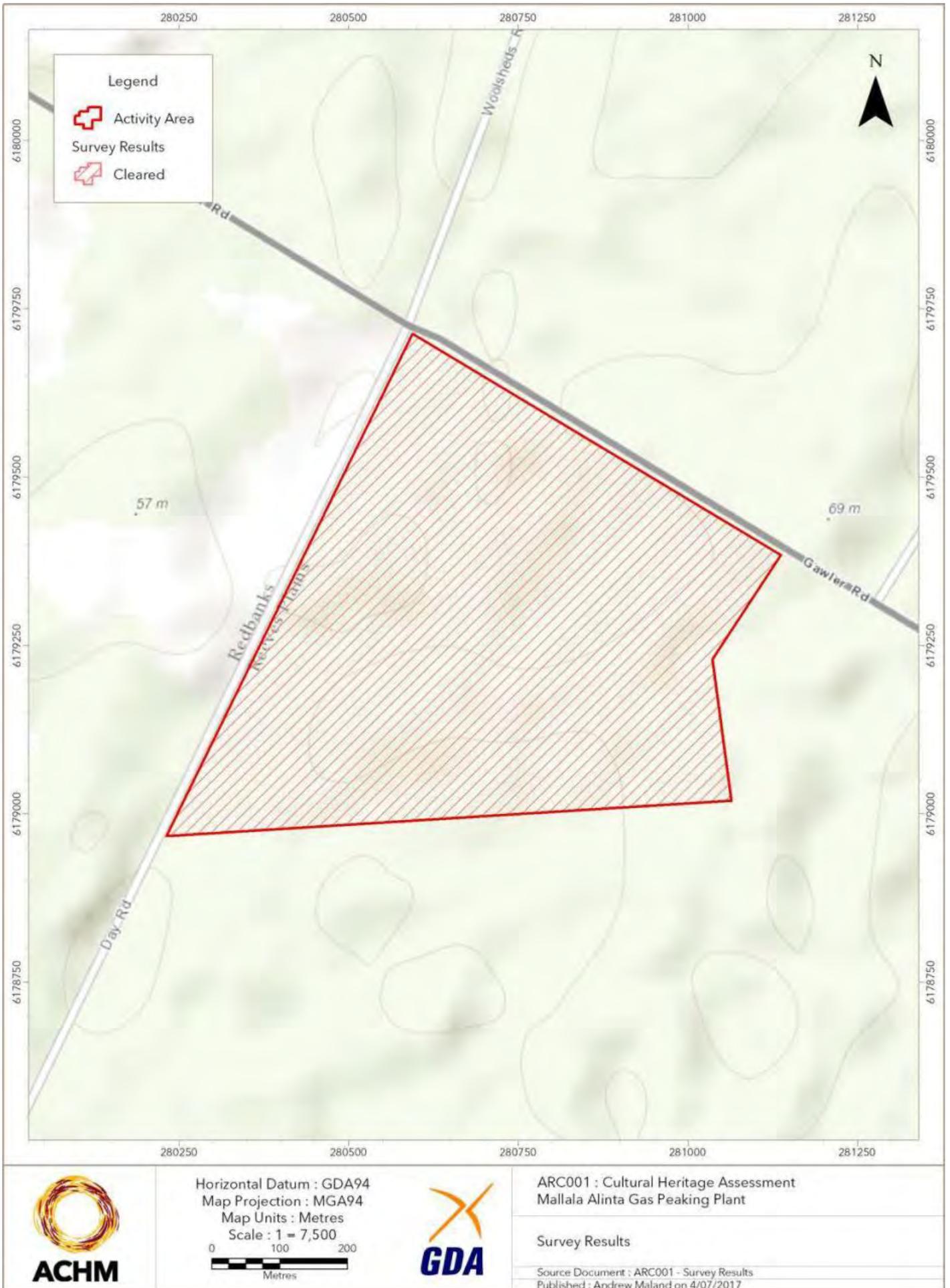
Figure 7-1: Former dam reused as refuse pit on western edge of property, view south



Figure 7-2: Reduced ground visibility due to wheat crop, view east



Figure 7-3: Limestone nodules evident in plough furrows



Map 7-1: Surveys Results Map.

8 Summary

The following information was obtained as a result of searches of the relevant heritage databases, historical and literary research into the Aboriginal occupation of the area, and historical and literary research into the colonial settlement of the area.

- A search of the World Heritage List revealed that no World Heritage sites are located within the survey area.
- A search of Australia's National Heritage list revealed that no National Heritage sites are located within the survey area.
- A search of the Commonwealth Heritage register revealed that no Commonwealth Heritage sites are located within the survey area.
- A search of the South Australian Heritage Register revealed that no State Heritage places are located within the survey area.
- A search of the National Trust of South Australia (NTSA) database revealed that there is no sites are located within the survey area that are managed by the NTSA.
- A search of the archived Register of the National Estate found no places on the register are located within the survey area.
- A query with the Adelaide Plains Council found no places of local significance within the survey area.
- The survey area is located within the area over which one native title claim exists (Kurna Peoples), which has been accepted for registration.
- There are no recorded Aboriginal heritage sites within the designated investigation area according to the Central Archive of the Aboriginal Affairs and Reconciliation Division (AARD) of the Department of the Premier and Cabinet

An Aboriginal cultural heritage assessment (archaeological site survey) was undertaken by ACHM archaeologist Martin Wimmer and Kurna Nations Cultural Heritage Association (KNCHA) representatives Jenny Wright and Garth Agius on 29 of June 2017. The following observations are noted from the survey:

- The proposed works footprint straddles a highly disturbed pastoral landscape which has been ploughed, trenched, driven across, excavated and built on.
- Sections have been re-planted with *Eucalyptus Porosa* (Mallee Box) and assorted non-indigenous trees and shrubs. These occur mainly along the fencelines and around the homestead
- The soil is thick and loamy and appears to overlay limestone. Many limestone nodules have been churned up by seasonal ploughing and have been cracked by plough impacts
- No Aboriginal artefacts were observed in the paddock earmarked for development and none were observed in the adjoining paddocks or around the homestead
- Very little stone suitable for tool making (quartz or silcrete) was observed
- The re-planted trees are too young and also of a type unsuitable for manufacturing Aboriginal utensils consequently none exhibited cultural scars

The following recommendations have been made for this project:

Based on the results of the desk top research outlined in this report and archaeological field work carried out across the proposed works footprint, ACHM in consultation with KNCHA have no objection to the project proceeding. It is however recommended that the works be confined to the area archaeologically cleared to avoid impacting any Aboriginal heritage which may be extant on adjoining properties and paddocks that have not been investigated.

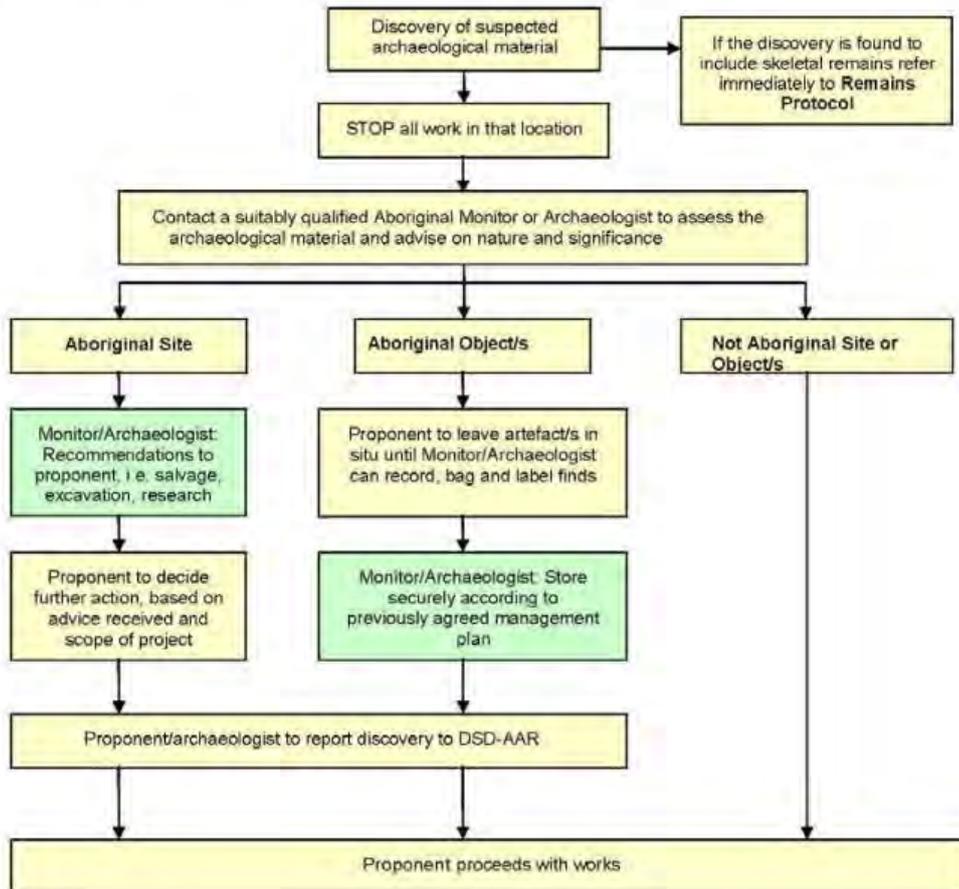
9 Appendices

9.1 Aboriginal Heritage Discovery Protocol for proponents holding a section 23 authorisation: Dealing with the discovery of Aboriginal sites and objects.

ABORIGINAL HERITAGE DISCOVERY PROTOCOL
For proponents holding a section 23 Authorisation

Dealing with the discovery of Aboriginal sites and objects

It is recommended that prior to beginning works, proponents undertaking ground disturbing works in high risk areas negotiate with Aboriginal groups and an archaeologist a plan for managing the discovery of any Aboriginal sites and/or objects.

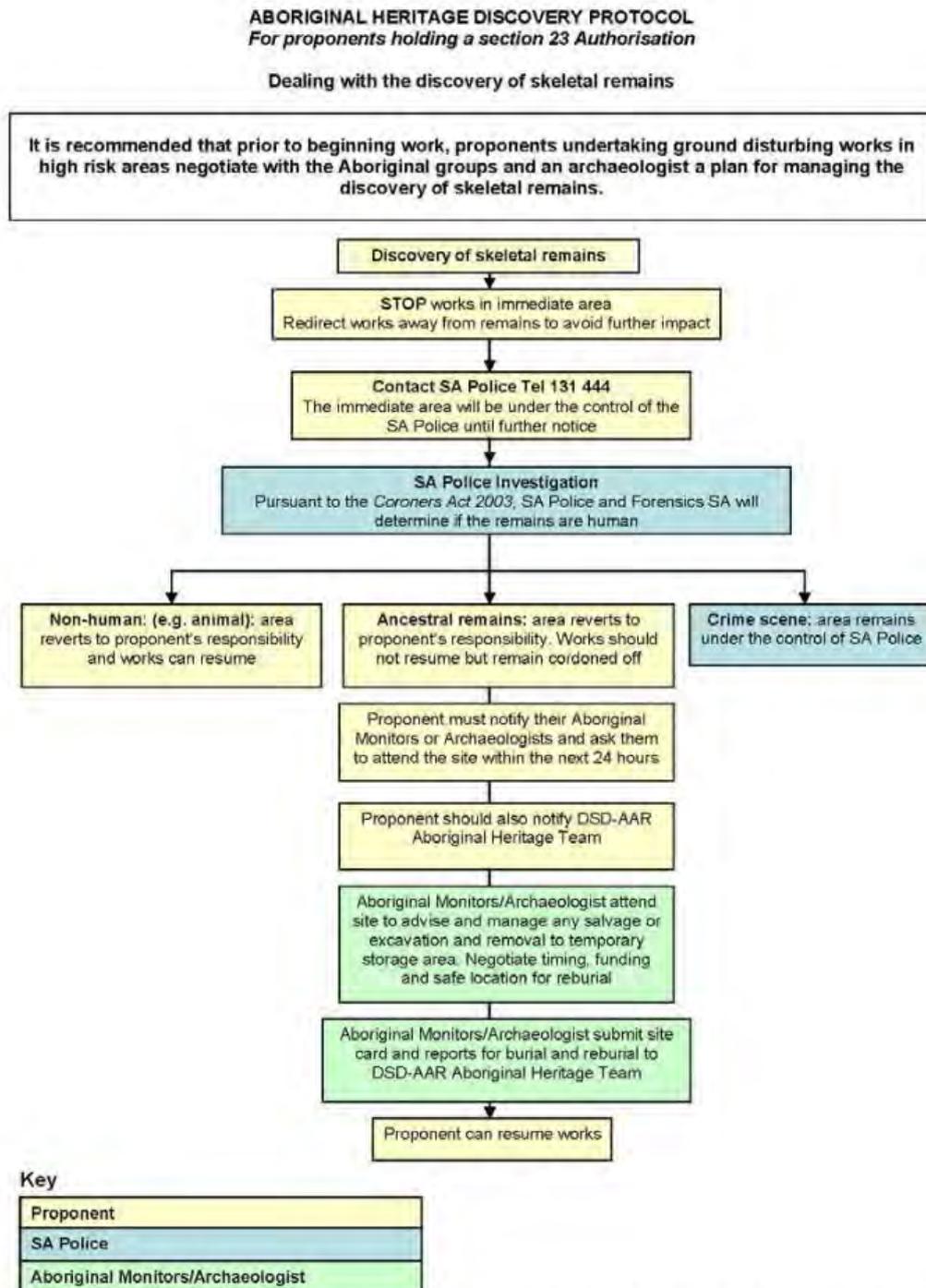


Key

Proponent
Monitor/Archaeologist

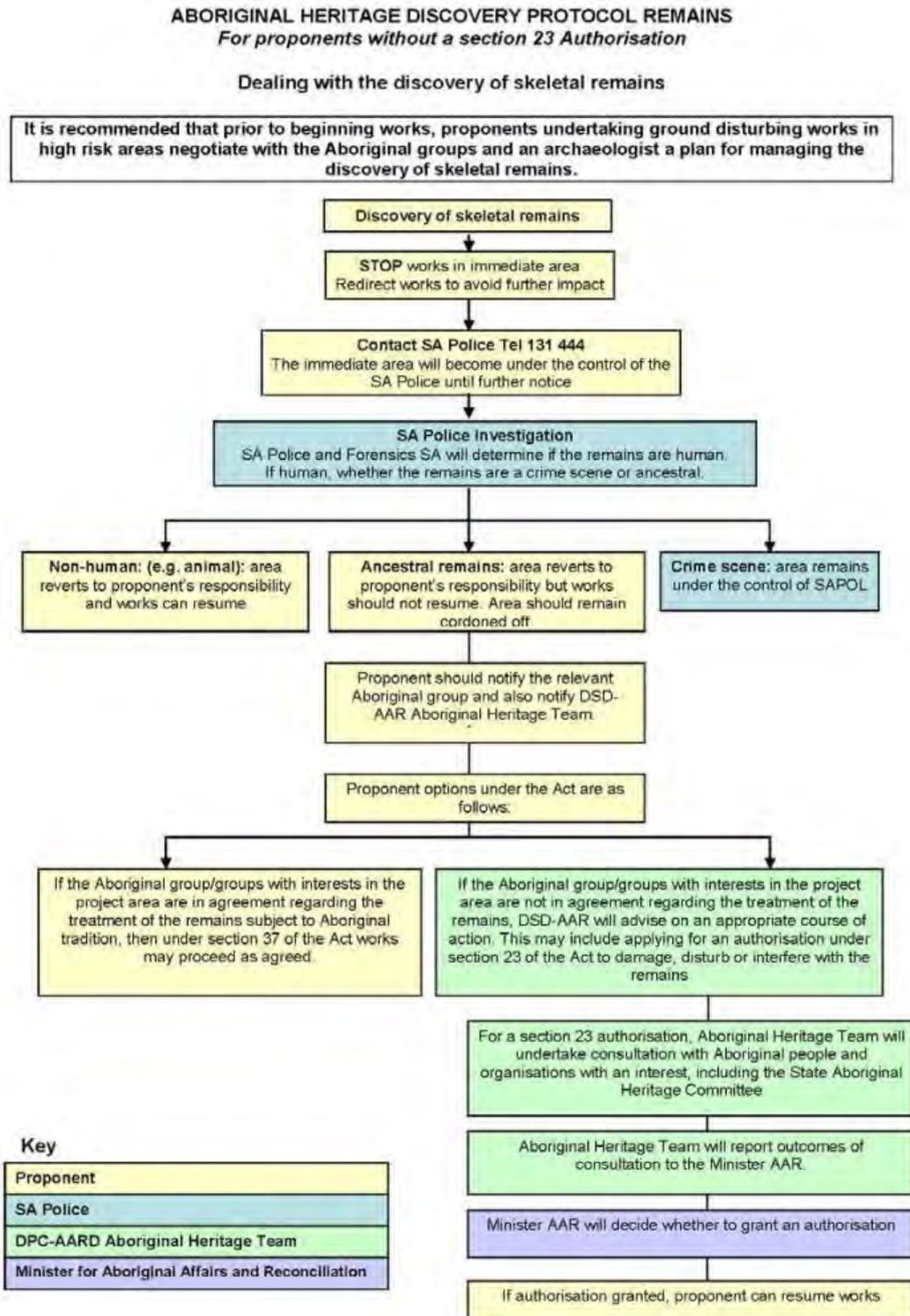
As part of project planning, proponents may allocate a secure on-site storage area for the temporary securing of objects, pending repatriation.

9.2 Aboriginal Heritage Discovery Protocol for proponents holding a section 23 authorisation: Dealing with the discovery of skeletal remains.



As part of project planning, proponents may allocate a secure on-site storage area for the temporary securing of remains, pending reburial.

9.3 Aboriginal Heritage Discovery Protocol for proponents without a section 23 authorisation: Dealing with the discovery of skeletal remains.



10 Bibliography

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11 Appendices

APPENDIX N – PHASE 1 PRELIMINARY SITE ASSESSMENT

PHASE 1 PRELIMINARY SITE ASSESSMENT

1629 Redbanks Road, Reeves Plains, South Australia

13 SEPTEMBER 2017

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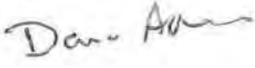
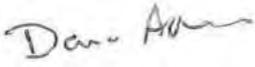
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ALINTA ENERGY PTY LIMITED PHASE 1 PRELIMINARY SITE ASSESSMENT

1629 Redbanks Road, Reeves Plains, South
Australia

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Report No	10005589-R01B-02	
Date	11/09/2017	
Revision Text	02	

This report has been prepared for Alinta Energy Pty Limited in accordance with the terms and conditions of appointment for Reeves Plains Power Station dated 9 May 2017. Arcadis Australia Pacific Pty Limited (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

REVISIONS

Revision	Date	Description	Prepared by	Approved by
01	4/08/2017	Draft for Internal Review	Y Ma	E Cook
02	11/09/2017	Issue to client	E Cook	D Adams

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LotSearch Report

1 EXECUTIVE SUMMARY

Arcadis Australia Pacific Pty Ltd was commissioned by Alinta Energy to conduct a Preliminary Site Assessment (PSA) at 1629 Redbanks Road, Reeves Plains, South Australia, herein referred to as the 'site'. Refer to **Figure 1 Appendix A** for the site location and **Figure 2 Appendix A** shows the current site layout.

The scope of work comprised a search of site history data.

The current site layout comprises a group of farm buildings, including a farm house located in the north-eastern portion of the site. The western/southern portion of the site is used as arable farmland. The south-eastern portion comprises a paddock. The site itself is zoned as Primary Production. A Lotsearch report which was commissioned for the site (**Appendix B**) indicated that the elevation of the site is approximately 45 mAHD and the site itself is relatively flat. Aerial imagery dating back to 1949 indicates the site to have undergone a number of building changes from 1949 to 1979, a dam in the western portion of the site was present in 1949 but is no longer present on site, debris was observed in this area from 1987 to present. A historical map dated 1982 notes a buried pipeline (use not identified) running north-south across the western part of the site.

The site is underlain by Hindmarsh Clay, Carisbrooke Sand, Ochre Cove Formation, Seaford Formation of Pliocene – Pleistocene age. Soil types likely present on site have been identified as loam over poorly structured red clay in the north-western portion, and calcareous loam over the remainder of the site.

The groundwater in the region ranges from fresh to brackish with an approximate TDS of 0 – 1,500 mg/L. However, TDS data from 15162 indicates that the groundwater in close proximity to the site may be saline (8,476 mg/L). A registered irrigation bore, 15162 is located approximately 2 km south of the site.

There were no identified ecological or cultural heritage constraints associated with the site. No current EPA listings are associated with the site.

Based on the desktop information of the site history, the following chemicals of potential concern were identified: herbicides and pesticides associated with agricultural land use. Asbestos and lead paint could potentially be present within the farm buildings given their age or within the soil in the vicinity of demolished buildings (present at least since 1949, based on aerial imagery). In addition, debris to the west of the site, and potentially material used to fill the former farm dam, may contain contaminants including asbestos, total recoverable hydrocarbons, polyaromatic hydrocarbons and metals.

Based on the above findings, targeted soil sampling for herbicides and pesticides, as well as a survey of potentially asbestos and lead containing materials associated with the farm buildings should be considered before physical works on site commence. Waste in the western portion of the site should be investigated to determine its extent and any contaminant impacts. This will help determine the best method for managing any potential risks identified and to avoid impacts to any sensitive receptors, particularly during the construction phase of the Project.

2 INTRODUCTION

Arcadis Australia Pacific Pty Ltd was commissioned by Alinta Energy to conduct a Preliminary Site Assessment (PSA) at 1629 Redbanks Road, Reeves Plains, South Australia, herein referred to as the 'site'. Refer to **Figure 1 Appendix A** for the site location and **Figure 2** for the current site layout.

The Reeves Plains Power Station Project involves the construction and operation of a gas fired power station and associated infrastructure (the Project). The project proponent is Alinta Energy (Reeves Plains) Pty Limited (Alinta Energy). The power station will be located at 1629 Redbanks Road on a 41 ha rural site located in Reeves Plains, approximately 12 km south-east of Mallala and 50 km north of Adelaide.

The power station will operate as a 'peaker', providing electricity during periods of high demand. It will be designed to generate up to 300 megawatts (MW) of power and will be delivered in two stages with up to 150MW installed initially with further build out as required by prevailing market conditions. The Project includes the following infrastructure:

- A gas receival station
- Up to six (6) dual fuel (gas and diesel) turbines each capable of generating 50MW of power
- Three (3) transformers designed to convert low voltage electricity into high voltage electricity
- Connection to the electricity network including a new substation, transmission tower and communications tower
- Water supply and storage including:
 - Water treatment plant
 - Water storage tanks
 - Firefighting system
- Evaporation pond
- Diesel storage

Also included within the Project are the following:

- Control rooms, workshop and maintenance facilities and administration building
- Security fencing and lighting
- Onsite drainage works
- Upgrade to the Redbanks Road and Day Road intersection and sealing of Day Road from Redbanks Road to the Project entrance
- Carparking for employees and contractors
- Demolition of existing buildings onsite
- Landscaping

The Project is required to obtain development consent from the State Commission Assessment Panel before proceeding. Construction of the Project is scheduled to commence in 2018 with operation of the power station occurring in Q1 2020 at the earliest.

2.1 Objectives

The objective of this assessment was to provide an appropriate level of due diligence to identify the potential for contamination so it can be appropriately considered and managed in subsequent project phases.

2.2 Scope of Work

Arcadis completed the following scope of works:

- A site history report for the area was commissioned. This included: planning zones, published geology and hydrogeology, EPA records of environmental audits, notices, waste facilities in the area and historical aerial photos;
- Site history information was compiled and assessed for any additional potential contamination issues.
- The development risks associated with land and groundwater contamination were reviewed; and
- Preparation of this report detailing the findings of the assessment.

2.3 Report Limitations

The findings of this report are based on the Scope of Work described in this report. Arcadis Australia Pacific Pty Limited (Arcadis) performed the services in a manner consistent with the level of care and expertise exercised by members of the environmental profession.

No warranties, express or implied, are made. Subject to the Scope of Work, Arcadis' assessment is limited strictly to identifying typical environmental conditions associated with the subject property.

While normal assessments of data reliability have been made, Arcadis assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Arcadis, or developments resulting from situations outside the scope of this project

Arcadis prepared this report for the sole and exclusive benefit and use of the client. Notwithstanding delivery of this report by Arcadis or the client to any third party, any copy of this report provided to a third party is provided for informational purposes only, without the right to rely.

Information from samples collected by Arcadis personnel relating to soil, groundwater, waste, air or other matrix conditions in this document is considered to be accurate at the date of issue. Surface, subsurface and atmospheric conditions can vary across a particular site or region, which cannot be wholly defined by investigation. As a result, it is unlikely that the results and estimations presented in this report will represent the extremes of conditions within the site that may exist. Subsurface conditions including contaminant concentrations can change in a limited period of time and typically have a high level of spatial heterogeneity.

From a technical perspective, there is a high degree of uncertainty associated with the assessment of subsurface, aquatic and atmospheric environments. They are prone to be heterogeneous, complex environments, in which small subsurface features or changes in geologic conditions or other environmental anomalies can have substantial impact on water, air and chemical movement.

Arcadis' professional opinions are based upon its professional judgment, experience, and training. These opinions are also based upon data derived from the limited testing and analysis described in this report. It is possible that additional testing and analysis might produce different results and/or different opinions. Arcadis has limited its investigation(s) to the scope agreed upon with its client.

That standard of care may change and new methods and practices of exploration, testing and analysis may develop in the future, which might produce different results.

3 SITE CHARACTERISTICS

A search of available information was commission for the site on 31/07/2017 and is presented in **Appendix B**.

3.1 Site Description

The site is bounded by Day Road to the west and Redbanks Road to the north and farmland to the south. A number of farm buildings occupy the north-eastern portion of the site.

Based on current aerial imagery of the site, the site surface is mostly covered in crops with a sparse area of vegetation grouped in close proximity to the farm buildings in the north-eastern portion of the site. The current site layout comprises a group of farm buildings, including a farm house located in the north-eastern portion of the site. The western/southern portion of the site is used as a farmland for crops. The south-eastern portion comprises a paddock.

3.2 Site Identification

The site details are summarised in **Table 3-1**.

Table 3-1 Summary of Site Details

Characteristic	Detail
Site Address	1629 Redbanks Road, Reeves Plains, S.A.5502
Certificate of Title	Vol: 5887 Fol: 243 Lot 1 on Plan 22848
Local Government Area	Mallala
Current Land Use	Farmland
Property Area	Approximately 41 hectares
Site Zoning	Primary production

The site is surrounded by farmland. The surrounding land use are detailed in **Table 3-2** below.

Table 3-2 Surrounding Land Uses

Location	Description
North	Redbanks Road and farmland (paddocks), farm houses
East	Farmland (paddocks), farm houses
South	Verner Road and farmland (paddocks), farm houses
West	Day Road and farmland (paddocks), farm houses

3.3 Cultural Heritage Sensitivity

There were not identified cultural heritage sensitivity areas for the site.

3.4 Land Development Zones

The site itself is zoned as primary production (Department of Planning, Infrastructure and Transport). An area zoned as rural living is located approximately 500 m to the northeast.

3.5 Natural Hazards

The property is mapped as a “General” bushfire risk.

3.6 Ecological Constraints

There are currently no identified ecological constraints based on the Lotsearch information.

3.7 Topography

Site elevation is approximately 48 m AHD and is relatively flat across the site.

3.8 Regional Geology

The Department of Environment, Water and Natural Resources 1: 1,000,000 Surface Geology Map indicates the site is underlain by (TpQa5) Hindmarsh Clay, Carisbrooke Sand, Ochre Cove Formation, Seaford Formation of Pliocene – Pleistocene age.

Soil types likely present on site have been identified as:

- North-western portion: Loam over poorly structured red clay
- Remaining portion of site: Calcareous loam

3.8.1 Acid sulfate soils risk

The area is mapped on the Atlas of Acid Sulfate Soils (CSIRO) as being at extremely low probability of occurrence on site. The soil types on site are also classed as being of negligible potential for developing acid sulfate soils. This information agrees with the soil mapping for the site which indicated the presence of calcareous loams/loam across the site (see section above).

3.8.2 Soil salinity risk

The site has been mapped as being of negligible risk from water table induced soil salinity. However, the majority of the site is mapped as moderate soil salinity (surface ECe of 4-8 dS/m, subsurface ECe of 8 – 16 dS/m). The north-western portion of the site is mapped as moderately low soil salinity (surface ECe of 2-4 dS/m, subsurface ECe of 4-8 dS/m). Negligible Magnesia patches were mapped for the site.

3.9 Regional Hydrogeology

The site is located within a regional aquifer hosted in sedimentary rocks comprising limestone basins that may be cavernous, encompassing sandstone, sand shale and clay. The groundwater salinity is likely saline, with TDS in the nearby registered bore 151162, located approximately 2 km south of the site, measured at 8,476 mg/L. Regional TDS of the shallow aquifer system in the region, however, indicates that the regional groundwater may be fresh to brackish with a TDS range 0-1,500 mg/L (LocationSAViewer, accessed 03/08/2017). The depth to water table is estimated to be 10 to 20 m BGL (LocationSAViewer, accessed 03/08/2017).

3.10 Registered Groundwater Use

A search of the Department of Environment, Water and Natural Resources database identified five registered drill holes within 1 km of the property comprising:

- Three irrigation bores:
 - 151161 (abandoned)
 - 151162

- 151160 (abandoned)
- 149174 (backfilled)
- 149314, of unknown purpose.

A summary of the closest drill hole, 149174 is presented in **Table 3-3** below.

Table 3-3 Drill hole closest to site (within 500 m)

WELL ID	DISTANCE FROM SITE BOUNDARY	YEAR INSTALLED	USES	DEPTH (MAHD)	GROUND ELEVATION (MAHD)
149174	48 M NORTH	-	BACKFILLED	32.00	46.93

3.11 Mining

No records of mines or mineral deposits were identified in the Lotsearch for the site.

4 SITE HISTORY

4.1 Historical Aerial Photographs

A summary of the aerial photography is provided below in **Table 4-1**.

Table 4-1 Summary of Aerial Photography

Year	Detail
1949	The site appeared similar to its current day configuration, comprising a paddock stretching to the west and south of the site. A house and a number of buildings were located in the north-eastern portion of the site, surrounded by a sparse stand of trees. A dam with trees was located close to western boundary of the site.
1963	The house remained unchanged. A possible dirt track was present bounding the west and south of the north-eastern portion containing the various buildings and house. Two more farm buildings had been constructed. Further buildings towards the south of the eastern portion no longer appeared. There appeared to be decrease in vegetation surrounding the farm buildings.
1979	The dam along the western boundary appeared to have decreased in size. An additional two buildings were observed towards the south west of the established buildings in the north-eastern portion. The site and remaining surrounding area appeared unchanged.
1987	The dam in the western portion was no longer visible. The site and remaining surrounding area appeared unchanged.
1999	The western portion of site appeared to have a crop planted, debris was in the vicinity of the previous dam location. The surrounding area remained unchanged.
2005	An increase in debris in the vicinity of the previous dam was observed. The surrounding area remained unchanged.
2012	The site and surrounding area remained unchanged.

A historical map dated 1982 notes a buried pipeline running north-south across the western part of the site. The pipeline is identified as the Moomba-Adelaide Pipeline System (MAPS) which delivers gas from the Cooper Basin near Moomba to Adelaide.

4.2 Regulatory Review

4.2.1 EPA Site Contaminations Index

The site is not listed on the EPA Site Contamination Index.

4.2.2 EPA Environmental Protection Order

The site does not have an EPA Environmental Protection Order.

4.2.3 EPA Authorisations

There are currently no EPA Authorisations associated with the site.

4.2.4 EPA Assessment Areas

The site is not listed as an EPA assessment area.

4.2.5 Waste Management Facilities

There are no waste facilities listed on the National Waste Management Database within 100 m of the site.

4.2.6 EPA Approved Container Depots

The site is not listed as an EPA approved container depot.

4.3 Summary of Potential Historical Contamination Sources

Based on the limited information sourced as part of this assessment, the following contaminants of potential concern (COPC) may be present at the site.

Table 4-2 Contaminants of Potential Concern (COPC)

Description	Contaminants of Potential Concern
Farming	Herbicides, pesticides
Farm buildings	Potentially asbestos containing materials
Dumped waste (e.g. in area of former dam)	Asbestos, TRH, PAH and metals

4.4 Potential exposure pathways

The anticipated primary transport media for the migration of contaminants identified were:

- Dermal contact and ingestion of soil.
- Air inhalation of fugitive dust.
- Lateral migration of herbicides and pesticides within the groundwater.

4.5 Potential receptors of concern

Identified receptors include:

- On-site construction and maintenance/utility workers.
- Future industrial occupants.
- Off-site residential occupants.
- Users of groundwater abstraction bores.

No extractive uses of groundwater were identified in the immediate vicinity of the site. However, potential extractive uses of groundwater offsite (i.e. within 2 km) for irrigation was identified.

4.6 Summary of site history information

Review of the current and historical activities undertaken at the site did not identify any significant potential sources of contamination.

5 DEVELOPMENT RISK

The development is to include an evaporation pond and distillate storage. Without proper mitigation this has the potential to cause contamination onsite. Contamination risk will be mitigated by designing bunding around the distillate storage tanks in accordance with EPA guidelines 080/12 *Bunding and spill management*. The evaporation pond will be lined with a HDPE liner to ensure no leakage into the subsurface.

Fire suppression systems to be used onsite will be fluorine free.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The elevation of the site is approximately 45 mAHD and the site itself is relatively flat. Aerial imagery dating back to 1949 indicates the site to have undergone a number of building changes from 1949 to 1979, a dam in the western portion of the site was present in 1949 but is no longer present on site, debris was observed in this area from 1987 to present. A historical map dated 1982 notes a buried pipeline (use not identified) running north-south across the western part of the site.

The site is underlain by Hindmarsh Clay, Carisbrooke Sand, Ochre Cove Formation, Seaford Formation of Pliocene – Pleistocene age. Soil types likely present on site have been identified as loam over poorly structured red clay in the north-western portion and calcareous loam over the remainder of the site.

The groundwater in the region ranges from fresh to brackish with an approximate TDS of 0 – 1,500 mg/L. However, TDS data from 15162 indicates that the groundwater in close proximity to the site may be saline (8,476 mg/L). A registered irrigation bore, 15162 is located approximately 2 km south of the site.

There were no identified ecological or cultural heritage constraints associated with the site. No current EPA listings are associated with the site.

Based on the desktop information of the site history, the following chemicals of potential concern were identified: herbicides and pesticides associated with agricultural land use. Asbestos and lead paint could potentially be present within the farm buildings given their age or within the soil in the vicinity of demolished buildings (present at least since 1949, based on aerial imagery). In addition, debris to the west of the site, and potentially material used to fill the former farm dam, may contain contaminants including asbestos, total recoverable hydrocarbons, polyaromatic hydrocarbons and metals

6.2 Recommendations

Based on the above findings, targeted soil sampling for herbicides and pesticides, as well as a survey of potentially asbestos and lead containing materials associated with the farm buildings should be considered before physical works on site commence. Waste in the western portion of the site should be investigated to determine its extent and any contaminant impacts. This will help determine the best method for managing any potential risks identified and to avoid impacts to any sensitive receptors, particularly during the construction phase of the Project.

APPENDIX A

Figures

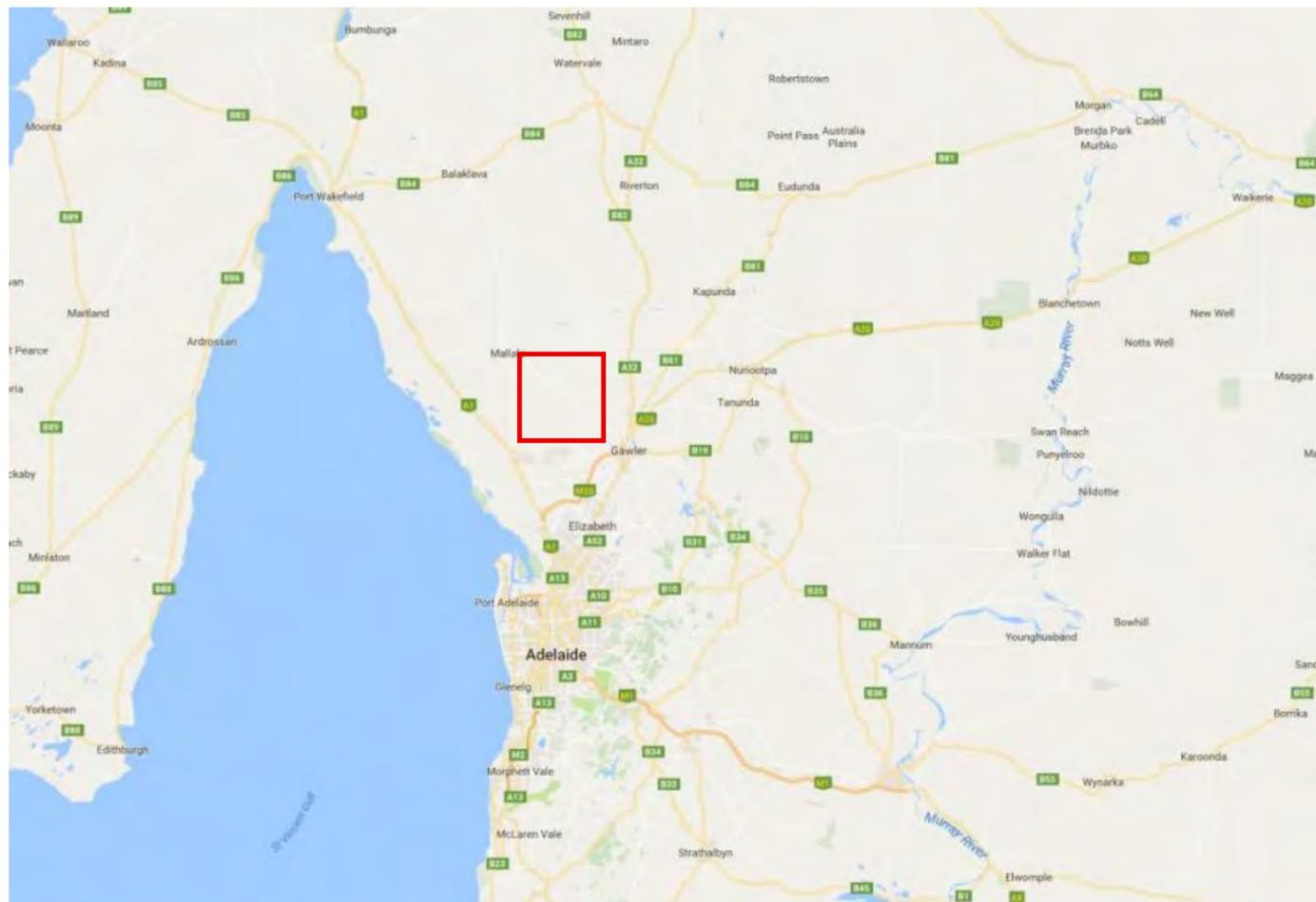
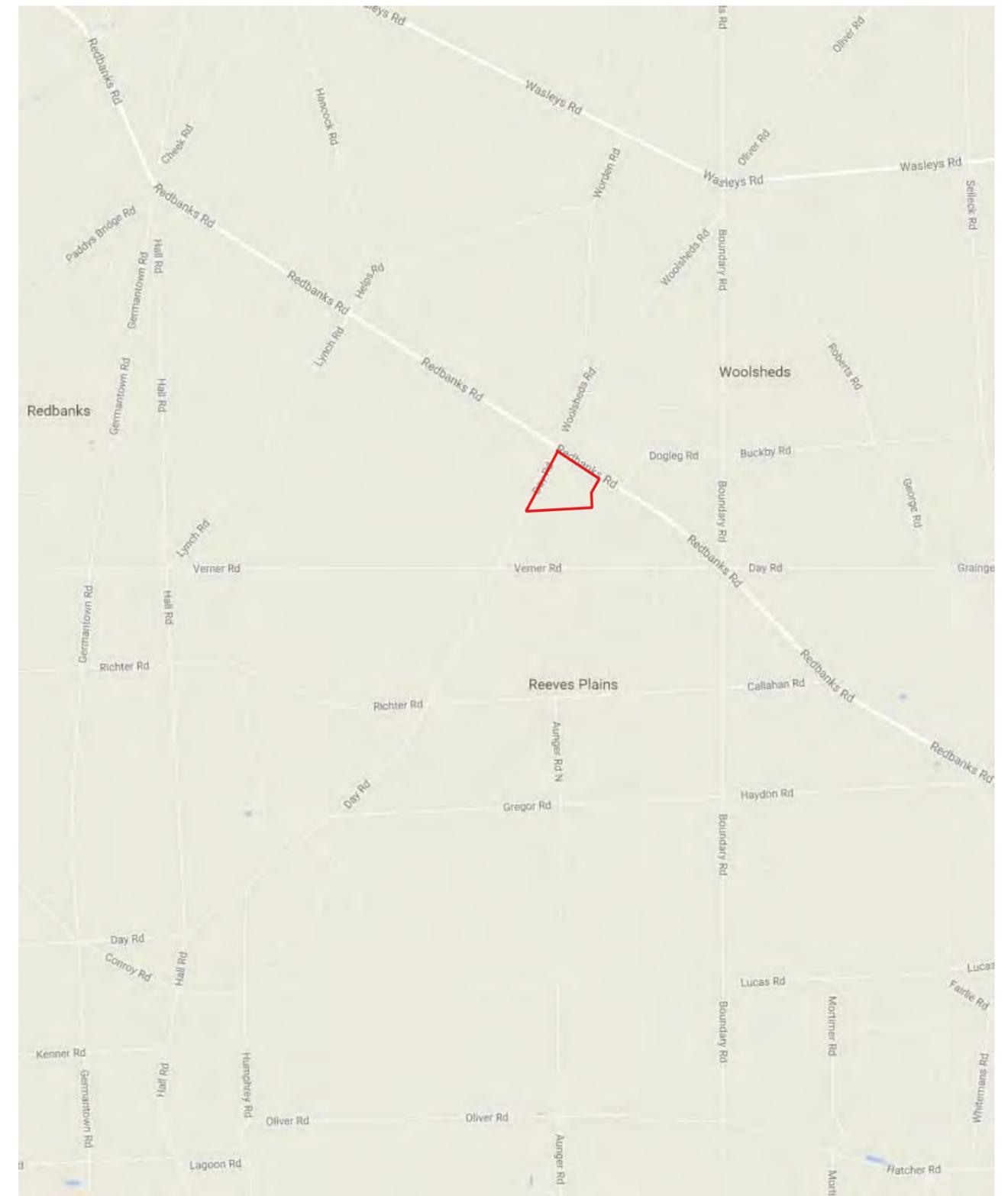


Figure 1 | Site Location
17220 MG Reeves Plains Phase 1
1629 Redbanks Road, Reeves Plains, SA

Basemap from Google Maps
 Projection WGS 84 / Pseudo Mercator
 12/10/16 Drafted by TS





APPENDIX B

LotSearch Report

Lotsearch



Environmental Risk and Planning Report

1629 Redbanks Road, Reeves Plains, SA 5502

Report Date: 03 Aug 2017 11:22:10

Disclaimer:

The purpose of this report is to provide an overview of some of the site history, environmental risk and planning information available, affecting an individual address or geographical area in which the property is located. It is not a substitute for an on-site inspection or review of other available reports and records. It is not intended to be, and should not be taken to be, a rating or assessment of the desirability or market value of the property or its features. You should obtain independent advice before you make any decision based on the information within the report. The detailed terms applicable to use of this report are set out at the end of this report.

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Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a confidence is given under the field heading “LocConf” or “Location Confidence”.

Location Confidence	Description
Premise Match	Georeferenced to the site location / premise or part of site
Area Match	Georeferenced with the confidence of the general/approximate area
Road Match	Georeferenced to the road or rail
Road Intersection	Georeferenced to the road intersection
Buffered Point	Feature is a buffered point
Network of Features	Georeferenced to a network of features

Dataset Listing

Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
EPA Site Contamination Index	EPA South Australia	03/08/2017	03/08/2017	Monthly	1000	0	0	0
EPA Environmental Protection Orders	EPA South Australia	02/08/2017	02/08/2017	Monthly	1000	0	0	0
EPA Assessment Areas	EPA South Australia	02/08/2017	21/07/2017	Quarterly	1000	0	0	0
EPA Environmental Authorisations	EPA South Australia	02/08/2017	02/08/2017	Monthly	1000	0	0	0
National Waste Management Site Database	Geoscience Australia	27/06/2017	07/03/2017	Quarterly	1000	0	0	0
EPA Collection Depots	EPA South Australia	07/06/2017		Quarterly	1000	0	0	0
Mines and Mineral Deposits	Department of State Development, Resources and Energy	21/07/2017	21/07/2017	Monthly	1000	0	0	0
Groundwater Aquifers	Department of Environment, Water and Natural Resources	19/07/2017	01/01/2008	As required	1000	1	1	1
Drillholes	Dept of Environment, Water and Natural Resources - South Australia	17/06/2017	10/01/2017	Quarterly	2000	0	1	5
Surface Geology 1:100,000	Department of State Development, Resources and Energy, South Australia	20/06/2017	28/05/2012	As required	1000	1	1	1
Geological Linear Structures 1:100,000	Department of State Development, Resources and Energy, South Australia	20/06/2017	28/05/2012	As required	1000	0	0	0
Soil Types	Dept of Environment, Water and Natural Resources - South Australia	30/01/2017	01/07/2009	As required	1000	2	3	3
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000	1	1	1
Acid Sulfate Soil Potential	Dept of Environment, Water and Natural Resources - South Australia	08/07/2017	01/09/2009	As required	1000	1	1	1
Soil Salinity - Watertable Induced	Dept of Environment, Water and Natural Resources - South Australia	30/01/2017	01/07/2009	As required	1000	1	2	2
Soil Salinity - Non-watertable	Dept of Environment, Water and Natural Resources - South Australia	30/01/2017	01/07/2009	As required	1000	2	2	2
Soil Salinity - Non-watertable (magnesia patches)	Dept of Environment, Water and Natural Resources - South Australia	30/01/2017	01/07/2009	As required	1000	1	1	1
Land Development Zones	Department of Planning, Transport and Infrastructure	19/07/2017	14/07/2017	Monthly	1000	1	1	2
State Heritage Areas	Dept of Environment, Water and Natural Resources - South Australia	24/05/2017	10/11/2004	As required	1000	0	0	0
SA Heritage Places	Dept of Environment, Water and Natural Resources - South Australia	14/07/2016	25/02/2016	Quarterly	1000	0	0	0
Bushfire Protection Areas	Department of Planning, Transport and Infrastructure	30/01/2017	04/03/2015	As required	1000	1	1	1
Bushfires and Prescribed Burns History	Department of Environment, Water and Natural Resources	17/07/2017	19/12/2016	As required	1000	0	0	1
Ramsar Wetland Areas	Department of Environment, Water and Natural Resources	30/01/2017	30/01/2013	As required	1000	0	0	0

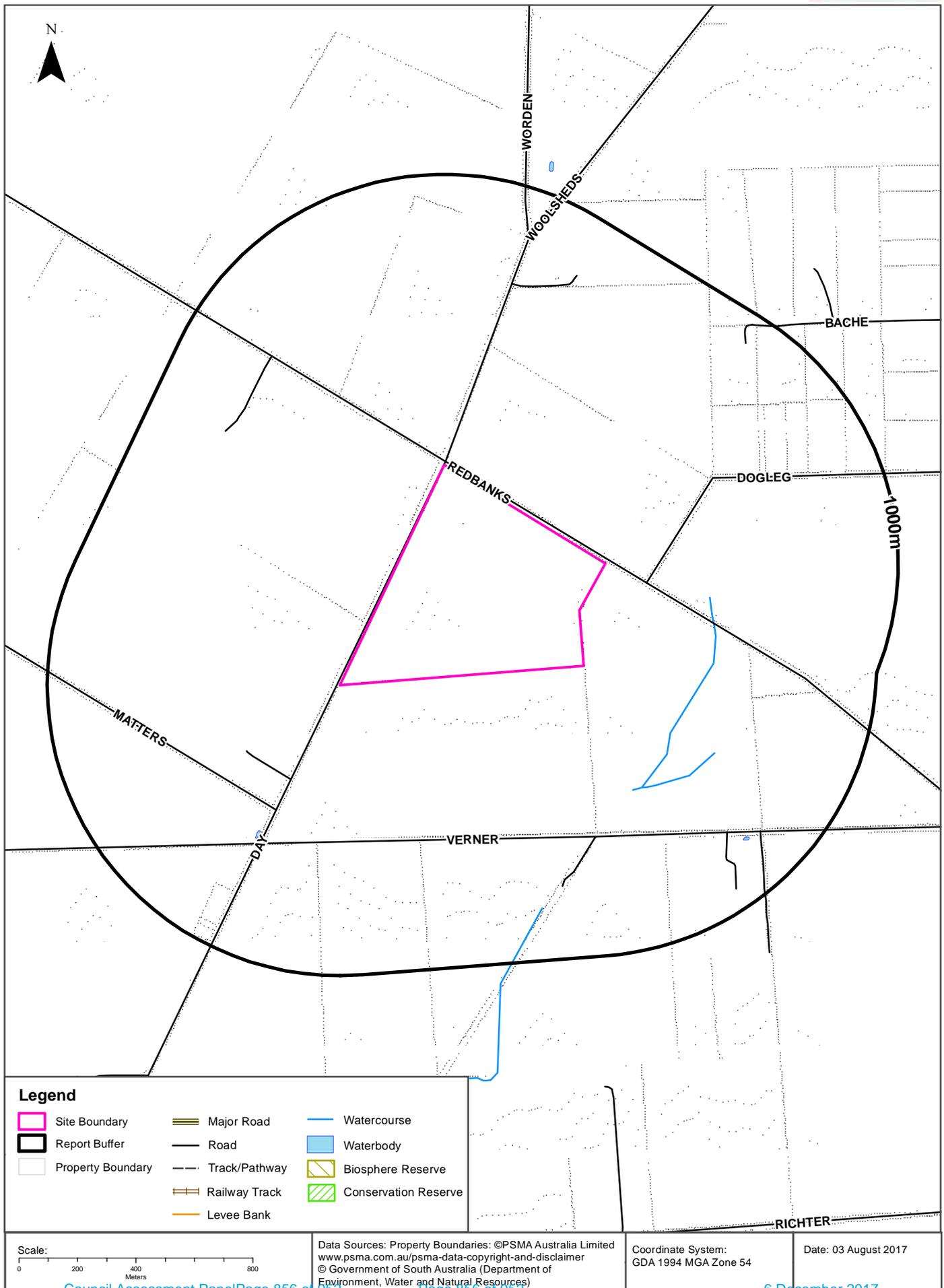
Aerial Imagery 2016

1629 Redbanks Road, Reeves Plains, SA 5502



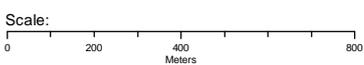
Topographic Features

1629 Redbanks Road, Reeves Plains, SA 5502



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- Major Road
- Road
- Track/Pathway
- Railway Track
- Levee Bank
- Watercourse
- Waterbody
- Biosphere Reserve
- Conservation Reserve



Data Sources: Property Boundaries: ©PSMA Australia Limited
 www.pasma.com.au/psma-data-copyright-and-disclaimer
 © Government of South Australia (Department of Environment, Water and Natural Resources)

Coordinate System:
 GDA 1994 MGA Zone 54

Date: 03 August 2017

EPA Contaminated Land

1629 Redbanks Road, Reeves Plains, SA 5502

EPA Site Contamination Index

Sites on the EPA Contamination Index within the dataset buffer:

Notification No	Type	Address	Activity	Status	Location Confidence	Distance	Direction
N/A	No records in buffer						

Site Contamination Index Data Source: EPA South Australia

EPA Environmental Protection Order

1629 Redbanks Road, Reeves Plains, SA 5502

EPA Environmental Protection Order

EPA Environmental Protection Orders within the dataset buffer:

Record No	Version No	Record Type	Order Status	Entity	Address	Issued Date	Particulars	Status	Location Confi	Dist	Direction
N/A		No records in buffer									

Environmental Protection Order Data Source: EPA South Australia

EPA Authorisations

1629 Redbanks Road, Reeves Plains, SA 5502

EPA Authorisations

EPA Authorisations within the dataset buffer:

Map Id	Licence No	Activity	Licence Name	Map Link	Location Confidence	Distance	Direction
N/A	No records in buffer						

Authorisations Data Source: EPA South Australia

EPA Assessment Areas

1629 Redbanks Road, Reeves Plains, SA 5502

EPA Assessment Areas

EPA Assessment Areas within the dataset buffer:

Map Id	Supplied Ref	Area Name	Map Link	Status	Location Confidence	Distance	Direction
N/A	No records in buffer						

Assessment Areas Data Source: EPA South Australia

Waste Management Facilities

1629 Redbanks Road, Reeves Plains, SA 5502

National Waste Management Site Database

Sites on the National Waste Management Site Database within the dataset buffer:

Site Id	Owner	Name	Address	Suburb	Class	Revised Date	Location Confidence	Distance	Direction
N/A	No records in buffer								

Waste Management Facilities Data Source: Australian Government Geoscience Australia
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EPA Approved Container Collection Depots

EPA approved container collection depots within the dataset buffer:

MapId	Name	Address	Suburb	Loc Conf	Distance	Direction
N/A	No records in buffer					

Collection Depot Data Source: EPA South Australia

Aerial Imagery 2012

1629 Redbanks Road, Reeves Plains, SA 5502



Legend

-  Site Boundary
-  Buffer 150m

Google Earth



Data Sources: Aerial Imagery © 2016 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 54

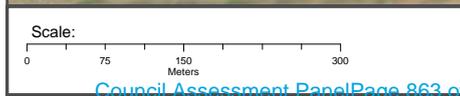
Date: 21 April 2017

Aerial Imagery 2005

1629 Redbanks Road, Reeves Plains, SA 5502



Google Earth



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Coordinate System:
GDA 1994 MGA Zone 54

Date: 21 April 2017

Aerial Imagery 1999

629 Redbanks Road, Reeves Plains, SA



Legend	
	Site Boundary
	Buffer 150m

Scale: 0 75 150 300 Meters

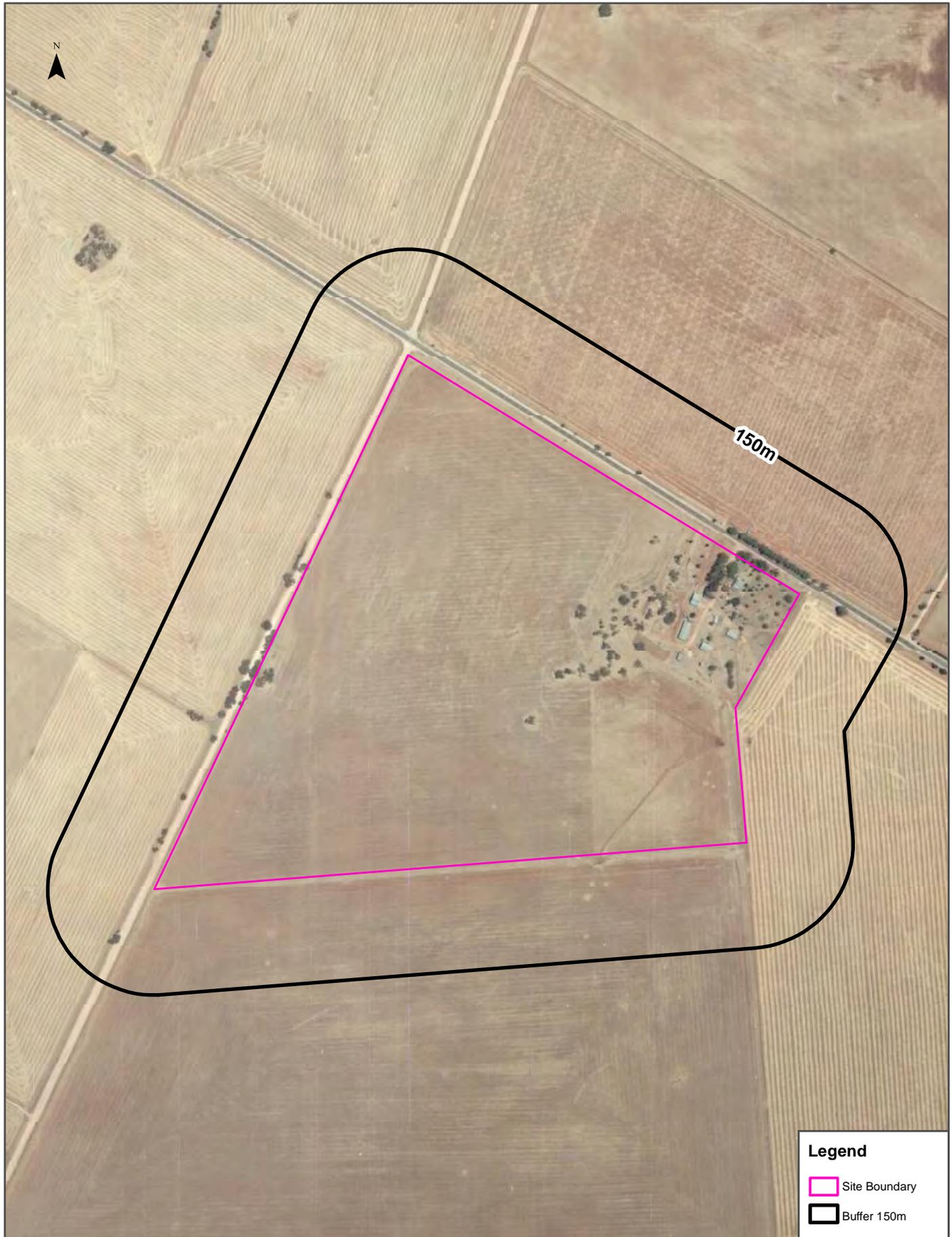
Data Sources: Historical Aerials: © Department of Environment, Water & Natural Resources

Coordinate System: GDA 1994 MGA Zone 54
--

Date: 02 August 2017

Aerial Imagery 1987

629 Redbanks Road, Reeves Plains, SA



Legend

- Site Boundary
- Buffer 150m

Scale:

0 75 150 300
Meters

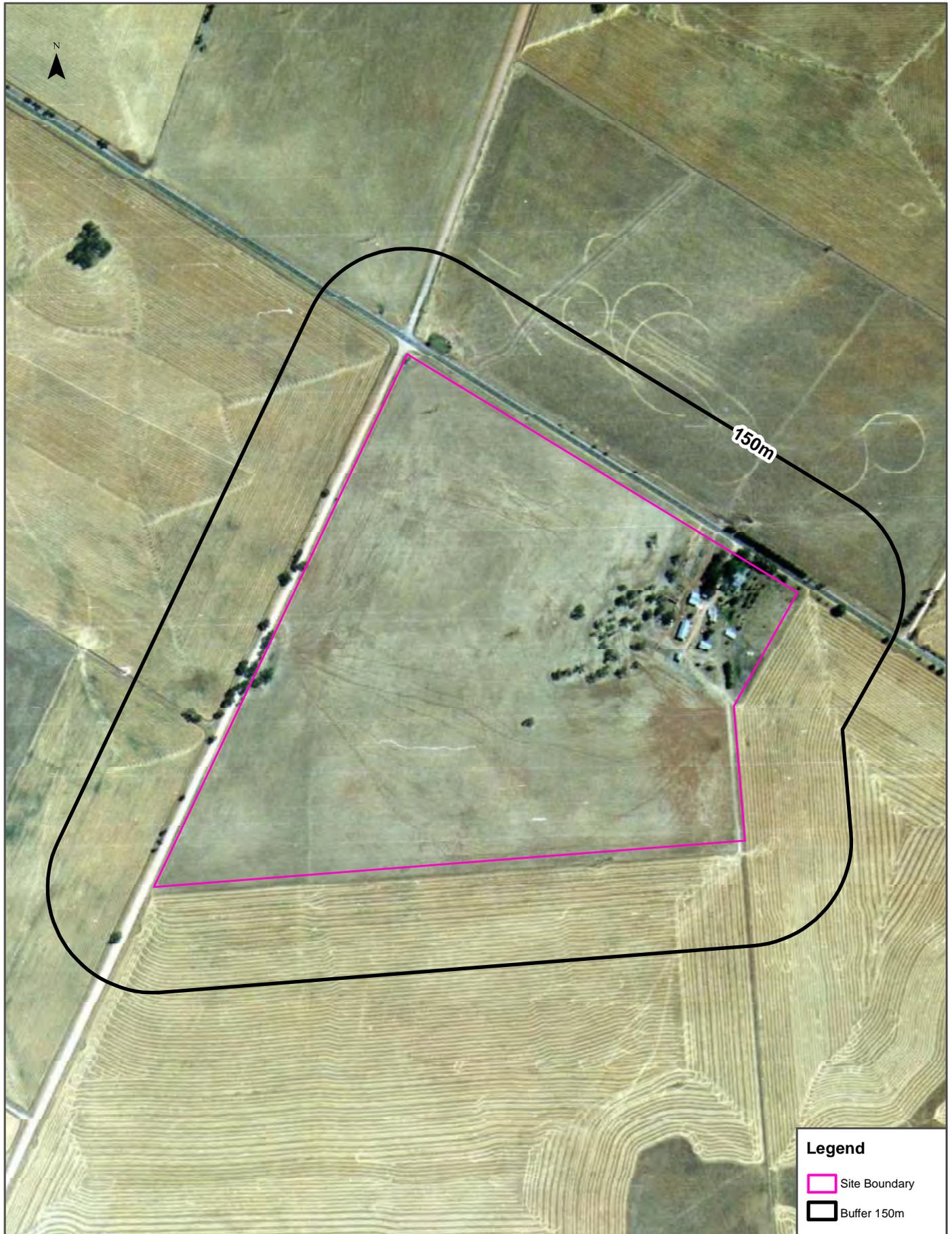
Data Sources: Historical Aerials: ©
Department of Environment, Water & Natural Resources

Coordinate System:
GDA 1994 MGA Zone 54

Date: 02 August 2017

Aerial Imagery 1979

629 Redbanks Road, Reeves Plains, SA



Legend

- Site Boundary
- Buffer 150m

Scale: 0 75 150 300 Meters

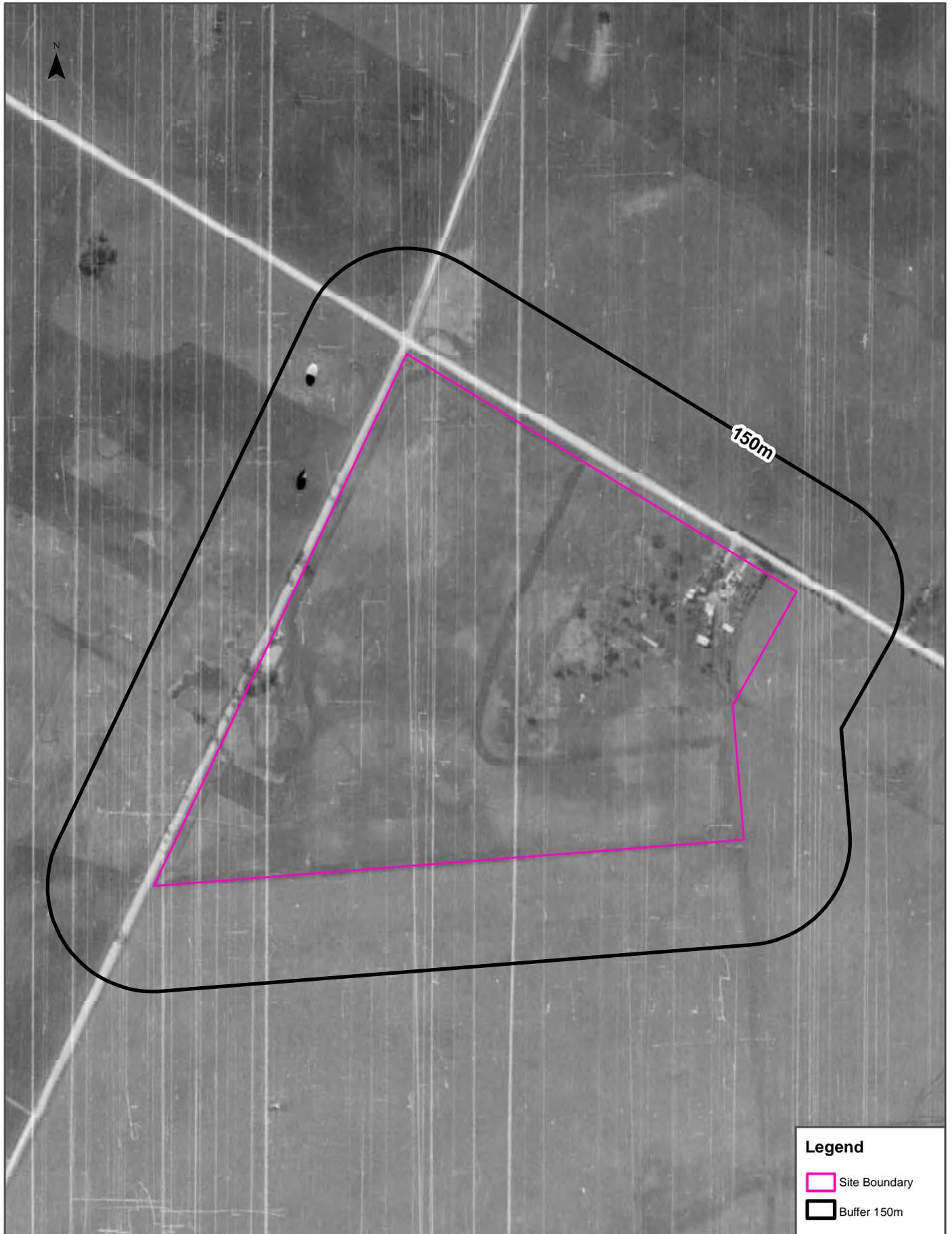
Data Sources: Historical Aerials: © Department of Environment, Water & Natural Resources

Coordinate System: GDA 1994 MGA Zone 54

Date: 02 August 2017

Aerial Imagery 1963

629 Redbanks Road, Reeves Plains, SA



Legend	
	Site Boundary
	Buffer 150m

Scale: 0 75 150 300 Meters

Data Sources: Historical Aerials: © Department of Environment, Water & Natural Resources

Coordinate System: GDA 1994 MGA Zone 54
--

Date: 02 August 2017

Aerial Imagery 1949

629 Redbanks Road, Reeves Plains, SA



Legend	
	Site Boundary
	Buffer 150m

Scale: 0 75 150 300 Meters

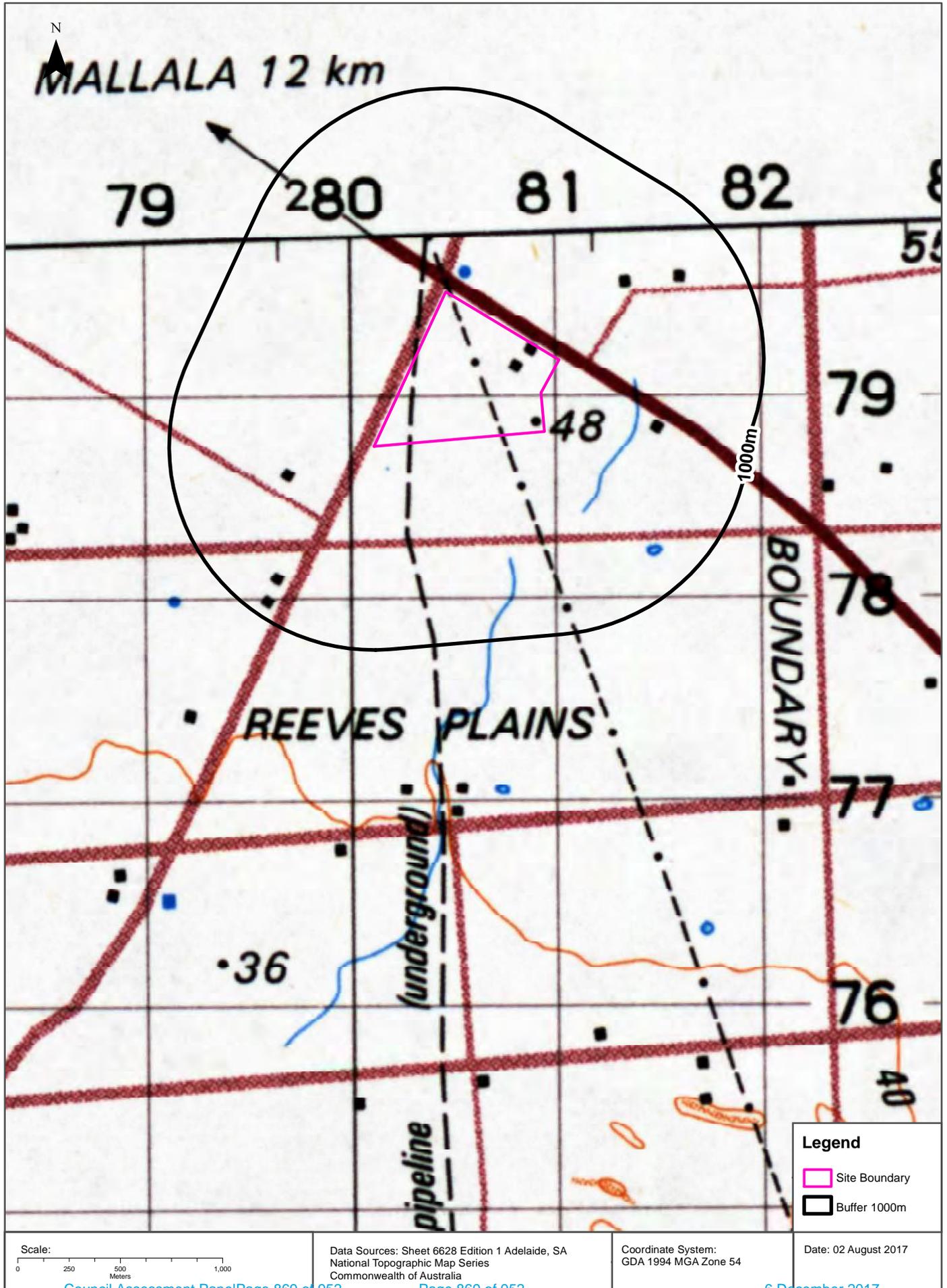
Data Sources: Historical Aerials: © Department of Environment, Water & Natural Resources

Coordinate System: GDA 1994 MGA Zone 54

Date: 02 August 2017

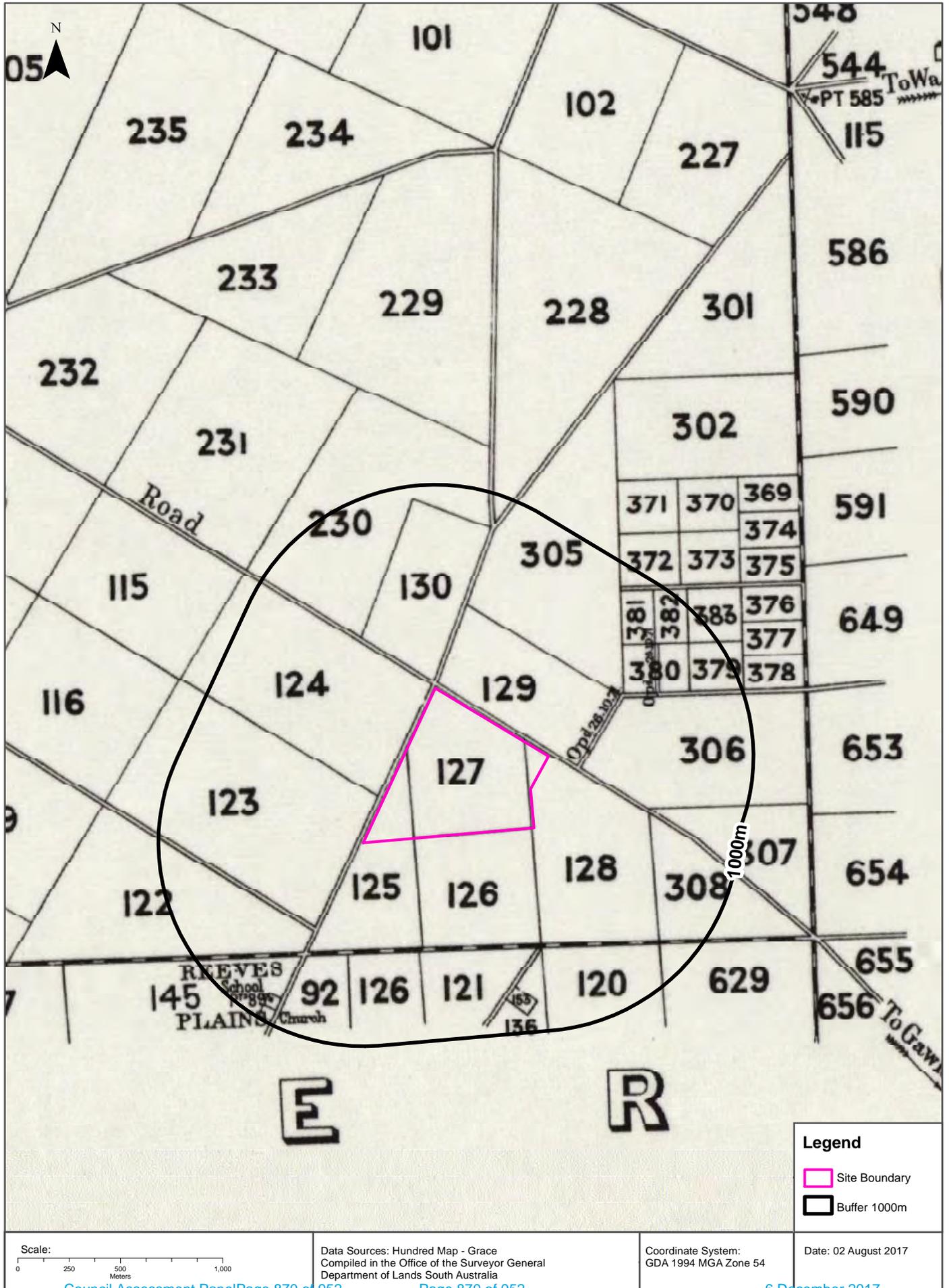
Historical Map 1982

1629 Redbanks Road, Reeves Plains, SA 5502



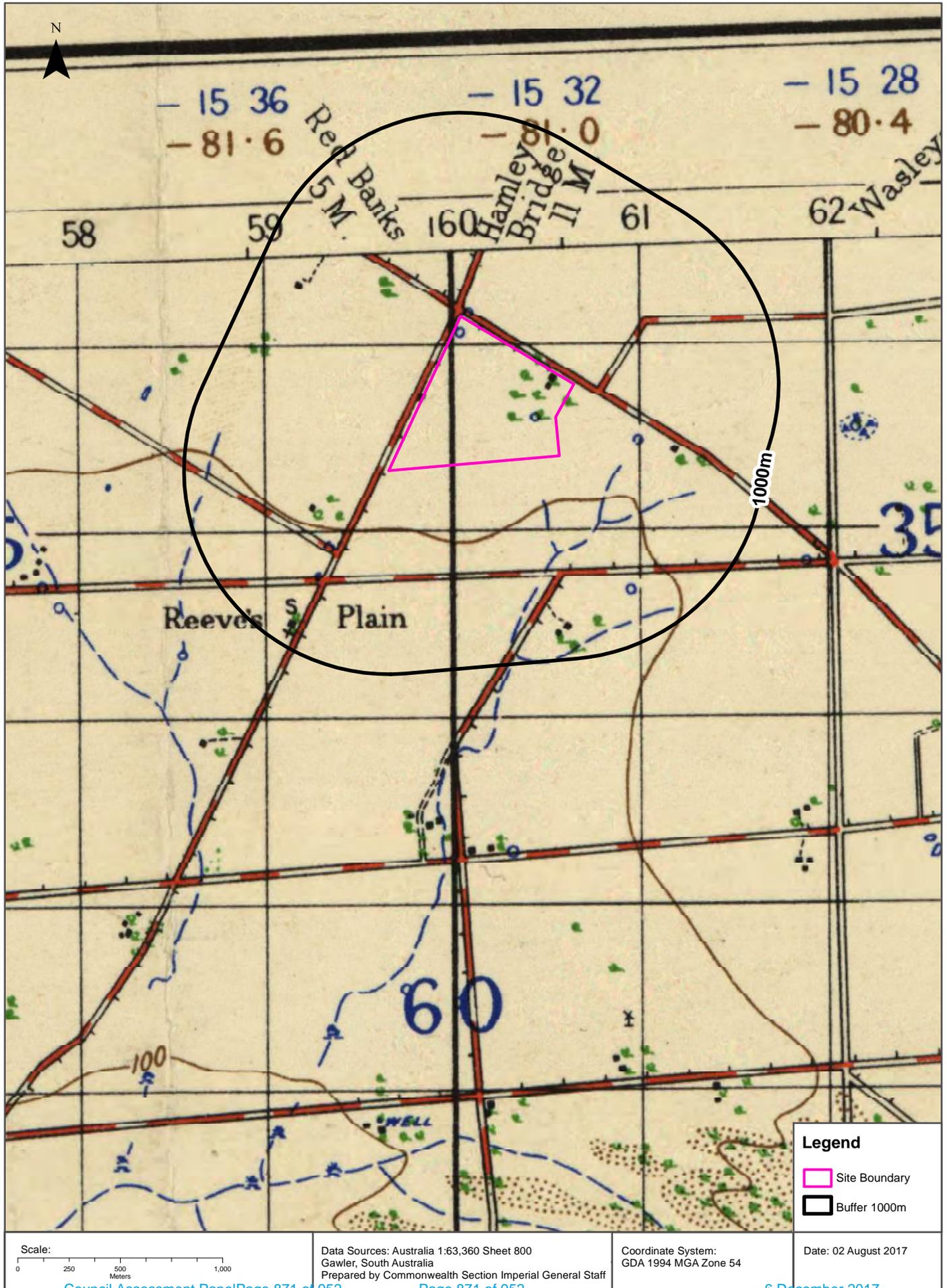
Historical Map ca.1966

1629 Redbanks Road, Reeves Plains, SA 5502



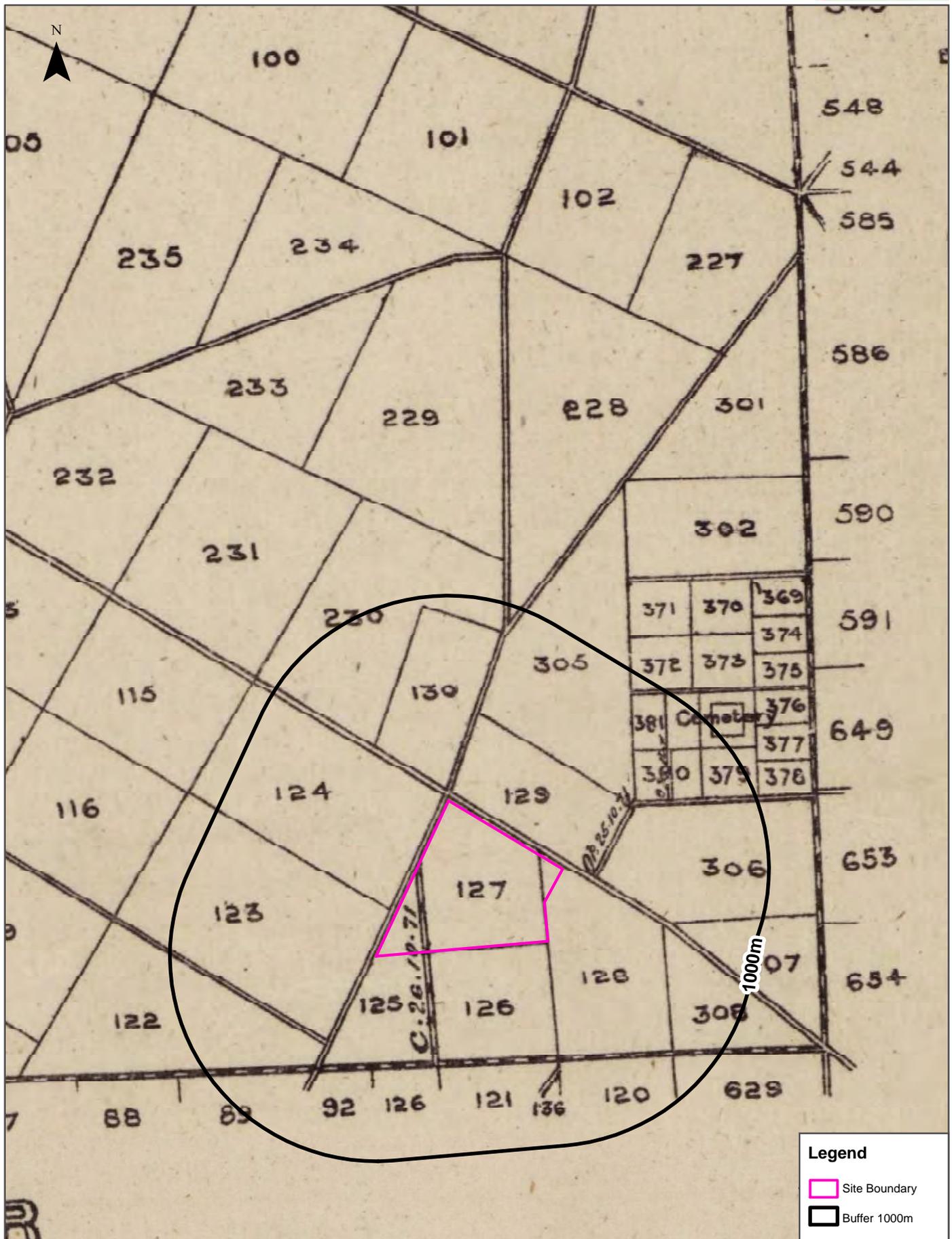
Historical Map ca.1935

1629 Redbanks Road, Reeves Plains, SA 5502



Historical Map ca.1873

1629 Redbanks Road, Reeves Plains, SA 5502



Legend

- Site Boundary
- Buffer 1000m

<p>Scale: 0 250 500 1,000 Meters</p>	<p>Data Sources: Hundred Map - Grace Compiled in the Office of the Surveyor General Department of Lands South Australia</p>	<p>Coordinate System: GDA 1994 MGA Zone 54</p>	<p>Date: 02 August 2017</p>
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Mining

1629 Redbanks Road, Reeves Plains, SA 5502

Mines and Mineral Deposits

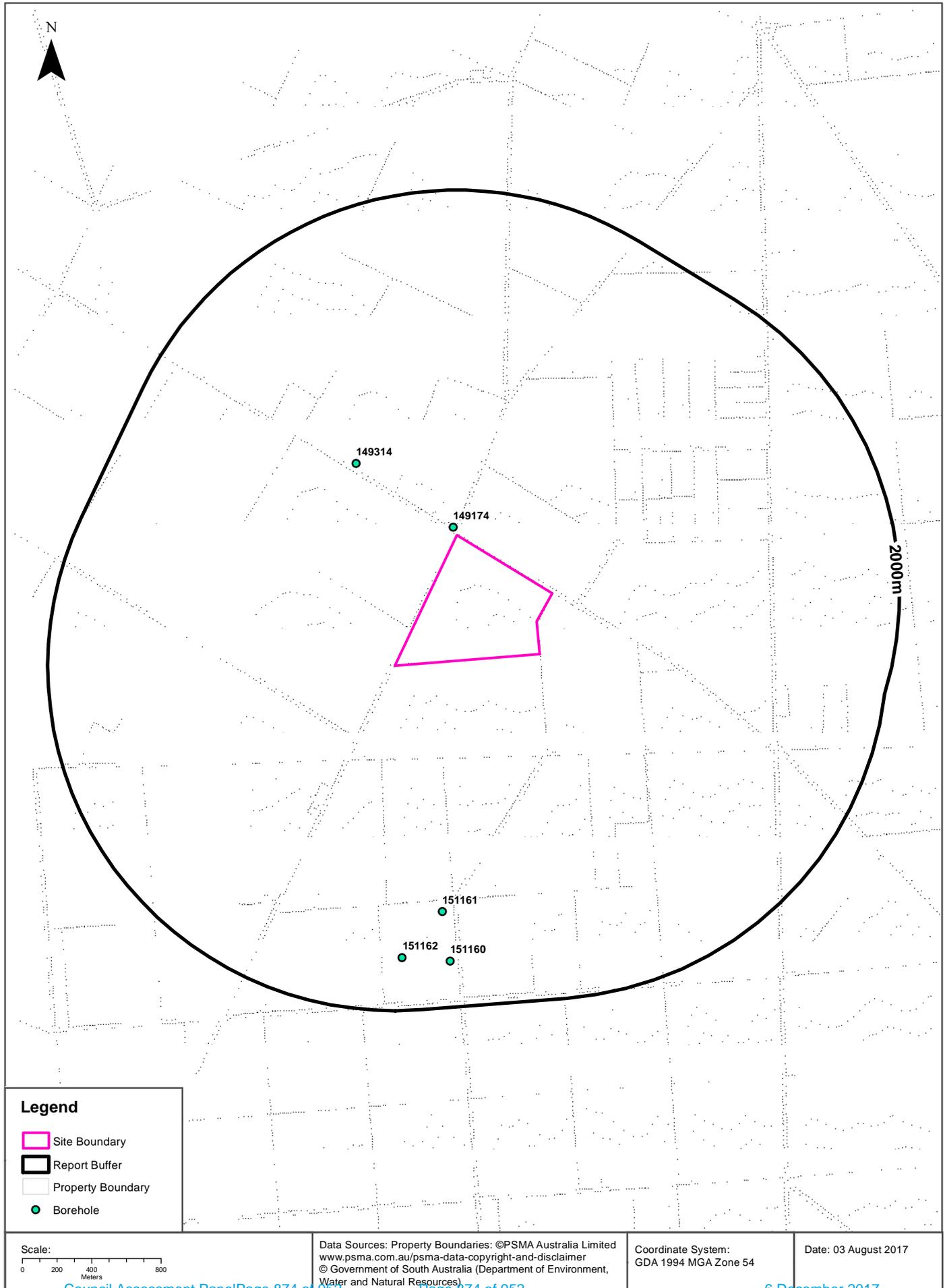
Mines and mineral deposits within the dataset buffer:

Deposit No.	Name	Class	Status	Commodity	Year	Description	Dist	Dir'n
N/A	No records in buffer							

All Mines and Mineral Deposits Data Source: Dept. of State Development, Resources and Energy - South Australia
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Drillholes

1629 Redbanks Road, Reeves Plains, SA 5502



Groundwater and Drillholes

1629 Redbanks Road, Reeves Plains, SA 5502

Groundwater Aquifers

Groundwater aquifers within the dataset buffer:

Aquifer Code	Description	Distance	Direction
20	Sedimentary Rocks - basins include limestone, often cavernous, sandstone, sand shale and clay	0m	Onsite

Groundwater Aquifers Data Source: Dept. of Environment, Water and Natural Resources - South Australia
Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

Drillholes

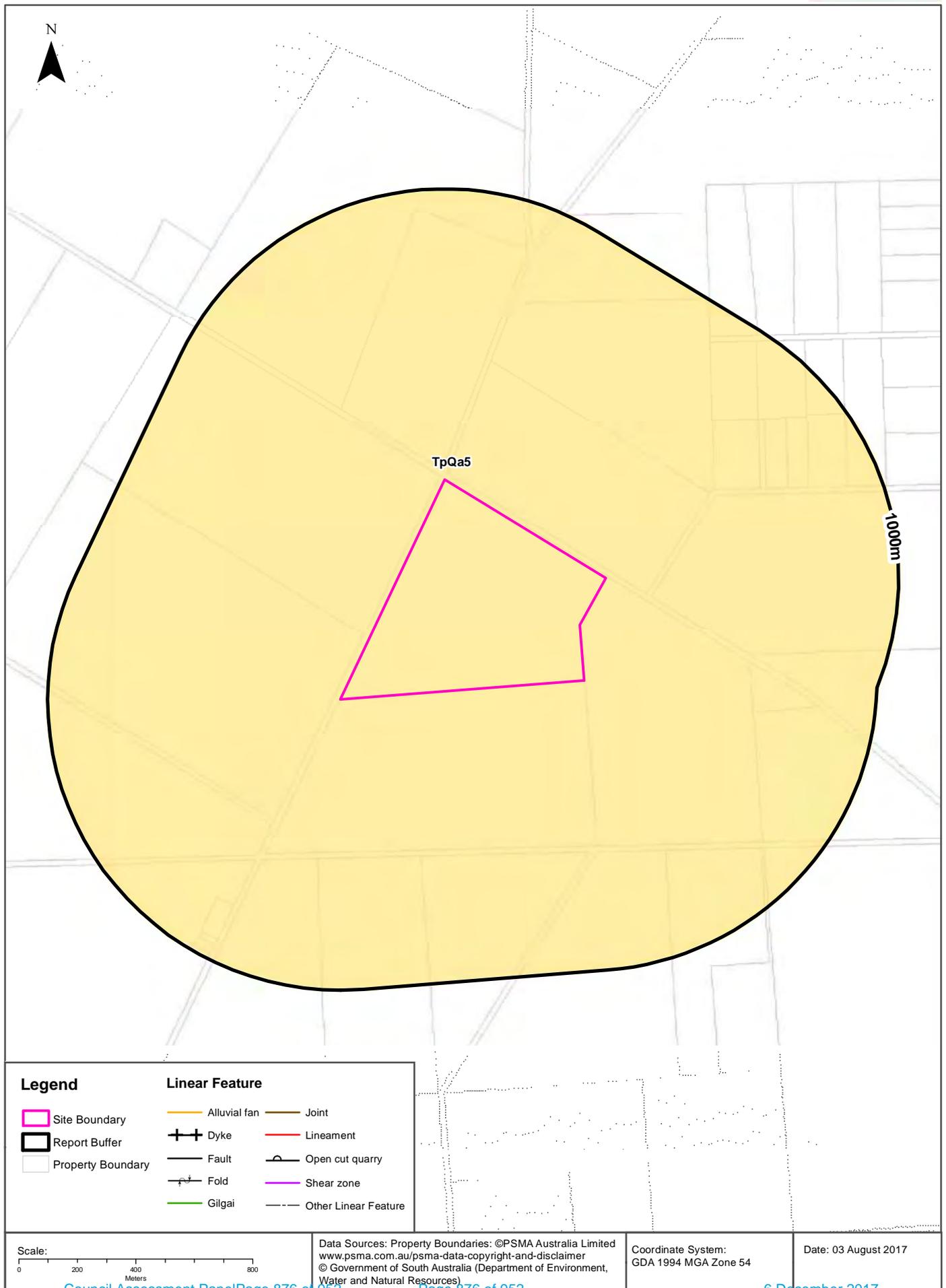
Drillholes within the dataset buffer:

Drillhole No	Name	Status	Purpose	Drill Date	Max Depth	Ref Elev	Ground Elev	PH	TDS	Yield	DTW	SWL	RSWL	EC	Dist	Dir'n
149174		Backfilled			32.00		46.93								48m	North
149314					33.53		45.37								713m	North West
151161		Abandoned	Irrigation	1995-06-15	26.00		40.42								1445 m	South
151162			Irrigation	1995-08-08	55.00		40.74	7.40	8476	10.0000				14600	1693 m	South
151160		Abandoned	Irrigation	1995-06-15	32.00		39.99								1733 m	South

Drillholes Data Source: Dept of Environment, Water and Natural Resources - South Australia
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Geology 1:100,000

1629 Redbanks Road, Reeves Plains, SA 5502



Geology

1629 Redbanks Road, Reeves Plains, SA 5502

Surface Geology 1:100,000

Surface Geology Units within the dataset buffer:

Map Unit Code	Name	Description	Parent Name	Province	Age	Min Age	Max Age	Distance
TpQa5		Hindmarsh Clay, Carisbrooke Sand, Ochre Cove Fmn, Seaford Fmn: ADELAIDE/BARKER digital database.			PLIOCENE- PLEISTOCENE	Pleistocene	Pliocene	0m

Geology Data Source: Dept of Environment, Water and Natural Resources - South Australia
Creative Commons 4.0 © Commonwealth of Australia <https://creativecommons.org/licenses/by/4.0/>

Linear Structures 1:100,000

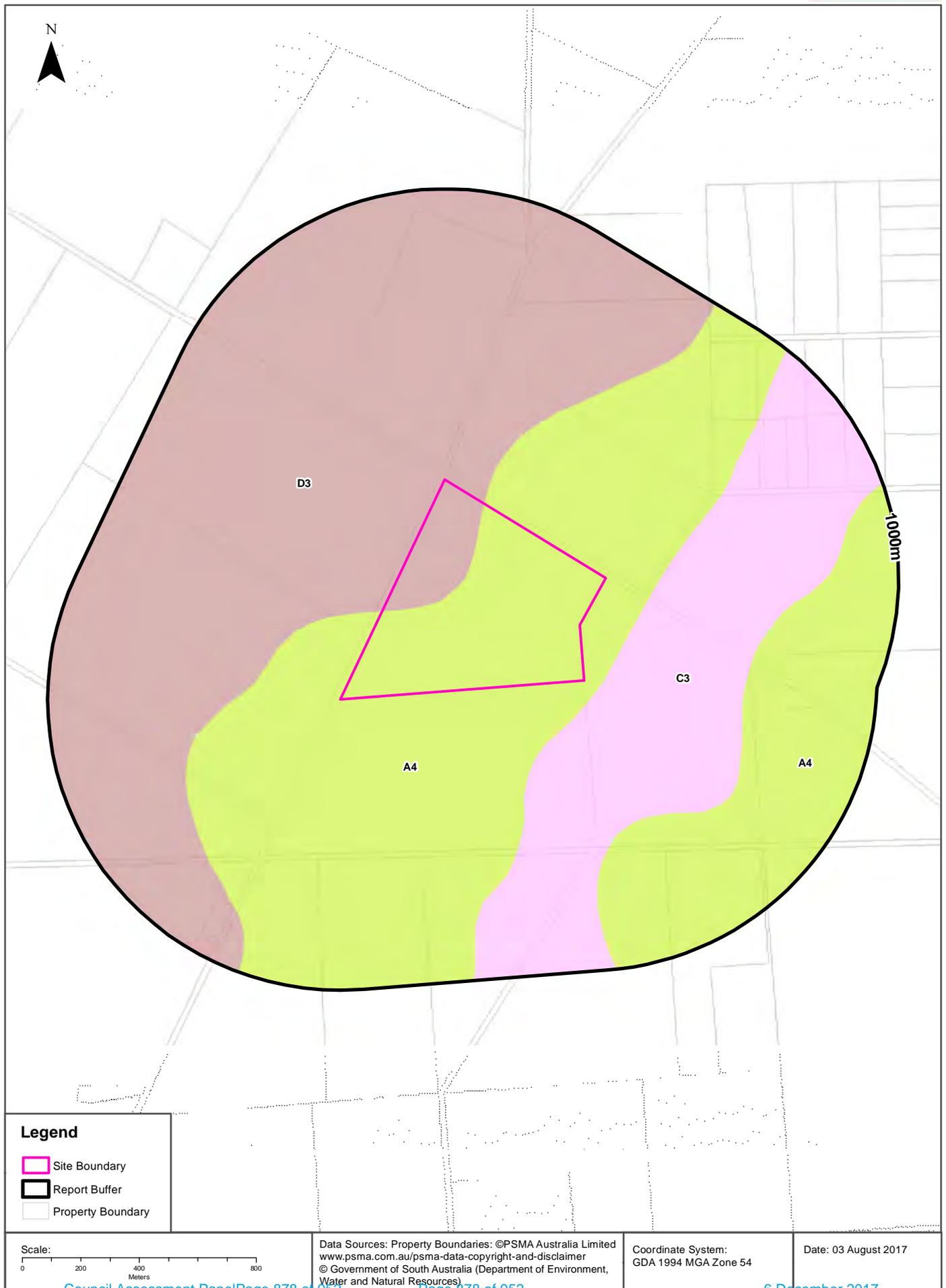
Linear geological structures within the dataset buffer:

Map Code	Description	Distance
N/A	No features in buffer	

Geology Data Source: Dept of Environment, Water and Natural Resources - South Australia
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Soil Types

1629 Redbanks Road, Reeves Plains, SA 5502



Soils

1629 Redbanks Road, Reeves Plains, SA 5502

Soil Types

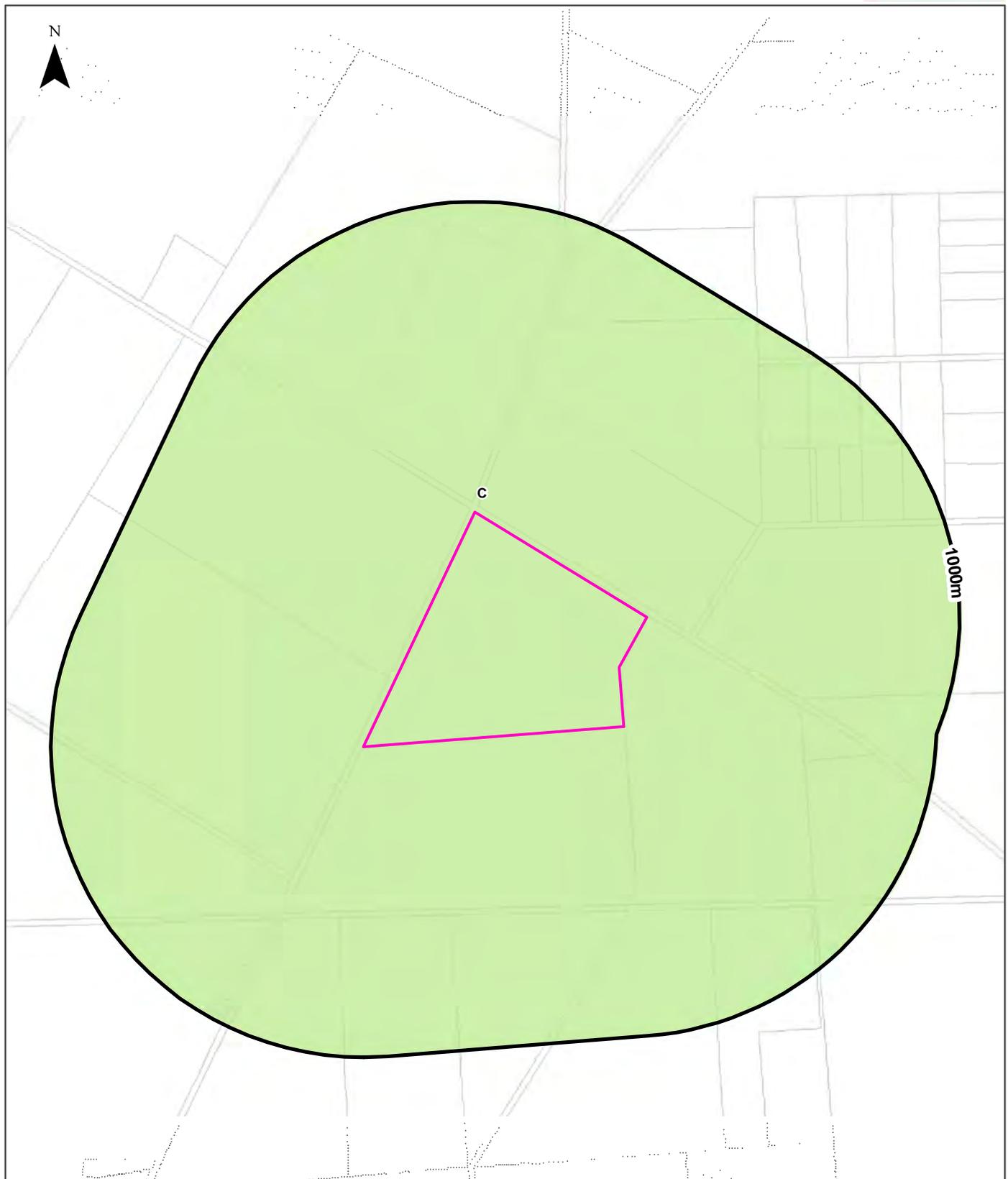
Soil types within the dataset buffer:

Map category code	Soil type description	Distance
A4	Calcareous loam	0m
D3	Loam over poorly structured red clay	0m
C3	Friable gradational clay loam	53m

Soil Types Data Source: Dept of Environment, Water and Natural Resources - South Australia
Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

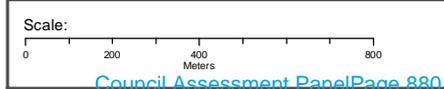
Atlas of Australian Acid Sulfate Soils

1629 Redbanks Road, Reeves Plains, SA 5502



Legend

Site Boundary	Probability of occurrence of Acid Sulfate Soils	
Report Buffer	A. High (>70%)	C. Extremely Low (1-5%)
Property Boundary	B. Low (6-70%)	D. No Chance (0%)



Data Sources: Property Boundaries: ©PSMA Australia Limited
www.pdma.com.au/psma-data-copyright-and-disclaimer
© Government of South Australia (Department of Environment,
Water and Natural Resources)

Coordinate System:
GDA 1994 MGA Zone 54

Date: 03 August 2017

Acid Sulfate Soils

1629 Redbanks Road, Reeves Plains, SA 5502

Atlas of Australian Acid Sulfate Soils

Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

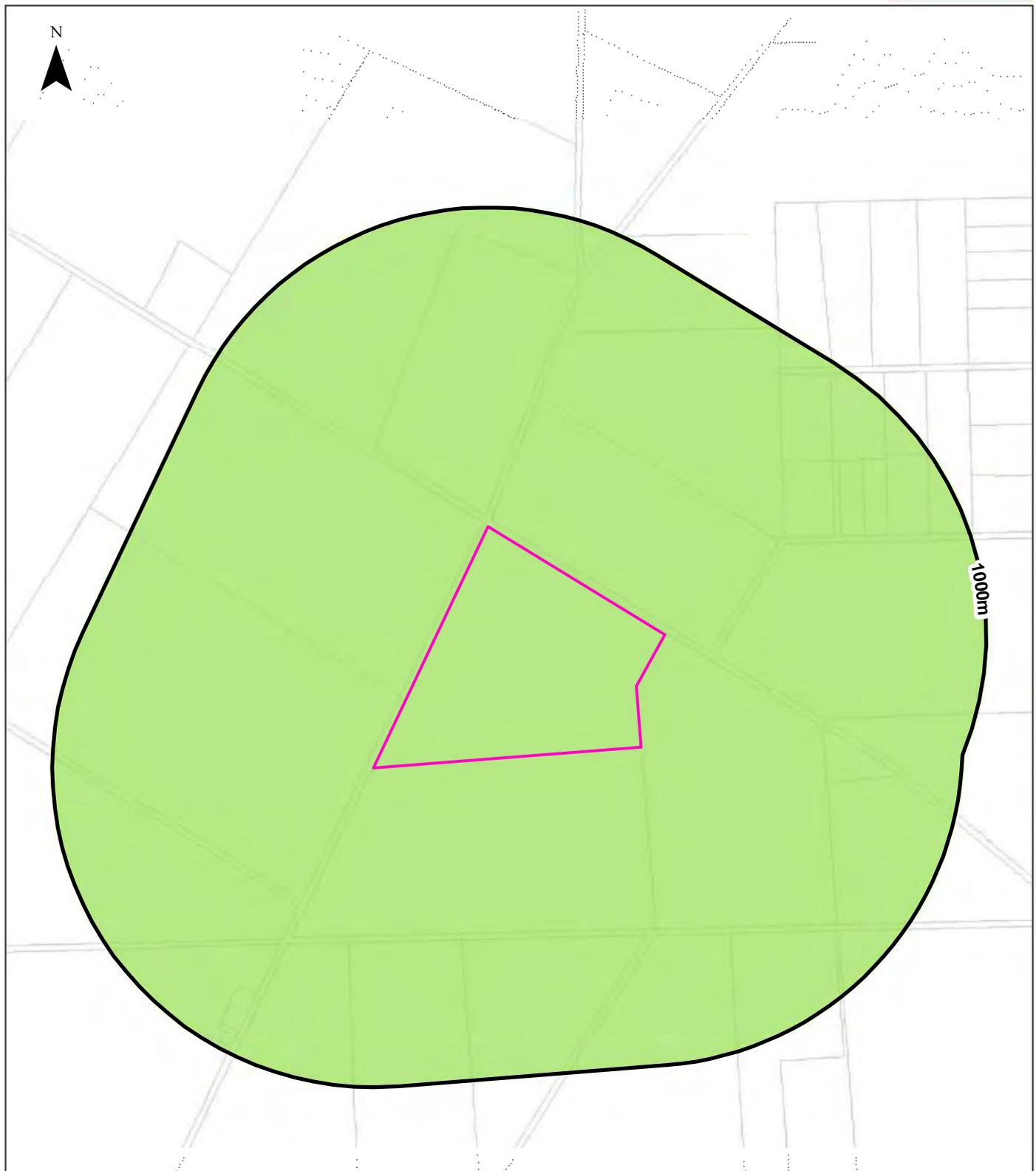
Class	Description	Distance
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m

Atlas of Australian Acid Sulfate Soils Data Source: CSIRO

Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

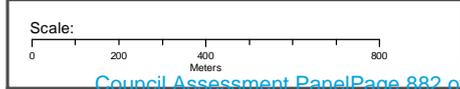
Acid Sulfate Soils Potential

1629 Redbanks Road, Reeves Plains, SA 5502



Legend

Site Boundary	Negligible	30-60%
Report Buffer	1-10%	More than 60%
Property Boundary	10-30%	Incomplete data (usually wet inland areas)
		Not applicable - No assessment/analysis



Data Sources: Property Boundaries: ©PSMA Australia Limited
 www.pdma.com.au/psma-data-copyright-and-disclaimer
 © Government of South Australia (Department of Environment,
 Water and Natural Resources)

Coordinate System:
 GDA 1994 MGA Zone 54

Date: 03 August 2017

Acid Sulfate Soils

1629 Redbanks Road, Reeves Plains, SA 5502

Acid Sulfate Soil Potential

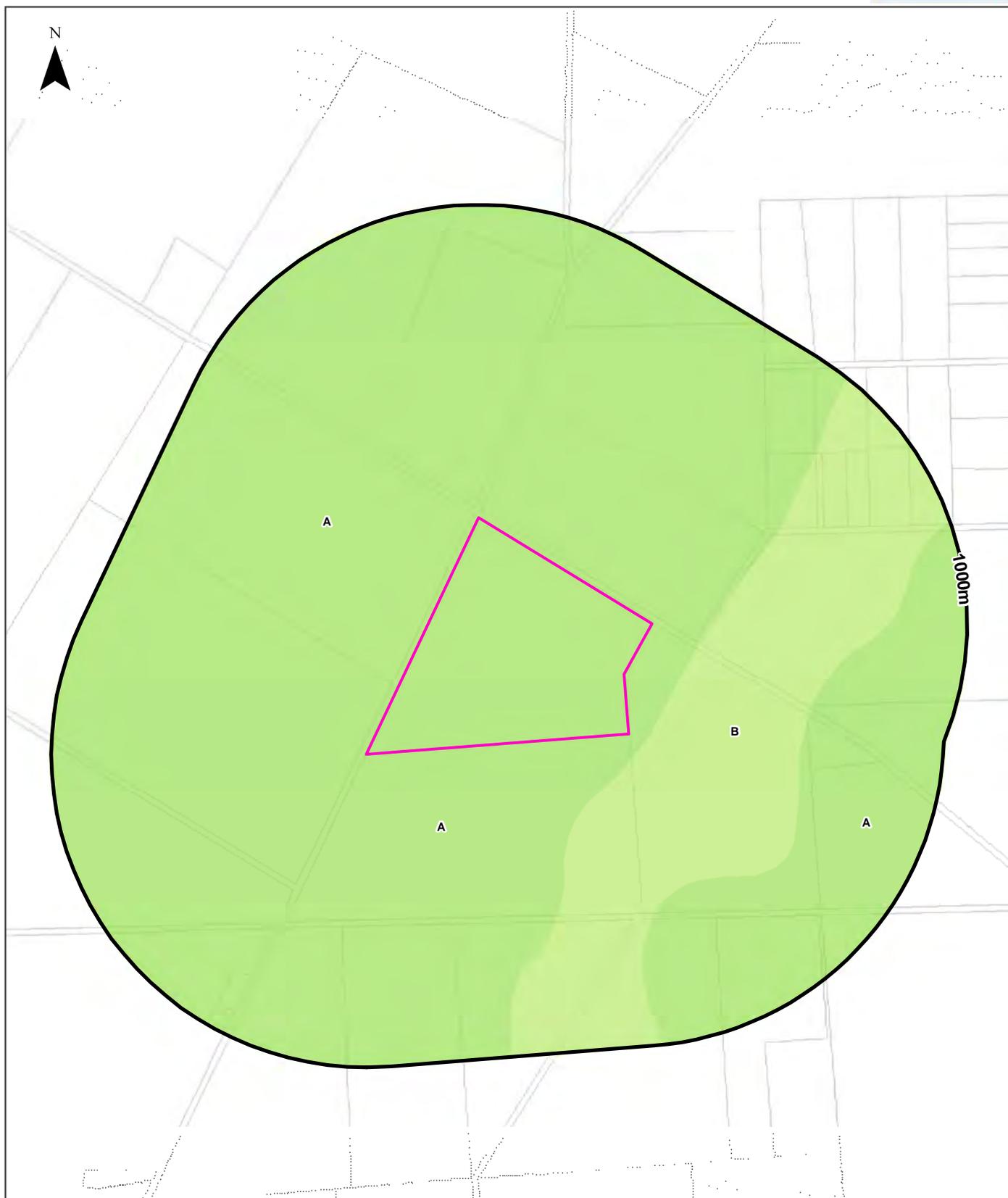
Acid sulfate soil potential within the dataset buffer:

Map category code	Proportion of land susceptible to the development of acid sulfate soils	Distance
A	Negligible	0m

Acid Sulfate Soils Data Source: Dept of Environment, Water and Natural Resources - South Australia
Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

Soil Salinity - Watertable Induced

1629 Redbanks Road, Reeves Plains, SA 5502

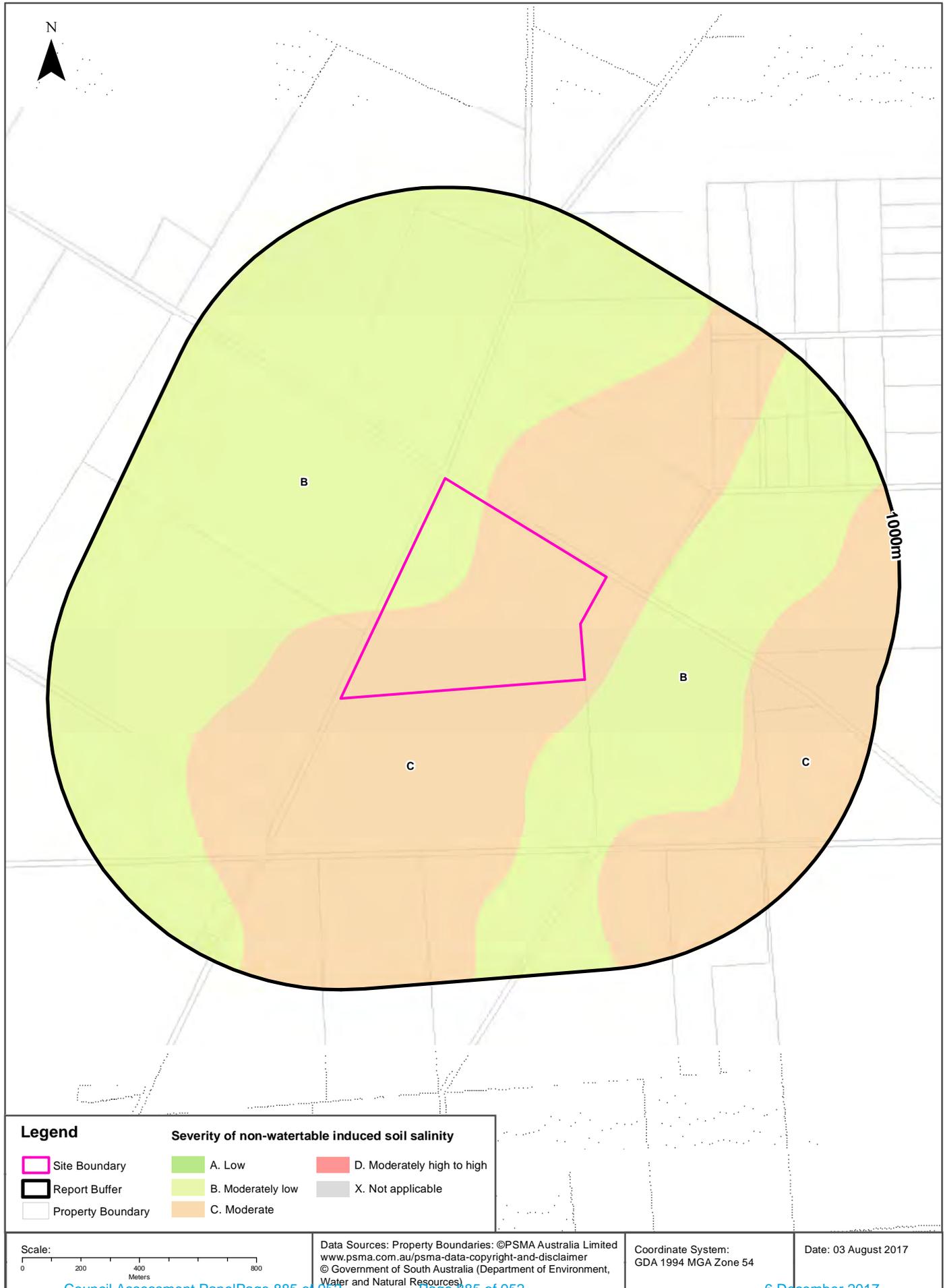


Legend			
Site Boundary	Severity of watertable induced soil salinity		
Report Buffer	A. Negligible	D. Moderately high	G. Very high to extreme
Property Boundary	B. Moderately low	E. Moderately high to high	X. Not applicable
	C. Moderate	F. High	

Scale: 	Data Sources: Property Boundaries: ©PSMA Australia Limited www.pdma.com.au/psma-data-copyright-and-disclaimer © Government of South Australia (Department of Environment, Water and Natural Resources)	Coordinate System: GDA 1994 MGA Zone 54	Date: 03 August 2017
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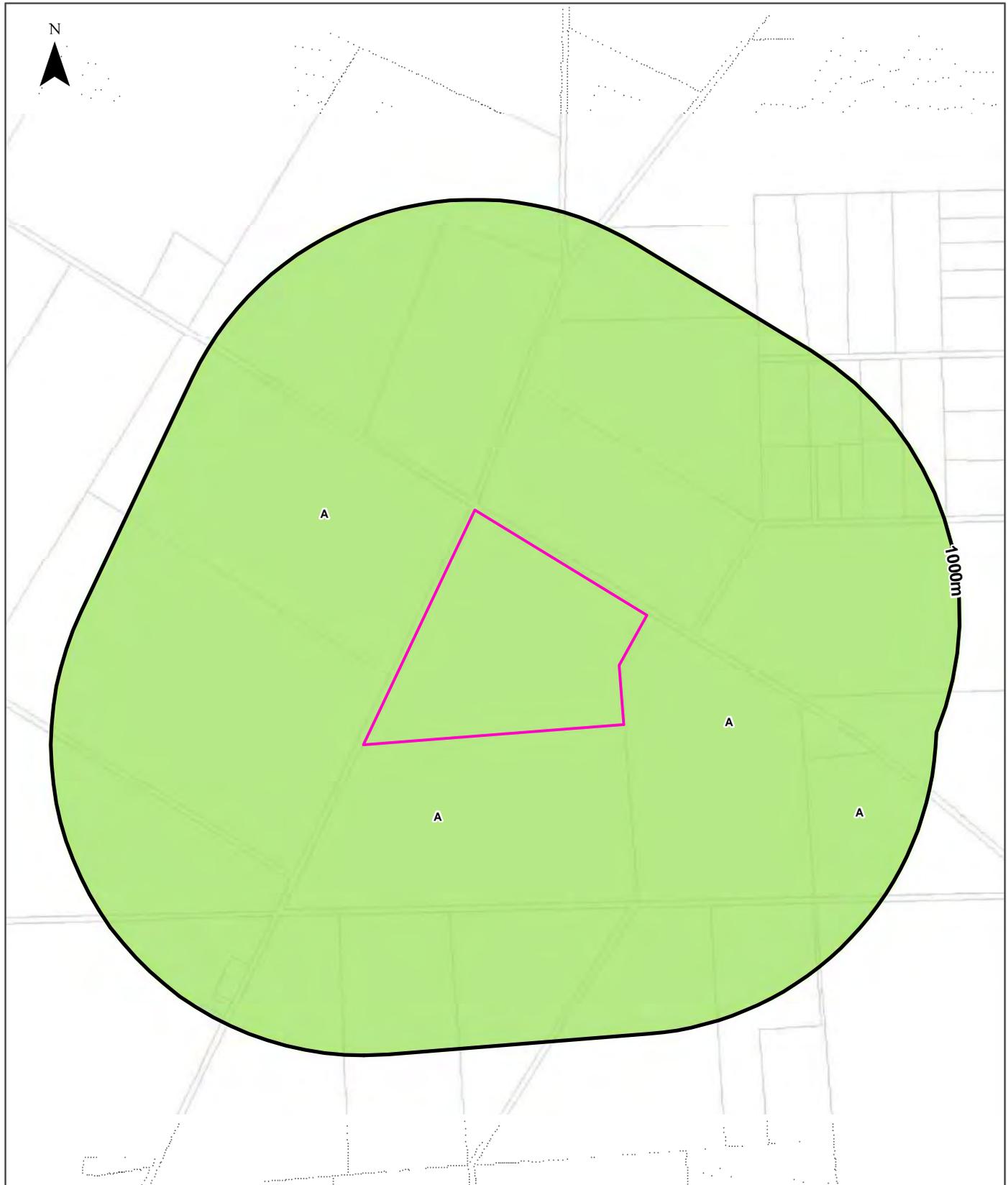
Soil Salinity - Non-watertable

1629 Redbanks Road, Reeves Plains, SA 5502



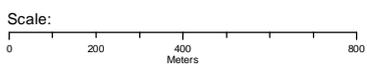
Soil Salinity - Non-watertable (Magnesia Patches)

1629 Redbanks Road, Reeves Plains, SA 5502



Legend

- | | | | |
|-------------------|--|-----------|-------------------|
| Site Boundary | Proportion of land affected by magnesia patches | | |
| Report Buffer | A. Negligible | C. 2-10% | E. More than 50% |
| Property Boundary | B. Up to 2% | D. 10-50% | X. Not applicable |



Data Sources: Property Boundaries: ©PSMA Australia Limited
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 Water and Natural Resources)

Coordinate System:
 GDA 1994 MGA Zone 54

Date: 03 August 2017

Soil Salinity

1629 Redbanks Road, Reeves Plains, SA 5502

Soil Salinity - Watertable Induced

Watertable induced soil salinity within the dataset buffer:

Map category code	Severity description	Distance
A	Negligible	0m
B	Moderately low salinity, or less than 2% of land affected by highly saline seepage	53m

Salinity Watertable Induced Data Source: Dept of Environment, Water and Natural Resources - South Australia
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Soil Salinity - Non-Watertable

Non-watertable soil salinity within the dataset buffer:

Map category code	Severity description	Surface ECe (dS/m)	Subsoil ECe (dS/m)	Distance
B	Moderately low	2-4	4-8	0m
C	Moderate	4-8	8-16	0m

Salinity Non-Watertable Data Source: Dept of Environment, Water and Natural Resources - South Australia
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Soil Salinity - Non-Watertable (Magnesia Patches)

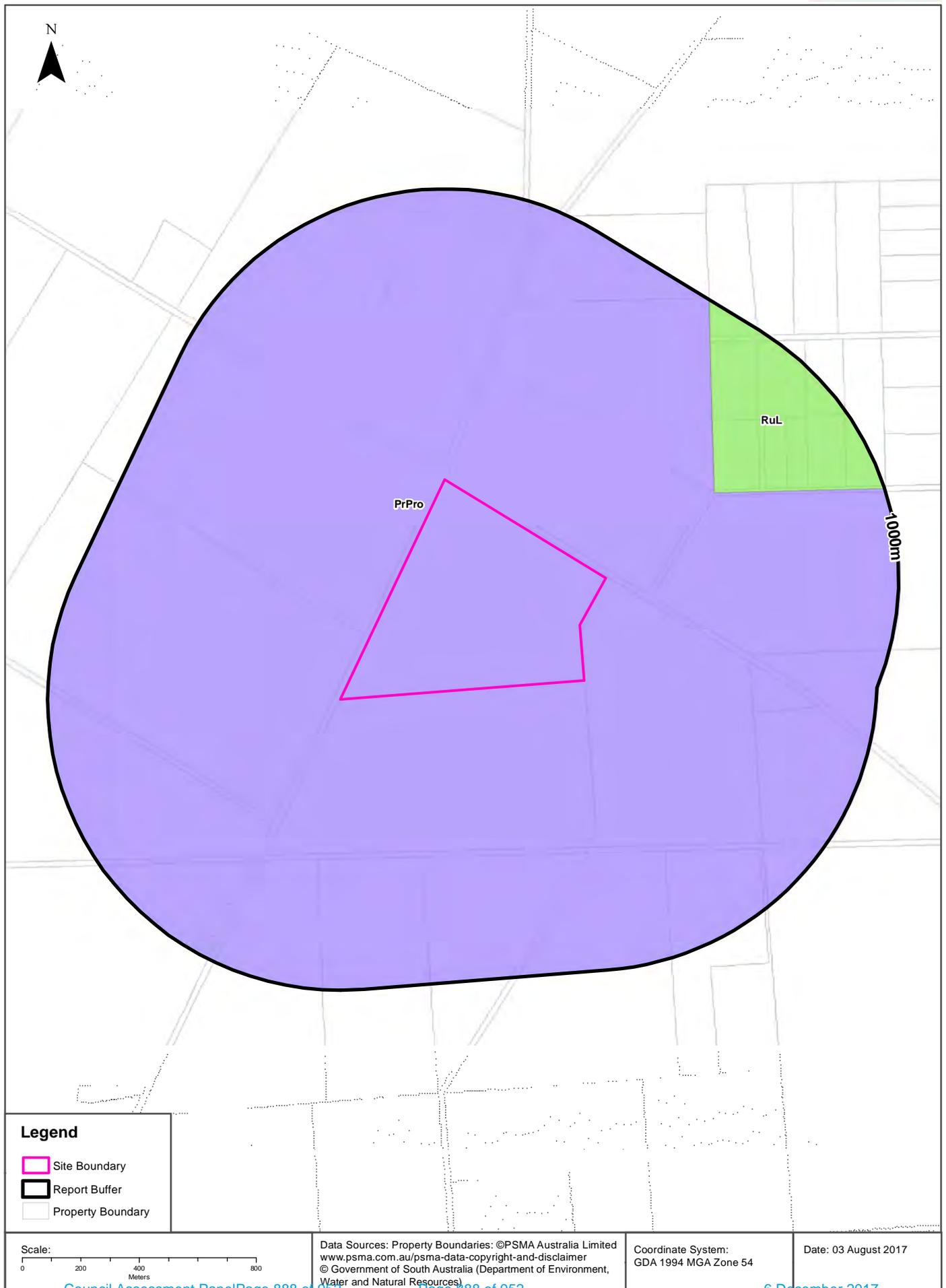
Magnesia patches within the dataset buffer:

Map category code	Proportion of land affected by magnesia patches	Distance
A	Negligible	0m

Salinity Non-Watertable (Magnesia Patches) Data Source: Dept of Environment, Water and Natural Resources - South Australia
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Land Development Zones

1629 Redbanks Road, Reeves Plains, SA 5502



Planning

1629 Redbanks Road, Reeves Plains, SA 5502

Land Development Zones

Land development zoning within the dataset buffer:

Zone Code	Development Plan Code	Zone Description	Development Category	Distance	Direction
PrPro	MAL	Primary Production	PRIMARY PRODUCTION - MINING	0m	Onsite
RuL	MAL	Rural Living	RURAL LIVING	471m	North East

Land Development Zones Data Source: Dept of Planning, Transport and Infrastructure - South Australia
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Heritage

1629 Redbanks Road, Reeves Plains, SA 5502

State Heritage Areas

State Heritage Areas within the dataset buffer:

Heritage Id	Name	Distance	Direction
N/A	No records in buffer		

Heritage Areas Data Source: Dept of Environment, Water and Natural Resources - South Australia
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SA Heritage Places

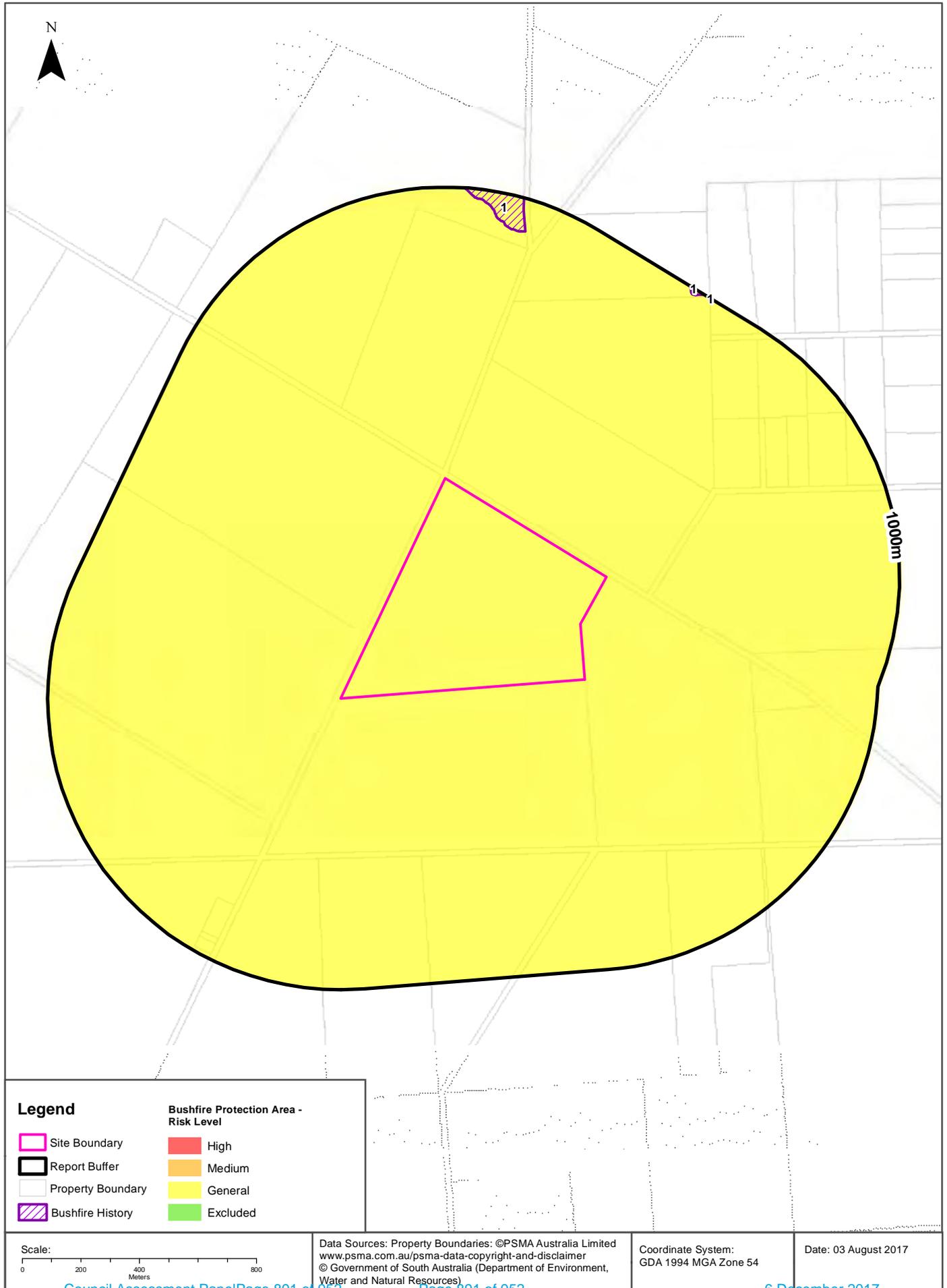
SA Heritage Places within the dataset buffer:

Heritage No	Location	Heritage Class	Australian Class	Details	Auth Date	Distance	Direction
N/A	No records in buffer						

Heritage Places Data Source: Dept of Environment, Water and Natural Resources - South Australia
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Bushfire

1629 Redbanks Road, Reeves Plains, SA 5502



Natural Hazards

1629 Redbanks Road, Reeves Plains, SA 5502

Bushfire Protection Areas

Bushfire Protection Areas within the dataset buffer:

Map Id	Bushfire Risk Code	Development Plan Code	Additional Development Criteria	Distance	Direction
444	General	MAL		0m	Onsite

Bushfire Protection Areas Data Source: Dept of Planning, Transport and Infrastructure - South Australia
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Bushfires and Prescribed Burns History

Bushfires and prescribed burns within the dataset buffer:

Map Id	Incident No.	Incident Name	Incident Type	Date of Fire	Area of Fire	Distance	Direction
5177	201511009	Pinery	Bushfire	11/25/2015 12:00:00 AM	78257	884m	North

Bushfires and Prescribed Burns History Data Source: Dept of Environment, Water and Natural Resources - South Australia
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Ecological Constraints

1629 Redbanks Road, Reeves Plains, SA 5502

RAMSAR Wetlands

RAMSAR Wetlands within the dataset buffer:

Wetland	Distance	Direction
No records in buffer		

RAMSAR Wetlands Data Source: Dept of Environment, Water and Natural Resources - South Australia
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APPENDIX O – PLANNING ASSESSMENT

APPENDIX O – PRINCIPLES OF DEVELOPMENT PLAN

The following section identifies the provisions of the Mallala Council Development Plan (Development Plan) relevant to the assessment of the Project. A copy of the Development Plan Policy can be found on the Adelaide Plains Council website - <http://www.mallala.sa.gov.au/strategicplans> .

An assessment of sections of the Mallala Council Development Plan that are relevant to the Project was undertaken at the beginning of the planning process, the results of which are presented in Table 1.

Table 1 - Relevant sections of Mallala Council Development Plan

Section	Relevance to Project
Advertisements	Not applicable – there is no advertising material associated with Project
Animal Keeping	Not applicable – the Project does not involve animal keeping
Building near Airfields	Applicable – the subject site is located in military airspace and triggers the requirement for a plume rise assessment
Bulk Handling and Storage Facilities	Not applicable - the Project does not include any bulk handling or agricultural commodity storage facilities
Centres and Retail Development	Not applicable - the Project does not include any community centres and retail development
Coastal Areas	Not applicable – the Project is located approximately 20 km from the nearest coastline at Middle Beach
Community Facilities	Not applicable – the Project is not a community facility
Crime Prevention	Applicable – the Project will be secured to restrict public access
Design and Appearance	Applicable – the Project will be visible in the local area and measures have been proposed to mitigate any impact to visual amenity in the local area
Energy Efficiency	Applicable – buildings associated with the Project will be designed to be energy efficient
Forestry	Not applicable – the Project does not involve land use relating to forestry
Hazards	Applicable – the Project will be designed, constructed and managed to mitigate hazards associated with the facility.
Heritage Places	Not applicable – the Project does not impact on any indigenous, local or State heritage
Industrial Development	Applicable – the Project is considered to be an industrial use
Infrastructure	Applicable – the Project is infrastructure
Interface between Land Uses	Applicable – the Project is located in the Primary Production Zone and the predominate land use is agricultural. The subject site is located near the rural residential zone of Fischer which is zoned Rural Living.
Land Division	Not applicable – the Project does not involve the division of land
Landscaping, Fences and Walls	Applicable – landscaping is proposed to assist in providing visual screening for the Project

Section	Relevance to Project
Marinas and Maritime Structures	Not applicable – the Project is does not include any of these structures
Mineral Extraction	Not applicable – the Project does not include any mineral extraction
Natural Resources	Applicable – the Project will be designed and managed to minimise the impact on natural resources including avoiding areas of native vegetation and developing a Concept Stormwater Management Plan that appropriately manages stormwater risks.
Open Space and Recreation	Not applicable – open space and recreation facilities are not consistent with the land use associated with the Project
Orderly and Sustainable Development	Applicable – the Project will be developed with consideration given to adjoining land uses and the provisions of the Development Plan
Renewable Energy Facilities	Not applicable – the Project is not a renewable energy facility
Residential Development	Not applicable – the Project is not a residential development
Short-Term Workers Accommodation	Not applicable – no workers accommodation will be provided on the subject site
Siting and Visibility	Applicable – the Project would be designed sited to minimise visual impact. This would include setting back the infrastructure from public roads, ensure building finishes compliment the agricultural landscape where possible and the provision of landscaping to screen the Project from viewpoints in the area.
Sloping Land	Not applicable – the Project has a grade of x % and is not considered to be sloping
Supported Accommodation, Housing for Aged Persons and People with Disabilities	Not applicable – the Project does not include any of these facilities
Telecommunications Facilities	Not applicable – the Project does not include any telecommunications facilities
Tourism Development	Not applicable – the Project is not being developed for the purposes of tourism
Transportation and Access	Applicable – the Project will be developed to ensure the construction and operation activities do not have a significant impact on accessibility around the subject site. The Traffic Impact Assessment shows that traffic generation by the proposed development is expected to be minimal, and it can be effectively and safely accommodated by the existing road network
Waste	Applicable – the Project will consider the waste management hierarchy in all phases of development as demonstrated by the Waste Management Plan prepared as part of this Development Application
Waste Management Facilities	Not applicable – the Project is not a waste management facility

The following sections detail the development control principles contained in the Malalla Council Development Plan that are relevant to the Reeves Plains Power Station and an assessment as to whether the Project is compliant or otherwise. In some cases, the development control principles detailed

requirements that would need to be addressed in the future, Alinta Energy have committed to ensuring the construction and operation of the Project meets these principles.

GENERAL SECTION PROVISIONS

Building near Airfields

The Project is located within RAAF Edinburgh airspace and is 11.74 nautical miles north of the airfield itself.

Objectives	Principles of Development Control	Assessment
1	<ol style="list-style-type: none"> The height and location of buildings and structures should not adversely affect the long-term operational, safety, commercial and military aviation requirements of airfields 	<p>The proposed development will not have a structural impact on the OLS and PANS-OPS surfaces of any airports or airfields.</p> <p>CASA undertook an assessment of plume velocity and found that the Project does not impact the NDB (non-directional beacon) approaches and does not trigger the need for the establishment of a Danger Area</p>
	<ol style="list-style-type: none"> Buildings and structures that exceed airport building heights should not be developed unless a safety analysis determines that the building/structure does not pose a hazard to aircraft operations 	<p>Refer to response to PDC 1 above.</p>
	<ol style="list-style-type: none"> Development in the vicinity of airfields should not create a risk to public safety, in particular through any of the following: <ol style="list-style-type: none"> Lighting glare Smoke, dust and exhaust emissions Air turbulence Storage of flammable liquids Attraction of birds Reflective surfaces (eg roofs of buildings, large windows) Materials that affect navigational aids 	<p>The Project satisfactory and appropriate from an aviation impact point of view having regard to:</p> <ul style="list-style-type: none"> Runways and Approach/Departure Paths OLS and PANS-OPS surfaces Building generated windshear and turbulence Navigation aids and control tower External lighting Reflected sunlight Landscaping and bird hazards Air emissions Aircraft noise National Airports Safeguarding Framework
	<ol style="list-style-type: none"> Outdoor lighting within 6 kilometres of an airport should be designed to that it does not pose a hazard to aircraft operations 	<p>The National Airports Safeguarding Framework (NASF) Guideline E provides guidance to address the risk of distractions to pilots of aircraft from lighting and light fixtures near airports. All external lighting on the subject site will not emit upward waste light (Ocd above the horizontal) in accordance with the NASF Guideline E.</p> <p>RAAF Edinburgh airport is located 11.74 nautical miles to the south of the subject site</p>
	<ol style="list-style-type: none"> Development that is likely to increase the attraction of birds should not be located within 3 km of an airport used by commercial aircraft. If located closer than 3 kilometres the facility should incorporate bird control measures to minimise the risk of bird strike to aircraft. 	<p>The subject site is approximately 32 km from the nearest commercial airport at Parafield Airport.</p>

Objectives	Principles of Development Control	Assessment
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Development Principles 6 and 7 are not applicable to the Project as:

- the subject site is not affected by airport noise

Crime Prevention

The Project would be a critical piece of energy infrastructure in South Australia and security is a key consideration during construction and operation.

Objectives	Principles of Development Control	Assessment
------------	-----------------------------------	------------

1	1. Development should be designed to maximise surveillance of public spaces through the incorporation of clear lines of sight, appropriate lighting and the use of visible permeable barriers wherever practicable.	Project lighting will be accordance with AS/NZS 1680 and the subject site will be bordered by a chainmesh security fence.
	3. Development should provide a robust environment that is resistant to vandalism and graffiti.	The subject site will be secured by a chainmesh security fence and monitored by security cameras to discourage vandalism and graffiti
	5. Development, including car park facilities should incorporate signage and lighting that indicate the entrances and pathways to, from and within sites.	The Project will include illuminated exit signs and emergency lighting system which will be supplied and installed in accordance with AS/NZS 2293
	6. Landscaping should be used to assist in discouraging crime by: <ul style="list-style-type: none"> a) screen planting areas susceptible to vandalism b) planting trees or ground covers, rather than shrubs, alongside footpaths c) planting vegetation other than ground covers a minimum distance of 2 metres from footpaths to reduce concealment opportunities. 	As shown in the Landscape Concept Plan (Appendix X) all planting will be internal to the subject site boundary and will include trees and groundcovers.
	7. Site planning, buildings, fences, landscaping and other features should clearly differentiate public, communal and private areas.	A chainmesh fence around the subject site will clearly delineate the Project boundary.

Development Principles 2, 4, 8, 9 and 10 are not applicable to the Project as:

- the buildings associated with the development do not overlook public or communal streets
- the development is not in a public space
- there are no adjoining dwellings
- the Project does not include provision for public toilets
- the Project is not accessible to the public.

Design and Appearance

An LVIA has been undertaken to assess the impact on visual amenity as a result of the Project and a Landscape Concept Plan has been developed to provide guidance for the provision of landscaping at the subject site.

Objectives	Principles of Development Control	Assessment
1	<p>1. The design of a building may be contemporary in nature and exhibit an innovative style provided the overall form is sympathetic to the scale of the development in the locality and with the context of its setting with regard to shape, size, materials and colour.</p>	<p>As referenced in the LVIA (Appendix G) material and finishes, such as pitched roof and neutral colourbond zincalume finish would be considered for service buildings and other infrastructure to provide a contextual reference within the agricultural landscape. Materiality and colour finishes consistent with the surrounding agricultural landscape will provide additional visual management to enhance the integration of the Project into the landscape.</p>
	<p>2. Buildings should be designed and sited to avoid creating extensive areas of uninterrupted walling facing areas exposed to public view.</p>	<p>Compliant – the layout, scale and bulk of the Project infrastructure does not result in uninterrupted walling with landscape screening proposed to include a series of overlapping but staggered belts of vegetation with adequate gaps between them to aid in visual management.</p>
	<p>3. Buildings should be designed to reduce their overall bulk and provide visual interest through design elements such as:</p> <ol style="list-style-type: none"> Articulation Colour and detailing Small vertical and horizontal components Design and placing of windows Variations to facades 	<p>Refer to response to PDC 1 above.</p>
	<p>5. Building form should not unreasonably restrict existing views available from neighbouring properties and public spaces.</p>	<p>The centre of the subject site is located approximately 1 km from the nearest residential property and does not restrict views, while the view from public spaces (such as roads) will change, the views are not restricted.</p>
	<p>7. The external walls and roofs of buildings should not incorporate highly reflective materials which will result in glare to neighbouring properties or drivers.</p>	<p>Refer to response to PDC 1 above.</p>
	<p>8. Structures located on the roofs of buildings to house plant and equipment should form an integral part of the building design in relation to external finishes, shaping and colours.</p>	<p>Refer to response to PDC 1 above.</p>
	<p>13. Buildings, landscaping, paving and signage should have a co-ordinated appearance that maintains and enhances the visual attractiveness of the locality.</p>	<p>Refer to response to PDC 1 above.</p>
	<p>16. Development should be designed and sited so that outdoor storage, loading and service areas are screened from public view by an</p>	<p>The Landscape Concept Plan (Appendix Q) shows that locating tress closer to the boundary perimeter a greater screening effect is achieved.</p>

Objectives	Principles of Development Control	Assessment
	appropriate combination of built form, solid fencing and/or landscaping.	
	17. Outdoor lighting should not result in light spillage on adjacent land.	Lighting design will be completed during the detailed design phase. Provision has been made in the PPR's that lighting will be directed internally to the site and be shrouded were appropriate to ensure light spill does not impact adjacent residences.
	19. Buildings should be designed so that windows, doors, balconies or decks do not cause a loss of privacy to the residents of adjacent dwellings.	Due to the distances from residential dwellings (at least 1 km from administration buildings) and the provision of landscaping around the subject site privacy of residents in the area will not be impacted.
Building Setbacks from Road Boundaries		
2	21. The setback of buildings from public roads should: a) be similar to, or compatible with, setbacks of buildings on adjoining land and other buildings in the locality	The key infrastructure on the subject site (turbines) is set back at least 100 m from both Redbanks Road and Day Road which is compatible with other buildings in the locality. The existing dwelling on the site (to be demolished) is currently setback 40 m from Redbanks Road.
	23. Except where specified in a zone, policy area or precinct, the setback of development from a secondary street frontage should reflect the setbacks of the adjoining buildings and other buildings in the locality.	Refer to response to PDC 21 above.
1	25. Unless otherwise stated within the specific zone or policy area provisions, buildings and structures excluding advertisements and/or advertising hoardings should be setback at least: a) 50 metres from the road boundary of the Port Wakefield Road outside defined township and settlement zones b) 20 metres from the road boundary (other than the Port Wakefield Road) in any area outside of a defined township, settlement or rural living zone boundary c) (c) 8 metres from the road boundary within the Township Zone or Settlement Zone.	Refer to response to PDC 21 above
<p>Development Principles 4, 6, 9, 10, 11, 12, 14, 15, 18, 20, 22 and 24 25 are not applicable to the Project as:</p> <ul style="list-style-type: none"> no buildings are planned to be sited on or close to a boundary buildings used during the operation phase of the Project will be permanent structures the subject site will not be accessible to the public the subject site is not located next to any other facilities, dwellings or buildings buildings on the subject site are ancillary to the key infrastructure (turbines) there are no balconies on buildings or sheds and garages (from a residential perspective) associated with the Project the subject site does not encroach on any road widening setback. 		

Energy Efficiency

The Project would be sited in between existing gas and electricity easements. This means that energy and resources are conserved during construction by minimising the connection infrastructure requirements.

Objectives	Principles of Development Control	Assessment
1	<ol style="list-style-type: none"> 1. Development should provide for efficient solar access to buildings and open space all year around 2. Buildings should be sited and designed: <ol style="list-style-type: none"> a) to ensure adequate natural light and winter sunlight is available to the main activity areas of adjacent buildings b) so that open spaces associated with the main activity areas face north for exposure to winter sun 	<p>The Administration building is located to the north to the tallest structures onsite which satisfy the requirement to provide sufficient solar access all year around.</p> <hr/> <p>Refer to response to PDC 1 above</p>
<p>Development Principles 3 and 4 are not applicable to the Project as:</p> <ul style="list-style-type: none"> • the Project supports renewable energy penetration by providing dispatchable energy during times of peak demand or when renewable energy supply is interrupted. 		

Hazards

Alinta Energy operate power stations across Australia and have developed safe and reliable systems to ensure hazards associated with power station construction and operation are appropriately controlled.

Objectives	Principles of Development Control	Assessment
2	<ol style="list-style-type: none"> 1. Development should be excluded from areas that are vulnerable to, and cannot be adequately and effectively protected from, the risk of hazards. 	<p>The Project can be adequately and effectively protected from the risk of flooding and bushfire (refer to Appendix H and Appendix J) which are considered the main hazards associated with the subject site. Alinta Energy will also develop Standard Operating Protocols to control the risk associated with hazards during operation of the Project.</p>
1	<ol style="list-style-type: none"> 2. Development located on land subject to hazards as shown on the <i>Overlay Maps – Development Constraints</i> should not occur unless it is sited, designed and undertaken with appropriate precautions being taken against the relevant hazards 3. There should not be any significant interference with natural processes in order to reduce the exposure of development to the risk of natural hazards 	<p>The subject site is not within land subject to hazards as shown on the <i>Overlay Maps – Development Constraints</i>.</p> <p>The subject site is relatively flat and does not include any watercourses or tracts of vegetation therefore there will be no significant interference of natural process when reducing the risk of natural hazards on the Project. The risk from natural hazards is further reduced through the provision of the Concept Stormwater Management Plan and Bushfire Hazard Assessment which outline mitigation measures to further reduce any potential risks.</p>
Flooding		
5	<ol style="list-style-type: none"> 4. Development should not occur on land where the risk of flooding is likely to be harmful to safety or damage property 5. Development should not be undertaken in areas liable to inundation by tidal, drainage or flood waters unless the development can achieve the following: <ol style="list-style-type: none"> a) It is developed with a public stormwater system capable to catering for a 1-in-100 year average return interval flood event b) Buildings are designed and constructed to prevent the entry of floodwaters in a 1-in-100 year average return interval flood event 6. Development, including earthworks associated with development, should not do any of the following: <ol style="list-style-type: none"> a) impede the flow of floodwaters through the land or other surrounding land 	<p>The subject site is not within the Gawler or Light River floodplains. A Concept Stormwater Management Plan has been developed (Appendix H) to ensure localised flooding risk is appropriately managed. This includes the provision of a stormwater basin that can store the 10% AEP rainfall event and reduce the flow of larger events.</p> <p>The subject site is not within the Gawler or Light River floodplains and is not located in an area liable to tidal inundation. The Concept Stormwater Management Plan provide a basis for managing site drainage so that discharge is consistent with existing conditions, including provision of a stormwater retention/detention basin.</p> <p>The Concept Stormwater Management Plan developed shows the clean run-off would be diverted around the site and temporarily stored in a stormwater basin which achieves the parts a – f of this development control principle. No watercourses are located on the subject site.</p>

Objectives	Principles of Development Control	Assessment
	<ul style="list-style-type: none"> b) increase the potential hazard risk to public safety of persons during a flood event c) aggravate the potential for erosion or siltation or lead to the destruction of vegetation during a flood d) cause any adverse effect on floodway function e) increase the risk of flooding of other land f) obstruct a watercourse 	
Bushfire		
3	<p>8. The following bushfire protection principles of development control apply to development of land identified as General, Medium and High bushfire risk areas as shown on the Bushfire Protection Area BPA Maps - Bushfire Risk.</p> <hr/> <p>9. Development in a Bushfire Protection Area should be in accordance with those provisions of the Minister's Code: Undertaking development in Bushfire Protection Areas that are designated as mandatory for Development Plan Consent purposes.</p> <hr/> <p>10. Buildings and structures should be located away from areas that pose an unacceptable bushfire risk as a result of one or more of the following:</p> <ul style="list-style-type: none"> a) vegetation cover comprising trees and/or shrubs b) poor access c) rugged terrain d) inability to provide an adequate building protection zone e) inability to provide an adequate supply of water for firefighting purposes. <hr/> <p>13. Buildings and structures should be designed and configured to reduce the impact of bushfire through the using simple designs that reduce the potential for trapping burning debris against the building or structure, or between the ground and building floor level in the case of transportable buildings</p>	<p>The subject site is located in the General Bushfire Protection Area and a bushfire hazard assessment has been undertaken in accordance with those requirements (Appendix J).</p> <hr/> <p>The Minister's Code: Undertaking development in Bushfire Protection Areas has been considered in the bushfire hazard assessment (Appendix J).</p> <hr/> <p>A 50 m reduced fuel zone has been proposed for the Project as well as an emergency vehicle access track. Provision has also been made for a 36kL water tank that can be accessed by the CFS independent of accessing the firewater tanks onsite, the final location will be confirmed during detailed design.</p> <hr/> <p>A 50m reduced fuel zone has been proposed for the Project and building structures on the subject site would utilise simple designs that minimise the potential for debris to be trapped against structures.</p>
Site Contamination		
9, 10	<p>23. Development, including land division, should not occur where site contamination has occurred unless the site has been assessed and remediated as necessary to ensure that it is suitable and safe for the proposed use.</p>	<p>The Phase 1 Preliminary Site Assessment (Appendix N) concluded that targeted testing or herbicides and pesticides should be undertaken to determine appropriate disposal if required. The subject site is considered suitable and safe for the proposed use as a power station.</p>

Objectives	Principles of Development Control	Assessment
Containment of Chemical and Hazardous Material		
11	<p>23. Hazardous materials should be stored and contained in a manner that minimises the risk to public health and safety and the potential for water, land or air contamination.</p>	<p>Bunding would be designed in accordance with EPA Guidelines 080/16 (Bunding and spill management).</p>
	<p>23. Development that involves the storage and handling of hazardous materials should ensure that these are contained in designated areas that are secure, readily accessible to emergency vehicles, impervious, protected from rain and stormwater intrusion and other measures necessary to prevent:</p> <ul style="list-style-type: none"> a) discharge of polluted water from the site b) contamination of land c) airborne migration of pollutants d) potential interface impacts with sensitive land uses 	<p>Bunding will be designed in accordance with EPA Guidelines 080/16 (Bunding and spill management). The site will be secured by a chainmesh fence and security cameras and can be made accessible to emergency vehicles by Alinta Energy operations staff</p>

Industrial Development

Industrial development is not considered to be non-complying in the Primary Production Zone and industry should be developed if it supports primary production, processing, storage and distribution of local primary produce. The Reeves Plains Power Station will improve the reliability of the South Australian electricity grid and drive prices down due to increased competition, therefore it is will directly support primary production, processing, storage and distribution of local primary produce.

Objectives	Principles of Development Control	Assessment
1	1. Offices and showrooms associated with industrial, warehouse, storage and transport development should be sited at the front of the building with direct and convenient pedestrian access from the main visitor parking area	The concept layout (Drawing 5589-01 – Appendix D) shows that the administration building is located adjacent to the car parking area at the front of the facility.
	3. Industrial development should enable all vehicles to enter and exit the site in a forward direction	The project includes provision of a 30 m wide entry and sufficient room to enable heavy and emergency vehicles to enter and exit the site in a forward direction
	4. Industrial and commercial development should provide emergency vehicle access to the rear of the site	A 3 m wide bushfire track (with 6 m passing bays at regular intervals) will be constructed as part of the Project which will enable emergency service to access the rear of the site. The location and alignment of this access will be confirmed during the detailed design.
	5. Industrial development abutting an arterial road, a non-industrial zone boundary, or significant open space should be developed in a manner that does not create adverse visual impacts on the locality	The LVIA (Appendix G) states that there is moderate visual impact as a result of the development which improves to slight once landscaping matures.
	6. Building development should be designed and sited to ensure the layout of buildings and activities can accommodate all land use, parking and circulation requirements within the boundary of the site	The operation of the Project will be contained within the subject site boundary
	6	7. Building facades facing a non-industrial zone, public road, or public open space should: <ul style="list-style-type: none"> f) use a variety of building finishes g) not consist solely of metal cladding h) contain materials of low reflectivity i) incorporate design elements to add visual interest j) avoid large expanses of blank walls.
8. Industrial development should minimise significant adverse impact on adjoining uses due to hours of operation, traffic, noise, fumes, smell, dust, paint or other chemical over-spray, vibration, glare or light spill, electronic interference, ash or other harmful or nuisance-creating impacts		The Environmental Noise Impact Assessment (Appendix E) and the Air Quality Impact Assessment (Appendix F) all show that the Project will comply with the relevant environmental protection policies. Traffic associated with the Project will not result in a reduced level of service on Redbanks Road or Day Road. All lighting will be installed in accordance with Standard AS4282 Obtrusive Effects of Outdoor Lighting.
4		

Objectives	Principles of Development Control	Assessment
6	9. Landscaping should be incorporated as an integral element of industrial development along nonindustrial zone boundaries	A Landscape Concept Plan (Appendix Q) have been prepared as part of this Development Application.
	10. Fencing (including colour-coated wire mesh fencing) adjacent to public roads should be setback in one of the following ways: a) in line and/or behind the building facade b) behind a landscaped area that softens its visual impact.	The security chain mesh fence will be located in front of the landscaped area for security reasons however the landscaping will still provide some level of back-screening that will soften the visual impact.
<p>Development principles 2, 11, 12, 13, 14, 15, 16, 17 and 18 are not applicable to the Project as:</p> <ul style="list-style-type: none"> • the Project is not on or abutting a non-industrial zone boundary • the Project is not a marine aquaculture onshore storage, cooling and processing facility • the Project is not an agricultural industry, home-based industry, mineral water extraction and processing plant, or winery in a rural area, rural living and horticultural area 		

Infrastructure

The Project is a key piece of electricity generation infrastructure that will benefit South Australia by:

- providing new, locally based, generation capacity;
- improving reliability in the State's energy supply;
- increasing competition in the South Australian wholesale generation market;
- enhancing competition in the electricity retail market benefiting business, industry, community organisations and residential consumers; and
- creating direct and indirect jobs

Objectives	Principles of Development Control	Assessment
1, 3	<p>1. Development should only occur where it has access to adequate utilities and services, including:</p> <ol style="list-style-type: none"> electricity supply water supply drainage and stormwater systems effluent disposal systems formed all-weather public roads telecommunications services gas services. 	<p>The subject site has access to electricity, telecommunication and water supply infrastructure. No formalised drainage, or effluent disposal systems are located at the subject site however these will be constructed as part of the Project. Redbanks Road is an all-weather road and Day Road will be sealed up to the Project entrance to allow access in all weather. Reticulated gas services aren't required for the Project.</p>
3	<p>3. Development should only occur where it provides, or has access to, relevant easements for the supply of infrastructure.</p>	<p>The subject site has direct access to the MAPS and 275kV transmission line.</p>
	<p>4. Development should incorporate provision for the supply of infrastructure services to be located within common service trenches where practicable.</p>	<p>The EPC Contractor will investigate the provision of utility services within common trenches where reasonable and practicable.</p>
1	<p>5. Development should not occur until adequate and coordinated drainage of the land is provided.</p>	<p>The PPR's stipulate that the EPC Contractor must undertake all necessary site preparation works including site drainage and water management provisions.</p>
1, 2	<p>10. Electricity infrastructure should be designed and located to minimise visual and environmental impacts</p>	<p>The LVIA (Appendix G) states that with landscaping treatments the visual impact as a result of construction of the Project is slight. A Landscape Concept Plan is provided in Appendix Q..</p>
1	<p>11. Utilities and services, including access roads and tracks, should be sited on areas already cleared of native vegetation. If this is not possible, their siting should cause minimal interference or disturbance to existing native vegetation and biodiversity</p>	<p>The concept layout (Drawing 5589-01) does not impact on any areas of native vegetation as highlighted in the Background Ecological Report (Appendix L).</p>
2	<p>12. Utility buildings and structures should be grouped with non-residential development, where possible.</p>	<p>The structures associated with the Project are grouped together as shown in Drawing 5589-01 (Appendix D).</p>
	<p>13. Development in proximity to infrastructure facilities should be sited and be of a scale to ensure adequate separation to protect people and property.</p>	<p>The Project is sited to take advantage of the existing gas and electricity infrastructure on the subject site. Based on the concept layout (Drawing 5589-01) the nearest residential property is 930 m from the closest</p>

Objectives	Principles of Development Control	Assessment
		turbine which is adequate to protect people and property.
3	14. Incompatible uses should not encroach upon the easements of infrastructure corridors for existing and proposed transmission lines.	As shown in Drawing 5589-01 (Appendix D) the development does not encroach on the transmission line or MAPS easement
	16. Provision should be made for new transmission and distribution substations and overhead major electricity line corridors (having a capacity greater than or equal to 33kV) in areas which have the required buffer distance to protect people and allow for adequate access.	The new switching substation is located on the same property as the transmission network which ensures a suitable buffer distance to protect people and can be easily accessed via the Reeves Plains Power Station
<p>Development principles 2, 6, 7, 8, 9, 15, and 17 are not applicable to the Project as:</p> <ul style="list-style-type: none"> • the Project does not include social infrastructure, community services and facilities • the Project is not located in an urban area • reticulated water is available • no land division is associated with the Project 		

Interface between Land Uses

The subject site is located in a Primary Production Zone and close to a Rural Living Zone. Numerous specialist studies have been undertaken to investigate potential risks and develop mitigation measures where appropriate.

Objectives	Principles of Development Control	Assessment
1	<ol style="list-style-type: none"> 1. Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following: <ol style="list-style-type: none"> a) the emission of effluent, odour, smoke, fumes, dust or other airborne pollutants b) noise c) vibration d) electrical interference e) light spill f) glare g) hours of operation h) traffic impacts. 	<p>The Environmental Noise Impact Assessment (Appendix E) and the Air Quality Impact Assessment (Appendix F) all show that the Project will comply with the relevant environmental protection policies. Traffic associated with the Project will not result in a reduced level of service on Redbanks Road or Day Road. All lighting will be installed in accordance with Standard AS4282 Obtrusive Effects of Outdoor Lighting. The operation of the Reeves Plains Power Station is contained to the subject site.</p>
1, 2	<ol style="list-style-type: none"> 2. Development should be sited and designed to minimise negative impact on existing and potential future land uses considered appropriate in the locality. 	<p>The subject site has direct access to the MAPS and 275kV transmission line therefore minimising the impact associated with the Project and ensuring surrounding agricultural land uses are not significantly impacted.</p>
1	<ol style="list-style-type: none"> 5. Sensitive uses likely to conflict with the continuation of lawfully existing developments and land uses considered appropriate for the zone should not be developed or should be designed to minimise negative impacts 	<p>The Project has been designed to ensure it complies with the relevant environmental protection policies and will be constructed using materials and finishes which are consistent with the desired visual amenity of the area. For example, the use of neutral colourbond zincaluminium finishes.</p>
Noise		
1	<ol style="list-style-type: none"> 6. Development should be sited, designed and constructed to minimise negative impacts of noise and to avoid unreasonable interference. 	<p>The Environmental Noise Impact Assessment (Appendix E) shows that the Project would comply with the Noise EPP.</p>
	<ol style="list-style-type: none"> 7. Development should be consistent with the relevant provisions in the current Environment Protection (Noise) Policy. 	<p>Refer to response to PDC 6 above.</p>
Rural Interface		
1	<ol style="list-style-type: none"> 12. Existing primary production uses and mineral extraction should not be prejudiced by the inappropriate encroachment of sensitive uses such as urban development. 	<p>Refer to response to PDC 2 above.</p>
<p>Development principles 3, 4, 8, 9, 10, 11, 13 and 14 are not applicable to the Project as:</p> <ul style="list-style-type: none"> • the Project is not adjacent to a Residential Zone or residential area within a Township Zone • the Project is not located near a rail corridor • the Project does not involve primary production activities • the Project does not relate to open field horticulture 		

Landscaping, Fences and Walls

The provision of landscaping is an important aspect of the Project and will provide screening of the Reeves Plains Power Station from surrounding areas.

Objectives	Principles of Development Control	Assessment
1	<ol style="list-style-type: none"> 1. Development should incorporate open space and landscaping and minimise hard paved surfaces in order to: <ol style="list-style-type: none"> a) complement built form and reduce the visual impact of larger buildings (eg taller and broader plantings against taller and bulkier building components) b) enhance the appearance of road frontages c) screen service yards, loading areas and outdoor storage areas d) minimise maintenance and watering requirements e) enhance and define outdoor spaces, including car parking areas f) maximise shade and shelter g) assist in climate control within and around buildings h) minimise heat absorption and reflection i) maintain privacy j) maximise stormwater reuse k) complement existing vegetation, including native vegetation l) contribute to the viability of ecosystems and species m) promote water and biodiversity conservation. 	<p>The Landscape Concept Plan shows the location of plantings which are intended to provide screening of the Project at multiple heights. The species proposed are all native to the region and will promote biodiversity while complementing the existing native vegetation, minimise heat adsorption and maximise shade and shelter.</p> <p>The establishment of landscaping will be supported by stormwater reuse from the subject site as identified in the Concept Stormwater Management Plan.</p>
	<ol style="list-style-type: none"> 2. Landscaping should: <ol style="list-style-type: none"> a) include the planting of locally indigenous species where appropriate b) be oriented towards the street frontage c) result in the appropriate clearance from powerlines and other infrastructure being maintained. 	<p>The species list included in the Landscape Concept Plan includes native species and has taken into account the bushfire protection zone and infrastructure easements. Native species include (but are not limited to):</p> <ul style="list-style-type: none"> • Golden Wattle • Southern Australian Mallee Box • Kangaroo Thorn • Fleshy Saltbush.
	<ol style="list-style-type: none"> 3. Landscaping should not: <ol style="list-style-type: none"> a) unreasonably restrict solar access to adjoining development b) cause damage to buildings, paths and other landscaping from root invasion, soil disturbance or plant overcrowding. c) introduce pest plants d) increase the risk of bushfire e) remove opportunities for passive surveillance f) increase leaf fall in watercourses g) increase the risk of weed invasion h) obscure driver sight lines 	<p>The Landscape concept plan promotes the use of native species and takes into account bushfire risk by ensuring there are no continuous fuel sources (limited to 20 m extents in accordance with the bushfire hazard assessment) which also maintains the opportunities for passive surveillance. Plantings are also setback from the corner of Redbanks Road and Day Road so that driver sight lines are not obscured.</p>

Objectives	Principles of Development Control	Assessment
	<ul style="list-style-type: none"> i) create a hazard for train or tram drivers by obscuring sight lines at crossovers. 	
2	<p>4. Fences and walls, including retaining walls, should:</p> <ul style="list-style-type: none"> a) not result in damage to neighbouring trees b) be compatible with the associated development and with existing predominant, attractive fences and walls in the locality c) enable some visibility of buildings from and to the street to enhance safety and allow casual surveillance d) incorporate articulation or other detailing where there is a large expanse of wall facing the street e) assist in highlighting building entrances f) (be sited and limited in height, to ensure adequate sight lines for motorists and pedestrians especially on corner sites g) in the case of side and rear boundaries, be of sufficient height to maintain privacy and/or security without adversely affecting the visual amenity or access to sunlight of adjoining land h) be constructed of non-flammable materials. 	<p>The security chain mesh fence will be located in front of the landscaped area.</p>

Natural Resources

To support the planning assessment, and to address various environmental regulations and guidelines, a number of the specialist assessments have been undertaken which address natural resources including water and biodiversity.

Objectives	Principles of Development Control	Assessment
1, 2, 3, 6, 10	1. Development should be undertaken with minimum impact on the natural environment, including air and water quality, land, soil, biodiversity, and scenically attractive areas.	<p>Numerous specialist assessments have been undertaken to support this Development Application including (but not limited to):</p> <ul style="list-style-type: none"> • noise • air • stormwater • ecology • visual amenity • heritage • land contamination and groundwater <p>All assessments show that the Project would comply with the relevant legislative, regulatory and policy documents. The Project will be built and operated in accordance with the CEMP and OEMP (to be prepared following approval of this Development Application)</p>
1, 6, 8, 10, 13, 11	2. Development should ensure that South Australia's natural assets, such as biodiversity, water and soil, are protected and enhanced.	Refer to response to PDC 1 above.
1, 2, 3, 6	4. Development should be appropriate to land capability and the protection and conservation of water resources and biodiversity.	The subject site has been extensively, ploughed, cropped and cultivated and does not contain significant levels of biodiversity (Background Ecological Report). A Concept Stormwater Management Plan has been developed to provide protection of local downstream water resources through separation, retention and detention of stormwater flows.
Water Sensitive Urban Design		
2, 3, 4, 5, 6	6. Development should be designed to maximise conservation, minimise consumption and encourage reuse of water resources.	The retention of stormwater (as proposed in the Concept Stormwater Management Plan) provide opportunities for reuse of water, particularly in the establishment and maintenance of landscaping.
	7. Development should not take place if it results in unsustainable use of surface or underground water resources.	The Project will source water from the SA Water 150mm water main on Redbanks Road.
2, 3, 4, 5, 6, 7, 12	8. Development should be sited and designed to: <ul style="list-style-type: none"> a) capture and reuse stormwater, where practical on site b) minimise surface water runoff c) prevent soil erosion and water pollution d) protect and enhance natural water flows 	<p>A Concept Stormwater Management Plan (Appendix H) has been developed to provide protection of local downstream water resources through separation, retention and detention of stormwater flows.</p> <p>The EPC Contractor will also be required to prepare a Soil Erosion and Drainage Management Plan as part</p>

Objectives	Principles of Development Control	Assessment
	<ul style="list-style-type: none"> e) protect water quality by providing adequate separation distances from watercourses and other water bodies f) not contribute to an increase in salinity levels g) avoid the water logging of soil or the release of toxic elements h) maintain natural hydrological systems and not adversely affect: <ul style="list-style-type: none"> i. the quantity and quality of groundwater and/or surface waters ii. the depth and directional flow of groundwater iii. the quality and function of natural springs. 	of the CEMP to document procedures to minimise soil erosion and water pollution.
11, 6	<p>9. Water discharged from a development site should:</p> <ul style="list-style-type: none"> a) be of a physical, chemical and biological condition equivalent to or better than its pre-developed state b) not exceed the rate of discharge from the site as it existed in pre-development conditions 	The retention basin proposed in the Concept Stormwater Management Plan would retain flows up to the 10% AEP. Flows above this rate would be detained for a period of time and an outlet sized to maintain the existing level of discharge during those larger events.
4, 5, 6, 7	<p>10. Development should include stormwater management systems to protect it from damage during a minimum of a 1-in-100 year average return interval flood event.</p> <p>11. Development should have adequate provision to control any stormwater over-flow runoff from the site and should be sited and designed to improve the quality of stormwater and minimise pollutant transfer to receiving waters.</p> <p>12. Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.</p> <p>13. Development should include stormwater management systems to minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system.</p> <p>14. Stormwater management systems should preserve natural drainage systems, including the associated environmental flows.</p> <p>15. Stormwater management systems should:</p> <ul style="list-style-type: none"> a) maximise the potential for stormwater harvesting and reuse, either on-site or as close as practicable to the source 	<p>The finished floor levels and levels of critical infrastructure will be set based on the predicted 1% AEP flood level on the subject site. This would be determined during detailed design.</p> <p>Refer to responses to PDC 8 and 9 above.</p> <p>Refer to response to PDC 9 above</p> <p>Refer to response to PDC 8 above</p> <p>Refer to response to PDC 9 above</p> <p>Refer to response to PDC 6 above</p>

Objectives	Principles of Development Control	Assessment
	<ul style="list-style-type: none"> b) utilise, but not be limited to, one or more of the following harvesting methods: <ul style="list-style-type: none"> i. the collection of roof water in tanks ii. the discharge to open space, landscaping or garden areas, including strips adjacent to car parks iii. the incorporation of detention and retention facilities iv. (iv) aquifer recharge 	
6, 7	<p>16. Where it is not practicable to detain or dispose of stormwater on site, only clean stormwater runoff should enter the public stormwater drainage system.</p> <hr/> <p>17. Areas for activities such as loading and unloading, wash down of vehicles, plant or equipment or storage of waste refuse bins should be suitably paved, bunded to exclude stormwater runoff from external sources, and designed so that water that has made contact with such areas, directed to either (a) or (b):</p> <ul style="list-style-type: none"> a) a sediment trap, separator or other appropriate treatment device and then to sewer b) a wastewater holding tank. 	<p>Clean stormwater would be directed around the site (as per the Concept Stormwater Management Plan) which stormwater from higher risk areas would be captured in bunding, collected and disposed of offsite.</p> <hr/> <p>Stormwater from higher risk areas of the Project (e.g. chemical storage area, diesel storage area) would be bunded in accordance with the EPA Guideline 080/12 Bunding and spill management.</p>
6, 7, 12	<p>18. Development should prevent erosion and stormwater pollution before, during and after construction and associated works by:</p> <ul style="list-style-type: none"> a) appropriate control of surface water entering or leaving the land b) installing and maintaining erosion control works and measures c) installing and maintaining sediment collection devices to prevent the export of sediment from the land d) rehabilitating disturbed areas. 	Refer to responses to PDC 8 and 9 above.
6, 12	<p>19. A soil erosion and drainage plan should be prepared where either any of the following applies:</p> <ul style="list-style-type: none"> a) there is a high risk of sediment pollution to adjoining lands or receiving water b) the total area to be distributed, or left distributed, at any one time exceeds 0.5 hectares. 	Refer to response to PDC 8 above
5, 6, 7	<p>20. Artificial wetland systems, including detention and retention basins, should be sited and designed to:</p> <ul style="list-style-type: none"> a) ensure public health and safety is protected b) minimise potential public health risks arising from the breeding of mosquitoes 	The stormwater retention/detention basin is located within the subject site which would not be accessible by the public.
Water Catchment Areas		

Objectives	Principles of Development Control	Assessment
	30. Development should comply with the current Environment Protection (Water Quality) Policy.	The Concept Stormwater Management Plan has been prepared using the Environment Protection (Water Quality) Policy 2015 (EPA, 2015)
1, 2, 3, 4, 6	32. Watercourses, wetlands and floodplains should be retained in their natural state: a) by minimising development within the 1-in-100 year average return interval flood event area b) through subdivision design, maximising the road frontage along open space areas restoring watercourses as illustrated in the following diagram	The subject site is not located within any floodplain mapped by Adelaide Plains Council
Biodiversity and Native Vegetation		
1, 8, 9	33. Development should retain existing areas of native vegetation and where possible contribute to revegetation using locally indigenous plant species.	Native vegetation identified on the subject site will not be removed as part of the Project. The Landscape Concept Plan nominates native plant species to be used in landscape planting.
	34. Development should be designed and sited to minimise the loss and disturbance of native flora and fauna, including marine animals and plants, and their breeding grounds and habitats	Refer to response to PDC 33 above
1, 6, 8, 9	35. Native vegetation should be conserved and its conservation value and function not compromised by development if the native vegetation does any of the following: a) provides an important habitat for wildlife or shade and shelter for livestock b) has a high plant species diversity or includes rare, vulnerable or endangered plant species or plant associations and communities c) provides an important seed bank for locally indigenous vegetation d) has high amenity value and/or significantly contributes to the landscape quality of an area, including the screening of buildings and unsightly views e) has high value as a remnant of vegetation associations characteristic of a district or region prior to extensive clearance for agriculture f) is growing in, or is characteristically associated with a wetland environment g) it is required to minimise or is suitable for minimising potential land use conflict (eg act as a buffer for minimising spray drift).	This project was assessed against the provisions of the Commonwealth Environment Protection and Biodiversity Conservation Act, State National Parks and Wildlife Act and State Native Vegetation Act, and no impacts are expected to any populations of any flora and fauna species listed at State or National level.
1, 8, 9	39. Development should be located and occur in a manner which: a) does not increase the potential for, or result in, the spread of pest plants, or	Plants proposed as part of the Landscape Concept Plan are all native. Weeds currently exist at the subject site and these will be disposed of during initial construction works.

Objectives	Principles of Development Control	Assessment
	<p>the spread of any nonindigenous plants into areas of native vegetation or a conservation zone</p> <p>b) avoids the degradation of remnant native vegetation by any other means including as a result of spray drift, compaction of soil, modification of surface water flows, pollution to groundwater or surface water or change to groundwater levels</p> <p>c) incorporates a separation distance and/or buffer area to protect wildlife habitats and other features of nature conservation significance.</p>	
1, 10,	<p>40. Development should promote the long-term conservation of vegetation by:</p> <p>a) avoiding substantial structures, excavations, and filling of land in close proximity to the trunk of trees and beneath their canopies</p> <p>b) minimising impervious surfaces beneath the canopies of trees</p> <p>c) taking other effective and reasonable precautions to protect both vegetation and the integrity of structures and essential services</p>	<p>Native vegetation identified at the subject site is located on the eastern side of transmission line and the western side of the gas easement. None of the critical infrastructure associated with the Project will be constructed at these locations.</p>
Soil Conservation		
11	<p>43. Development should not have an adverse impact on the natural, physical, chemical or biological quality and characteristics of soil resources.</p>	<p>High risk areas will be bunded in accordance with EPA Guideline 080/12 Bunding and spill management and the evaporation pond will be lined with a HDPE liner. Accidental spills will be managed as per the procedures that would be developed as part of the CEMP and OEMP.</p>
12	<p>44. Development should be designed and sited to prevent erosion.</p>	<p>Refer to response to PDC 8 above.</p>
10	<p>45. Development should take place in a manner that will minimise alteration to the existing landform.</p>	<p>The Project will be constructed by minimising cut and fill quantities as much as reasonable practicable.</p>
11, 12	<p>46. Development should minimise the loss of soil from a site through soil erosion or siltation during the construction phase of any development and following the commencement of an activity.</p>	<p>Refer to response to PDC 8 above.</p>
<p>Development principles 3, 5, 21 - 29, 31, 36 – 38, 41 and 42 are not applicable to the Project as:</p> <ul style="list-style-type: none"> • the subject site is not associated with sensitive ecological areas • the subject site is not located within the Gawler River catchment • the subject site is not within an identified floodplain and does not contain a watercourse, swamp, water supply catchment area or wetland • no native vegetation is proposed to be cleared 		

Objectives

Principles of Development Control

Assessment

- horticulture is not an applicable land use to the Project

Orderly and Sustainable Development

A detailed assessment against the Mallala Council Development Plan has been undertaken to satisfy stakeholders that the subject site is suitable for the development of a power station and will not have significant impacts on future development within the zone and surrounding area.

Objectives	Principles of Development Control	Assessment
4	1. Development should not prejudice the development of a zone for its intended purpose.	The subject site has direct access to the MAPS and 275kV transmission line therefore minimising the impact associated with the Project and ensuring surrounding agricultural land uses can continue undisturbed.
3	2. Land outside of townships and settlements should primarily be used for primary production and conservation purposes.	The subject site has direct access to the MAPS and 275kV transmission line therefore minimising the impact associated with the Project. The reduction in land available for primary production is negligible when assessed against the primary production land in the Adelaide Plains region.
1	3. The economic base of the region should be expanded in a sustainable manner.	The Project will create up to 100 construction jobs and result in 6 full time jobs associated with the operation of the facility and contracting jobs related to ongoing maintenance.
1	6. Development should be located and staged to achieve the economical provision of public services and infrastructure, and to maximise the use of existing services and infrastructure.	Refer to response to PDC 1 above.
2	7. Where development is expected to impact upon the existing infrastructure network (including the transport network), development should demonstrate how the undue effect will be addressed.	The Reeves Plains Power Station requires access to both the MAPS and 275kV transmission line. Connection agreements with Epic Energy and ElectraNet will ensure that in undertaking these connections there will be no noticeable impact to these networks.
2	8. Vacant or underutilised land should be developed in an efficient and co-ordinated manner to not prejudice the orderly development of adjacent land.	The subject site has direct access to the MAPS and 275kV transmission line therefore is can be considered that a gas fired power station constructed and operated in accordance with best practice and assessed to the compliant with environmental requirements would be the highest and best form of land use for the subject site.

Development principles 4, 5 and 9 are not applicable to the Project as:

- the Project is not an urban development
- the Project is not a ribbon development
- the subject site is not in an area identified in the following Concept Plan Maps
 - Concept Plan Map Mal/1 - Recreation Two Wells
 - Concept Plan Map Mal/2 - Industry Two Wells
 - Concept Plan Map Mal/3 - Mallala Residential
 - Concept Plan Map Mal/4 - Two Wells Residential
 - Concept Plan Map Mal/5 - Rural Living Dublin

Objectives	Principles of Development Control	Assessment
	<ul style="list-style-type: none">- Concept Plan Map Mal/6 - Dublin Township- Concept Plan Map Mal/7 - Two Wells- Concept Plan Map Mal/8 – Two Wells- Concept Plan Map Mal/9 – Mallala Light Industry, Bulk Handling and Commercial- Concept Plan Map Mal/10 – Two Wells Town Centre Areas	

Siting and Visibility

The MAPS and Para-Bungama 275kV transmission line intersect the subject site, making it an ideal location for the development of a gas-fired power station.

Objectives	Principles of Development Control	Assessment
1	<ol style="list-style-type: none"> 1. Development should be sited and designed to minimise its visual impact on: <ol style="list-style-type: none"> a) the natural, rural or heritage character of the area b) areas of high visual or scenic value, particularly rural and coastal areas c) views from the coast, near-shore waters, public reserves, tourist routes and walking trails d) the amenity of public beaches. 	<p>As referenced in the LVIA (Appendix G) material and finishes, such as pitched roof and neutral colourbond zincalume finish would be considered for service buildings and other infrastructure to provide a contextual reference within the agricultural landscape. Materiality and colour finishes consistent with the surrounding agricultural landscape will provide additional visual management to enhance the integration of the Project into the landscape.</p>
	<ol style="list-style-type: none"> 2. Buildings should be sited in unobtrusive locations and, in particular, should: <ol style="list-style-type: none"> a) be grouped together b) where possible be located in such a way as to be screened by existing vegetation when viewed from public roads. 	<p>The structures associated with the Project are grouped together as shown in Drawing 5589-01 (Appendix D). The Landscape Concept Plan (Appendix Q) shows that planting will provide screening at various heights and by locating trees closer to the boundary permitter a greater screening effect is achieved for the taller infrastructure</p>
	<ol style="list-style-type: none"> 3. Buildings outside of urban areas and in undulating landscapes should be sited in unobtrusive locations and in particular should be: <ol style="list-style-type: none"> a) sited below the ridgeline b) sited within valleys or behind spurs c) sited in such a way as to not be visible against the skyline when viewed from public roads d) set well back from public roads, particularly when the allotment is on the high side of the road. 	<p>The regional landscape character is a result of low lying topography associated with the Adelaide Plains between the Mount Lofty Ranges and the coastal edge including Port Gawler and Middle Beach. Given the low lying nature of the landscape some elements of the Project will be visible against the skyline, subject to the viewer's location. However, the Project has been setback from Redbanks Road and Day Road (400m and 118m to the nearest turbine respectively) and will be visually screened as per the Landscape Concept Plan prepared as part of the Project.</p>
	<ol style="list-style-type: none"> 4. Buildings and structures should be designed to minimise their visual impact in the landscape, in particular: <ol style="list-style-type: none"> a) the profile of buildings should be low and the roof lines should complement the natural form of the land b) the mass of buildings should be minimised by variations in wall and roof lines and by floor plans which complement the contours of the land c) large eaves, verandas and pergolas should be incorporated into designs so as to create shadowed areas that reduce the bulky appearance of buildings 	<p>Drawing 5589-02 shows the elevations of the structures associated with the Project. Buildings associated with the Project are typical 1 -2 storey heights (3 -6 metres) while the turbine stack themselves will be approximately 15.5 metres high. Infrastructure associated with electrical transmission and distribution would be up to 45 metres high (transmission line cut in towers) however the lattice form associated with this infrastructure reduces the visual bulk due to an increased degree of visual permeability.</p> <p>Once landscaping matures the impact on visual amenity as a result of the Project is expected to be slight.</p>
	<ol style="list-style-type: none"> 5. The nature of external surface materials of buildings should not detract from the visual character and amenity of the landscape. 	<p>Refer to response to PDC 1 above.</p>

Objectives	Principles of Development Control	Assessment
	<p>6. The number of buildings and structures on land outside of urban areas should be limited to that necessary for the efficient management of the land.</p> <hr/> <p>7. Development should be screened through the establishment of landscaping using locally indigenous plant species:</p> <p>a) around buildings and earthworks to provide a visual screen as well as shade in summer, and protection from prevailing winds</p> <p>b) along allotment boundaries to provide permanent screening of buildings and structures when viewed from adjoining properties and public roads</p> <p>c) along the verges of new roads and access tracks to provide screening and minimise erosion.</p>	<p>The buildings and structures associated with the Reeves Plains Power Station are all necessary for the safe and efficient operation of the facility.</p> <hr/> <p>Native species selected in the Landscape Concept Plan include (but are not limited to):</p> <ul style="list-style-type: none"> • Golden Wattle • Southern Australian Mallee Box • Kangaroo Thorn • Fleshy Saltbush. <p>The location and type of plantings take into account the need for visual screening of larger structures from public roads while still satisfying the requirements of the bushfire hazard assessment and providing suitable sight lines for drivers, including those entering and exiting the site and those passing by.</p>

Transportation and Access

Objectives	Principles of Development Control	Assessment
1	1. Land uses arranged to support the efficient provision of sustainable transport networks and encourage their use	The subject site is located on Redbanks Road, an arterial road, and as such requires minimal improvements to support the development of the Project. The Traffic Impact Assessment (Appendix I) also highlights the proposed material delivery route from Port Adelaide, utilising Port Wakefield Road and the Northern Expressway.
Movement Systems		
2,	2. Development should be integrated with existing transport networks, particularly major rail and road corridors as shown on Location Maps and Overlay Maps – Transport, and designed to minimise its potential impact on the functional performance of the transport networks	The Traffic Impact Assessment (Appendix I) shows that the Project will have minimal impact on the functional performance of the local transport networks and can be effectively and safely accommodated by the existing road network
2, 3	7. The location and design of public and community transport set-down and pick-up points should maximise safety and minimise the isolation and vulnerability of users	There is a bus stop associated with Gawler District School bus route at the corner of Redbanks Road and Day Road. The selected EPC Contractor will be required to consult with stakeholders during the construction phase to manage disruption to the service. The management approach will be documented in the Construction Traffic Management Plan (to be prepared following Project approval). As part of the Project formalised school bus stops (one of either side of Day Road) would be constructed for use in the school bus route.
4	8. Development should provide safe and convenient access for all anticipated modes of transport including cycling, walking public and community transport, and motor vehicles	The subject site will be accessed via a dedicated entry point on Day Road (emergency vehicles will be provided alternative access that will be confirmed in detailed design).
2, 4	9. Development at intersections, pedestrian and cycle crossings, and crossovers to allotments should maintain or enhance sightlines for motorists, cyclists and pedestrians to ensure safety for all road users and pedestrians	The subject site entry is located 158m from the intersection of Day Road and Redbanks Road. Landscaping around this area of the subject site will involve shrubs, with taller vegetation setback from the roads to ensure appropriate sight lines are provided for motorists.
1	11. Development should discourage commercial and industrial vehicle movements through residential streets and adjacent other sensitive land uses such as schools	The Traffic Impact Assessment shows that the proposed material delivery route from Port Adelaide to the subject site, utilises Port Wakefield Road and the Northern Expressway and Redbanks Road which minimises interactions with sensitive land uses.

Objectives	Principles of Development Control	Assessment
2	12. Industrial/commercial vehicle movements should be separated from passenger vehicle car parking areas	There is a dedicated staff parking area while other vehicles (deliveries and maintenance) would proceed to their work front and be managed by the nominated facility supervisor.
	13. Development should make sufficient provision on site for the loading, unloading and turning of all traffic likely to be generated	Hardstand areas would be provided around all critical infrastructure elements associated with the Project, enabling the loading and unloading of all vehicles.
	14. All loading and unloading of goods, including temporary storage, should occur to the rear or side of the site	Key Project infrastructure is setback at least 100 metres from Day Road and would be screened by the proposed landscaping, reducing any amenity impacts associated with the delivery of material and/or equipment.
Access		
2	25. Development should have direct access from an all-weather public road	The subject site will be accessed from Day Road, which will be sealed up to the entry point (refer to Appendix I – Traffic Impact Assessment)
	26. Development should be provided with safe and convenient access which: a) Avoids unreasonable interference with the flow of traffic on adjoining roads b) Provides adequate separation distance from existing roads or level crossings c) Accommodates the type and volume of traffic likely to be generated by the development or land use and minimise induced traffic through over-provision	Refer to response to PDC 9 above.
1	27. Development should not restrict access to publicly owned land such as recreation areas.	There are no private accesses opposite any boundary of the subject site therefore the Project is not expected to restrict access to publicly owned land
2, 3	28. The number of vehicle access points onto arterial roads shown on Overlay Maps - Transport should be minimised, and where possible access points should be: a) limited to local roads b) shared between developments.	The subject site will be accessed from Day Road (not an arterial road). An emergency vehicle access point will be provided off Redbanks Road – the location of which will be determined during detailed design.
2	32 Driveways, access tracks and parking areas should be designed and constructed to: a) follow the natural contours of the land b) minimise excavation and/or fill c) minimise the potential for erosion from runoff d) avoid the removal of existing vegetation e) be consistent with Australian Standard AS 2890 Parking facilities.	The provision of access tracks around the subject site does not impact on areas of native vegetation identified as part of the Background Ecological Report. The EPC Contractor would be responsible for the detailed design of any access points and will implement measures to minimise disturbance to land associated with their construction and operation. As highlighted in Appendix I (Traffic Impact Assessment)

Objectives	Principles of Development Control	Assessment
		parking facilities will be designed to satisfy the requirements of Australian Standard AS 2890 Parking Facilities.
Vehicle Parking		
2	35. Development should provide off-street vehicle parking and specifically marked disabled car parking places to meet anticipated demand in accordance with <i>Table Mal/1 - Off Street Vehicle Parking Requirements</i> .	There is approximately 1,600m ² of floor space associated with the Project (control room, workshop, administration building). Eight parking spaces have been proposed which satisfy the requirements for off-street parking for industrial developments
1	37. Development should be consistent with Australian Standard AS 2890 Parking facilities.	As highlighted in Appendix I (Traffic Impact Assessment) parking facilities will be designed to satisfy the requirements of Australian Standard AS 2890 Parking Facilities.
2	38. Vehicle parking areas should be sited and designed in a manner that will: <ul style="list-style-type: none"> a) facilitate safe and convenient pedestrian linkages to the development and areas of significant activity or interest in the vicinity of the development b) include safe pedestrian and bicycle linkages that complement the overall pedestrian and cycling network c) not inhibit safe and convenient traffic circulation d) result in minimal conflict between customer and service vehicles e) avoid the necessity to use public roads when moving from one part of a parking area to another f) minimise the number of vehicle access points to public roads g) avoid the necessity for backing onto public roads h) where reasonably possible, provide the opportunity for shared use of car parking and integration of car parking areas with adjoining development to reduce the total extent of vehicle parking areas and the requirement for access points i) not dominate the character and appearance of a site when viewed from public roads and spaces j) provide landscaping that will shade and enhance the appearance of the vehicle parking areas. 	The parking area is located close to the administration, control and workshop buildings and is separated from areas that would typically be accessed by larger vehicles (e.g. maintenance and deliveries). Surrounding landscaping will screen the parking area from public roads and spaces.
	42. Parking areas that are likely to be used during non daylight hours should provide floodlit entrance and exit points and site lighting directed and shaded in a manner that will not cause nuisance to adjacent properties or users of the car park.	All lighting will be installed in accordance with Standard AS4282 Obtrusive Effects of Outdoor Lighting.
	42. Parking areas should be sealed or paved in order to minimise dust and mud nuisance.	The eight bay parking area would be sealed.

Objectives	Principles of Development Control	Assessment
	<p>43. To assist with stormwater detention and reduce heat loads in summer, vehicle parking areas should include soft (living) landscaping.</p>	<p>To mitigate bushfire risk a 50 m fuel reduction zone has been proposed for the Project. As a result, no landscaping is proposed around the vehicle parking area. Site-wide landscaping is proposed, as demonstrated in the Landscape Concept Plan.</p>
	<p>44. Parking areas should be line-marked to indicate parking bays, movement aisles and direction of traffic flow.</p>	<p>The staff parking area will have line-marked parking bays and appropriately sited give-way signs</p>

Development principles 3, 4, 5, 6, 7, 10, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 33, 34, 35, 39, 40 and 41 are not applicable to the Project as:

- the Project does not involve the development of a transport corridor
- once operational the Project will not generate high levels of traffic
- there are no existing footpaths surrounding the subject site
- the subject site is located 12km from the Mallala township
- the location of the subject site, existing infrastructure and type of development does not facilitate formalised cycling and walking networks
- the nature of the Project necessitates that staff and contractors are fully able
- Redbanks Road traffic volumes does not exceed 6000 vehicles per day
- the main subject site access point is not located on an arterial road
- parking associated with the Project is private

Waste

Objectives	Principles of Development Control	Assessment
1, 2	<ol style="list-style-type: none"> 1. Development should be sited and designed to prevent or minimise the generation of waste (including wastewater) by applying the following waste management hierarchy in the order of priority as shown below <ol style="list-style-type: none"> a) Avoiding the production of waste b) Minimising waste production c) Reusing waste d) Recycling waste e) Recovering part of the waste for reuse f) Treating waste to reduce the potentially degrading impacts g) Disposing of waste in an environmentally sound manner 	<p>A Waste Management Plan (WMP) (Appendix K) has been prepared for the Project. The mitigation measures and waste management practices included in the WMP have been developed based on the waste management hierarchy.</p>
	<ol style="list-style-type: none"> 2. The storage, treatment and disposal of waste materials from any development should be achieved without risk to health or impairment of the environment 	<p>Risk to the environment and human health has been mitigated through appropriate storage, treatment and removal of waste materials generated from the construction and operational phases of the project. Wastes will be classified and disposed of according to the details provided in the WMP (Appendix K).</p>
	<ol style="list-style-type: none"> 3. Development should avoid as far a practical, the discharge or deposit of waste (including wastewater) onto land or into any waters (including process such as seepage, infiltration or carriage by wind, rain, sea spray, stormwater or by the rising of water table) 	<p>No wastewater generated from the Project's processes are expected to be deposited on to land. Wastes will be handled appropriately, stored and removed safely to an appropriate end destination, depending on the nature of the waste generated.</p>
	<ol style="list-style-type: none"> 4. Untreated waste should not be discharged to the environment, and in particular any water body. 	<p>All wastes generated and the treatment level required will be decided based on their classification as discussed in the WMP (Appendix K).</p> <p>No untreated wastes will be discharged to the environment or water body. Appropriate storage and handling of wastes will ensure that materials will be disposed of correctly to an appropriate end destination</p>
	<ol style="list-style-type: none"> 5. Development should include appropriately sized area to facilitate the storage of receptacles that enable the efficient recycling of waste 	<p>Appropriately bunded storage areas within the gas plant and the site will be developed and marked on plans. This will include the allocation of recyclable receptacles, for wastes generated through the construction phase and through the operational phase in ancillary facilities and maintenance and plant operations.</p>
	<ol style="list-style-type: none"> 6. Development that involves the production and/or collection of waste and/or recyclable material should include designated collection and storage area(s) that are: <ol style="list-style-type: none"> a) Screened and separated from adjoining areas b) Located to avoid impacting on adjoining sensitive environments and land uses 	<p>The requirements of the storage receptacles (refer to response to PDC 5 above), will meet the requirements noted here.</p>

Objectives	Principles of Development Control	Assessment
	<ul style="list-style-type: none"> c) Designed to ensure that wastes do not contaminate stormwater or enter the stormwater collection system d) Located on an impervious sealed area graded to a collection point in order to minimise the movement of any solids or contamination of water e) Protected from wind and stormwater and sealed to prevent leakage and minimise the emission of odours f) Stored in such a manner that ensures all waste is contained within the boundaries of the site until disposed of in an appropriate manner 	
1, 2	7. Waste from development should be disposed of at least 100 m from any bore or well	All wastes will be appropriately transported to licensed end facilities that will meet South Australian waste depots or recycling facility licensing requirements. No wastes generated from the Project will be disposed of directly, within 100 meters from any bore or well.
Wastewater		
1, 2	<p>8. The disposal of wastewater to land should only occur where methods of wastewater reduction and reuse are unable to remove the need for its disposal, and where its application to the land is environmentally sustainable</p> <hr/> <p>9. Wastewater lagoons should not be sited in any of the following areas:</p> <ul style="list-style-type: none"> a) within land subject to a 1-in-100 year average return interval flood event b) within 50 metres of the top of the bank of a watercourse c) within 500 metres of the coastal high water mark d) within 20 metres of a public road or road reserve e) within 200 metres of a residence built on land that is not under the same ownership as the subject land f) within an area which has sufficient space or capacity to irrigate reuse water without environmental impact g) where the base of the lagoon would be below any seasonal water table. <hr/> <p>11. Wastewater lagoons (excluding wetlands) associated with any development should be designed and constructed to:</p> <ul style="list-style-type: none"> a) prevent leakage of the effluent b) prevent overflow from the dam to the surface of the land surrounding the dam c) prevent overflow from the dam into a watercourse 	<p>Waste from the evaporation basin will be disposed offsite by a licenced contractor to a licenced facility. During operation sewerage from onsite amenities will be treated using a septic system which the most reasonable and practicable way of disposing of sewerage waste in an area without a sewer connection.</p> <hr/> <p>The subject site is located outside the Light River and Gawler River floodplains and is not located within 50 metres of a watercourse, is located 42 metres from Day Road and greater than 200 metres from the nearest residence. The water table is estimated to be 10 – 20m metres below ground level meaning the evaporation pond wouldn't intersect with groundwater.</p> <hr/> <p>The exact size of the evaporation basin will be determined during the detailed design phase to satisfy freeboard and overflow requirements; however, the Concept Stormwater Management Plan philosophy diverts clean run-off around the basin. The evaporation basin will be constructed with a HDPE liner to prevent leakage.</p>

Objectives	Principles of Development Control	Assessment
	<ul style="list-style-type: none"> d) exclude clean rainfall runoff from entering the dam at any time e) have sufficient capacity to avoid the need for effluent to be irrigated onto land during wet periods of the year f) incorporate a freeboard capable of coping with all rainfall durations for 1-in-100 year average return interval flood events. <hr/> <p>15. Waste water (process water) should be captured and satisfy at least one of the following:</p> <ul style="list-style-type: none"> a) treated before being discharged to a sewer b) treated before being directed to an evaporation pond c) transported off site to a licensed liquid waste disposal facility. 	<p>Process water from the Project will be discharged to the onsite evaporation pond and be transported offsite to a licenced liquid waste disposal facility.</p>
Waste Treatment System		
1, 2	<p>17. Development that produces any sewage or effluent should be connected to a waste treatment system that complies with (or can comply with) the relevant public and environmental health legislation applying to that type of system.</p>	<p>The onsite septic system will be design and constructed to comply with South Australian Health Commission Code and 'Waste Control Systems – Standard for Construction, Installation and Operation of Septic Tanks Systems in South Australia".</p>
	<p>18. Industrial and commercial development should incorporate sewage disposal systems which enable the collection and reuse of treated effluent for irrigation or other suitable purposes on or off the site.</p>	<p>Refer to response to PDC 17 above.</p>
	<p>19. The methods for, and siting of, effluent and waste storage, treatment and disposal systems should minimise the potential for environmental harm and adverse impacts on:</p> <ul style="list-style-type: none"> a) the quality of surface and groundwater resources b) public health c) the amenity of a locality d) sensitive land uses e) soil resources. 	<p>Refer to response to PDC 17 above.</p>
	<p>21. Any on-site wastewater treatment system/ reuse system or effluent drainage field should be located within the allotment of the development that it will service</p>	<p>The onsite septic system will be located within the subject site.</p>
	<p>22. A dedicated on-site effluent disposal area should not include any areas to be used for, or could be reasonably foreseen to be used for, private outdoor open space, driveways, car parking or outbuildings.</p>	<p>The location of the onsite septic system will be confirmed in the detailed design phase and will be sited to take into account other infrastructure associated with the Project.</p>

Objectives	Principles of Development Control	Assessment
	<p>23. Development that is connected to a septic tank or that has a low pollution potential should be located at least 50 metres from any watercourse.</p>	<p>The closest watercourse is 350 metres south east of the south east corner of the subject site.</p>
	<p>24. Development with a high pollution potential should be located at least 100 metres from any watercourse</p>	<p>Refer to response to PDC 23 above.</p>
<p>Development principles 10, 12, 13, 14, 16, 20, 25, 26 and 27 are not applicable to the Project as:</p> <ul style="list-style-type: none"> • the Project does not include an artificial wetland • no effluent drainage systems are proposed for the Project • wastewater reuse is not proposed for the Project • does not include land uses referenced in PDC 26 and 27 		

ZONE SPECIFIC PROVISIONS

Primary Production Zone

Outlined within the Mallala Council Development Plan 2016; is the specified desired character for the Primary Production Zone which includes the following statements.

The predominant uses are livestock grazing and cereal cropping which are generally farmed on relatively large land holdings as well as intensive animal keeping. The zone also accommodates significant horticulture production, rural value adding, the livestock markets, bulk grain storage, a major landfill, composting, and bulk grain storage. This zone will continue to accommodate grazing and cropping and intensive animal keeping as the dominant land uses without restricting further diversification of land use in terms of horticultural glass house development and associated value adding, the development of abattoirs, meat processing, cold storage, and other forms of compatible development, which contribute to agricultural productivity and the rural character.

Wind farms and ancillary development such as substations, maintenance sheds, access roads and connecting power-lines (including to the National Electricity Grid) are envisaged within the zone and constitute a component of the zone's desired character. These facilities will need to be located in areas where they can take advantage of the natural resource upon which they rely and, as a consequence, components (particularly turbines) may need to be:

- *located in visually prominent locations such as ridgelines;*
- *visible from scenic routes and valuable scenic and environmental areas; and*
- *located closer to roads than envisaged by generic setback policy.*

This, coupled with the large scale of these facilities (in terms of both height and spread of components), renders it difficult to mitigate the visual impacts of wind farms to the degree expected of other types of development. Subject to implementation of management techniques set out by general / council wide policy regarding renewable energy facilities, these visual impacts are to be accepted in pursuit of benefits derived from increased generation of renewable energy.

While not explicitly mentioned in the Development Plan the Project is considered a compatible development that is not in conflict with the objectives of the Primary Production Zone.

The design and siting of the Project have been undertaken in consideration of the desired character of the zone set out in Development Plan. The predominate land uses in the surrounding area are livestock grazing and cereal cropping. The Primary Production Zone however also accommodates significant horticulture production, rural value adding businesses, bulk grain storage as well as a major landfill and composting. The grain silos associated with bulk grain storage are an intermittent but visually prominent character element across the Adelaide Plains. ElectraNet's high voltage transmission line and the operation of a major landfill and composting operations show that land uses with a perceived environmental impact can be appropriately managed within the zone.

Improved energy security in the area will in turn support the diversification of land uses in the zone. Possible new land uses include abattoirs, meat processing and cold storage, which require an absolutely reliable supply of electricity to operate efficiently.

An important aspect of development in the Primary Production Zone is implementing land management practices to minimise potential impacts to surrounding agricultural land. Key aspect which must be addressed include erosion control and surface water management. The environmental management plan developed for the site will specifically address these issues. A summary of all potential environmental impacts presented by the Project is presented in Section 8 of the Development Application.

The Development Plan generally seeks to preserve existing tracts of native vegetation, such as around the banks of the Gawler and Light Rivers. The current Project footprint would not result in any clearing of native vegetation. As part of the concept landscape plan, extensive native planting will be undertaken as part of visual screening for the Project. This landscaping would make a positive contribution to the prevailing character and attractiveness of the rural landscape.

It is also noted in the Development Plan that "*wind farms and ancillary development such as substations, maintenance sheds, access roads and connecting power lines are envisaged within the zone and constitute*

Objectives	Principles of Development Control	Response
	<p>3. Industry and warehousing should only be developed if it supports primary production, processing, storage and distribution of local primary produce or products produced on the same site, and should be developed where:</p> <ul style="list-style-type: none"> a) it has a direct relationship with primary production b) it is unlikely to limit or inhibit the use of adjoining land for primary production c) the particular use requires a site in proximity to a particular natural resource or other product or materials sourced from the locality d) it will not result in the alienation of land or water resources identified as significant for primary production or ecological reasons e) the use would be inappropriate within a township 	<p>As the MAPS and the 275kV transmission line both intersect the subject site the Project will not inhibit or limit adjoining land for other primary production uses. Specialist studies undertaken for the purposes of the Development Application have indicated that the Project can be built and operated in accordance with environmental policy, regulations and guidelines.</p> <p>It is also noted that a composting facility and a landfill currently exist within the Primary Production Zone. These are not considered 'typical' land uses within the zone and show that, provided a suitable site selection process and environmental studies are undertaken, the zone can support a range of uses.</p>
7	<p>9. Development should not be undertaken unless it is consistent with the desired character for the zone.</p>	<p>Refer to response to PDC 3 above</p>
4	<p>10. Development should not occur within 500 metres of a national park, conservation park, wilderness protection area or significant stands of native vegetation if it will increase the potential for, or result in, the spread of pest plants</p>	<p>There are no national parks, conservation parks or wilderness protection areas within 500 metres of the subject site. The Background Ecological Report (Appendix L) showed that native vegetation on the subject site is highly degraded and is not considered significant</p>
7	<p>11. Building development should be located, designed and sufficiently elevated having regard to the flood potential of the land, particularly when located in close proximity to the Light and Gawler River.</p>	<p>The Project is not located within the Light or Gawler River floodplains and based on information provided by Adelaide Plains Council the subject site is approximately 1.8 km from the nearest flood area. The Project will be designed to ensure critical infrastructure is protected from any potential flooding from the subject site itself.</p>
3	<p>12. Development should provide an access way of at least 3 metres wide that provides access for emergency vehicles to the rear of the allotment.</p>	<p>The Project will include a 3 m wide bushfire access track that will provide access for emergency vehicles from both Redbanks Road and Day Road.</p>
7	<p>13. Buildings should primarily be limited to farm, horticulture and animal keeping buildings, a detached dwelling associated with primary production on the allotment and residential outbuildings that are:</p> <ul style="list-style-type: none"> a) grouped together on the allotment and setback from allotment boundaries to minimise the visual impact of buildings on the landscape as viewed from public roads b) screened from public roads and adjacent land by existing vegetation or landscaped buffers. 	<p>Buildings to be located on the subject site are critical to ensure the safe and efficient operation of the Reeves Plains Power Station. As depicted in the Landscape Concept Plan (Appendix Q) buildings on the subject site would be screened by native plantings of varying heights and species.</p>

Objectives	Principles of Development Control	Response
<p>Development principles 4, 5, 6, 7, 8, 14, 15, 16, 17, 18, 19, 20 and 41 are not applicable to the Project as:</p> <ul style="list-style-type: none">• the Project does not involve the development of a wind farm, dwelling, tourist accommodation, shop or involve stock slaughter• the buildings on the subject site do not relate to sheds, garages or outbuildings typically associated with primary production• the subject site is not located within Flood Hazard Zone 2 or 3• there is no land division associated with the Project		

APPENDIX P – DUST DEPOSITION MEMO

Date 12/09/2017
To Alinta Energy
From Arcadis Australia Pacific Pty Ltd
Copy to
Subject Dust Deposition into Tank Water Supplies – Alinta Energy – Reeves Plains Power Station

Background

Alinta Energy (Reeves Plains) Pty Limited (Alinta Energy) has proposed the construction of a 300MW natural gas power station (the Project) at 1629 Redbanks Road, Reeves Plains (the subject site). Arcadis Australia Pacific Pty Ltd (Arcadis) was engaged to complete the Development Application for the proposed gas power station. The Development Application, which this memo supports, should be referred to for full details on the Project and its potential environmental impacts, including those associated with air quality issues.

Following the Community Information Session at Mallala Football Club on 27 July 2017, the potential for dust deposition to impact on nearby private domestic drinking water supply tanks was identified as an issue of concern for members of the public. As consideration of this pathway was not required under the Development Application, the assessment presented here was prepared to address this issue.

Approach

To estimate the potential concentration of contaminants introduced into domestic drinking water tanks by dust deposition from the Project, the assessment requires an estimate of:

- dust deposition rates;
- volumes of water in which the dust is mixed in domestic tanks, to calculate a concentration of total deposited dust in drinking water; and
- composition data for the dust deposited, to enable calculation of chemical specific concentrations within tank water.

The values adopted for each of these parameters, and the sources of these inputs, are detailed below.

Assessment

Dust Deposition Rates

The Air Quality Impact Assessment (AQIA) conducted by Northstar Air Quality Pty Ltd (2017) presents dust deposition rates for the power plant under a range of scenarios, including operation of the proposed six 50 MW turbines operating at all times, using either gas or diesel fuel at loads of 100%, 75%, 50% and 25%.

The maximum calculated rates of dust deposition at any potential receptor are summarised below (Table 1). The maximum annual average dust deposition value from any operational scenario was adopted for this assessment. Using the maximum annual average is considered highly conservative, given the power station is not intended to operate at full capacity throughout the year, but is being installed to operate during peak load times. It is estimated that the Reeves Plains Power Station will run for 1,400 hours per annum with the hours of operation varying subject to electricity demand. The annual dust deposition rates calculated in the AQIA assume the plant is operating 24 hours a day for 365 days a year, which equates to 8,760 hours of operation each year. The maximum annual average dust deposition values therefore represent a value up to 6 times higher than the dust deposition that is likely to occur, assuming 1,400 hours of operation a year.

Table 1 - Calculated dust deposition rates from the AQIA (Northstar, 2017)

Fuel Type	Units and Averaging Period	100% Load	75% Load	50% Load	25% Load
Gas	$\text{g} \cdot \text{m}^{-2} \cdot \text{day}^{-1}$	0.00003	0.00003	0.00004	0.00005
	$\text{g} \cdot \text{m}^{-2} \cdot \text{yr}^{-1}$	0.00078	0.00088	0.00095	0.00109
Diesel	$\text{g} \cdot \text{m}^{-2} \cdot \text{day}^{-1}$	0.00003	0.00004	0.00004	0.00005
	$\text{g} \cdot \text{m}^{-2} \cdot \text{yr}^{-1}$	0.00084	0.00090	0.00091	0.00111

The maximum annual average dust deposition rate for a 25% diesel load was adopted. This deposition rate of **0.00111 g/m²/year** is considered a highly conservative estimate of actual dust deposition rates that would occur. It is also noted that this concentration is well below the dust deposition screening criteria of 2 g/m²/month.

Concentration of Dust in Drinking Water

Annual average rainfalls were obtained from Roseworthy meteorological station, located approximately 7 km from the subject site and considered to be representative of the area potentially affected.

The annual average rainfall at Roseworthy is **389 mm** (BoM, 2017).

Assuming a roof collection area of **100 m²** (noting the area over which water is collected will not alter the outcomes of the assessment, as dust deposition volumes will scale up or down with the size of the collection area), the annual average volume of water generated within a tank would be **38,900 L/year**, not allowing for losses through first flush systems.

With a modelled dust deposition rate of **0.00111 g/m²/year**, the mass of dust deposited on the 100 m² roof in a year of full time operation would be **0.111 g/year**.

The concentration of power station sourced dust in a water tank capturing rain from a 100 m² surface would therefore be $0.111 \text{ g/year} \div 38,900 \text{ L/year} = 2.9 \times 10^{-6} \text{ g/L}$, or **0.0029 mg/L**.

Chemical Composition of Dust Generated

Limited data was available on the chemical composition of particulate matter (PM) generated from a natural gas combustion source. A review of Australian and international literature was undertaken, with one study noting that particulate emission testing from gas-fired sources was rarely undertaken as particulate emissions from these sources are extremely low (Chang and England, 2004). Available data does report that PM emissions from natural gas sources include trace amounts of metals, non-

combustible inorganic material, and condensable, semi-volatile organics such as polycyclic aromatic hydrocarbons (PAHs) (USEPA, 1998).

Available data on natural gas combustion emissions rates and general composition were reviewed (USEPA, 1998; Ristovski et al, 2000; DEFRA, 2004; Alanen et al, 2017; etc.), with emissions data and speciation assessments providing some evidence of the relative mass of constituents within the natural gas emissions (including organic carbon, sulphur compounds, PAHs, metals, etc.).

A review of diesel PM composition data was also undertaken. This review aimed to identify whether further assessment of dust deposition into domestic tank pathways was required to assess situations where diesel fuel is used in place of natural gas. As noted in the available reports, combustion products from diesel fuel are generally similar to those from natural gas, with diesel generating a greater mass of particles due to poorer efficiency of combustion (Chang and England, 2004; LEAP, 2010). Available data indicates that both diesel and natural gas combustion products are comprised of “carbonaceous material generated by pyrolysis of the fuel ... [with] ... hydrocarbons, sulfates, nitrates and metallic ash” (LEAP, 2010). As nitrous oxides (NO_x) are the key component that differs between diesel and natural gas, and as NO_x is a vapour phase constituent of emissions and not a particle, for the purposes of this assessment of particle composition of diesel and natural gas combustion were assumed to be equivalent.

Speciation analyses of PM undertaken by England et al. (2002) were considered conservative, and were adopted to assess potential contribution to dissolved phase concentrations from individual compounds within the dust deposited. Based on the analyses undertaken by England et al (2002), a speciation profile for primary emissions from a gas fired source were obtained (see Table 2).

Dissolved Phase Concentrations

Based on a total concentration of deposited dust in the drinking water supply of **0.0029 mg/L**, the substances identified in the speciation assessment were converted to dissolved phase concentrations. This was done by applying the proportion of compounds present in the speciation assessment (England et al, 2002) to the concentration of dust deposited (e.g. organic carbon was 63% of mass in the speciated emissions assessment, and assuming it was 63% of the 0.0029 mg/L, a concentration of 0.018 mg/L was derived). This calculation is conservative and assumes that 100% of the deposited dust dissolves in the water and that no insoluble components remain.

The solubility of each substance was assumed to be greater than the calculated concentration.

Dissolved phase concentrations were compared against drinking water criteria adopted from the Australian Drinking Water Guidelines (ADWG) (NHMRC, 2011), or the Regional Screening Levels (RSLs) (USEPA, 2017) where an ADWG was unavailable.

Table 2 - Speciation assessment and derivation of dissolved phase concentrations

Substance	Mass Fraction (%)	Dissolved Phase Concentration (mg/L)	Drinking Water Criteria (mg/L)
Organic Carbon (OC)	63	0.018	NA
Ammonia	11	0.0032	0.5
Sulphur compounds (S)	9.1	0.0026	0.021
Elemental carbon (EC)	6.6	0.0019	NA
Nitrate	5.9	0.0017	32
Iron (Fe)	2.5	0.00073	0.3
Chloride (Cl)	2.2	0.00064	5
Zinc (Zn)	1.9	0.00055	3
Silica (Si)	0.66	0.00019	600*
Aluminium (Al)	0.56	0.00016	0.1
Copper (Cu)	0.45	0.00013	1
Calcium(Ca)	0.37	0.00011	200
Cadmium (Cd)	0.3	0.000087	0.002
Potassium (K)	0.12	0.000035	600*
Phosphorus compounds (P)	0.12	0.000035	600*
Lead (Pb)	0.06	0.000017	0.01
Vanadium (V)	0.06	0.000017	0.086
Titanium (Ti)	0.05	0.000015	- #
Bromine (Br)	0.02	0.0000058	0.02
TOTAL	105	0.030	-

* Total dissolved solids screening criteria applied, as TDS comprises: sodium, potassium, calcium, magnesium, chloride, sulfate, bicarbonate, carbonate, silica, organic matter, fluoride, iron, manganese, nitrate, nitrite and phosphates (ADWG, 2011).

NA – not available, see discussion below.

No criteria available, however the very low concentration estimated and low relative toxicity indicates titanium in drinking water will not be an issue.

The 'total' row is provided as a cross check of the calculations. Rounding errors have resulted in a 5% overestimate of the total dissolved concentrations, which is considered to be reasonable and represents an overestimate so is therefore considered to be conservative.

A large mass of the material identified within the speciation assessment was classified as Organic Carbon (OC) and Elemental Carbon (EC), at 63% and 6% respectively. The composition of this OC and EC would include a complex mix of organics, including PAHs such as benzo(a)pyrene. Benzo(a)pyrene (BaP) is often used as a reference compound for assessing exposure to other PAHs, with toxic equivalency factors (TEFs) applied to the BaP drinking water criteria to assess other forms of PAHs. As the drinking water criteria for other PAHs are generally one to three orders of magnitude higher than the BaP criteria (see the RSLs (USEPA, 2017), and the TEFs adopted for PAHs in the Assessment of Site Contamination National Environment Protection Measure (NEPC, 2013)), an assessment of potential concentrations of BaP was considered appropriate as an initial screen.

Based on the speciation assessment presented by USEPA, the relative mass of BaP in total carbon (OC plus EC) was identified, and an associated dissolved phase concentration derived as per the approach outlined above.

Table 3 - Speciation assessment and derivation of dissolved phase concentrations - Benzo(a)pyrene

Substance	Fraction in Dust (%)	Dissolved Phase Concentration (µg/L)	Drinking Water Criteria (µg/L)
Benzo(a)Pyrene	0.000015 ^a	0.0000043	0.01

a Calculated from emission factor concentrations in USEPA (1998), using ratio of BaP / PM2.5.

$$= ((0.0000000057 \div 0.038) \times 100) = 0.000015\%$$

As the BaP drinking water guidelines are not exceeded based on this highly conservative assessment, with a significant margin of safety, then other less toxic PAHs and organic compounds can also be assumed to be below their respective drinking water criteria.

Conclusions

This document presents a highly conservative assessment of potential dust deposition from the Reeves Plains Power Station into domestic drinking water supply tanks in the vicinity of the site. The dust deposition numbers as modelled in the AQIA assume the power station may be operational at all times, rather than for the 1,400 hours/year which have been estimated as a realistic operational capacity. Estimated dust deposition rates used in the calculations are therefore up to 6 times higher than the operational emissions are likely to be when the plant is operating.

In addition, the assessment does not take into account potential mitigating factors such as loss of deposited dust from tank catchment surfaces due to wind borne dispersal, or the presence of a first flush diverter which will act to prevent dust deposited on roof surfaces from entering the water tanks. Estimated concentrations in drinking water were also conservatively derived assuming complete dissolution of the dust.

As all calculated dissolved phase concentrations were below the relevant drinking water criteria, and as the calculated concentrations were made by relying on conservative assumptions, the potential impact from dust deposition into drinking water tanks is considered negligible.

It is recommended that private residences which rely upon rain water and tank supplies for domestic use ensure tanks and water collection infrastructure are maintained in accordance with SA Health guidance. This guidance recommends the use of first flush diverters, which prevent the first rains after a dry period from flowing into the tank. The first flush diverter will ensure that any dust, bird droppings, leaves and debris which have accumulated on the roof are flushed from the system prior to being washed into the tank.

References

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USEPA, 2017. *Regional Screening Levels – Generic Tables (June 2017)*. Accessed:
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APPENDIX Q – LANDSCAPE CONCEPT PLAN

15/09/2017

Landscape Design – Reeves Plains Power Station

Landscape Design Response Statement

Project Site

The Reeves Plains Power Station Project involves the construction and operation of a gas fired power station and associated infrastructure (the Project). The project proponent is Alinta Energy (Reeves Plains) Pty Limited (Alinta Energy). The power station will be located at 1629 Redbanks Road on a 41 ha greenfield site located in Reeves Plains, approximately 12 km south-east of Mallala and 50 km north of Adelaide. The site sits within a prostrate rural landscape consisting of open pastoral fields and existing electrical infrastructure.

Landscape Design

The landscape design has the following overarching objectives:

- Mitigating visual impact of infrastructure
- Minimising bushfire risk, and
- Enhancing existing vegetation and biodiversity

The landscape design utilises swathes of mixed native trees and bands of shrub and grass planting predominantly along the perimeter of the site to help mitigate the visual impact of the infrastructure. Planting has been arranged in groups with clear horizontal and vertical separation between swathes of trees and shrub areas, providing additional bushfire defence. All planting proposed are Australian natives and should perform well once established. A 10 metre maintenance setback around the property boundary has been proposed to allow for easier access for maintenance. Where possible all existing vegetation will be retained and in areas indicated as existing native vegetation under the Native Vegetation Act 1991, we are proposing further planting enhancements.

The trees are a mixture of small, medium and larger trees that provide screening potential at multiple heights and act as a wind buffer that helps slow down the spread of bush fires. Swathes of trees and shrub banding are separated and no shrubs or grasses are proposed under tree canopies. Both this and an offset of approximately 20 metres between bands of trees and shrubs will help reduce the spread of bushfires.

By locating trees closer to the boundary perimeter closer to the viewer, we create a greater screening effect of taller infrastructure.

The bands of shrub and grass planting consists of a mix of native shrubs and grasses and provides low to medium height screening and visual diversity. Breaks within this band planting help slow the spread of bush fires and the range of native plant species help improve biodiversity of the site. Additional shrub planting is proposed around the main entry road to enable driver visibility when entering the exiting the site, while providing some visual amenity.



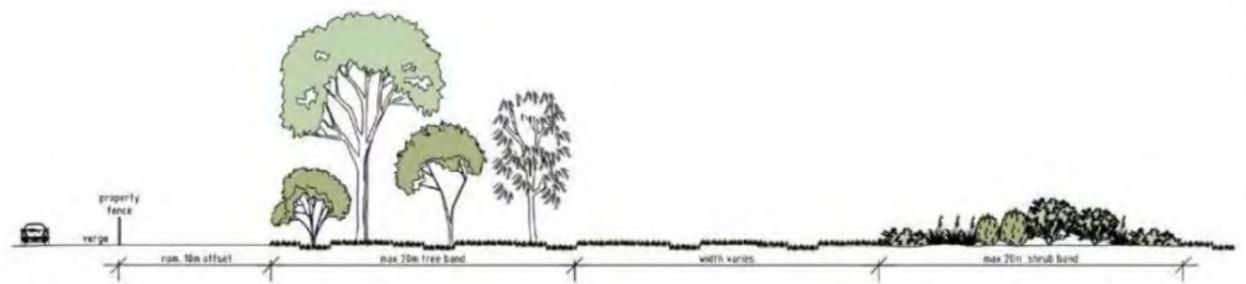
Paul Wong

Registered Landscape Architect



NOTES:

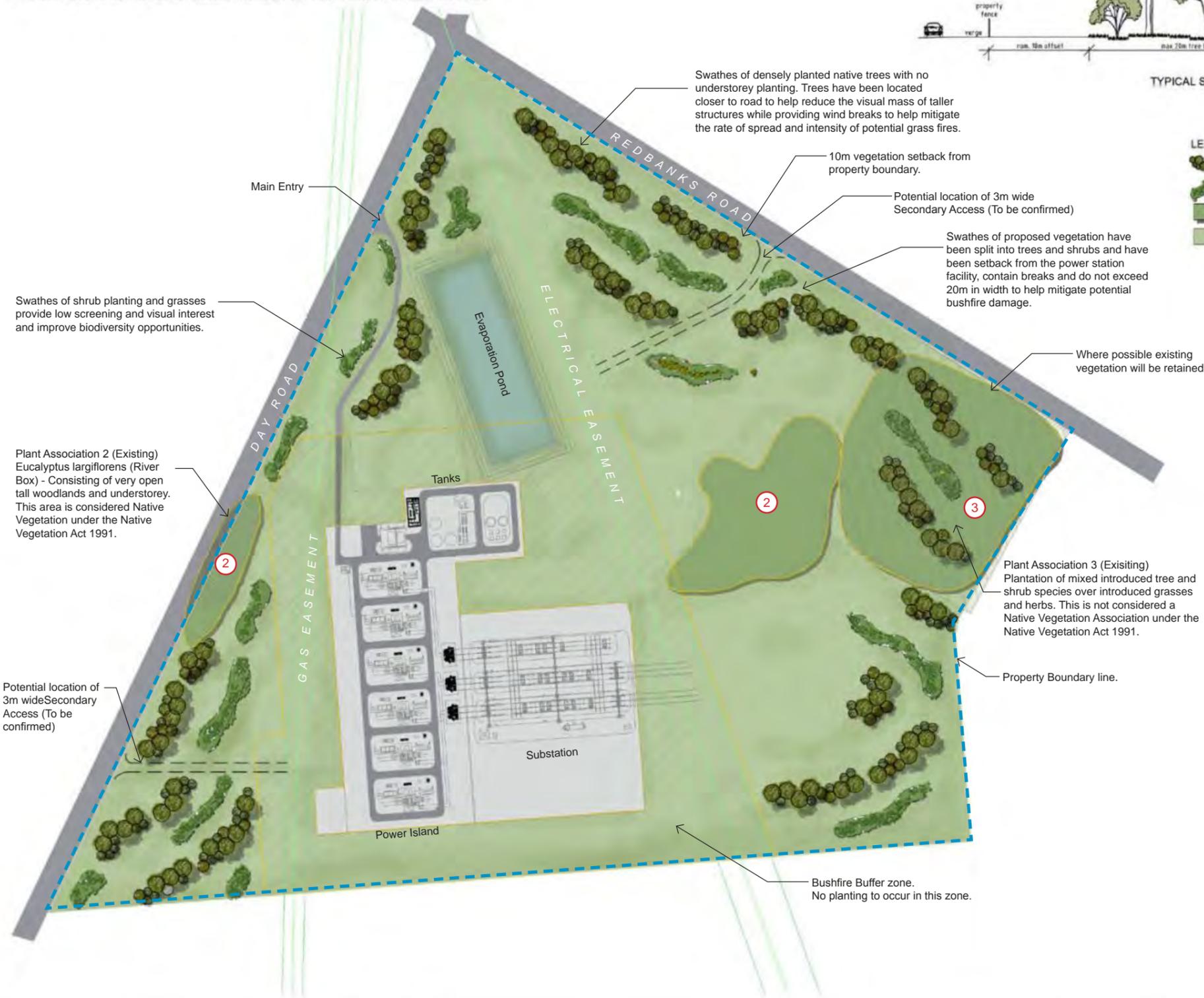
- All tree and shrub plantings shown on plan are indicative only. Final location of trees and shrub planting to be confirmed on site and approved prior to construction.
- Supply & install all plant species listed in the drawings from an approved nursery. Plants are to be healthy, well grown specimens, free of pest & diseases.
- All areas of planting to be cultivated to a minimum depth of 300mm with 20mm of certified organic compost mixed thoroughly by rotary hoe. All composts, soil conditioners & mulches shall conform to AS4454.
- All trees and shrubs to be planted in a natural appearance in groups of 3,5,7 etc. No two plantings of the same species are to be planted next to each other.
- All shrub planting areas to be topped with organic mulch to a depth of 100mm and topped up during maintenance period.
- All trees and shrubs to be watered thoroughly as required to maintain the health of the plants. All plantings to be hand watered for the duration of the maintenance period.
- Final selection and quantities of species to be established and approved pending availability.
- All planting to be offset 10m from boundary fence to allow for maintenance access.
- Provide weed control, to ensure landscape works are weed free during the maintenance period.



TYPICAL SECTION OF SCREEN PLANTING LAYOUT

- LEGEND**
- Grove of Trees
 - Shrubs and Grasses
 - Existing Vegetation
 - Bushfire Buffer Zone

CODE	SCIENTIFIC NAME	COMMON NAME	HIGHT	WIDTH
Apy	Acacia pycnantha	Golden Wattle	3-8m	
Asa	Acacia salicina	Black Wattle	3-20m	
Ave	Allocasuarina verticillata	Drooping sheoak	4-10m	
Cgr	Callitris gracilis	Cypress-pine	5-25m	
Epo	Eucalyptus pterosa	South Australian Mallee Box	10m	
Ano	Acacia notabilis	Mallee golden wattle	3m	
Apa	Acacia paradoxa	Kangaroo thorn	3m	3m
Bsp	Bursaria spinosa	Native Blackthorn, Christmas Bush	1-12m	
Div	Dodonaea viscosa	Sticky hop bush	1.5-4m	
Rcr	Rhagodia crassifolia	Fleshy Saltbush	0.3-2m	1.5m
Cro	Carprobotrus rossii	karkalia or pig face	0.2-0.4m	1-3m
Dre	Dianella revoluta	Black-anther Flax-lily	0.3-0.4m	0.3-0.4m
Hvi	Hardenbergia violaceae	False sarsaparilla	6m	
Fno	Ficinia nodosa	Knobby club-rush	1m	
Kpo	Kanzea pomifera	Emu apples, native cranberries	0.3m	2m



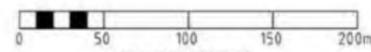
Issue	Description	Drawn	Checked	App'd	Date
1	ISSUED FOR CLIENT REVIEW	LJ	PW		13/09/17

THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATION.

THE CONTRACTOR AND THEIR SUB-CONTRACTORS SHALL VERIFY ALL DIMENSIONS, LINES, LEVELS AND EXISTING SERVICE LOCATIONS, PRIOR TO COMMENCEMENT ON SITE. PREPARATION OF DETAIL SHOP DRAWINGS AND FABRICATION OF CONSTRUCTION BUILDING COMPONENTS.

OUTER SPACE

258a Hundle Street
Adelaide SA 5000
P (61) 8223 3228
E admin@outerspace.net.au



PRELIMINARY
NOT FOR CONSTRUCTION

Designed Date	LJ	09/17
Drawn Date	LJ	09/17
Checked Date	PW	09/17

Project	REEVES PLAINS POWER STATION
Client	ARCADIS
Drawing	LANDSCAPE CONCEPT PLAN

File Ref	OS602_Reeves Plains Power Station_Landscape Concept Plan	
Scale	1:2000 @ A1	Sheet 1/1
Dwg no	OS602_CD01	Issue/Rev. 0

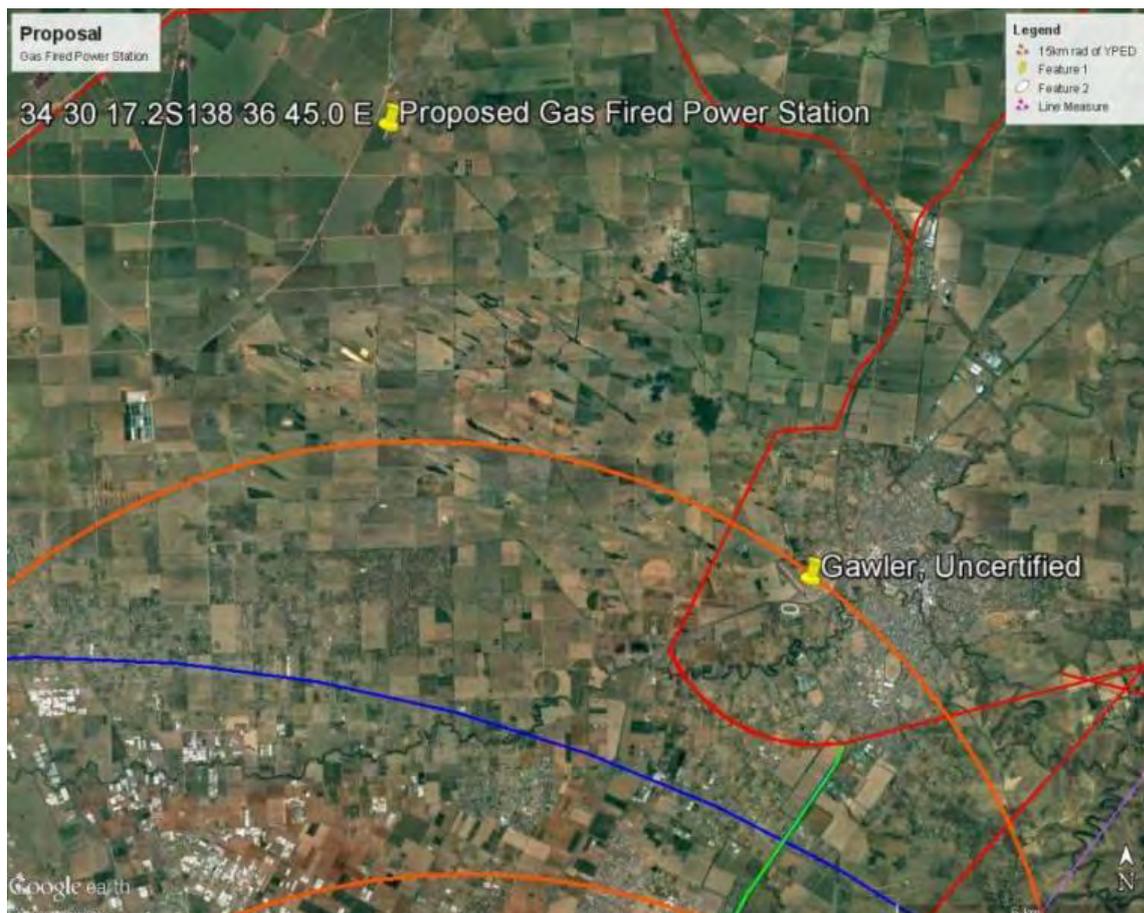
APPENDIX R – OAR PLUME ASSESSMENT

Date 30/08/2017
To Alinta Energy
From Arcadis Australia Pacific Pty Ltd
Copy to
Subject Office of Airspace Regulation plume rise assessment

The Civil Aviation Safety Authority (CASA) was notified of the proposed Reeves Plains Power Station during the early stakeholder engagement phase of the Project.

The following information was provided by CASA on 30 August 2017.

The OAR has carried out an assessment of the high velocity plume exhaust plumes from the proposed Reeves Plain Power Station at S34 30 17.2 E138 36 45 based on the amended details supplied on 10 Aug 2017. The location is indicated on the attached VTC within the Edinburgh Military Control Zone approximately 7.8 nautical miles north west of Gawler uncertified aerodrome and 11.74NM from Edinburgh ARP. A Google image is also attached for reference.



Assessment Tool Upgrade

The OAR Screening Tool has recently been upgraded to include the 6.1m/s plume height which can now be applied to assessments where flight over the plume is likely on terminal instrument flight procedures. The 10.6m/s benchmark will continue to be used for aircraft flying by visual reference. The 4.3m/s trigger remains valid for advising CASA of the potential impact of a high velocity exhaust plume. The advisory circular for plume rise assessments will shortly be updated to include the 6.1m/s benchmark which was chosen as it is the velocity represented by the top of the light turbulence classification by the Bureau of Meteorology. You will note that the 10.6m/s benchmark aligns with the top of the moderate turbulence range which is not considered hazardous when flight is conducted by visual reference and is not unusual to experience in normal flight conditions.

Attached is a copy of the reference and below the speeds are converted to metres per second for comparison.

Classifications of Turbulence

Light	300-1199 FPM	or	1.5 – 6.1 m/s
Moderate	1200 – 2099 FPM	or	6.1 – 10.6m/s
Severe	2100 – 2999 FPM	or	10.6 – 15.2 m/s
Extreme	> 3000FPM	or	> 15.2m/s

The OAR Screening Tool was used to calculate the height of the 6.1m/s plume as there was a possible impact on the civil and military NDB approaches at that location. The worst case scenario was the high velocity plume. The tool was limited to using only one distance between the stacks hence the closer figure of 30m was used to achieve the worst case scenario. Using these parameters the plume reduced to 6.1m/s at 300FT AGL (249FT above the stack top). The elevation at the site was advised to be 50-52FT (max 170.6m). Therefore the result is 470.6FT AMSL. This result does not impact the NDB approaches and does not trigger the need for the establishment of a Danger Area. The 10.6m/s result was 83FT AGL (32FT above the stack top) or 253.6FT AMSL which does not trigger the need for the inclusion of a plume symbol. However, consideration may be given to including the name of the Power Station for reference on the relevant aviation charts. The screener tool results are attached for reference.

This assessment did not include any lighting or marking requirements that may apply.

Thank you for referring this proposal.

Screen Tool Results

Assessment	Number of Stacks	Stack Separation	Stack Diameter	Temperature	Exit Velocity	Stack Height	Critical Velocity	Critical Height
High velocity plume	6	30 m	3.50 m	396°C	17.08 m/s	15.50 m	6.1 m/s	91 m AGL 76 m above stack top
10.6m/s benchmark	6	30 m	3.50 m	396°C	17.08 m/s	15.50 m	10.6 m/s	25 m AGL 10 m above stack top

largely dependent on the atmospheric stability, wind strength, wind shear and turbulence.

Wake turbulence incidents continue to be reported at Australian airports (19 occurrences between 1998 and 2000). One incident occurred when a CL600 encountered the wake of a 737. The aircraft pitched up and banked 45 degrees causing the stall warning and stick shaker to activate, but fortunately the crew recovered control. There have been several reports of wake turbulence incidents causing momentary loss of control of flight, only evasive action by alert crews have prevented serious accidents.

Helicopters also produce wake turbulence. Helicopter wakes may be of significantly greater strength than those from a fixed wing aircraft of the same weight. The strongest wake occurs when the helicopter is operating at slower speeds.

The strength of the vortex is governed by the weight, speed and shape of the wing of the generating aircraft.

Typically, for each nautical mile behind the generating aircraft, the vortices will have descended between 100 and 200 feet.

These vortices generally persist for up to 80 seconds over the runway, but in light or calm air this period may be up to three minutes.

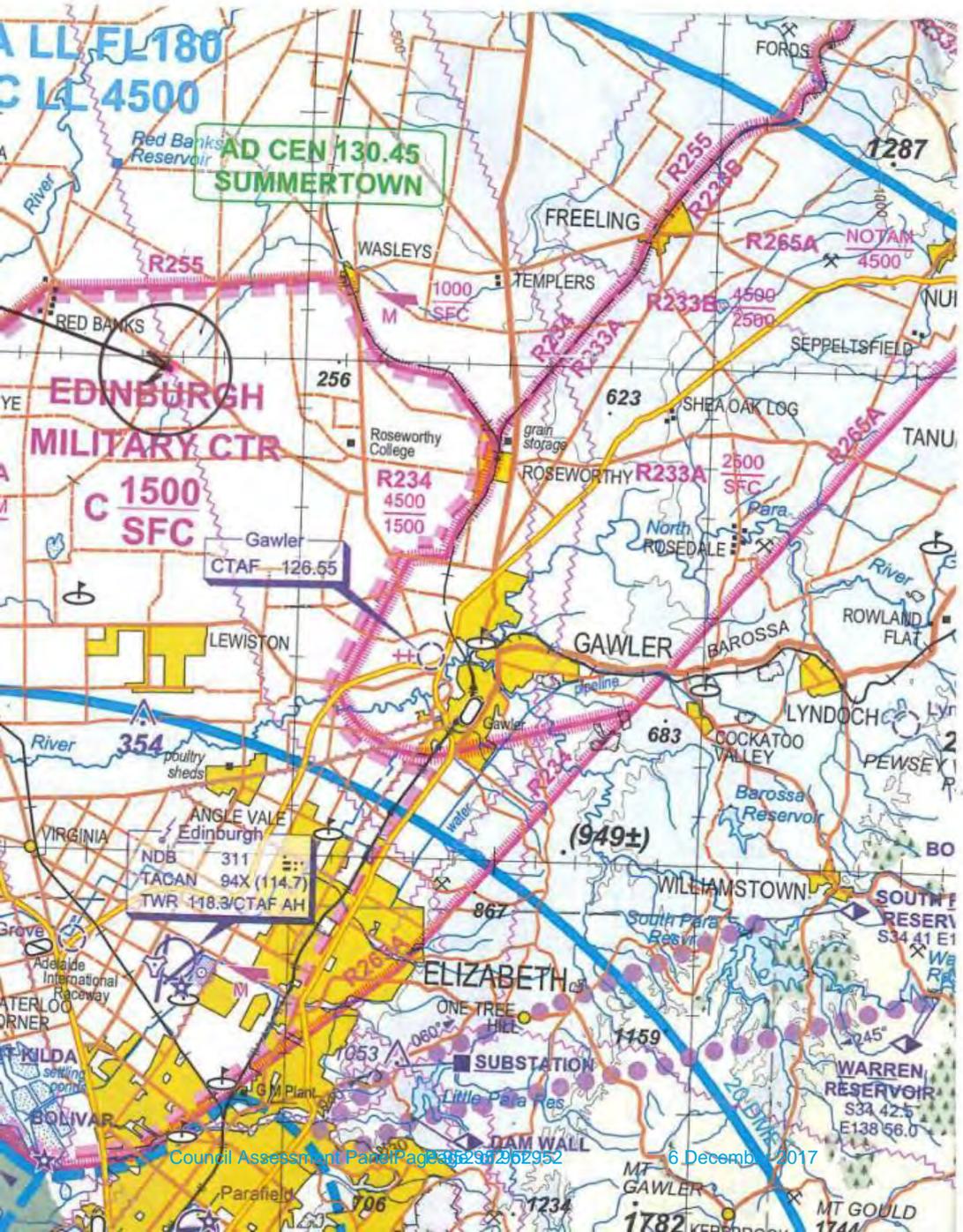
10.6 CLASSIFICATION OF TURBULENCE

Turbulence intensity is specified according to the effect of the wind gusts upon the aircraft and its occupants as light, moderate, severe and extreme. A guide to these specifications is outlined in Table 10.1 below. Be aware that for a given turbulence situation, there will be a broad range of aircraft and passenger reactions, depending on the size, shape, weight, altitude and speed of the aircraft.

Intensity	Airspeed fluctuations (knots)	G-load (g)	Vertical gusts (feet per minute)	Aircraft reaction	Reaction inside aircraft
Light	5 - 14.9	0.15 - 0.49	300 - 1199	Rhythmic bumpiness. Momentary changes in altitude and attitude.	Little effect on loose objects.
Moderate	15 - 24.9	0.50 - .99	1200 - 2099	Rapid bumps or jolts. Appreciable changes in altitude and attitude.	Unsecured objects move. Appreciable strain on seatbelts.
Severe	= > 25	1.00 - 1.99	2100 - 2999	Large abrupt changes in altitude and attitude. Momentary loss of control.	Unsecured objects are tossed about. Passengers violently forced against seat belts.
Extreme		> 2.00	> 3000	Practically impossible to control aircraft. May cause structural damage.	Unsecured objects tossed about. Passengers forced violently against seat belts.

Table 10.1

A guide to aircraft reactions and in-cabin response to fluctuations in wind speed.



**AD CEN 130.45
SUMMERTOWN**

**EDINBURGH
MILITARY CTR**

**C 1500
SFC**

Gawler
CTAF 126.55

ANGLE VALE
Edinburgh

NDB	311
TACAN	94X (114.7)
TWR	118.3/CTAF AH

ELIZABETH

ONE TREE HILL
SUBSTATION

LITTLE PARA RES

DAM WALL

MT GAWLER
1782

6 December 2017