Form: DA1

134 Lachlan Street Hay NSW 2711
PO Box 141 Hay NSW 2711
Ph: 6990 1100 Fax: 6993 1288
Email: mail@hay.nsw.gov.au

APPLICATION FOR DEVELOPMENT/CONSTRUCTION CERTIFICATE AND COMPLYING DEVELOPMENT

Environmental Planning & Assessment Act 1979

TYPE OF APPROVAL SOUGHT – Please indicate by "X"

- ☒ DEVELOPMENT CONSENT (DA)
- ☐ CONSTRUCTION CERTIFICATE (CC)
- ☐ SUBDIVISION
- ☐ COMPLYING DEVELOPMENT CERTIFICATE (CDC)

1. Person completing this form – name and address details etc:

Applicant's Name: IT Power (Australia) Pty Ltd

Postal Address: PO Box 6127, O'Connor, ACT Postcode 2602

Your reply will be posted to the above address

Phone: 62573511 Company Contact Person (below):

Mobile: 0403520690 Mishka Talent

Fax: Email: mishka.talent@itpau.com.au

2. Location of the land to be developed and the title description of the property

Unit No: Street No: 110 Street: Mid Western Hwy

Town: Hay Site Area m²: 217000

Lot(s) 110 Section DP/SP 1187931

Assessment No: 13797088

The above information is available from your rate notice, property deeds, or from Council's property maps.

3. Description of your proposed Development

Is a construction certificate application to be lodged at the same time as the application for development consent? ☐ YES ☒ NO

OR

Has Development Consent previously been granted? ☐ YES ☒ NO

If Yes,

Development Consent No: Date of Determination:

Building Code of Australia Building Classification:

DESCRIPTION OF DEVELOPMENT Construction of a 5MW solar farm using single axis trackers

4. Type of Development Consent

DEVELOPMENT TYPE

- ☐ Use of land/building
- ☐ Subdivision of land/building
- ☐ Erection of Temporary Building
- ☐ Erection of a Building
- ☐ Carrying out of Work
- ☐ Buildings Additions/Alterations
- ☐ Demolition
- ☐ Landclearing / Dam
- ■ Other

CONSTRUCTION CERTIFICATE

- ☐ Building Work
- ☐ Subdivision Work

5. Estimated Cost

ESTIMATED COST OF DEVELOPMENT / VALUE OF WORK:

$ 7500000

6. What are the operational hours of the development?
(for commercial and industrial developments only)

Days of Operation	Hours of Operation	Days of Operation	Hours of Operation
☐ Monday – Friday	.....to.....	☐ Monday	.....to.....
☐ Saturday	.....to.....	☐ Tuesday	.....to.....
☐ Sunday	.....to.....	☐ Wednesday	.....to.....
☐ Public Holidays	.....to.....	☐ Thursday	.....to.....
		☐ Friday	.....to.....

7. Section 68 of the Local Government Act 1993

Approvals required under Section 68 of the Local Government Act 1993

- ☐ Water Supply Work
- ☐ Sewerage Works
- ☐ Stormwater Drainage
- ☐ Install and Operate a Sewer Management Facility

NB: Installations of water meters and onsite sewerage systems require "Application for Local Activity" to be completed.

8. Environmental Impact

(N/A for CDC)

- Is this application for Designated Development (see Schedule 3 of the Environmental Planning and Assessment Regulations 2000 [N]
- An Environmental Impact Statement (EIS) is attached – for designated development [N] (Y or N)

If the application is not designated:

- A statement of environmental effects is attached [Y]
- The proposed development is considered to have negligible effect [N]

9. Integrated Development

Applications to be referred to another authority for approval

(N/A for CDC)

- Is this application for Integrated Development YES [X] NO [ ]

List other approvals required to be obtained.

• Fisheries Management Act 1994	☐ s144	☐ s201	☐ s205	☐ s219	
• Heritage Act 1977	☐ s58				
• Mine Subsidence Compensation Act 1961	☐ s15				
• Mining Act 1992	☐ s63	☐ s64			
• National Parks and Wildlife Act 1974	☐ s90				
• Pollution Control Act 1979	☐ s17A	☐ s17D	☐ s171		
• Petroleum (Onshore) Act 1991	☐ s9				
• Protection of the Environment Operations Act 1997	☐ ss43 (a)	☐ ss43 (b)	☐ ss43 (d)	☐ ss47	
	☐ ss48	☐ ss55	☐ ss122		
• Roads Act 1993	[X] s138				
• Rural Fires Act 1997	☐ s100B				
• Water Management Act 2000	☐ s89	☐ s90	☐ s91		

10. Do you need Home Building Act Insurance?

If you are using a licenced builder for residential building work exceeding $20,000 you must obtain Home Building Act Insurance. A certificate of insurance must be provided with this application or submitted with the Notice of Commencement. If you are an owner/builder and intend to sell within 6 years you need to provide insurance cover. Owner/builder's work in excess of $20,000 requires completion of a course for the permit.

Yes ☐ Not relevant ■

11. Affected Neighbours

Have you discussed the application with affected neighbours? Yes ☐ No ☒
(We strongly recommend that you discuss this application with your neighbours)

12. Principal Certifying Authority

Before you commence the development, you must appoint a Principal Certifying Authority (PCA). You can nominate Council or a private accredited certifier.
Do you wish to nominate Hay Shire Council as your Principal Certifying Authority?
☒ YES ☐ NO ☐ OTHER

If other,
Name:
Accreditation No:
Date of Expiration:

You must advise Council of the appointment of PCA a minimum of 2 days before work commences.

13. Builder / Owner - Builder details

☒ Not known ☐ Owner-Builder
☐ Licensed Builder – Licence No.
Name:
Address: Postcode
Phone:

14. Schedule for building work only

Information for the Australian Bureau of Statistics

- What are the current uses of the building/land?
  (If land is vacant state that it is **Vacant**)
- Does this site contain a dual occupancy? ☐ YES ☐ NO
- Gross floor area **proposed** addition or **new** building (m^2)
- Gross floor area **whole** building (m^2)
- Number of pre-existing dwellings: Number of dwellings to be demolished
- How many dwellings are proposed: How many storeys?

14. Schedule for building work only

CONT.

Materials to be used:
Place a tick in the box which best describes the materials the new work will be constructed of:

WALLS	*ROOF*	*FLOOR*	*FRAME*
☐ Brick (Double)	☐ Tiles	☐ Concrete	☐ Timber
☐ Brick (Veneer)	☐ Concrete	☐ Timber	☐ Steel
☐ Concrete/Stone	☐ Fibre Cement	☐ Other	☐ Aluminium
☐ Fibre Cement	☐ Steel	☐ Unknown	☐ Other
☐ Timber/Weatherboard	☐ Aluminium		☐ Unknown
☐ Curtain glass	☐ Other		
☐ Steel ☐ Unknown			
☐ Aluminium			
☐ Other			
☐ Unknown			

15. Owners Consent

Must be completed by the owner of the land.
If the owner is a company or strata title body corporate, the application must be signed by a director or an authorised person and delegated under common seal.

Owner's Name: JMT Holdings Pty Ltd - Julia McDonald

Owner's Address: PO Box 1091, Dickson ACT

Phone number:0407060981 Postcode 2602

As the owner/s of the land to which this application relates, I/we consent to this application. I also give consent for authorised Council Officers to enter the land to carry out inspections.

Signature/s:

Sign here if you are signing on the owner's behalf as the owner's legal representative

16. Applicant's Declaration

I apply for consent to carry out the development described in this application. I declare that all the information given is true and correct.

I also certify that the development proposal submitted with this form and as detailed on the attached plans will comply with all covenants, caveats and restrictions to user however described or recorded on this title.

I also understand that if incomplete, the application may be delayed, rejected or more information may be requested.

Signature:

Date: 15/2/2019

17. Privacy Policy

The information you provide in this application will enable your application to be assessed by the certifying authority under the *Environmental Planning and Assessment Act 1979*. If the information is not provided, your application may not be accepted. The application can potentially be viewed by members of the public. Please contact the Council if the information you have provided in your application is incorrect or changes.

18. How to lodge your application

Applications should be addressed to:
General Manager
Hay Shire Council

How to contact us:
Phone: (02) 6990 1100
Fax: (02) 6993 1288
Email: mail@hay.nsw.gov.au

Mail:
PO Box 141
HAY NSW 2711

Personal Delivery:
134 Lachlan Street
HAY NSW 2711

If you wish to discuss a proposal, it is essential that you arrange an appointment. We recommend that you consult with a Council officer before submitting this application.

Hay Shire Council

134 Lachlan Street, Hay NSW 2711
Phone: (02) 6990 1100 Fax: (02) 6993 1288

TAX INVOICE

Including GST
ABN: 84 075 604 155

Please direct all mail to PO Box 141, Hay NSW 2711

To: TEC-C Investments Pty Ltd
Attention: Felipe Kovacic
L1, 377 New South Head Road
DOUBLE VAY NSW 2028

Debtor Acc. 497.01
Date: 28/02/2019

DATE	TAX INVOICE No.	DESCRIPTION	AMOUNT
28/02/2019	3811	AMENDED DA FEES LANGS CROSSING SOLAR FARM DA103941	
		GST *0.00*	11,975.00
		AMENDED DA FEES LANGS CROSSING SOLAR FARM	
		GST *0.00*	4,795.00
		AMENDED DA FEES LANGS CROSSING SOLAR FARM	
		GST *0.00*	5.00
		AMENDED DA FEES LANGS CROSSING SOLAR FARM	
		GST *0.00*	140.00
		AMENDED DA FEES LANGS CROSSING SOLAR FARM	
		DA FEES $11975.00	
		FIRST PLAN LEVY $4795.00	
		PLAN FIRST LEVY COUNCIL $5.00	
		INTERGRATED DEVELOPMENT FEE $140.00	
		Invoice Total (including GST if applicable)	16,915.00

Paid 5/3/19 Receipt No 132812

Total Value non-taxable supply(s)	16,915.00
Total Value taxable supply(s) excluding GST	0.00
Total GST Payable	0.00
TOTAL	**16,915.00**

HAY SHIRE COUNCIL - REMITTANCE ADVICE SLIP

(Please return this slip with your payment to PO Box 141, Hay NSW 2711)

To:

TEC-C Investments Pty Ltd
Attention: Felipe Kovacic
L1, 377 New South Head Road
DOUBLE VAY NSW 2028

DUE DATE: 30/03/2019
AMOUNT DUE: **16,915.00**
ACCOUNT No. 497.01
TAX INVOICE N 3811
BILLING REF: 0000000000049701

TAX INVOICE

EFT payment details; BSB: 032-753 Acc: 000060
(please use Debtor Acc. as reference)

HAY SHIRE COUNCIL
DEVELOPMENT APPLICATION AND CONSTRUCTION CERTIFICATE CHECKLIST

1. Application Form	Have you completed all the spaces on the application form? Has the owner signed and endorsed the application form?	☒ ☒
2. Restrictions / Easements	The owner has identified all covenants, easements or restrictions to user and indicated on the plans.	☑
3. Plans or drawing describing the proposed development	Your plans or drawings describing the proposed development must indicate (where relevant): • Floor plans of proposed buildings showing layout, partitioning, room sizes, each floor section and intended uses of each part of the building; • Elevations and sections showing proposed external finishes and heights; • Proposed finished levels of the land in relation to buildings and roads; • Indicate the height, design, construction and provision for fire safety resistance (if any); • The specification is to describe the construction and materials to be used in the building, method of drainage sewerage and water supply and whether the materials to be used are new or second hand; • Proposed parking arrangements, entry and exit points for vehicles, and provision for movement of vehicles within the site (including dimensions where appropriate);\ • A site plan and Landscape concept plan; • All identified BASIX Commitments.	☐ ☐ ☐ ☐ ☐ ☐ ☐
4. Location plan of the Land	Supporting detail may be required in addition to your site plan including: • Location of proposed new buildings or works (including extensions or additions to existing buildings or works) in relation to the land's boundaries and adjoining development; • Location, boundary dimensions, site area, scale, and north point; • Existing vegetation and trees on the land; • Location and uses of existing buildings on the land; • Existing and proposed levels of the land and buildings; • Location and uses of buildings on sites adjoining the land where required by Council.	☐ ☐ ☐ ☐ ☐ ☐
5. Required Attachments	Have you attached the correct number of copies of your plans or drawings describing the proposed development and location of the land? • 3 copies of plans or drawings describing the proposed development • 3 copies of the location plan of the land • 3 copies of Specifications • Application Fees • BASIX Certificate • Statement of Environmental Effects	☐ ☐ ☐ ☐ ☐ ☐

PLEASE NOTE: New Dwelling Applications
Alterations / Additions (over $50,000, Swimming Pools over 40,000ltr)

BASIX Certificate

The Building Sustainability Index (BASIX) is a web-based planning tool designed to assess the potential performance of residential buildings against a range of sustainability indices.

A BASIX Certificate identifies the sustainability features required to be incorporated in the building design. These features may include sustainable design elements such as recycled water, rainwater tanks, AAA-rated showerheads and taps, native landscaping, heat pump or solar water heaters, gas space heaters, roof eaves/awnings and wall/ceiling insulation.

You need a BASIX Certificate in Hay Shire Council when BASIX applies to the type of development for which you require approval. Commencement dates and details of types of development are at www.basix.nsw.gov.au.

The applicant is required to submit the BASIX Certificate with the Development Application or Complying Development Certificate application. The plans and specifications must also identify the BASIX commitments which will be checked by a professional building certifier during construction. Where submitted plans or specifications are inconsistent with the relevant BASIX Certificate, Council will require applicants to submit consistent applications before progressing with the assessment process, either by amending plans/specifications or by submitting a new BASIX Certificate with commitments that match the rest of the application.

Applicants can generate the BASIX Certificate only on the BASIX website: www.basix.nsw.gov.au. For more information, phone BASIX Help Line on 1300 650 908.

POLITICAL DONATIONS & GIFTS – DAs ONLY

Your attention is drawn to the Department of Planning's Guidelines on Political Donations & Gifts. The guidelines require the following:

Any persons with a financial interest in the application, is required to disclose all reportable political donations and gifts made within the previous 2 years when making a planning application to the Council. A disclosure must also be made of any reportable political donations or gifts made during the period the planning application is being considered prior to it being determined. These include:

(i) all reportable political donations made to any local councillor of the council,
(ii) all gifts made to any local councillor or employee of that council.
A reportable political donation made to a local councillor of any local council includes any donation made at the time the person was a candidate for election to the council.

STATEMENT OF ENVIRONMENTAL EFFECTS

Lot 110 DP 1187931 - Mid Western Hwy, Hay, NSW

Proposed 5MW solar farm

Zenith

TOWN PLANNING

sustainable thinking

Zenith Town Planning Pty Ltd
PO Box 591 Moruya NSW 2537
0408 258 877|zenithplan@bigpond.com|www.zenithplan.com.au

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TABLE OF CONTENTS

Document Details & History

Project number	0119
Project title	Hay 1A Solar Farm
Document title	Statement of Environmental Effects
Client	IT Power (Australia) Pty Ltd
Author	Allen Grimwood
ABN	11 624 467 349
Version	Draft 12 February 2019
	Draft Rev A 14 February 2019
	Final 15 February 2019

1. INTRODUCTION

1.1 Overview

The purpose of this Statement of Environmental Effects is to support an application to Hay Shire Council to develop a solar farm at Lot 110 DP 1187931 Mid Western Highway, Hay, referred to as the Hay 1A Solar Farm. The application is for regionally significant development that needs consent and is to be determined by the Western Regional Planning Panel.

The proposal is for integrated development due to the need to construct a new entry to the site off the Mid Western Highway. Under section 138 of the *Roads Act 1993* works in, on or over a public road cannot be carried out without the consent of the appropriate roads authority and in the case of a classified road without the concurrence of RMS.

There are no other separate approvals required to be obtained under section 4.46 of the *Environmental Planning and Assessment Act 1979*.

This Statement has been prepared having regard to pre-lodgement advice provided by Hay Shire Council at a meeting with Council's Director of Planning and Development held on 31 January 2019. Information has also been sourced from the Council's website, the NSW legislation website, SIX Maps, the website of the Office of Environment and Heritage, and the Department of Planning & Environment's Planning Portal.

All information referenced in this Statement has been sourced from publicly available documents or websites and from expert reports produced to support the application.

1.2 Scope of the report

The scope of this report is to describe the location and physical characteristics of the site on which the development is proposed, identify relevant provisions of plans and policies applying to the land, and to discuss any potential environmental impacts of the development and proposed servicing arrangements.

The purpose of this report is to assist Council's assessment of the proposal against the matters for consideration listed in section 4.15 of the *Environmental Planning and Assessment Act 1979*.

1.3 The proponent

The proponent for the proposed solar farm at Hay is IT Power (Australia) Pty Ltd. IT Power (Australia) is a private sector organization based in Canberra, which was established in 2003. It is part of the IT Power

Group which was formed in 1981 in the UK to bring together specialists in renewable energy, energy efficiency and carbon markets. IT Power offers expertise in renewable energy and energy efficiency, including research, development and implementation, managing and reviewing government incentive programs, high level policy analysis (including carbon markets), engineering design and project management. IT Power (Australia) has partnered with TEC-C Investments to develop the Hay 1A Solar Farm.

1.4 Justification

Solar energy is energy created by the heat and light of the sun. Solar power is produced when this energy is converted into electricity or used to heat air, water, or other substances. Australia has the highest average solar radiation per square metre of any continent in the world. Despite uncertainty regarding energy policy, the Commonwealth and NSW Governments have recognized the need to supplement energy derived from fossil fuels with energy generated from renewable sources. Alternative energy supply may be sourced from solar photovoltaic, geo-thermal, solar thermal, wave and tidal action, and wind.

The development of solar photovoltaic power is well underway in NSW and across Australia. This growth in the local solar PV sector continues to provide a significant boost for Australia's regional economy with renewable infrastructure development estimated to create upwards of 2,300 direct jobs plus indirect employment.

According to the Australian Renewable Energy Agency (ARENA), the deployment of household solar PV that generates about 5 kW is expected to continue and at the same time an increase in rooftop solar PV installations on commercial premises generating around (10-100 kW) is expected. Large scale solar PV is also rapidly expanding in Australia with several solar farms being constructed that will have the capacity to generate over 50MW. The proposed Hay 1A Solar Farm aims to fill the gap in the mid-sized plants. It will generate 5MW of power and contribute to renewable energy supply to supplement electricity generation from coal, oil and gas and assist to reduce reliance on these unsustainable means of supply.

The proposed development is in accordance with relevant objects of the *Environmental Planning and Assessment Act 1979* in that it will assist to generate power to be distributed to the residents of NSW thereby promoting the social and economic welfare of the community in a manner that manages and conserves natural resources.

The Hay 1A Solar Farm will further the goals of sustainability, and the orderly and economic use of land. The development will not detrimentally affect the environment, biodiversity or cultural heritage.

2. SITE DESCRIPTION AND CONTEXT

2.1 Description

The site of the proposed development is described as Lot 110 DP 1187931 Mid Western Highway, NSW. It is located approximately 1.6 kilometres north-east of the town centre of Hay and is a rhombus shape with an area of approximately 20.7 hectares.

The southern boundary fronts the Mid Western Highway and existing access to the site is located about 115 metres west of the south-east corner of the lot.

An unformed road separates the site from farmland and an Essential Energy sub-station to the west and a disused rail line to the north. Land adjoining the eastern boundary is vegetated.

The location of the site is shown in Figure 1 below. The site is indicated by a red cross.

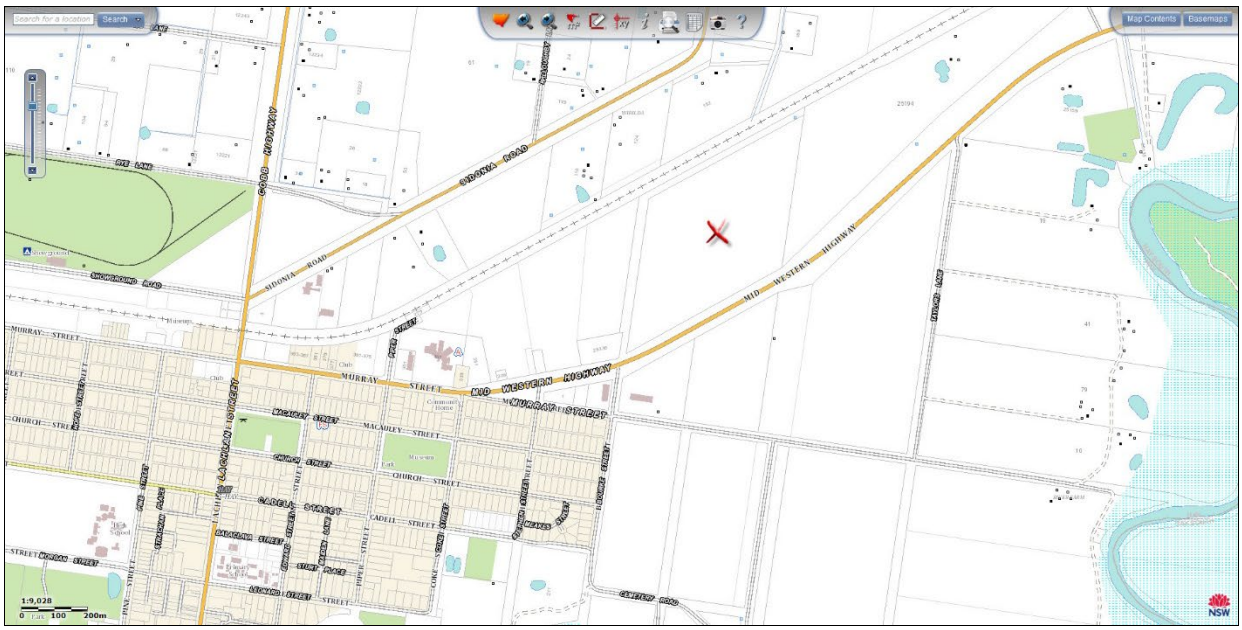


Figure 1: Locality map. Source: SIX Maps, 2018

The site has been fully cleared in the past for agricultural use and is now disused. The topography is flat and there are no structures on the site. It is severely degraded due to past practices and current drought conditions.

2.2 Context

The site and surrounding countryside is flat and is partly mapped as being bushfire prone land. An abandoned rail line runs parallel to the northern boundary and Hay Shire Council have advised that Transport for NSW does not have plans to recommence rail operations.

Urban residential dwellings are located to the south-west of the site and a number of scattered rural residential dwellings are located north of the disused rail line. Land on the southern side of the Mid Western Highway comprises rural uses and industrial development. The Hay Hospital, a registered club and offices of the National Parks & Wildlife Service are located off the highway west of the site.

An aerial image of the site and surrounding land is shown in Figure 2 below. The site is edged red.

Figure 2: Aerial image dated October 2013. Source: SIX Maps, 2018

Below are photographs of the property that show land uses and existing development on the site and adjoining land. All photographs were taken in January 2019 by Zenith Town Planning Pty Ltd.

Plate 1: Looking towards the site from the south-western corner

Plate 2: The existing entry to the site off the Mid Western Highway

Plate 3: Vegetation on land to the east

Plate 4: The sub-station on land to the west

Plate 5: Industrial and commercial development to the south

Plate 6: Dwellings with the rail line in the foreground

2.3 Climate

Global solar exposure is described on the Bureau of Meteorology website as being the total amount of solar energy falling on a horizontal surface. The daily global solar exposure is the total solar energy for a day. Typical values for daily global solar exposure range from 1 to 35 MJ/m^2 (megajoules per square metre). The values are usually highest in clear sun conditions during the summer, and lowest during winter or very cloudy days.

Figure 3 below shows average daily solar exposure based on 22 years from 1989 to 2011. The Hay area has received an average of between 18 and 20 MJ/m^2 each day, placing it within the second highest area receiving solar radiation in Australia.

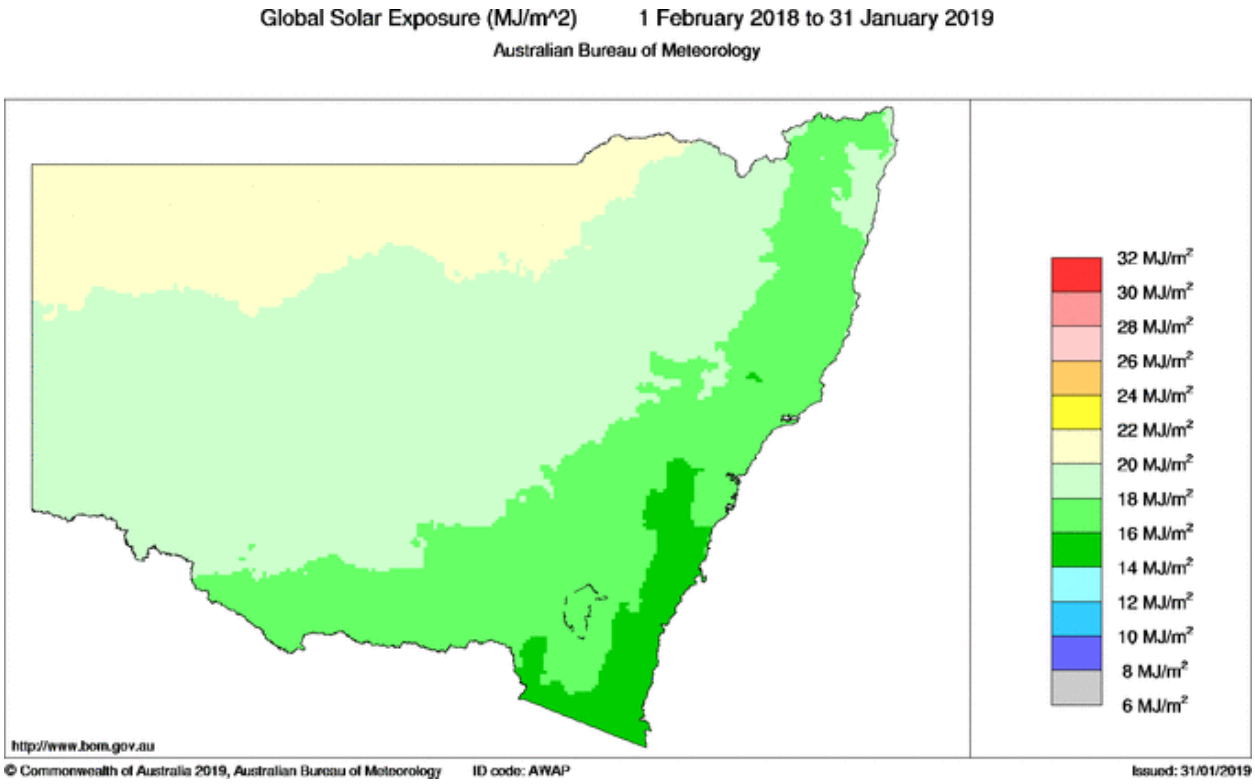


Figure 3: Average daily solar exposure. Source: Australian Bureau of Meteorology

The mean monthly global solar exposure measured at Hay Airport, the closest measuring station to the Hay 1A solar farm site, is given in Table 1 below. The annual average for 2018 was 18.2MJ/m^2.

Table 1: Mean monthly global solar exposure at Hay Airport, 2018

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly mean	26.3	23.2	19.7	14.9	11.1	9.4	10.7	12.9	18.7	21.6	24.1	25.7

The map below (Figure 4) shows the average daily hours of sunshine across Australia. The Hay area receives and average of 7 to 8 hours of sunshine each day.

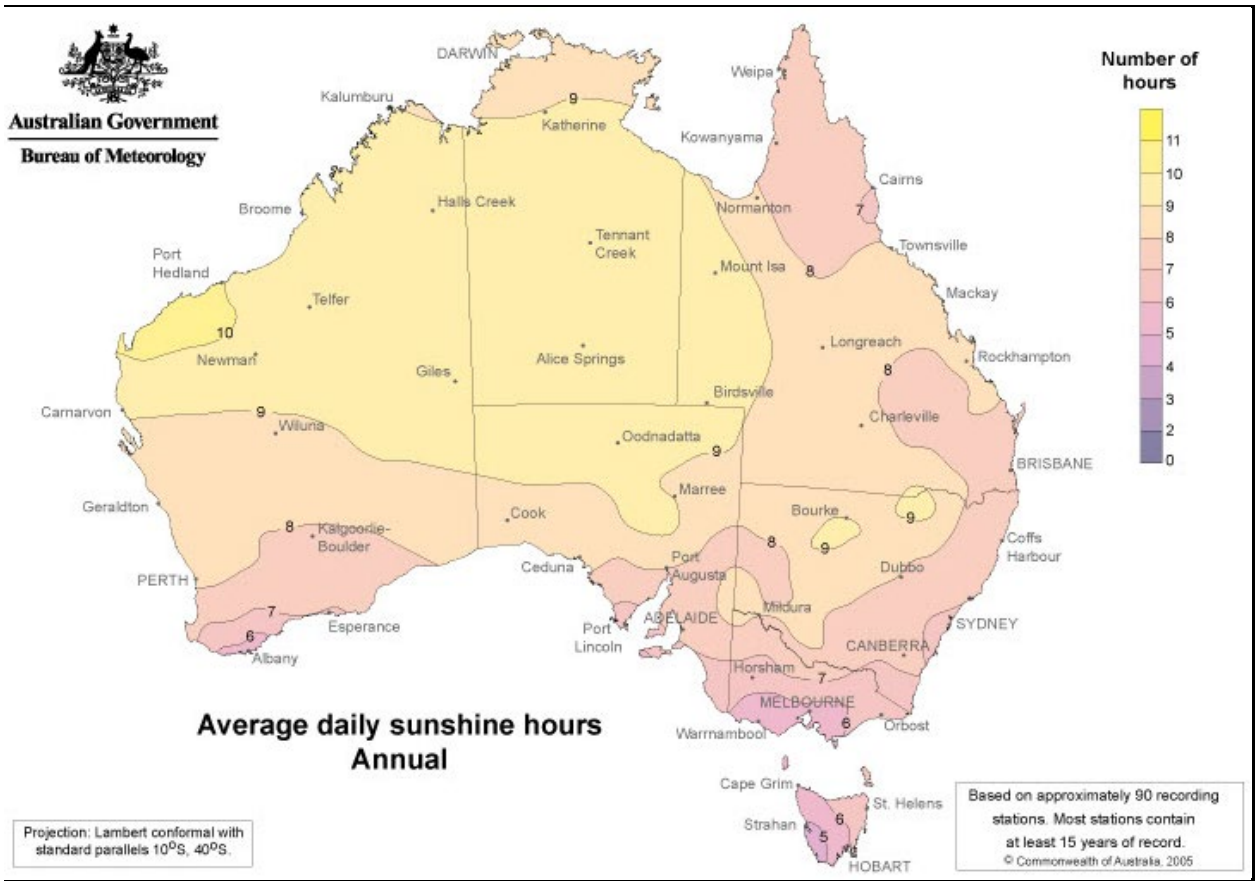


Figure 4: Average daily sunshine hours. Source: Australian Bureau of Meteorology

The global solar exposure coincides with seasons – the longer the daylight hours the greater the solar radiation due to the tilt of the earth during summer months. Rainfall is spread relatively evenly across the year and so does not appear to impact on the level of solar radiation.

Solar exposure estimates are important for a wide range of applications, including for agriculture, power generation and solar heating system design and use. This climatic information sourced from the Australian Bureau of Meteorology indicates that the global solar exposure, or solar radiation, is sufficient to support power generation in the proposed location which benefits from existing grid infrastructure such as the Essential Energy electrical sub-station on adjoining land.

3. DETAILS OF THE PROPOSED DEVELOPMENT

3.1 Overview

The proposed Hay 1A Solar Farm is to be located on the Mid Western Highway, east of the town of Hay. The site is approximately 20.7 hectares that was previously used for agriculture. A lease agreement with terms of 45 years is being negotiated with the intention of constructing a solar farm with a DC array capacity of 5.0 MWp and an AC output of 6.1 MW.

The array is proposed to be placed at the western end of the allotment and would occupy about three-quarters (15 hectares) of the lot.

3.2 Photovoltaic panels

There are proposed to be 16,800 solar modules installed in 51 rows, each row being approximately 91 metres long and 2 metres wide and oriented north to south. There is approximately 6 metres spacing between each row.

Each row of PV modules will rotate to track the sun across the sky from east to west each day. The hub height of each tracker is 1.6 metres with the peak of the modules reaching an approximate height of 2.6 metres when the array is fully tilted to 60 degrees from horizontal, i.e. in the early morning and late evening.

3.3 Inverters and battery storage

Two 2.5 MW inverter stations will be installed at the solar farm. These inverters are to be located within the array and are each mounted on a 6 metre long skid. Each of these inverter stations incorporate high and medium voltage switchgear and transformers. Each will connect by way of underground cables to connect to the Essential Energy 33kV feeder that runs parallel to the highway and then connects to the Hay 33 substation to inject power to the electricity grid.

Dial-before-you-dig investigations would be carried out prior to commencing all subsurface work.

3.4 Services

Reticulated water and sewer services are not required to be provided to the solar farm as there are no permanent offices or amenities proposed on site. Maintenance workers would not be required to remain on site. Cleaning of the PV panels would be carried out on an annual basis to maximise the performance of the system. This is done using water brought into the site and a sponge mop.

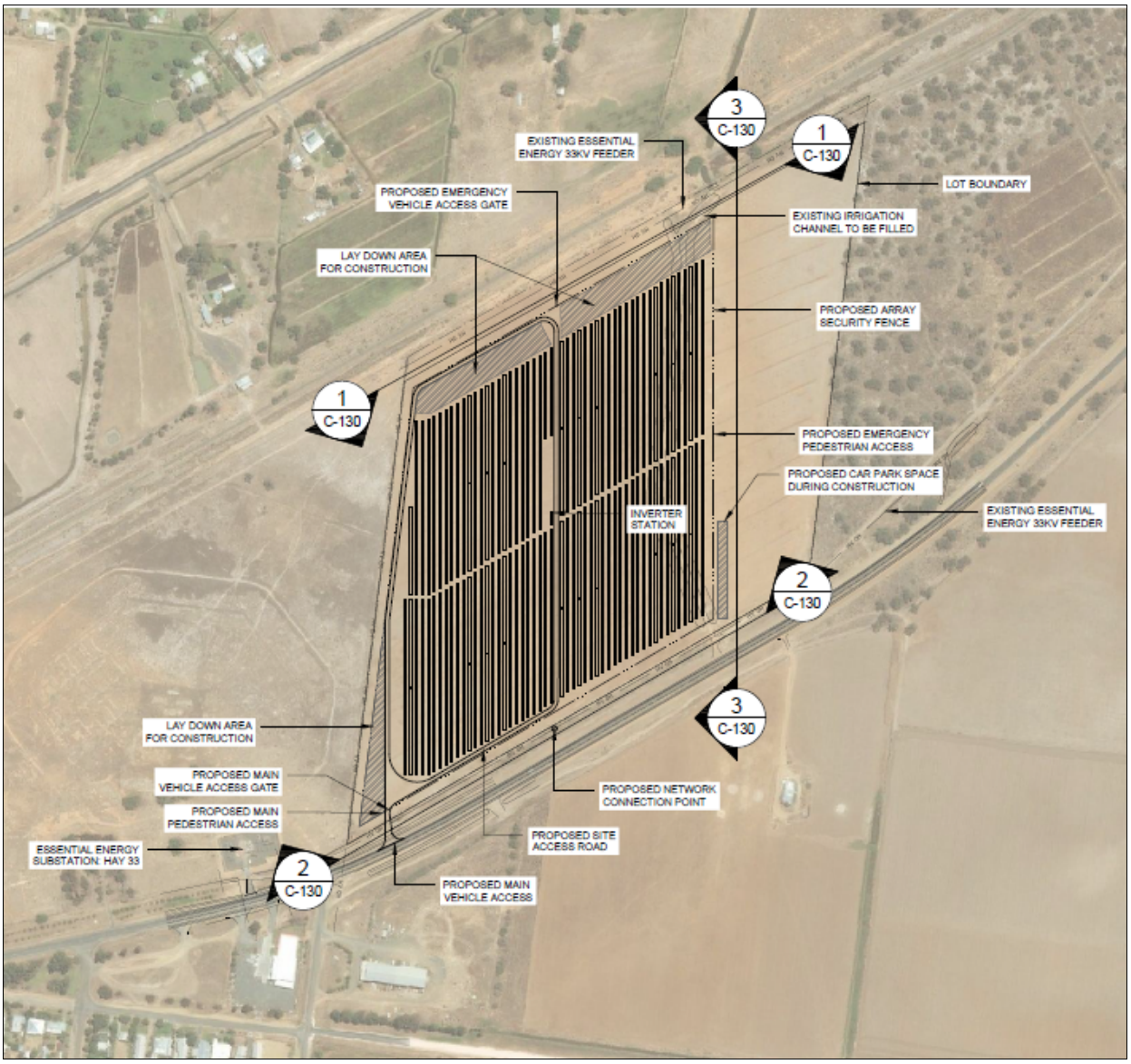


Figure 5: General arrangement plan. Source: ITP Renewables

Vehicle access to the site would be off a new driveway entrance located adjacent the existing fenced substation compound off the Mid Western Highway. It is not proposed to use the existing access located further to the east off the highway. During the construction stage there would be approximately 160 semi-articulated trucks, with an expected daily maximum of 4 vehicles, accessing the site to deliver PV panels, mounting frame equipment and inverters plus construction machinery to grade the accessways and erect the mounting system. A site access road would run around the permitter and through the centre of the array.

In addition, it is expected that car parking for up to 40 small vehicles will be needed to cater to the 50 construction workers at the rate of 0.8 spaces per worker. A temporary car parking area is to be sited at

the eastern edge of the array of panels. Materials laydown areas are located adjacent the driveway entry and along the northern edge of the array.

It was noted at the meeting with Council's Director of Planning and Development that there are two parts of the site that are potentially affected by localised flooding. These are at the north-eastern and south-western corners of the site. There is no development proposed at the north-eastern corner as the array and all ancillary works are proposed on the western three-quarters of the site. The south-western corner will be used as a materials laydown area and possibly short-term car parking space during construction. These uses are temporary and will be used only during construction. Once operational the accessway will be used for maintenance on a quarterly basis.

3.5 Construction

The mounting system for the PV panels is constructed on piles that are driven in to the ground using a vibrating pile driver. The piles will be driven approximately 1.2 to 2.5 metres into the ground, as to be comfirmed by a geotechnical and structural engineer.

During construction there is expected to be 50 personnel on site working from 7 am – 4 pm Monday to Friday. The construction is expected to take approximately three to six months. Should it be necessary to carry out work outside these hours then activities would be limited to those generating low noise emissions. Once operational the site will be unmanned. Maintenance is expected to be carried out quarterly by a crew of 2 to 3 people.

3.6 Landscaping

No landscaping is proposed. However, land that is disturbed during construction of the solar farm and not to be used for access or other maintenance purposes will be sown with native grasses endemic to the Hay area following completion of construction.

3.7 Security

The solar farm is to be enclosed within a 1.8 metre high security fence set within the boundaries and surrounding the array. The proposed fence is to be chain mesh steel topped with three rows of barbed wire giving a total height of 2.1 metres similar to that shown in Plate 7 below.

3.8 Decommisioning

The Hay 1A Solar Farm is intended to remain in operation indefinitely in order to contribute to sustainable electricity power supply to the state of NSW. If, however, circumstances change and it is necessary to decommission the farm in around 20 to 25 years then all infrastructure, panels, mounting frames including

footings and inverters would be disassembled and removed from the site. All gravel surfacing of accessways would be removed unless required for a future use. The site may then return to an agricultural use. If necessary, Council may impose a condition of consent that requires a decommissioning plan to be prepared and approved prior to the event.

Plate 7: Example of security fencing

4. STATUTORY FRAMEWORK

4.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment (EPA) Act 1979* is the principal piece of legislation governing the use and development of land in NSW. The objects of the Act are:

(a) *to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,*
(b) *to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,*
(c) *to promote the orderly and economic use and development of land,*
(d) *to promote the delivery and maintenance of affordable housing,*
(e) *to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,*
(f) *to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),*
(g) *to promote good design and amenity of the built environment,*
(h) *to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,*
(i) *to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*
(j) *to provide increased opportunity for community participation in environmental planning and assessment.*

The objects of the EPA Act are intended to guide land planning and management. Section 4.15 of the Act lists matters for consideration when assessing and determining an application for development.

4.2 State Environmental Planning Policies

4.2.1 State Environmental Planning Policy No 55 – Remediation of Land

SEPP 55 requires Council to consider whether land is contaminated and to determine whether the proposed use is suitable with or without contamination. Council can require an applicant for development to conduct a preliminary investigation and a subsequent more detailed investigation if warranted. Where contamination exists and remediation is necessary, Council must be satisfied that the remediation will take place before the land is used for the proposed purpose. It is noted that should the preliminary investigation identify contamination on the site then the NSW *Contaminated Land Planning Guidelines* apply to subsequent investigations.

The property has been cleared and farmed for many years and is not known to be listed on a Council register of potentially contaminated land. There has been no known historical usage that would cause the land to be contaminated. The use of farm chemicals such as pesticides and fertilisers is not considered to contaminate soils to the extent that mediation is required. It is considered that a preliminary investigation is not required for the development of a solar farm.

4.2.2 State Environmental Planning Policy (Infrastructure) 2007

The aims of *SEPP (Infrastructure) 2007* are to ensure a consistent and flexible planning system to facilitate the delivery of services. The policy identifies environmental assessment categories for types of infrastructure, matters to consider when assessing development adjacent to infrastructure and provides for consultation with relevant public authorities. The policy applies to the whole of NSW. *SEPP (Infrastructure)* contains provisions relating to approval processes and assessment requirements for infrastructure proposals according to the type or sector of infrastructure. It outlines land use zones where types of infrastructure are permissible with or without consent and identifies certain works as exempt and complying development.

Part 3 Division 4 of the policy relates to electricity generating works or solar energy systems. Section 34 enables Development for the purpose of electricity generating works to be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone. Zone RU1 Primary Production is a prescribed rural zone. Similarly, development for the purpose of a solar energy system may be carried out by any person with consent on any land, although this is limited to no more than 100kW in a prescribed residential zone. The proposed development is located in zone RU1 Primary Production and is therefore permitted with consent by *SEPP (Infrastructure) 2007*.

4.2.3 State Environmental Planning Policy (Rural Lands) 2008

SEPP (Rural Lands) 2008 applies to all rural LGAs including Hay Shire. This policy sets out *Rural Planning Principles* and *Rural Subdivision Principles* to implement measures that are intended to reduce land use conflicts and to identify State significant agricultural land.

The site at Hay is not listed in a schedule to the policy as being state significant agricultural land.

4.2.4 State Environmental Planning Policy (State and Regional Development) 2011

Development that is state and regionally significant is identified in *SEPP (State and Regional Development) 2011*. Electricity generating works including solar farms which have a capital investment value of more than $30 million, or a capital investment value of more than $10 million and are located in an environmentally sensitive area of State significance, are declared state significant development. Private infrastructure, including electricity generating stations, that have a capital investment value of over $5 million are declared regionally significant.

In this case the proposed development has a CIV of $7.5 million and is regionally significant. The application will be determined by the Western Regional Planning Panel.

4.3 Local Environmental Plan

4.3.1 Hay Local Environmental Plan 2011

The property is zoned RU1 primary Production under *Hay LEP 2011*. The objectives of zone RU1 are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural*
- *resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To permit a range of activities that support the agricultural industries being conducted on the land and limit development that may reduce the agricultural production potential of the land.*
- *To permit tourist facilities that promote an appreciation of the rural environment and associated agricultural and horticultural activities, while ensuring the continued economic viability of the land.*

The development is defined as ***electricity generating works*** which means a building or place used for the purpose of making or generating electricity. This use is prohibited in zone RU1. However, *SEPP (Infrastructure) 2007* prevails over *Hay LEP 2011* to the extent of an inconsistency meaning that the use is permitted with consent in zone RU1 by way of *SEPP (Infrastructure).*

The site is not mapped as being environmentally sensitive on the *Groundwater Vulnerability Map*, the *Terrestrial Biodiversity Map*, the *Wetlands Map*, or the *Riparian Lands and Watercourses Map* that accompany *Hay LEP 2011.*

It is not a listed heritage item and is not in the vicinity of a heritage item or heritage conservation area listed in *Schedule 5 Environmental heritage* of *Hay LEP 2011*.

The site is not affected by land reservation acquisition or urban release area provisions of the LEP. Provisions relating to these matters in *Hay LEP 2011* therefore do not apply to the proposed solar farm.

The site is affected by a development standard restricting subdivision for a dwelling to a minimum lot size of 20 hectares, however, subdivision of Lot 110 is not part of the proposed development.
The following clauses of *Hay LEP 2011* apply to the proposed development:

Clause 7.1 Earthworks

The objective of this clause is to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.

Development consent is required for earthworks unless the earthworks are ancillary to development for which development consent has been given. In deciding whether to grant development consent for development involving ancillary earthworks, the consent authority must consider:

(a) the likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality of the development,
(b) the effect of the development on the likely future use or redevelopment of the land,
(c) the quality of the fill or the soil to be excavated, or both,
(d) the effect of the development on the existing and likely amenity of adjoining properties,
(e) the source of any fill material and the destination of any excavated material,
(f) the likelihood of disturbing relics,
(g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area,
(h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Earthworks associated with the development comprise minor excavation to 150mm to install road base for accessways, 750mm footings for the inverters and security fence strainer posts, 1,000mm footings for the access gate and 1,500mm footings for the panel mounting frames. All of these earthworks are ancillary to the development of a solar farm and are not expected to impact adversely on drainage, future use of the land if the facility is decommissioned, relics, the natural environment or adjoining developments.

Clause 7.10 Essential services

This clause requires a consent authority to be satisfied that any of the following services that are essential for the development are available or that adequate arrangements have been made to make them available when required:

(a) the supply of water,
(b) the supply of electricity,
(c) the disposal and management of sewage,
(d) stormwater drainage or on-site conservation,
(e) suitable vehicular access.

The supply of water and sewerage services is not required for the proposed development. Electrical services are available to the site. Stormwater management is proposed to be addressed by controls recommended in this Statement with full details to be provided with the application for a construction certificate. Adequate vehicular access is proposed by way of a new entrance to the site off the Mid Western Highway adjacent the subsstation.

There are no draft environmental planning instruments that are on exhibition or have been exhibited but not yet published that apply to the site, or that relate to the proposed development of electricity generating works.

4.4 Development Control Plan

There is no development control plan that applies to Lot 110 DP 1187931.

4.5 Land use strategies

4.5.1 Hay LGA Community and Settlement Sustainability Strategy

The *Community and Settlement Sustainability Strategy* was adopted by Hay Shire Council in 2012. It is noted in the strategy that the town of Hay is surrounded by a grid of high voltage feeders and the capacity of the system is adequate to cater to growth.

The strategy contains mapping of sites across Hay LGA that may be contaminated due to chemical storage, buried putrescible waste, sewerage effluent, wool scouring waste, animal carcasses, or fuel and oil storage. Lot 110 is not mapped as being affected by potential contamination.

4.5.2 Riverina Murray Regional Plan

The *Riverina Murray Regional Plan 2036* was released in March 2017. It establishes a framework for growth over the next 20 years for the Riverina Murray Region which includes Hay LGA.

The plan supports the protection of high-value environmental assets and aims to develop a strong and diverse economy with supportive communities. The plan contains the following four goals:

1. A growing and diverse economy
2. A healthy environment with pristine waterways
3. Efficient transport and infrastructure networks
4. Strong, connected and healthy communities

A series of directions and actions are to guide land use planning priorities and decisions. Direction 21 is to align and protect utility infrastructure investment. It is noted that there are opportunities to provide cost-effective extended and upgraded services for stand-alone alternative energy generation and the use of renewable options such as solar generation.

5. ENVIRONMENTAL EFFECTS

5.1 Biodiversity

5.1.1 Methodology

A desktop biodiversity assessment has been carried out to determine the impact on threatened species and endangered ecological communities. This is supported by a site inspection carried out on 31 January 2019.

The development site is located in the Riverina IBRA Region and is within a rural landscape that has been extensively cleared. It is devoid of any healthy native vegetation and is severely degraded. The site is located about 860 metres north of the Murrumbidgee River at the closest point. There are no watercourses or wetlands within the site. A photograph of the site that demonstrates its current poor condition is given below.

Plate 8: The current condition of the site

The following sources of information and data have been used to determine whether any threatened species or endangered ecological communities occur on or near the site:

- SIX Maps aerial imagery dated October 2013,
- Natural Resources – Biodiversity mapping of *Hay LEP 2011*,
- BioNet Atlas,
- Atlas of Living Australia,
- Mapping by the NSW Office of Environment and Heritage (IBRA regional vegetation mapping, Native Vegetation Regulatory Map, Biodiversity Values Map)
- Schedules to the *Biodiversity Conservation Act 2016,* and
- Protected Matters Report of the *Environment Protection and Biodiversity Act 1999*.

Information concerning the flora and fauna of the Riverina bioregion has been sourced directly from the Office of Environment and Heritage www.environment.nsw.gov.au. The Riverina bioregion includes Hay and surrounding rural land covering the site of the proposed solar farm. Information has also been sourced from the Bionet Atlas, the Biodiversity Values Map and the Native Vegetation Regulatory Map all maintained by OEH.

5.1.2 Hay LEP 2011

Lot 110 DP 1187931 is not shown as being affected by biodiversity on the Natural Resource – Biodiversitiy Map of *Hay LEP 2011* as shown in Figures 6 and 7 below.

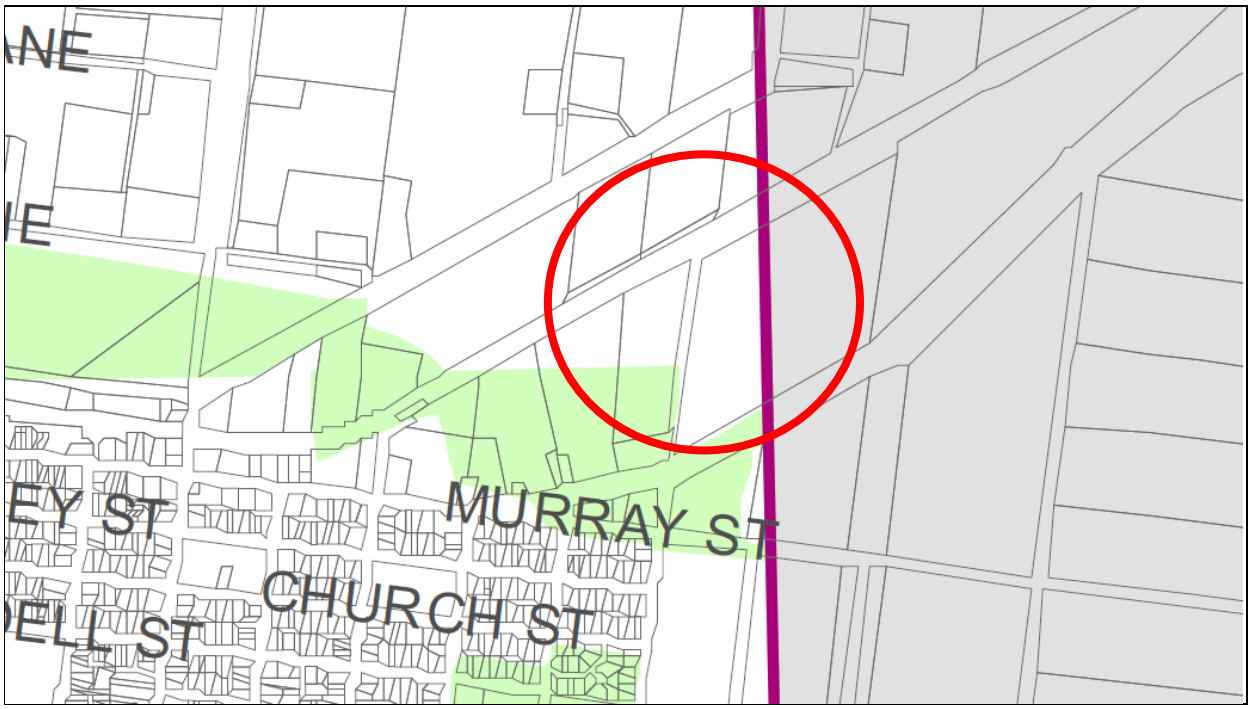


Figure 6: Extract from Hay LEP 2011 Natural Resource – Biodiversity Map Sheet NRB_005

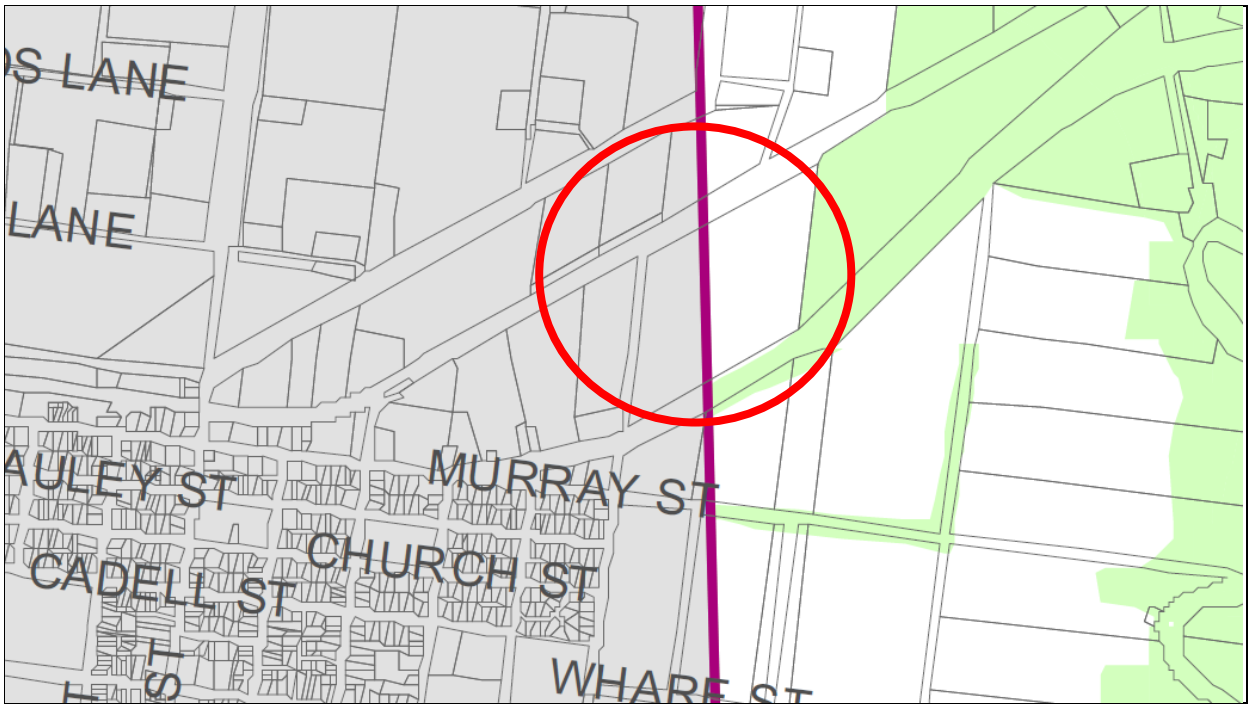


Figure 7: Extract from Hay LEP 2011 Natural Resource – Biodiversity Map Sheet NRB_009

5.1.3 Significant flora

There are 28 threatened flora species listed in the schedules of the *Biodiversity Conservation Act 2016* in the Riverina Bioregion. Of these, 12 are endangered, 15 are listed as vulnerable and one species is considered extinct in the bioregion.

A search of the Bionet Atlas listed six endangered ecological communities found in Hay LGA. These are:

- Acacia loderi shrublands
- Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions
- Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions

The full list of species within the area surrounding the site is appended as Attachment A.

A search of datasets maintained by OEH was then carried out to produce a map of vegetation communities on land north-east of Hay. These are shown in Figure 8 below. Lot 110 is fully cleared and is not mapped as vegetated. The communities found on adjoining properties to the east and south are:

- Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone of the Riverina Bioregion and Murray Darling Depression Bioregion (shaded brown)
- Cotton Bush open shrubland of the semi-arid (warm) zone (shaded purple)

Remnants of these communities are found on land adjoining the immediate area to be developed for the solar farm to the east and along the southern boundary the Mid Western Highway. The cotton bush community is also found along the road reserve of the Mid Western Highway. Neither of the vegetation communities located on adjoining and adjacent land are listed as an endangered ecological community in the *Biodiversity Conservation Act 2016*.

The mapping indicates that there are no remnant endangered ecological communities within the area to be developed for the solar farm which has been fully cleared and used for agriculture. This is supported by aerial imagery.

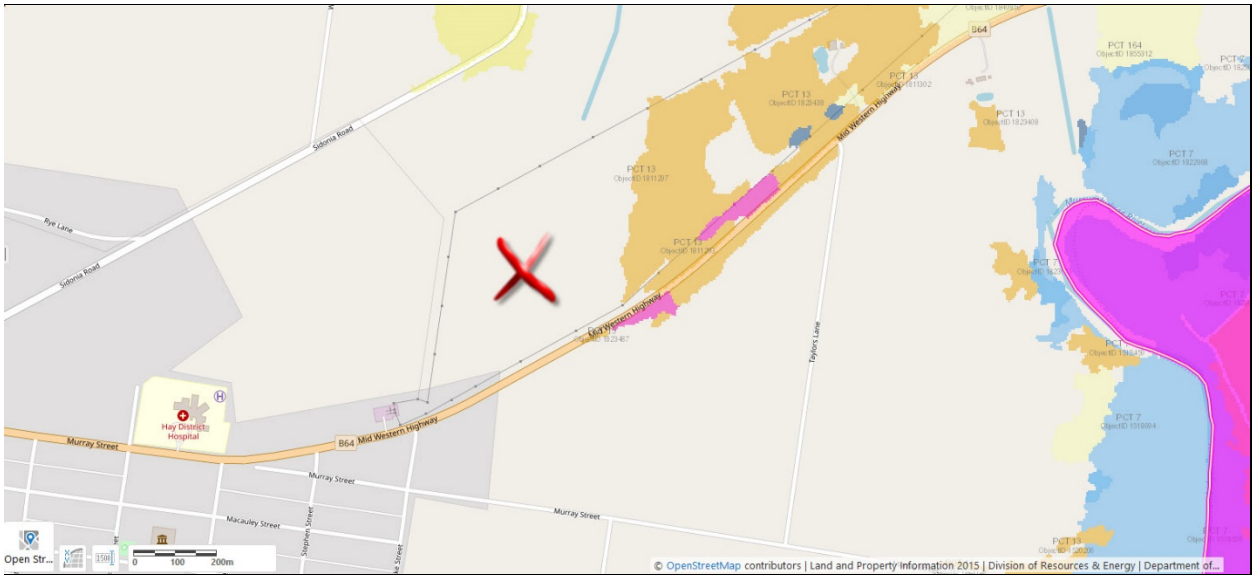


Figure 8: Vegetation communities of the area north-east of Hay. Source: OEH 2018

5.1.4 Significant fauna

Figure 9 below shows the search results from the Bionet Atlas maintained by OEH. Records of species are provided within a 100 square kilometre area surrounding Lot 110. The map indicates that no species have been recorded on the site.

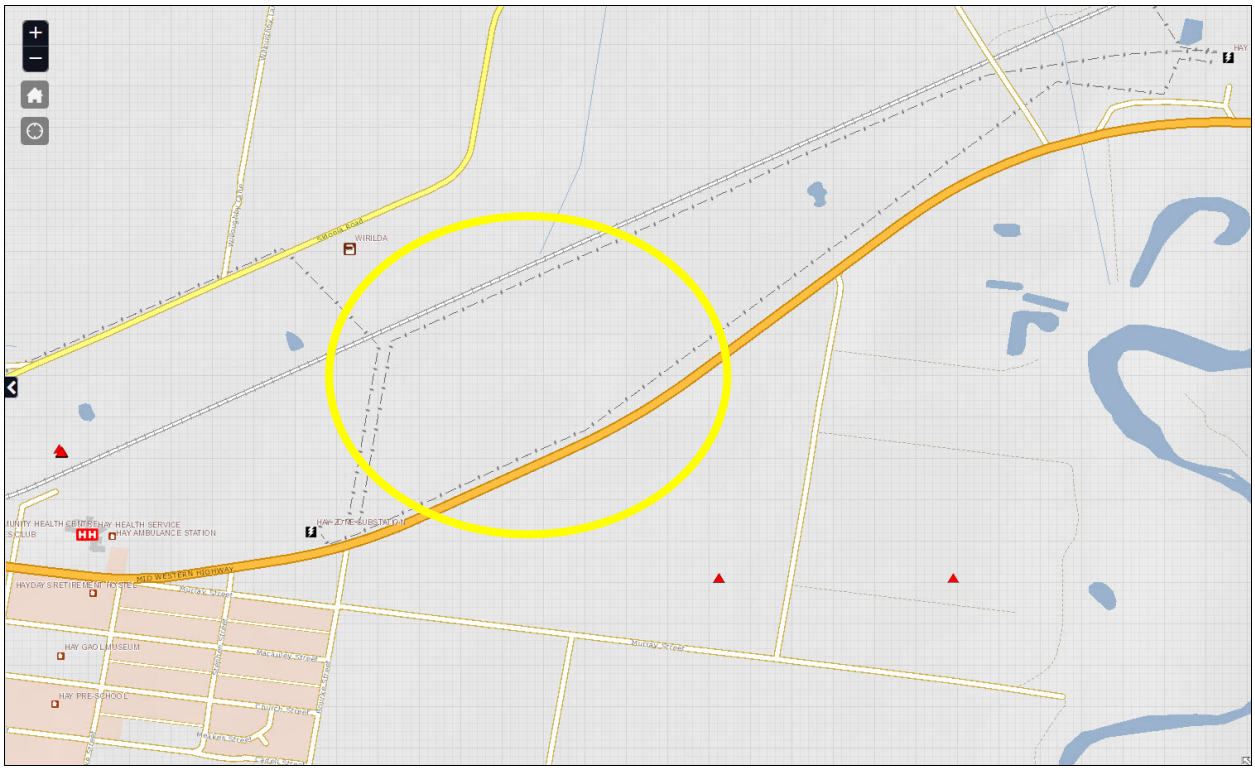


Figure 9: Bionet Atlas map. Source: OEH, 2019

There are 5 species listed as endangered and 11 listed as vulnerable that haves been recorded in the 100 square kilometre area surrounding the site. This is due to the extensive clearing and cultivation of crops that has fragmented the landscape. These species are listed in Table 2 below.

Table 2: Endangered and vulnerable species recorded near the site

Common name	Status
Southern Bell Frog	Endangered
Australian bustard	Endangered
Bush stone-curlew	Endangered
Plains wanderer	Endangered
Bilby	Endangered
Magpie Goose	Vulnerable
Blue-billed duck	Vulnerable
Freckled duck	Vulnerable
Spotted harrier	Vulnerable
Little eagle	Vulnerable
Black falcon	Vulnerable
Superb Parrot	Vulnerable
Brown treecreeper	Vulnerable
White-fronted chat	Vulnerable
Grey-crowned Babbler	Vulnerable
Diamond firetail	Vulnerable

Given that the part of the site to be developed as a solar farm has been fully cleared and used for the cultivation of crops for many years it is not likely that any endangered, vulnerable or threatened species occur on the site. As shown in Figure 9 the map of the Bionet Atlas search indicates that no endangered, vulnerable or threatened species have been recorded on the site.

5.1.5 Biodiversity Values Map

The Biodiversity Values Map is given in Figure 10 below. This map identifies land with high biodiversity value as defined by clause7.3(3) of the *Biodiversity Conservation Regulation 2017*. The Biodiversity Offsets Scheme applies to all clearing of native vegetation and other biodiversity impacts prescribed by the regulation on land identified on the map. The Biodiversity Offsets Scheme is used to determine whether the Biodiversity Assessment Method is to be used to assess the impacts of a development proposal and applies to local development.

The scheme is triggered based on threshold levels of clearing comprising the land area to be cleared and whether the area is mapped on the Biodiversity Values Map. In this case Lot 110 is not mapped as being of high biodiversity value. In this case a minimum lot size of 20 hectares applies to Lot 110. The threshold for clearing of native vegetation above which the Biodiversity Assessment Method applies is 0.5 hectares or more. It is not proposed to clear the land of any native vegetation other than is necessary to bore holes for the establishment of footings, therefore, it is not necessary to engage an accredited assessor to determine the offsets required to enable the project to proceed.

Figure 10: Biodiversity Values Map. Source: OEH, 2018

A test of significance under section 7.3 of the *Biodiversity Conservation Act 2016* is required to be carried out for local development proposals that do not exceed the Biodiversity Offsets Scheme threshold. This

test determines whether the potential impacts of development are likely to significant affect threatened species, ecological communities, and their habitats. Below are the results of the test of significance for the proposed solar farm.

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

The site has been cleared and farmed for many years and is not known to be inhabited by any threatened species. The Bionet Atlas does not contain any records of species on Lot 110. The development of a solar farm is not likely to adversely effect the lifecycle of any threatened species and pose a threat to the local population of any species.

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

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Mapping of vegetation communities indicates that there are no endangered ecological communities located within the site. The area of land to be developed as a solar farm is fully cleared and was formerly farmed.

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

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is considered that the site would not act as habitat for any threatened species or ecological community as it has been cleared and was continually farmed for many years.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The site is not mapped as being of high biodiversity value on the Biodiversity Values Map. The development of a solar farm is not likely to have any adverse effect on areas of outstanding value.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The development of a solar farm, including the installation of solar PV panels and ancillary facilities, is not listed as a key threatening process in Schedule 4 of the *Biodiversity Conservation Act 2016*.

As can be seen from Figure 11 below, all native vegetation on Lot 110 DP 1187931 has been cleared including the area for the proposed arrays of panels. There are not likely to be any threatened species or endangered ecological communities present on the site.

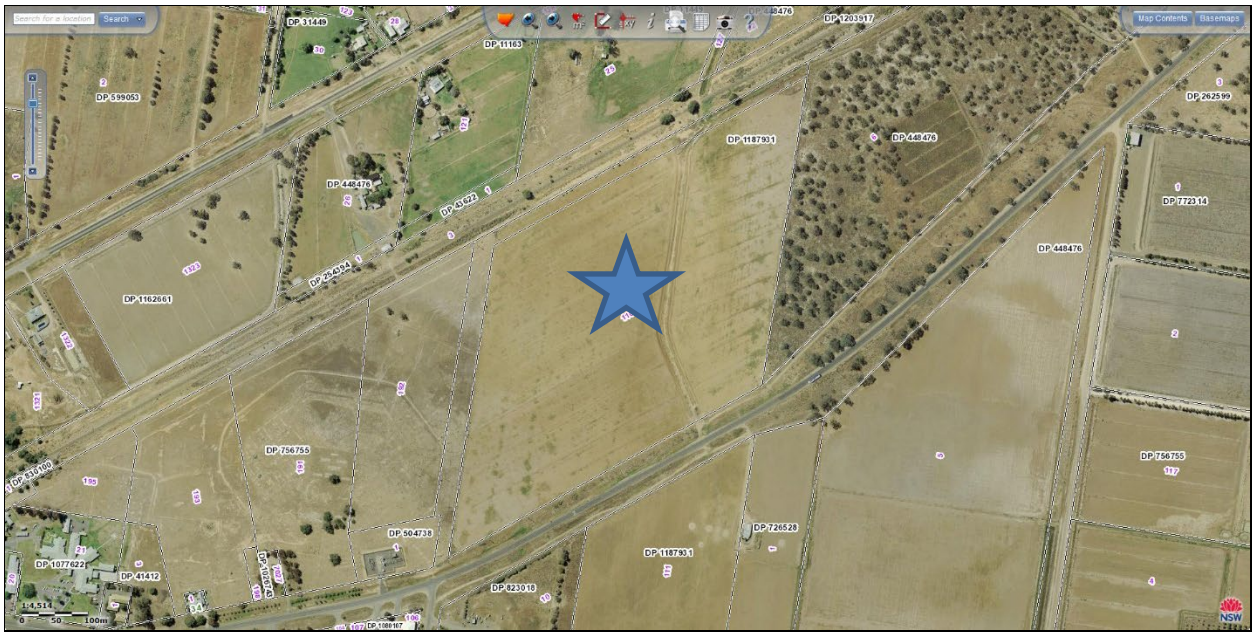


Figure 11: Aerial image of Lot 110. Source: SIX Maps

5.1.6 Native Vegetation Regulatory Map

The Native Vegetation Regulatory Map covers rural land in NSW and categorises land where management of native vegetation can occur without approval or where management of native vegetation may be carried out in accordance with Part 5A Land Management (native vegetation) of the Local Land Services Act 2013. The categories are Category 1 (unrestricted management where clearing is exempt from the LLS Act 2013), Category 2 is regulated land where the LLS Act applies to clearing as either code based, vulnerable or sensitive, and Excluded Land which is not regulated by the LLS Act 2013. The Native Vegetation Regulatory Map for Lot 110 is given as Figure 12 below. This land is not mapped as *sensitive regulated land* (shown in pink) or *vulnerable regulated land* (shown in yellow).

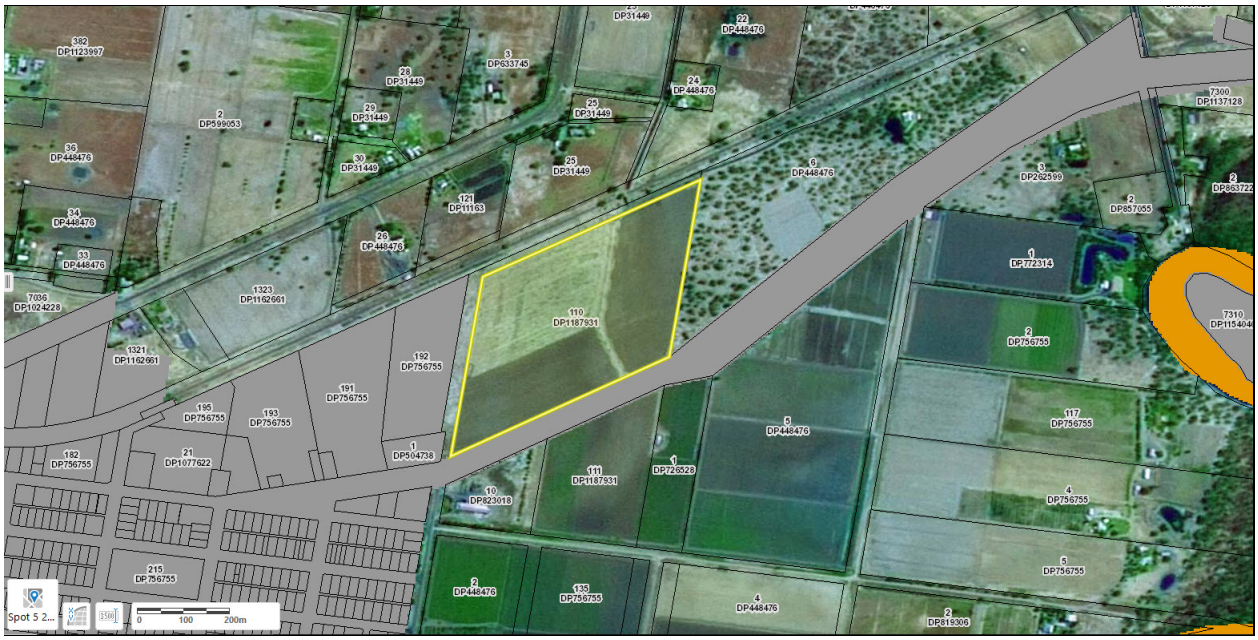


Figure 12: Native Vegetation Regulatory Map. Source: OEH, 2018

5.1.7 Environment Protection & Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* affords protection for seven matters of national environmental significance. These matters are world heritage properties, national heritage places, wetlands of national importance, listed threatened species and ecological communities, migratory species, commonwealth marine areas and nuclear actions including uranium mines. Actions that have, or are likely to have, a significant impact on a matter of national environmental significance require the approval of the Australian Government Minister for the Environment and Energy.

Actions include but are not limited to construction, expansion, alteration or demolition of buildings, structures, infrastructure or facilities; storage or transport of hazardous materials; waste disposal; earthworks; impoundment, extraction and diversion of water; research activities; vegetation clearance; military exercises and use of military equipment; and sale or lease of land.

It is the responsibility of the Minister to decide whether assessment and approval is required under the *EPBC Act*. Currently there are 4 wetlands of international importance, 3 listed threatened ecological communities, 25 listed threatened species of flora and fauna, and 10 listed migratory species of flora and fauna protected under the *EPBC Act* within Hay LGA. The provisions of the *Environment Protection and Biodiversity Conservation Act 1999* may apply to the development of a solar farm, however, the search of the Bionet Atlas indicates that there are no recorded threatened or migratory species, or threatened ecological communities on the site. The EPBC Protect Matters Report is appended as Attachment B.

The site to be developed as a solar farm is fully cleared and has been used for farming. There are no wetlands, threatened ecological communities or threatened species listed under the EPBC Act likely to occur on the site. There is no development proposed within 80 metres of the boundary to land occupied by a remnant vegetation community at the closest point and the development will not have a significant impact on a matter of national environmental significance. Referral to the Commonwealth Government is not necessary.

5.1.8 Mitigation measures

Land to the east and south of the subject site is mapped as Natural Resources – Biodiversity in *Hay LEP 2011*. A setback of the solar farm in excess of 80 metres to the boundary of adjoining land to the east is proposed at the closest point and the highway separates sensitive land to the south. To avoid interference with the vegetation community located on the adjoining land it is recommended that any vegetation planted to screen the development and any grasses planted to bind the soil following construction of the solar farm be native species endemic to the area. Access to the site is to be limited to that point shown on development plans and within the development area. Storage of materials is to be carried out wholly within the development area.

5.2 Natural hazards

5.2.1 Flooding

The site is not mapped as being flood prone in *Hay LEP 2011*, however, aerial imagery indicates that there is the potential for limited localised flooding. Flood mitigation measures and stormwater management have been considered in section *4.3 Water resources* of this Statement.

Two parts of the site are potentially affected by localised flooding. These are at the north-eastern and south-western corners of the site. There is no development proposed at the north-eastern corner as the array and all ancillary works are proposed on the western three-quarters of the site. The materials laydown areas are to be located at the south-western corner. These uses are temporary and will be used only during construction. Once operational the accessway will be used for maintenance on a quarterly basis.

5.2.2 Bushfire

The site is mapped as being bushfire prone. The south-eastern corner of the site is a buffer to land mapped as bushfire category 1 to the south of the Mid Western Highway. Infrastructure comprising electricity generating works is not a habitable building and is not listed as a *special fire protection purpose* under section 100B of the *Rural Fires Act 1997*. Therefore, a bushfire assessment is not required to be prepared and submitted with the development application.

The development of a solar farm would not affect the performance of the buffer to bushfire prone land to the south.

5.3 Water resources

5.3.1 Assessment of impacts

A desktop assessment of potential impacts on groundwater and surface water flows has been carried out. The assessment examines:

- Local hydrology and catchment and water quality data,
- Surface and groundwater quality data,
- Flood-risk potential of the site,
- Impacts of the development against NSW policies and industry standards, and
- Management procedures and mitigation measures for construction and operation.

It is noted that the site is located within the Hay Private Irrigation District and the Murrumbidgee Valley district of the Murrumbidgee regulated river system. Funding has been secured to upgrade the irrigation delivery system for an open channel to a low pressure pipeline. Data for rainfall and stream monitoring are included in the assessment.

Potential adverse impacts to the site may be due to surface water conditions including impediments to site accessibility and managing downstream nuisance.

The site is not shown as groundwater vulnerable under clause 6.9 of *Hay LEP 2011*. Although within the broader Murrumbidgee River catchment area which has a history of rising groundwater levels over the longer term in certain areas, this is not expected to be a concern at the site.

Flooding associated with the Murrumbidgee is not expected to inundate the site as it is located north of a 5.7 kilometre long levee that protects the Hay township from flooding. The levee consists of a combination of embankments, elevated roadways and naturally high ground. However, localised flooding may disrupt construction and material storage on the site even when the site is not inundated. Monitoring of rainfall and stream gauges is recommended during construction.

There is the potential for increased runoff on site due to the solar arrays. This may cause erosion at the base of solar panels due to soil type and lack of ground cover. Noting that the site has been used for agriculture and there is very little groundcover, there is the potential for runoff containing sediments which could increase the turbidity and water quality in downstream waterways.

5.3.2 Mitigation measures

It is recommended that:

- Consultation with local emergency management agencies be carried out as part of the project management plan to ensure notification of regional weather or climatic events that may affect site access
- Minimise erosion and sedimentation form construction activities by undertaking works in accordance with the NSW Government publication *Managing Urban Stormwater: Soils and Construction*
- Implement measures relating to site drainage and water quality controls for the design and construction phases, and stormwater point and source controls

5.4 Visual and scenic amenity

5.4.1 Methodology

Impacts on the visual and scenic amenity of the proposed Hay 1A Solar Farm have been assessed using the RMS guideline *Environmental Impact Assessment Practice Note – Guideline for Landscape Character and Visual Impact Assessment* (EIA-N04 Version 2-0 released on 28 March 2013). Details of methodology are given below.

A site inspection of the location of the proposed works and the surrounding area took place on Thursday 31 January 2019. The visual catchment, the context of the site of the proposed works and viewpoints were identified at this time.

Land uses and characteristics of the environment such as topography, vegetation, architecture of neighbouring buildings and any heritage values of any significant sites in the vicinity of the proposed solar farm were noted and the capacity of the area to absorb physical change is assessed. Development plans for the solar farm have been reviewed and the likely impacts on landscape character identified. This is determined by the sensitivity of the landscape to physical change and the magnitude, or relative size and scale, of the works.

The visual significance of the site to viewpoints and receivers within the visual catchment is described in terms of proximity to the site, landscape character, the composition of views and the sensitivity to change that will affect scenic values. The visual impacts that will be experienced by each receiver are identified and evaluated in terms of the sensitivity of each receiver to change and the magnitude of that change in terms of the proposed works. The impacts are calculated and ranked according to negligible, low, moderate or high impact based on the following matrix (sourced from the RMS *Guideline for Landscape Character and Visual Impact Assessment).*

Table 3: Landscape character and visual impact grading matrix. Source: RMS Guideline for Landscape Character and Visual Impact Assessment, 2013

Landscape character and visual impact grading matrix					
	Magnitude				
Sensitivity		High	Moderate	Low	Negligible
	High	High impact	High-moderate	Moderate	Negligible
	Moderate	High-moderate	Moderate	Moderate-low	Negligible
	Low	Moderate	Moderate-low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

The findings of the landscape character and visual impact assessments are summarised in the conclusion. Recommendations as to refinements of the development plans to avoid or mitigate significant landscape and visual impacts are made if necessary.

5.4.2 Description of the landscape

The character of the landscape near Hay is predominantly an open modified agricultural landscape that has been shaped by farming. It is generally flat land with little remnant vegetation. The site itself is peri-urban being on the eastern edge of the township of Hay. Structures within the vicinity of the site comprise an electrical sub-station, a disused rail line, urban and rural living dwellings, industrial and commercial uses, institutional facilities such as Hay Hospital, bushland and rural farmland. Photographs taken during the site visit and provided in section *2. Site location, description and context* of this Statement illustrate the site and surrounding area. The landscape is assessed to have low sensitivity to change.

5.4.3 Assessment of impacts on landscape character

The proposed Hay 1A Solar Farm will comprise 16,920 solar modules installed in 188 rows. These are to be placed within a confined area of 15 hectares within a 20.7 hectare property. The internal site access road that surrounds the perimeter of the solar farm on three sides is to be setback 23 metres from the northern boundary, 14.4 metres from the southern boundary, and is variable from the western boundary with a minimum of 10 metres. The nearest component of the solar farm to the eastern boundary is the security fence which would be approximately 180 metres at the northern end and in excess of 80 metres at the southern end of the fence from the eastern boundary.

The sensitivity of private property and public roads to landscape change would be low and decreasing over time given the mix of uses and spread of the urban area outwards along the Mid Western Highway. Private dwellings and occupants of Hay Hospital are likely to be impacted by a change in views on neighbouring land and would feel a low impact on character. The panels are likely to be of interest to occupants of the

hospital. The presence of the electrical substation to the west and commercial/industrial uses to the south of the highway capture motorists attention on approach to the township. The magnitude of the project and impact on landscape character is therefore considered to be low for private property and public roads.

5.4.4 The visual catchment

The visual catchment of the site of the proposed solar farm is defined by the area within which the works will be partially visible as shown inside blue edging on the visual envelope map below. Topography and vegetation have an influence on the visual catchment. As the land is flat it is unlikely that the site will be visible from adjoining private properties and public roads beyond 1 kilometre.

The visual impact of solar farms depends on the scale and type of infrastructure, the prominence and topography of the site relative to the surrounding environment; and any proposed screening measures to reduce visibility of the site. Some potential viewpoints were therefore discounted because of significant existing features such as built structures. The site itself is fully cleared and there are no structures or vegetation in the road reserve adjoining Lot 110.

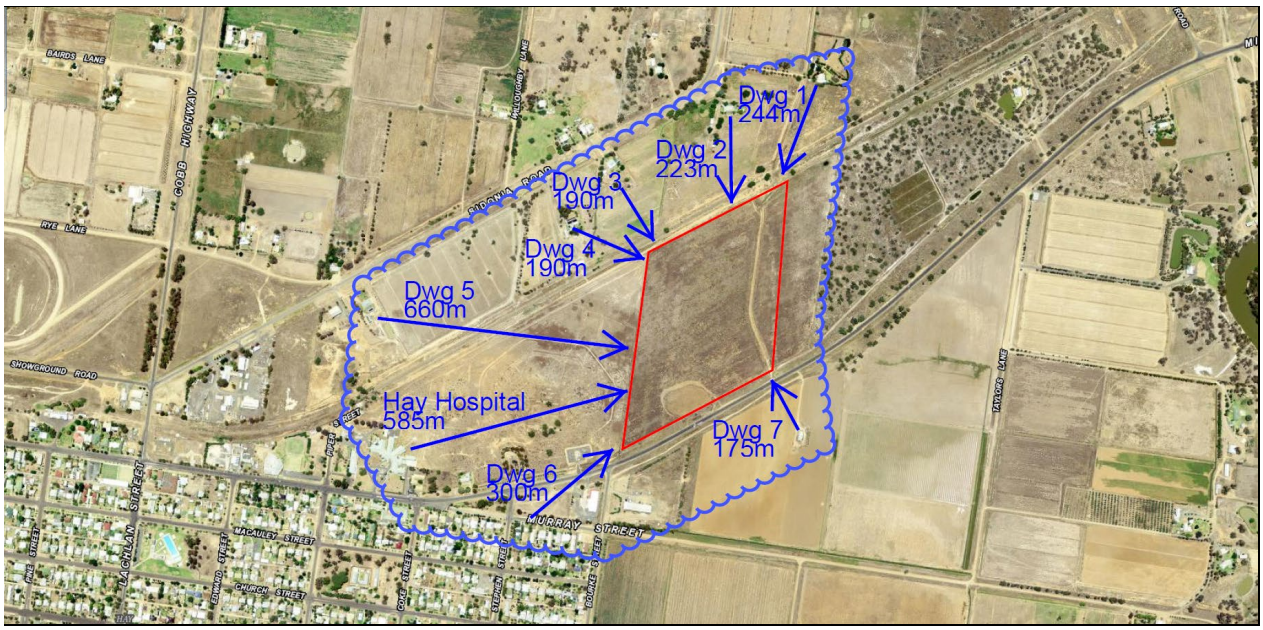


Figure 13: Approximate visual catchment and nearest dwellings. Source: SIX Maps

There are several dwellings within one kilometre of the site. The distance from seven locations are shown in Figure 14 with the separation distance from each dwelling to the site at the nearest point. It would be visible from public roads such as the Mid Western Highway from approximately 100 metres on approach from the east and 150 metres on approach from the west. Given that the panels would be oriented north and rotating east to west, only the rear of the panels and supporting frames would be visible from the highway.

The sensitivity of the neighbouring farmhouses to landscape change varies from low to moderate (dwellings 3 and 4) given the existing open landscape of the site though tempered by proximity to urban development and peri-urban location. The sensitivity would decrease with distance so that visibility of the solar farm to dwellings and other structures beyond 200 metres would be low and outside the visual catchment would be negligible. Dwelling 7 would be low sensitivity due to the slight incline towards the solar farm site and the highway on intervening land.

There are no structures that would screen the development from neighbouring residential properties to the north, however, the disused rail line is within a raised embankment which provides some screening to these properties. Vegetation within the private property boundaries would also serve to screen the solar farm. South of the site, a gentle incline of the land sloping towards the Murrumbidgee River and commercial and industrial development on intervening land reduces visibility of the site from residential properties to the south. (Commercial and industrial development are not considered sensitive receivers in terms of visual impact). Similarly, structures to the west including the Essential Energy substation and Hay Hospital interfere with views towards Lot 110. The rear of panels will be visible to motorists travelling along the Mid Western Highway, however, as they will be set within an increasingly industrial landscape on the edge of the urban area sensitivity is low.

5.4.5 Assessment of visual impacts

Table 4 below indicates the magnitude of the proposed solar farm in terms of the visual change in the landscape and proximity to the viewpoint, and the degree of sensitivity based on the quality of the view, whether the site is clearly visible or obscured by landform or vegetation, the direction and composition of the view, and how sensitive the view is to changes in the landscape that will result from the proposed development.

A rating is then given based on magnitude and sensitivity using the landscape character and visual impact grading matrix.

Table 4: Viewpoint impacts

Viewpoint	Magnitude	Sensitivity	Rating
Mid Western Highway	Low	Low	Low
Dwelling 1	Low	Low	Low
Dwelling 2	Low	Low	Low
Dwelling 3	Low	Moderate	Low-moderate
Dwelling 4	Low	Moderate	Low-moderate
Dwelling 5	Low	Low	Low
Dwelling 6	Low	Low	Low
Dwelling 7	Low	Low	Low
Hay Hospital	Low	Low	Low

5.4.6 Summary of impacts

The landscape on the urban edge of Hay is one that has been modified by human activity associated with the agricultural industry. It is characterised by a mix of urban and rural uses and utilities including the 33kV substation.

The impact of the proposed Hay 1A Solar Farm on landscape character has been assessed to be low based on magnitude of works and the sensitivity to change of surrounding properties. The works would be visible to motorists travelling along the Mid Western Highway, however, given the character of the proximity to the urban area and the commercial and industrial uses visible on the approach to town it is expected that acceptance of and adaptation to change will occur within a relatively short space of time following completion of works.

The visual impact of the proposed works are assessed to be low to moderate for the viewpoints identified in this assessment. Uses on land located between residential dwellings such as the substation, the disused rail line and commercial/industrial buildings would serve to screen and distract visual interest in the array of panels. The impacts are considered acceptable given the nature of the proposed development and that it will contribute to renewable energy generation.

5.4.7 Mitigation measures

No mitigation measures are proposed. It is not recommended that a vegetated buffer be incorporated to screen the panels as this would alter the open agricultural landscape that characterises the Hay Plains.

5.5 Traffic and access

5.5.1 Existing access arrangements and proposed movements

An assessment of the impacts on traffic and the adequacy of access arrangements has been carried out. The assessment includes a description of the existing road network and notes that the Mid Western Highway is a NSW State Highway servicing the Central West and Riverina regions and is part of the most direct route between Sydney and Adelaide. Lane widths near the western boundary of Lot 110 are approximately 3.5 metres wide with 0.8 metres of sealed shoulders and 0.6 metres of unsealed shoulder. The speed limit ranges from 50 km/hr at the western boundary to 110km/h approximately 165 metres from that point.

Existing access to the development site is via the Mid Western Highway at a point approximately 100 metres west of the eastern boundary. The speed limit is 110 km/hr at this point. The proposed access for the development has been located at the south-western corner of the site where the speed limit is 50 km/hr. The proposed access is located on the inside of a large radius bend but sight lines remain adequate.

The proposed access point would accommodate a 19 metre long vehicle and require minor alterations to the fence to allow a distance of 30 metres between the gate and the northern edge line of the highway. Proposed traffic generation is estimated based on 165 semi-articulated trucks accessing the site during the establishment and construction phases with up to a maximum of 4 construction vehicles accessing the site daily during peak construction periods. The assessment also allows for up to 50 personnel accessing the site each day during the construction period by small motor vehicles.

The findings of the assessment are that the proposed traffic generation resulting from up to 50 staff accessing the site and a maximum of 4 heavy vehicles delivering machinery and materials on any day can be accommodated at the proposed new access. There are no major geometry issues and sight lines and separation distances from existing neighbouring driveways are adequate.

5.5.2 Mitigation measures

The following mitigation measures are recommended:

- An area is allocated to be used as a temporary laydown and car parking area within the property at the south-western corner,
- Heavy vehicles should arrive and depart from the site outside of the morning and afternoon peak traffic periods,
- A new culvert should be constructed beneath the proposed new entrance to divert stormwater flows, and
- Signage to be erected near the entrance to indicate that construction vehicles are accessing the site.

5.6 Noise

5.6.1 Assessment of impacts

An assessment of the impacts of noise emissions has been carried out. The purpose of the noise assessment is to quantify potential environmental noise emissions associated with the construction and operation of the project. Where impacts are identified, recommendations are made to mitigate and manage noise.

The assessment includes the following key tasks:

- review construction and operating activities to identify key noise generating plant, equipment, machinery or activities proposed to be undertaken as part of the project;
- identify the closest and/or potentially most affected receptors situated within the area of influence to the project;
- establish existing noise levels to determine project-specific construction Noise Management Levels (NMLs), and operational noise criteria;

- undertake 3D noise modelling to predict levels that may occur as a result of the construction and operation of the project at the closest and/or potentially most affected receptors;
- provide a comparison of predicted noise levels against relevant construction NMLs and operational criteria;
- assess the potential noise impacts associated with construction and operational aspects of the project; and
- provide feasible and reasonable noise mitigation and management measures, and monitoring options, where NMLs or operational criteria may be exceeded.

The assessment has been conducted in accordance with the following key policy and guidelines where relevant:

- NSW Department of Environment and Climate Change, NSW Interim Construction Noise Guideline (ICNG), 2009,
- Environment Protection Authority's (EPA's), Noise Policy for Industry (NPI), 2017,
- NSW Department of Environment, Climate Change and Water (DECCW), NSW Road Noise Policy (RNP), 2011.
- Australian Standard AS 2436–2010 (R2016) (AS 2436) – Guide to Noise and Vibration Control on Construction, Demolition and Maintenance sites,
- Australian Standard AS 1055:2018 – Description and Measurement of Environmental Noise,
- Australian Standard AS IEC 61672.1–2004 (AS 61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring, and
- Australian Standard AS IEC 60942-2004 (AS 60942) – Electroacoustics – Sound Calibrators.

A number of potential noise sensitive receptors were identified as listed in Table 5 and shown in Figure 14 below. These receptors comprise residential and commercial properties.

Table 5: Noise sensitive receptors

ID	Description/address	Coordinates (MGA55)	
		Easting	Northing
R1	Rural Receiver Mid Western Highway	303796	6180333
R2	Suburban Receiver Murray Street & Bourke Street	303284	6180070
R3	Suburban Receiver Bourke St	303262	6179936
R4	Suburban Receiver Murray Street & Stephen Street	303065	6180094
R5	Suburban Receiver Mid Western Highway (House)	302984	6180214
R6	Rural Receiver Sidonia Road	303235	6180817
R7	Rural Receiver Sidonia Road	303324	6180982
R8	Rural Receiver Sidonia Road	303605	6181131
R9	Rural Receiver Piper Street	303833	6181210
R10	Rural Receiver Between Piper Street & Mid Western Highway	304319	6181165

ID	Description/address	Coordinates (MGA55)	
		Easting	Northing
C1	Commercial Receiver Bourke Street	303300	6180165
C2	Commercial Receiver Bourke Street	303380	6180147
H1	Hay Hospital	302814	6180249

Figure 14: Location of noise sensitive receptors

Construction and operational noise levels were predicted to each assessed receptor assuming receiver heights of 1.5m above ground level for typical construction activities and allowing for road traffic noise.

The findings of the assessment are that construction noise levels have the potential to exceed relevant construction NMLs at some receptor locations depending on their proximity to construction activities and that operational noise levels satisfy the criteria for assessed receptors.

The affected receptors are R1 Rural Receiver on the Mid Western Highway, R5 Suburban Receiver on the Mid Western Highway, and R6, R7, R8 and R9 which are rural receivers on Sidonia Road and Piper Street.

Recommendations have been provided to minimise the potential noise impacts from construction, albeit of a temporary nature during the daytime construction period.

5.6.2 Mitigation measures

The following mitigation measures are recommended to address noise emissions during the construction phase:

- a construction noise management protocol to minimise noise emissions, manage out of hours (minor) works to be inaudible, and to respond to potential concerns from the community,
- where possible use localised mobile screens or construction hoarding around plant to act as barriers between construction works and receivers, particularly where equipment is near the site boundary and/or a residential receiver including areas in constant or regular use (e.g. unloading and laydown areas),
- operating plant in a conservative manner (no over-revving), shutdown when not in use, and be parked/started at farthest point from relevant assessment locations,
- selection of the quietest suitable machinery available for each activity,
- avoidance of noisy plant/machinery working simultaneously where practicable,
- minimise impact noise wherever possible,
- utilise a broadband reverse alarm in lieu of the traditional high frequency type reverse alarm,
- provide toolbox meetings, training and education to drivers and contractors visiting the site during construction so they are aware of the location of noise sensitive receivers and to be cognisant of any noise generating activities,
- signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site, and
- utilise project related community consultation forums to notify residences within close proximity of the site with project progress, proposed/upcoming potentially noise generating works, its duration and nature and complaint procedure.

It is recommended that noise emissions from the solar farm be minimised when operational. To assist in noise management, it is recommended that a one-off noise validation monitoring assessment be completed to quantify emissions from the site and to confirm that relevant criteria are satisfied.

5.7 Air quality

5.7.1 Assessment of impacts

The Office of Environment and Heritage maintain an air quality monitoring station in Hay at the Bureau of Meteorology airport site. The instruments used at most rural network sites are low cost indicative particulate monitors that respond to all aerosols including smoke and fog.

Total Suspended Particles (TSP) are measured at this station. Data is collected in 15 minute intervals and reported hourly on the OEH website. Total suspended particulates are solid particles and liquid droplets

100 micrometres or less in diameter. They come from natural and human-made sources, such as pollen, bushfires and motor vehicle emissions. Dust emissions are also a source of air pollution in the hot, dry climate of Hay and can cause poor air quality.

Particles are measured as PM_{10} and $PM_{2.5}$. PM_{10} are particles less than 10 micrometres in diameter. Sources include crushing or grinding operations and dust stirred up by vehicles on roads. Particles less than 10 micrometres in diameter are measured as an hourly average reading of 7 at Hay in the morning on Wednesday 6 February 2019. $PM_{2.5}$ are fine particles less than 2.5 micrometres in diameter. Sources include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes. Particles less than 2.5 micrometres in diameter are measured as an hourly average reading of 9 at Hay in the morning on Wednesday 6 February 2019. Total suspended particles have an average hourly reading of 10 on 6 February 2019. This is a comparatively moderate to high reading indicative of the hot, dry climate of Hay.

Activities that disturb the earth's surface and that is carried out with the use of machinery have the potential to generate dust emissions. This may be exacerbated by wind exposure to an exposed ground surface.

The previous use of the land for farming may have involved regular tilling, sowing and harvesting that may create dust and impact on air quality. The current condition of the land is poor due to the loss of vegetation leading to exposed soil surfaces. The construction of the solar farm will not involve extensive earthworks and only excavation for footings for the array framework and ancillary structures will be carried out. Along with the delivery of materials using heavy vehicles, these construction works may generate dust, however, once operational the change of use of the land from agricultural to solar photovoltaic electricity generation is expected to reduce particulate emissions and lead to an improvement in local air quality. Vehicle movements would be restricted to internal access roads and the majority of the site would be revegetated with pasture grasses.

5.7.2 Mitigation measures

To minimize dust generation during the construction and operational phases the following mitigation measures are proposed:

During construction:

- Limit vehicle movements to areas necessary to deliver panels, ancillary structures and equipment
- Suppress dust emissions using watering and cease works during dry and windy conditions
- Ensure ground disturbance is limited to areas necessary to place footings or to be used for access
- Ensure minimal handling of excavated materials
- Ensure stockpiles of excavated material is bunded and protected from wind and vehicle movements

During operation:

- Grade and add road base to internal accessways
- Revegetate the site with suitable endemic native groundcover immediately construction works are completed
- Ensure all plant and equipment operates in accordance with specifications

5.8 Waste management

5.8.1 Waste materials and management

A desktop assessment of the waste generated during construction and operation of the solar farm has been carried out to determine the appropriate means of waste disposal and recycling. The assessment takes into account the requirements of relevant legislation and policy including the Protection of the Environment Operations (POEO) Act 1997, POEO (Waste) Regulation 2014 and the Waste Avoidance and Resource Recovery Act 2001.

The largest amount of waste will be generated during the construction phase. Wastes would include wooden pallets, cardboard and plastics. Construction of a solar farm would not generate any putrescible waste products. Minimal waste would be generated when the farm is operational other than small amounts of replacement parts and packaging required for maintenance and repair works.

It is expected that the solar farm will be operational for at least 20 to 25 years. Upon decommissioning all infrastructure, panels and mounting frames including footings and inverters would be disassembled and removed from the site. There are currently limited opportunities to recycle the components of solar panels, however, it is anticipated that the waste recycling industry will expand and develop new technologies and uses for those components by the time decommissioning occurs.

Estimates of waste materials and proposed management arrangements for each phase of the development project are provided in Table 6 below.

The proposed waste management measures support Hay Shire Council initiatives to encourage all residents to consider how to minimise waste and reduce the impact on the environment by maintaining the philosophy to minimising waste as *'Reduce, Re-Use, Recycle'.*

Council's waste management facility comprises general landfill and green waste, a waste transfer station and a community recycling centre located in Thelangerin Road, Hay. The community recycling centre supports recycling of domestic paint, motor oils, batteries and fluorescent lights.
There is also a facility to drop off recycling waste at Dunera Way in northwest Hay. Firms based in neighbouring regional centres such as Deniliquin, Griffith and Echuca collect scrap metal for re-use.

Table 6: Estimated waste materials and waste management arrangements

Phase	Waste material	Proposed management
Construction	• Packaging waste such as cardboard, wood pallets, plastic wrap, scrap metal, general waste including approximately 830 wooden pallets and carboard packing boxes • Concrete waste during setting of footings and mounts • Electric cable waste and cable reels • Plastic pipe offcuts/scrap • Empty drums and containers (minimal quantities) • Lubricating oil and filters • Unused chemicals	Waste products will be sorted and stored separately in skip bins located in the materials laydown area in accordance with EPA Waste Classification Guidelines. This will facilitate disposal through appropriate waste streams as follows: Recycling: • Steel and scrap metal (recycled) • Timber/cardboard (recycled) • Recyclable plastics • Recyclable fluids Landfill: • General wastes, oils, chemcials and plastic (other than where recyclable) All recycling would be taken to the Waste Transfer Station and the Community Recycling Centre located on Thelangerin Road, Hay. All non-recyclable materials would be taken to the waste Depot at Thelangerin Road, Hay.
Operational	Maintenance and repair waste, e.g. Electric cable waste and cable reels, plastic pipe offcuts, lubricating oils and filters	These waste products would be sorted on site into recyclable and general waste streams and taken to the Waste Management Facility in Thelangerin Road, Hay.
Decommissioning	• PV panels (16,920 panels) and supporting poles and mounts • Glass for panels (260 tonnes) • Silicon for wafers (40 tonnes) • Inverters / transformers / batteries • PV boxes, skids, scrap metal (830 tonnes) • Electrical cables • Fencing • Storage containers (two 40-foot containers)	The solar farm infrastructure would be dismantled into separate waste products such as metals, glass, plastics and concrete. All products would be sorted on site into recyclable and general waste streams in accordance with the EPA Waste Classification Guidelines and taken to the Waste Management Facility in Thelangerin Road, Hay or to an alternative specialised recycling facility.

It is recommended that a waste management plan be prepared following approval to specify precise volumes of each waste material, classify that waste material and identify appropriate management procedures including means of transport and the destination. Hay Shire Council is part of the RAMROC Riverina Waste Group which adheres to national and international hierarchy of waste management to avoid/reduce, reuse, recycle, recover, treat and dispose of waste products. Waste management of the Hay 1A Solar Farm should be predicated on these standards by seeking to avoid or reduce waste materials where possible, and to re-use, recycle and recover the majority of waste materials generated during each of the construction, operational and decommissioning phases.

5.8.2 Mitigation measures

It is recommended that a waste management plan be developed to provide detailed procedures to manage the waste stream. The plan should contain:

- Strategies to reduce waste during all project phases,
- Recycling, re-use and recovery strategies and opportunities,
- Classification of all waste streams,
- Tracking register and details,
- On site recycling management,
- Allocation of responsibilities for recycling, re-use and disposal,
- Reporting and notification procedures if a waste incident occur.

If vegetation clearance is required during preparation of the site prior to and/or during the construction phase, that vegetation should be re-used for mulch and on-site soil erosion control where possible.

5.9 The community and economy

5.9.1 Change of use of agricultural land

The solar PV system is designed to generate in excess of 10 GWh of energy annually with the system offsetting almost 8.5 thousand tonnes of CO^2 equivalent emissions (Sources: *National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Schedule 1)* and Department of the Environment and Energy) and providing enough energy to power about 1,400 NSW homes.

Although power will be transmitted to the grid, the benefit to the community will be through an understanding of sustainable development and by gaining a commitment to greater reliance on renewable energy.

Similarly, the clustering of solar power generation would bring regional economic development benefits as the Riverina area gains a reputation as a suitable location for renewable energy and linked industries.

The loss of agricultural land, in this case land that is disused and has not been used for farming for many years, would be offset by the contribution that the solar farm will make to the local economy through direct and indirect employment and expenditure over the short term and through the benefits that renewable energy power supply will bring to the nation.

5.9.2 Employment

It is anticipated that there will be 50 personnel directly involved in construction on site which is expected to take approximately three to six months. Varying levels of expertise will be required ranging from labourers to qualified electricians and project managers.

In addition, personnel would be involved in transport and delivery of materials to the site. Some of this employment is to be sourced locally. This will bring direct economic benefits to the local economy through wages and salaries and indirect benefits through the need for accommodation and sustenance in the area for non-local employees.

Once operational the site will be unmanned, however, two to three personnel will be necessary to carry out maintenance every quarter or as required.

The skills required to be involved in the construction and ongoing maintenance of Hay Solar Farm may require some personnel to undergo further training and education, leading to an upskilling of the local workforce and enhanced employment opportunities generally.

5.10 Heritage

5.10.1 Indigenous heritage

The following information concerning the history of Aboriginal community in the Riverina bioregion has been sourced directly from the Office of Environment and Heritage www.environment.nsw.gov.au.

Aboriginal people have been present in the Murray-Darling Basin for at least 40,000 years. The Riverina Bioregion was the original homeland for many large Aboriginal communities that lived on the Hay Plain and around the rivers. This included the Wiradjuri people that inhabited a vast area straddling the Murrumbidgee River including the Hay area. Relics of Aboriginal presence are common along the river systems, including scar trees used to cut bark for canoes, human burial sites, camping sites and middens.

The generic due diligence process outlined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* was implemented to ensure that an adequate due diligence process that addresses Aboriginal cultural heritage issues has been carried out. This process follows the following five steps:

1. Will the activity disturb the ground surface?

Minor excavation for footings for the panel frames and inverters will be carried out.

2a. Search the AHIMS database

In accordance with the code, an on-line search was carried out of the *Aboriginal Heritage Information Management Service (AHIMS)* that is maintained by the Office of Environment and Heritage. The search is part of the due diligence process and remains valid for 12 months. The search results are appended as Attachment C.

A search of Lot 110 DP 1187931 was performed on 6 February 2019. The search results are:

- There are no Aboriginal sites recorded in or near the selected location, and
- There are no Aboriginal places that have been declared in or near the selected location.

It is noted that surveys for Aboriginal objects have not been carried out in all parts of NSW and Aboriginal objects may exist on a parcel of land even though they have not been recorded in *AHIMS*.
Further, not all known Aboriginal sites are registered on the *AHIMS* database and not all sites consist of physical evidence or remains, e.g. dreaming and ceremonial sites.

2b. Activities in areas where landscape features indicate the presence of Aboriginal objects

The site does not possess landscape features that indicate the presence of Aboriginal objects.

3. Can you avoid harm to the object or disturbance of the landscape features

Not applicable as the site has been disturbed and farmed, does not possess significant landscape features and no known Aboriginal objects are listed in *AHIMS*.

4. Desktop assessment and visual inspection

Not applicable as the site has been disturbed and no known Aboriginal objects are listed in *AHIMS*.

5. Further investigations and impact assessment

An extensive search of *AHIMS* records, is not necessary given that there are no recorded sites or places at Lot 110 DP 1187931 Mid Western Highway, Hay. However, contact has been made with a representative of Hay Local Aboriginal Lands Council who advised that there may be relics such as artifacts in the area

and it would be appropriate for a representative of the LALC to be on site during works that require ground disturbance. Hay Shire Council may recommend a condition to this effect.

Council may also impose a condition of consent to comply with provisions of the *National Parks and Wildlife Act 1974* should any evidence of Aboriginal occupation be found during site works. An *Aboriginal Heritage Impact Permit* may be required to be obtained if indigenous heritage objects are found.

5.10.2 Non-indigenous heritage

The following information about the European settlement of the Hay are has been sourced from the Hay Historical Society website http://users.tpg.com.au/hayhist/.

Hay is located in the western Riverina region of New South Wales. The township began as a crossing-place on the Murrumbidgee River, for stock being driven south to markets in Victoria during the gold-rushes of the 1850s. The site was eventually surveyed in 1859 and Hay quickly developed as an important hub for the surrounding pastoral holdings, with their fat-stock and wool production.

During its earliest days Hay's economy was linked to the navigation by steam-boats of the Murrumbidgee, and it became an important port. The town and district was also extensively serviced by horse- and bullock-driven wagons. In 1882 the railway was extended to Hay, linking the town directly with regions to the east, including Sydney.

There are 19 heritage properties in Hay that are listed in *Schedule 5 Environmental heritage* of *Hay LEP 2011*. These are given in Table 7 below.
All of these properties have been assessed to be of local heritage significance other than the former Hay gaol, the post office and the Hay railway station and yard group which are of state significance.

Table 7: Extract from Schedule 5 Environmental heritage of Hay LEP 2011

Property	Address
Lake Merrimajeel	As defined on the LEP Heritage Map
Murrumbisdgil Swamp	As defined on the LEP Heritage Map
St Andrew's Presbyterian Church	Bank Street
Former Sewer Treatment Works	Brunker Street
Former Hay Gaol	355 Church Street
John Witcombe Memorial Drinking Fountain	Cnr Lachlan and Moppett Streets,
Westpac Bank	112 Lachlan Street
Post Office	120 Lachlan Street
Lands Board Office	126 Lachlan Street
Hay Shire Council Chambers	134 Lachlan Street
Commercial Hotel	195–199 Lachlan Street
Gatekeepers' Cottages	262–264 Lachlan Street

Property	Address
Sturt's Marked Tree	Mid Western Highway Road Reserve
Hay Courthouse	416–420 Moppett Street
St Fergal's Roman Catholic Presbytery	429 Moppett Street
Hay Railway Station and yard group including Hay Railway Station, Station Master's House, Water Tower and Railway Porters' Cottages	Narrandera– Hay Railway
Presentation Convent	Cnr Pine and Orson Streets
St Paul's Pro-Cathedral	185 Pine Street
Former Terminus Hotel	260 Pine Street

Lot 110 DP 1187931 is not listed as an item of environmental heritage in *Schedule 5 Environmental heritage* of *Hay LEP 2011* and there are no listed heritage items in the vicinity of the site. The closest item to the site, the former goal, is located within the urban area of Hay which is some 600 metres to the south-west at the nearest point to the site.

5.10.3 Mitigation measures

In relation to indigenous heritage, further consultation should be carried out with the Hay Local Aboriginal Lands Council prior to commencing site works and construction to determine whether it is necessary for members of the local indigenous community to be present on site during ground-disturbing works.

No mitigation measures are necessary in relation to non-indigenous heritage.

5.11 Electromagnetic radiation

5.11.1 Potential radiation sources

The information presented in this section has been sourced from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). It includes a description of the type of electromagnetic radiation that may be produced by the generation and distribution of electricity.

The generation, distribution and use of electricity can produce extremely low frequency (ELF) electric and magnetic fields (EMF) from electrically charged particles. The electric field is produced by the voltage whereas the magnetic field is produced by the current. The strength of the electric field is measured in units of volts per metre whilst the strength of the magnetic field is expressed in units of tesla (T), microtesla (μT), gauss (G) or milligauss (mG).

ELF EMF is produced by both natural and artificial sources. Naturally occurring ELF EMF is associated with atmospheric processes such as ionospheric currents, thunderstorms and lightning. Artificial sources are

the dominant sources of ELF EMF and are usually associated with the generation, distribution and use of electricity at the frequency of 50 or 60 Hz. The widespread use of electricity means that people are exposed to ELF electric and magnetic fields in the home, in the environment and in the workplace.

According to the Australian Radiation Protection and Nuclear Safety Agency, which maintains continual oversight of emerging research into the potential health effects of the EMF exposure, there is no established evidence of health effects from exposure to electric and magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of the proximity, causes any health effects.

5.11.2 Mitigation measures

The location of the solar farm and the distance separation between nearby dwellings and the site mean that any impacts on health are mitigated. No additional mitigation measures are proposed.

5.12 Glare and glint

5.12.1 Potential glare and glint

Glare is defined as a continuous source of excessive brightness relative to ambient lighting. Glint is defined as a momentary flash of bright light. Solar photovoltaic (PV) panels are constructed of dark, light-absorbing material and covered with anti-reflective coating. In order to maximise the efficiency, the panels are designed to limit reflection and to absorb around 98% of the light received. The glare generated from solar panels is significantly lower than many other surfaces, including water, however, the glass panels and metal frames have the potential to generate glare and glint. An assessment of the potential glare and glint generated by the proposed solar farm is necessary to ensure visual receptors such as road users, air traffic control towers and pilots are not impacted by the development of solar farms.

In a fixed PV solar array, the angle of incidence varies as the sun moves across the sky, that is, the angle of incidence is at its lowest around noon where the sun is directly overhead and increases in the early mornings and late evenings as the incidence angles increase. The variation of the angle is reduced where the PV array is mounted on a single axis tracking system whereby the panels rotate to remain perpendicular to the sun as proposed in the Hay 1A Solar Farm. Therefore, an array mounted on a tracking system has less potential to cause glare whilst it tracks the sun.

A desktop assessment has been carried out using the Solar Glare Hazard Analysis Tool. The results of the glare analysis are appended as Attachment D. The assessment is based on identifying the potential sensitive receptors and then assessing the potential glare and glint hazard and impacts on those receptors using the tool. Glare resulting from PV solar farms is analysed at different viewpoints based on the location, orientation and specifications of the solar panels. Mitigation measure are recommended to reduce potential impacts to an acceptable level. This tool is used by the United States Federal Aviation Administration for

glare hazard analysis near airports and is also recognised by the Australian Government Civil Aviation Safety Authority (CASA).

The analysis estimates green glare and yellow glare received at each identified potential receptor. Green glare is glare with low potential to cause an after-image when observed prior to typical blink response time, and yellow glare has a higher potential to cause an after-image when observed prior to a typical blink response time. The analysis is on a minute-by-minute basis because sun reflections from solar panels are likely to last at least one minute. Glint is a short-term flash which lasts for less than a minute is therefore unlikely to occur from the sun, due to the pace at which the sun and panels move. Glint is not considered to be a factor affecting motorists or pilots and is not considered further in this assessment.

The heights of the observation points were assumed to be 1.5 m for a motorist and 1.65 m for a standing person. Existing vegetation or structures can affect visual connectivity with solar panels. Similarly, atmospheric conditions such as cloud cover can influence light reflection and the resulting impact on visual receptors. Varying atmospheric conditions have not been accounted for in the analysis and there are no structures or vegetation either in the road reserve adjoining Lot 110 or on the site itself that would impede visual connectivity.

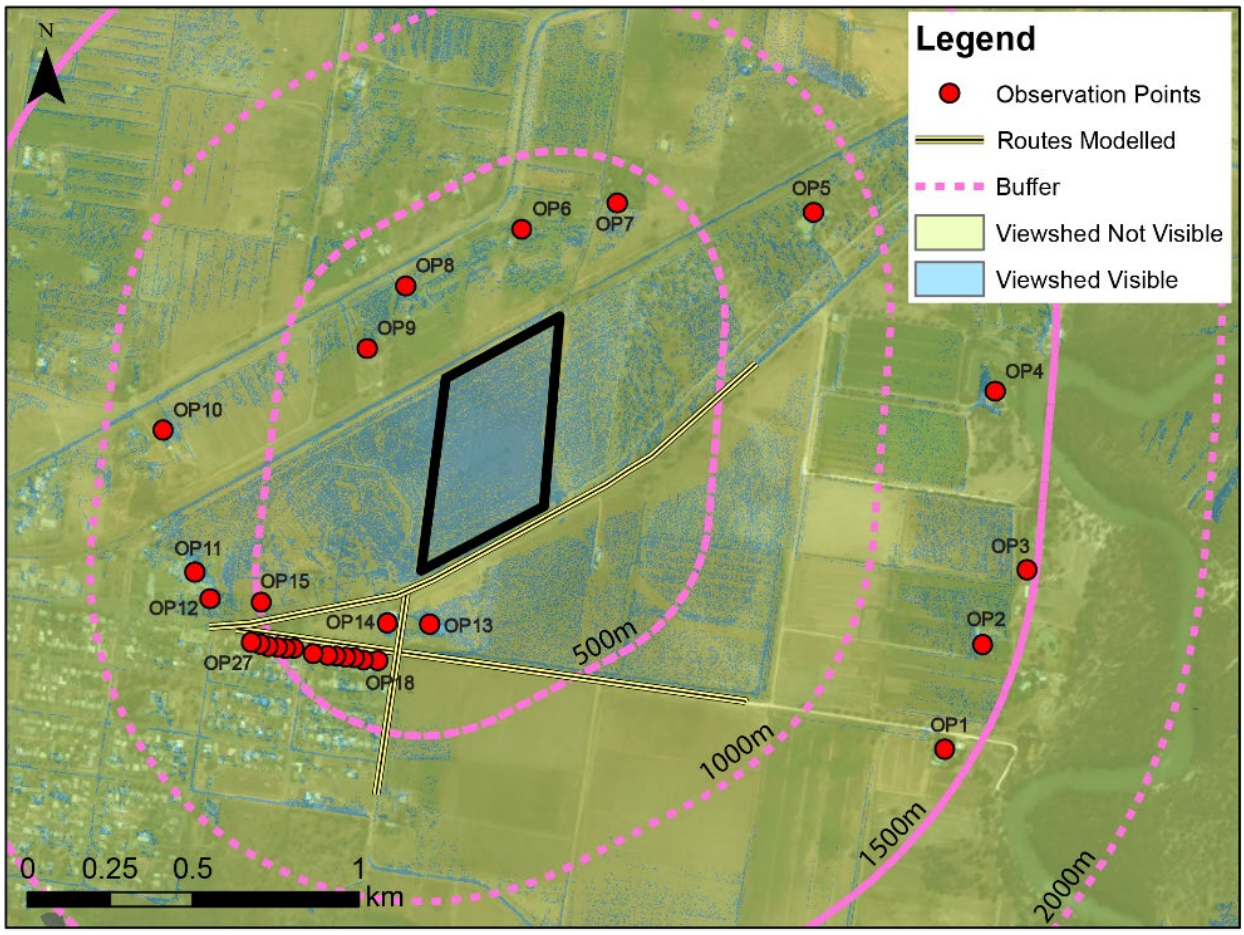


Figure 15: Viewshed and observation points

Potential sensitive receptors, called observation points, are shown in Figure 15 above. Three road observation routes and 28 residential/commercial observation points were identified as potential visual receptors. These were identified as follows:

- Considering the elevation of the site relative to surrounding land to determine land potentially affected. The blue shaded area in Figure 15 indicates areas of possible visual impact,
- Including residential and commercial properties and public roads within a 2 km radius of the site. Properties located at greater distances are unlikely to be affected, and
- Excluding properties where existing structures will act as visual barriers, for example, to the south-west of the site.

Hay Airport, which is located approximately 4 kilometres south-west of the site, is not considered a potential visual receptor of the site due to relative elevation and distance.

The results of the Solar Glare Hazard Analysis Tool for the Hay Solar Farm are detailed in Table 8.

Table 8: Solar Glare Hazard Analysis Tool specification inputs

Observation point (property)	Type or property	Location relative to solar farm	Green glare	Yellow glare	Results
Route 1	Mid Western Highway	Southern boundary	0	0	No glare
Route 2	Bourke Street	180m south	0	0	No glare
Route 3	Murray Street	Perpendicular Mid Western Hwy	0	0	No glare
OP1	Residence	1200m south-east	0	0	No glare
OP2	Residence	1310m south-east	0	0	No glare
OP3	Residence	1258m east	0	0	No glare
OP4	Residence	1172m east	0	0	No glare
OP5	Residence	720m north-east	0	0	No glare
OP6	Residence	952m east	0	0	No glare
OP7	Residence	671m north	0	0	No glare
OP8	Residence	775m north	0	0	No glare
OP9	Residence	609m north	0	0	No glare
OP10	Residence	550m north	0	0	No glare
OP11	Residence	931m west	0	0	No glare
OP12	Hay Hospital	580m west	0	0	No glare
OP13	Commercial	555m west	0	0	No glare
OP14	Commercial	250m south	0	0	No glare
OP15	Commercial	250m south	0	0	No glare

Observation point (property)	Type or property	Location relative to solar farm	Green glare	Yellow glare	Results
OP16	Residence	267m south-west	0	0	No glare
OP17	Residence	286m south-west	0	0	No glare
OP18	Residence	306m south	0	0	No glare
OP19	Residence	325m south-west	0	0	No glare
OP20	Residence	345m south-west	0	0	No glare
OP21	Residence	364m south-west	0	0	No glare
OP22	Residence	383m south-west	0	0	No glare
OP23	Residence	403m south-west	0	0	No glare
OP24	Residence	422m south-west	0	0	No glare
OP25	Residence	441m south-west	0	0	No glare
OP26	Residence	461m south-west	0	0	No glare
OP27	Residence	480m south-west	0	0	No glare
OP28	Residence	500m south-west	0	0	No glare

The results of the analysis indicate that persons occupying the selected properties are unlikely to be affected by either green or yellow glare as a result of the proposed solar farm. Motorists using the Mid Western Highway are unlikely to be affected by glare as the property is located to the north of the highway and the panels will track the sun over the day from east to west.

5.12.2 Mitigation measures

No mitigation measures are considered necessary.

6. CONCLUSION

The site is considered suitable for the proposed development of the Hay 1A Solar Farm. It is located adjacent a 33kV sub-station enabling efficient connections to transfer power generated by the solar PV panels to the grid.

The site is flat, is free of constraints and, owing to its location on a classified road, is accessible to large delivery vehicles during the construction phase and utility vehicles for ongoing maintenance.

According to the Australian Radiation Protection and Nuclear Safety Agency, which maintains continual oversight of emerging research into the potential health effects of the EMF exposure, there is no established evidence of health effects from exposure to electric and magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of the proximity, causes any health effects. The location of the solar farm and the distance separation between nearby dwellings and the site mean that any impacts on health are mitigated.

The likely impacts of the development have been considered in this Statement and supporting documents. Considerations include impacts on biodiversity, natural hazards, visual and scenic amenity, glare and glint, traffic, noise, air quality, waste management, water resources, indigenous and non-indigenous heritage, the community and the local economy. Any impacts on these interests have been found to be acceptable and mitigation measures have been recommended where necessary.

Below is a summary of mitigation measures. It is recommended that a environmental management plan be prepared to cover the construction and operational phases. Where necessary Table 9 includes a recommendation as to whether the mitigation measure should be included in the management plan.

Table 9: Summary of mitigation measures

Consideration	Mitigation measures	Environmental Management Plan
Biodiversity	Land to the east and south of the subject site mapped as Natural Resources – Biodiversity in *Hay LEP 2011*. A minimum setback of the solar farm in excess of 80 metres, ranging up to approximately 180 metres, to the boundary of adjoining land to the east is proposed. To avoid interference with the vegetation community located on the adjoining land it is recommended that any vegetation planted to screen the development and any grasses planted to bind the soil following construction of the solar farm be native species endemic to the area. Access to the site is to be limited to that point shown on development	Yes, with reference to ongoing site access during both construction and operational phases

	plans and within the development area. Storage of materials is to be carried out wholly within the development area.	
Natural hazards	None recommended	n/a
Water resources	• Consultation with local emergency management agencies be carried out as part of the project management plan to ensure notification of regional weather or climatic events that may affect site access • Minimise erosion and sedimentation form construction activities by undertaking works in accordance with the NSW Government publication *Managing Urban Stormwater: Soils and Construction* • Implement measures relating to site drainage and water quality controls for the design and construction phases, and stormwater point and source controls	Yes, for construction and operational phases. Include an erosion & sediment control plan or soil and water management plan
Visual & scenic amenity	No mitigation measures are proposed.	n/a
Traffic	• An area is allocated to be used as a temporary laydown and car parking area within the property at the south-western corner, • Heavy vehicles should arrive and depart from the site outside of the morning and afternoon peak traffic periods, • A new culvert should be constructed beneath the proposed new entrance to divert stormwater flows, and • Signage to be erected near the entrance to indicate that construction vehicles are accessing the site.	Yes, with reference to site access during the establishment and construction phases
Noise	The following mitigation measures are recommended to address noise emissions during the construction phase: • a construction noise management protocol to minimise noise emissions, manage out of hours (minor) works to be inaudible, and to respond to potential concerns from the community, • where possible use localised mobile screens or construction hoarding around plant to act as barriers between construction works and receivers, particularly where equipment is near the site boundary and/or a residential receiver including areas in constant or regular use (e.g. unloading and laydown areas), • operating plant in a conservative manner (no over-revving), shutdown when not in use, and be parked/started at farthest point from relevant assessment locations, • selection of the quietest suitable machinery available for each activity,	Yes, for construction and operational phases

	• avoidance of noisy plant/machinery working simultaneously where practicable, • minimise impact noise wherever possible, • utilise a broadband reverse alarm in lieu of the traditional high frequency type reverse alarm, • provide toolbox meetings, training and education to drivers and contractors visiting the site during construction so they are aware of the location of noise sensitive receivers and to be cognisant of any noise generating activities, • signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site, and • utilise project related community consultation forums to notify residences within close proximity of the site with project progress, proposed/upcoming potentially noise generating works, its duration and nature and complaint procedure. It is recommended that the noise emissions from the solar farm be minimised when operational. To assist in noise management, it is recommended that a one-off noise validation monitoring assessment be completed to quantify emissions from site and to confirm emissions relevant criteria are satisfied.	
Air quality	During construction: • Limit vehicle movements to areas necessary to deliver panels, ancillary structures and equipment • Suppress dust emissions using watering and cease works during dry and windy conditions • Ensure ground disturbance is limited to areas necessary to place footings or to be used for access • Ensure minimal handling of excavated materials • Ensure stockpiles of excavated material is bunded and protected from wind and vehicle movements During operation: • Grade and add road base to internal accessways • Revegetate the site with suitable groundcover immediately construction works are completed • Ensure all plant and equipment operates in accordance with specifications	Yes, for construction and operational phases

Waste management	It is recommended that a waste management plan be developed to provide detailed procedures to manage the waste stream. The plan should contain: • Strategies to reduce waste during all project phases, • Recycling, re-use and recovery strategies and opportunities, • Classification of all waste streams, • Tracking register and details, • On site recycling management, • Allocation of responsibilities for recycling, re-use and disposal, • Reporting and notification procedures if a waste incident occur. If vegetation clearance is required during preparation of the site prior to and/or during the construction phase, that vegetation should be re-used for mulch and on-site soil erosion control where possible.	Yes, for construction phase
The community & local economy	No mitigation measures are proposed.	n/a
Heritage	Consult with the Hay Local Aboriginal Lands Council prior to commencing site works and construction to determine whether it is necessary for members of the local indigenous community to be present on site during ground-disturbing works.	Yes, for construction phase
Electromagnetic radiation	No mitigation measures are proposed.	n/a
Glare and glint	No mitigation measures are proposed.	n/a

The proposed development of the Hay 1A Solar Farm is permissible under provisions of *SEPP (Infrastructure) 2007* and would assist to generate electricity and at the same time contribute to reducing greenhouse gas emissions and achieving the national targets.

The system is designed to generate in excess of 10 GWh of energy annually with the system offsetting almost 8.5 thousand tonnes of CO^2 equivalent emissions (Sources: *National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Schedule 1)* and Department of the Environment and Energy) and providing enough energy to power about 1,400 NSW homes.

Any potential impacts of the development may be avoided, minimized or mitigated. The development is considered to be in the public interest.

ATTACHMENT A - BIONET ATLAS SEARCH RESULTS

Data from the BioNet BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Entities in HAY LGA returned a total of 44,032 records of 1,286 species.
Report generated on 11/02/2019 4:05 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Actinopterygii	Cyprinidae	T1000	*Carassius auratus*	*	Goldfish			124	
Animalia	Actinopterygii	Cyprinidae	T044	*Cyprinus carpio*	*	Carp			111	
Animalia	Actinopterygii	Percichthyidae	T217	*Maccullochella peelii*		Murray Cod			1	
Animalia	Actinopterygii	Percichthyidae	T310	*Macquaria ambigua*		Golden Perch			3	
Animalia	Actinopterygii	Eleotridae	T1001	*Hypseleotris klunzingeri*	*	Western Carp Gudgeon			274	
Animalia	Malacostraca	Parastacidae	T904	*Cherax destructor*		Dam Yabby			22	
Animalia	Actinopterygii	Poeciliidae	T013	*Gambusia holbrooki*	*	Mosquito Fish			43	
Animalia	Actinopterygii	Retropinnidae	T051	*Retropinna semoni*		Australian Smelt			27	
Animalia	Amphibia	Myobatrachidae	3131	*Crinia parinsignifera*		Eastern Sign-bearing Froglet	P		59	
Animalia	Amphibia	Myobatrachidae	3135	*Crinia sloanei*		Sloane's Froglet	V,P		K	
Animalia	Amphibia	Myobatrachidae	3058	*Limnodynastes dumerilii*		Eastern Banjo Frog	P		3	
Animalia	Amphibia	Myobatrachidae	3059	*Limnodynastes fletcheri*		Long-thumbed Frog	P		63	
Animalia	Amphibia	Myobatrachidae	3060	*Limnodynastes interioris*		Giant Banjo Frog	P		26	
Animalia	Amphibia	Myobatrachidae	9048	*Limnodynastes sp.*		unidentified Limnodynastes	P		24	
Animalia	Amphibia	Myobatrachidae	3063	*Limnodynastes tasmaniensis*		Spotted Grass Frog	P		142	
Animalia	Amphibia	Myobatrachidae	3086	*Neobatrachus sudelli*		Sudell's Frog	P		2	
Animalia	Amphibia	Myobatrachidae	3098	*Notaden bennettii*		Crucifix Frog	P		1	
Animalia	Amphibia	Hylidae	3025	*Cyclorana platycephala*		Water-holding Frog	P		1	
Animalia	Amphibia	Hylidae	3204	*Litoria peronii*		Peron's Tree Frog	P		89	
Animalia	Amphibia	Hylidae	3207	*Litoria raniformis*		Southern Bell Frog	E1,P	V	289	
Animalia	Reptilia	Chelidae	5259	*Chelodina expansa*		Broad-shelled Turtle	P		1	
Animalia	Reptilia	Chelidae	2017	*Chelodina longicollis*		Eastern Snake-necked Turtle	P		3	
Animalia	Reptilia	Chelidae	2034	*Emydura macquarii*		Macquarie Turtle	P		1	
Animalia	Reptilia	Gekkonidae	2126	*Christinus marmoratus*		Marbled Gecko	P		2	
Animalia	Reptilia	Gekkonidae	2076	*Diplodactylus tessellatus*		Tessellated Gecko	P		57	
Animalia	Reptilia	Gekkonidae	2052	*Lucasium byrnei*		Gibber Gecko	P		14	
Animalia	Reptilia	Gekkonidae	2059	*Strophurus intermedius*		Southern Spiny-tailed Gecko	P		21	
Animalia	Reptilia	Gekkonidae	2138	*Underwoodisaurus milii*		Thick-tailed Gecko	P		8	
Animalia	Reptilia	Pygopodidae	2160	*Delma inornata*		Patternless Delma	P		1	
Animalia	Reptilia	Pygopodidae	2175	*Pygopus nigriceps*		Western Hooded Scaly-foot	P		3	
Animalia	Reptilia	Pygopodidae	2911	*Pygopus schraderi*		Eastern Hooded Scaly-foot	P		1	
Animalia	Reptilia	Scincidae	5156	*Cryptoblepharus australis*		Inland Snake-eyed Skink	P		12	
Animalia	Reptilia	Scincidae	T222	*Cryptoblepharus pannosus*		Ragged Snake-eyed Skink	P		41	
Animalia	Reptilia	Scincidae	2389	*Ctenotus uber*		Spotted Ctenotus	P		8	
Animalia	Reptilia	Scincidae	5154	*Lerista muelleri*		Wood Mulch-slider	P		2	
Animalia	Reptilia	Scincidae	2519	*Menetia greyii*		Common Dwarf Skink	P		10	
Animalia	Reptilia	Scincidae	2525	*Morethia adelaidensis*		Saltbush Morethia Skink	P		8	
Animalia	Reptilia	Scincidae	2526	*Morethia boulengeri*		South-eastern Morethia Skink	P		130	

Animalia	Reptilia	Scincidae	2579	*Tiliqua occipitalis*	Western Blue-tongued Lizard	V,P		P	
Animalia	Reptilia	Scincidae	2583	*Tiliqua rugosa*	Shingle-back	P		48	
Animalia	Reptilia	Scincidae	2580	*Tiliqua scincoides*	Eastern Blue-tongue	P		10	
Animalia	Reptilia	Agamidae	2177	*Pogona barbata*	Bearded Dragon	P		21	
Animalia	Reptilia	Agamidae	2204	*Pogona vitticeps*	Central Bearded Dragon	P		1	
Animalia	Reptilia	Agamidae	2257	*Tympanocryptis tetraporophora*	Eyrean Earless Dragon	P		1	
Animalia	Reptilia	Varanidae	2271	*Varanus gouldii*	Gould's Goanna	P		8	
Animalia	Reptilia	Varanidae	9056	*Varanus sp.*	Unidentified Goanna	P		1	
Animalia	Reptilia	Varanidae	2283	*Varanus varius*	Lace Monitor	P		10	
Animalia	Reptilia	Typhlopidae	2588	*Anilios bituberculatus*	Prong-snouted Blind Snake	P		3	
Animalia	Reptilia	Elapidae	2655	*Demansia psammophis*	Yellow-faced Whip Snake	P		1	
Animalia	Reptilia	Elapidae	2667	*Echiopsis curta*	Bardick	E1,P		P	
Animalia	Reptilia	Elapidae	2669	*Furina diadema*	Red-naped Snake	P		1	
Animalia	Reptilia	Elapidae	2681	*Notechis scutatus*	Tiger Snake	P		14	
Animalia	Reptilia	Elapidae	2693	*Pseudechis porphyriacus*	Red-bellied Black Snake	P		5	
Animalia	Reptilia	Elapidae	5229	*Pseudonaja aspidorhyncha*	Strap-snouted Brown Snake	P		1	
Animalia	Reptilia	Elapidae	2699	*Pseudonaja textilis*	Eastern Brown Snake	P		14	
Animalia	Reptilia	Elapidae	2722	*Suta suta*	Curl Snake	P		21	
Animalia	Aves	Casuariidae	0001	*Dromaius novaehollandiae*	Emu	P		84	
Animalia	Aves	Megapodiidae	0007	*Leipoa ocellata*	Malleefowl	E1,P	V	P	
Animalia	Aves	Phasianidae	0009	*Coturnix pectoralis*	Stubble Quail	P		20	
Animalia	Aves	Phasianidae	0011	*Coturnix ypsilophora*	Brown Quail	P		1	
Animalia	Aves	Anseranatidae	0199	*Anseranas semipalmata*	Magpie Goose	V,P		2	
Animalia	Aves	Anatidae	0210	*Anas castanea*	Chestnut Teal	P		9	
Animalia	Aves	Anatidae	0211	*Anas gracilis*	Grey Teal	P		961	
Animalia	Aves	Anatidae	0212	*Anas rhynchotis*	Australasian Shoveler	P		117	
Animalia	Aves	Anatidae	0208	*Anas superciliosa*	Pacific Black Duck	P		768	
Animalia	Aves	Anatidae	0215	*Aythya australis*	Hardhead	P		248	
Animalia	Aves	Anatidae	0217	*Biziura lobata*	Musk Duck	P		80	
Animalia	Aves	Anatidae	0202	*Chenonetta jubata*	Australian Wood Duck	P		419	
Animalia	Aves	Anatidae	0203	*Cygnus atratus*	Black Swan	P		365	
Animalia	Aves	Anatidae	0205	*Dendrocygna eytoni*	Plumed Whistling-Duck	P		23	
Animalia	Aves	Anatidae	0213	*Malacorhynchus membranaceus*	Pink-eared Duck	P		356	
Animalia	Aves	Anatidae	0216	*Oxyura australis*	Blue-billed Duck	V,P		59	
Animalia	Aves	Anatidae	0214	*Stictonetta naevosa*	Freckled Duck	V,P		54	
Animalia	Aves	Anatidae	0207	*Tadorna tadornoides*	Australian Shelduck	P		212	
Animalia	Aves	Podicipedidae	0060	*Podiceps cristatus*	Great Crested Grebe	P		61	
Animalia	Aves	Podicipedidae	0062	*Poliocephalus poliocephalus*	Hoary-headed Grebe	P		114	
Animalia	Aves	Podicipedidae	T180	*small grebe sp.*	Small grebe	P		8	
Animalia	Aves	Podicipedidae	0061	*Tachybaptus novaehollandiae*	Australasian Grebe	P		79	
Animalia	Aves	Columbidae	9931	*Geopelia striata*	Peaceful Dove	P		11	
Animalia	Aves	Columbidae	0043	*Ocyphaps lophotes*	Crested Pigeon	P		58	
Animalia	Aves	Columbidae	0034	*Phaps chalcoptera*	Common Bronzewing	P		16	
Animalia	Aves	Podargidae	0313	*Podargus strigoides*	Tawny Frogmouth	P		4	
Animalia	Aves	Aegothelidae	0317	*Aegotheles cristatus*	Australian Owlet-nightjar	P		8	
Animalia	Aves	Anhingidae	8731	*Anhinga novaehollandiae*	Australasian Darter	P		171	
Animalia	Aves	Phalacrocoracidae	0100	*Microcarbo melanoleucos*	Little Pied Cormorant	P		310	
Animalia	Aves	Phalacrocoracidae	0096	*Phalacrocorax carbo*	Great Cormorant	P		276	
Animalia	Aves	Phalacrocoracidae	0097	*Phalacrocorax sulcirostris*	Little Black Cormorant	P		269	
Animalia	Aves	Phalacrocoracidae	0099	*Phalacrocorax varius*	Pied Cormorant	P		90	
Animalia	Aves	Pelecanidae	0106	*Pelecanus conspicillatus*	Australian Pelican	P		377	
Animalia	Aves	Ardeidae	0977	*Ardea ibis*	Cattle Egret	P	C,J	5	
Animalia	Aves	Ardeidae	0186	*Ardea intermedia*	Intermediate Egret	P		106	
Animalia	Aves	Ardeidae	8712	*Ardea modesta*	Eastern Great Egret	P		240	

Animalia	Aves	Ardeidae	0189	*Ardea pacifica*	White-necked Heron	P		280	
Animalia	Aves	Ardeidae	T179	*Ardea/Egretta sp.*	Unidentified Egret	P		142	
Animalia	Aves	Ardeidae	0197	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	30	
Animalia	Aves	Ardeidae	0185	*Egretta garzetta*	Little Egret	P		18	
Animalia	Aves	Ardeidae	0188	*Egretta novaehollandiae*	White-faced Heron	P		343	
Animalia	Aves	Ardeidae	8703	*Ixobrychus dubius*	Australian Little Bittern	P		8	
Animalia	Aves	Ardeidae	0192	*Nycticorax caledonicus*	Nankeen Night Heron	P		124	
Animalia	Aves	Threskiornithidae	0182	*Platalea flavipes*	Yellow-billed Spoonbill	P		323	
Animalia	Aves	Threskiornithidae	0181	*Platalea regia*	Royal Spoonbill	P		200	
Animalia	Aves	Threskiornithidae	0178	*Plegadis falcinellus*	Glossy Ibis	P	C	1010	
Animalia	Aves	Threskiornithidae	0179	*Threskiornis molucca*	Australian White Ibis	P		343	
Animalia	Aves	Threskiornithidae	0180	*Threskiornis spinicollis*	Straw-necked Ibis	P		1583	
Animalia	Aves	Accipitridae	0222	*Accipiter cirrocephalus*	Collared Sparrowhawk	P		3	
Animalia	Aves	Accipitridae	0221	*Accipiter fasciatus*	Brown Goshawk	P		7	
Animalia	Aves	Accipitridae	0220	*Accipiter novaehollandiae*	Grey Goshawk	P		1	
Animalia	Aves	Accipitridae	0224	*Aquila audax*	Wedge-tailed Eagle	P		69	
Animalia	Aves	Accipitridae	0219	*Circus approximans*	Swamp Harrier	P		61	
Animalia	Aves	Accipitridae	0218	*Circus assimilis*	Spotted Harrier	V,P		22	
Animalia	Aves	Accipitridae	0232	*Elanus axillaris*	Black-shouldered Kite	P		18	
Animalia	Aves	Accipitridae	0233	*Elanus scriptus*	Letter-winged Kite	P		1	
Animalia	Aves	Accipitridae	0226	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P	C	47	
Animalia	Aves	Accipitridae	0228	*Haliastur sphenurus*	Whistling Kite	P		152	
Animalia	Aves	Accipitridae	0231	*^^Hamirostra melanosternon*	Black-breasted Buzzard	V,P,3		K	
Animalia	Aves	Accipitridae	0225	*Hieraaetus morphnoides*	Little Eagle	V,P		6	
Animalia	Aves	Accipitridae	0230	*^^Lophoictinia isura*	Square-tailed Kite	V,P,3		1	
Animalia	Aves	Accipitridae	0229	*Milvus migrans*	Black Kite	P		60	
Animalia	Aves	Falconidae	0239	*Falco berigora*	Brown Falcon	P		42	
Animalia	Aves	Falconidae	0240	*Falco cenchroides*	Nankeen Kestrel	P		106	
Animalia	Aves	Falconidae	0236	*^Falco hypoleucos*	Grey Falcon	E1,P,2		1	
Animalia	Aves	Falconidae	0235	*Falco longipennis*	Australian Hobby	P		17	
Animalia	Aves	Falconidae	0237	*Falco peregrinus*	Peregrine Falcon	P		5	
Animalia	Aves	Falconidae	0238	*Falco subniger*	Black Falcon	V,P		17	
Animalia	Aves	Gruidae	0177	*Grus rubicunda*	Brolga	V,P		5	
Animalia	Aves	Rallidae	0059	*Fulica atra*	Eurasian Coot	P		364	
Animalia	Aves	Rallidae	0056	*Gallinula tenebrosa*	Dusky Moorhen	P		41	
Animalia	Aves	Rallidae	0046	*Gallirallus philippensis*	Buff-banded Rail	P		7	
Animalia	Aves	Rallidae	0058	*Porphyrio porphyrio*	Purple Swamphen	P		69	
Animalia	Aves	Rallidae	0049	*Porzana fluminea*	Australian Spotted Crake	P		29	
Animalia	Aves	Rallidae	0050	*Porzana pusilla*	Baillon's Crake	P		8	
Animalia	Aves	Rallidae	0051	*Porzana tabuensis*	Spotless Crake	P		8	
Animalia	Aves	Rallidae	0055	*Tribonyx ventralis*	Black-tailed Native-hen	P		310	
Animalia	Aves	Otididae	0176	*Ardeotis australis*	Australian Bustard	E1,P		3	
Animalia	Aves	Burhinidae	0174	*Burhinus grallarius*	Bush Stone-curlew	E1,P		5	
Animalia	Aves	Recurvirostridae	0147	*Cladorhynchus leucocephalus*	Banded Stilt	P		1	
Animalia	Aves	Recurvirostridae	0146	*Himantopus himantopus*	Black-winged Stilt	P		206	
Animalia	Aves	Recurvirostridae	0148	*Recurvirostra novaehollandiae*	Red-necked Avocet	P		40	
Animalia	Aves	Charadriidae	0145	*Charadrius australis*	Inland Dotterel	P		8	
Animalia	Aves	Charadriidae	0143	*Charadrius ruficapillus*	Red-capped Plover	P		5	
Animalia	Aves	Charadriidae	0144	*Elseyornis melanops*	Black-fronted Dotterel	P		83	
Animalia	Aves	Charadriidae	0132	*Erythrogonys cinctus*	Red-kneed Dotterel	P		280	
Animalia	Aves	Charadriidae	0133	*Vanellus miles*	Masked Lapwing	P		144	
Animalia	Aves	Charadriidae	0135	*Vanellus tricolor*	Banded Lapwing	P		34	
Animalia	Aves	Pedionomidae	0020	*Pedionomus torquatus*	Plains-wanderer	E1,P	CE	110	
Animalia	Aves	Rostratulidae	0170	*Rostratula australis*	Australian Painted Snipe	E1,P	E	4	
Animalia	Aves	Scolopacidae	0163	*Calidris acuminata*	Sharp-tailed Sandpiper	P	C,J,K	29	
Animalia	Aves	Scolopacidae	0161	*Calidris ferruginea*	Curlew Sandpiper	E1,P	CE,C,J,K	K	
Animalia	Aves	Scolopacidae	0978	*Calidris melanotos*	Pectoral Sandpiper	P	J,K	2	
Animalia	Aves	Scolopacidae	0168	*Gallinago hardwickii*	Latham's Snipe	P	C,J,K	4	

Animalia	Aves	Scolopacidae	T181	*large wader sp.*	Large Waders	P		1	
Animalia	Aves	Scolopacidae	0152	*Limosa limosa*	Black-tailed Godwit	V,P	C,J,K	K	
Animalia	Aves	Scolopacidae	0154	*Tringa glareola*	Wood Sandpiper	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0158	*Tringa nebularia*	Common Greenshank	P	C,J,K	6	
Animalia	Aves	Scolopacidae	0159	*Tringa stagnatilis*	Marsh Sandpiper	P	C,J,K	3	
Animalia	Aves	Scolopacidae/Charadriidae	T182	*small wader sp.*	Small Waders	P		13	
Animalia	Aves	Turnicidae	0019	*Turnix pyrrhothorax*	Red-chested Button-quail	P		2	
Animalia	Aves	Turnicidae	0018	*Turnix velox*	Little Button-quail	P		3	
Animalia	Aves	Glareolidae	0173	*Stiltia isabella*	Australian Pratincole	P		19	
Animalia	Aves	Laridae	0110	*Chlidonias hybrida*	Whiskered Tern	P		201	
Animalia	Aves	Laridae	0125	*Chroicocephalus novaehollandiae*	Silver Gull	P		70	
Animalia	Aves	Laridae	0111	*Gelochelidon nilotica*	Gull-billed Tern	P	C	52	
Animalia	Aves	Laridae	0112	*Hydroprogne caspia*	Caspian Tern	P	C,J	22	
Animalia	Aves	Laridae	9022	*Sterna sp.*	Tern	P		4	
Animalia	Aves	Cacatuidae	0269	*Cacatua galerita*	Sulphur-crested Cockatoo	P		4	
Animalia	Aves	Cacatuidae	0271	*Cacatua sanguinea*	Little Corella	P		10	
Animalia	Aves	Cacatuidae	0265	*^Calyptorhynchus lathami*	Glossy Black-Cockatoo, Riverina population	E2,V,P,2		P	
Animalia	Aves	Cacatuidae	0273	*Eolophus roseicapillus*	Galah	P		119	
Animalia	Aves	Cacatuidae	0270	*^Lophochroa leadbeateri*	Major Mitchell's Cockatoo	V,P,2		2	
Animalia	Aves	Cacatuidae	0274	*Nymphicus hollandicus*	Cockatiel	P		9	
Animalia	Aves	Psittacidae	0294	*Barnardius zonarius*	Australian Ringneck	P		5	
Animalia	Aves	Psittacidae	0291	*Barnardius zonarius barnardi*	[Mallee Ringneck]	P		8	
Animalia	Aves	Psittacidae	0309	*^^Lathamus discolor*	Swift Parrot	E1,P,3	CE	K	
Animalia	Aves	Psittacidae	0310	*Melopsittacus undulatus*	Budgerigar	P		15	
Animalia	Aves	Psittacidae	0306	*Neophema chrysostoma*	Blue-winged Parrot	P		15	
Animalia	Aves	Psittacidae	0302	*^^Neophema pulchella*	Turquoise Parrot	V,P,3		2	
Animalia	Aves	Psittacidae	0297	*Northiella haematogaster*	Blue Bonnet	P		28	
Animalia	Aves	Psittacidae	0312	*Pezoporus occidentalis*	Night Parrot	E4,P	E	1	
Animalia	Aves	Psittacidae	0282	*Platycercus elegans*	Crimson Rosella	P		1	
Animalia	Aves	Psittacidae	0284	*Platycercus elegans flaveolus*	[Yellow Rosella]	P		59	
Animalia	Aves	Psittacidae	0709	*^^Polytelis anthopeplus monarchoides*	Regent Parrot (eastern subspecies)	E1,P,3	V	K	
Animalia	Aves	Psittacidae	0277	*^^Polytelis swainsonii*	Superb Parrot	V,P,3	V	2	
Animalia	Aves	Psittacidae	0295	*Psephotus haematonotus*	Red-rumped Parrot	P		40	
Animalia	Aves	Psittacidae	0296	*Psephotus varius*	Mulga Parrot	P		1	
Animalia	Aves	Cuculidae	0337	*Cacomantis pallidus*	Pallid Cuckoo	P		7	
Animalia	Aves	Cuculidae	0342	*Chalcites basalis*	Horsfield's Bronze-Cuckoo	P		36	
Animalia	Aves	Cuculidae	0343	*Chalcites lucidus*	Shining Bronze-Cuckoo	P		1	
Animalia	Aves	Cuculidae	0341	*Chalcites osculans*	Black-eared Cuckoo	P		1	
Animalia	Aves	Strigidae	0246	*^^Ninox connivens*	Barking Owl	V,P,3		K	
Animalia	Aves	Strigidae	9922	*Ninox novaeseelandiae*	Southern Boobook	P		13	
Animalia	Aves	Tytonidae	9923	*Tyto javanica*	Eastern Barn Owl	P		17	
Animalia	Aves	Tytonidae	0250	*^^Tyto novaehollandiae*	Masked Owl	V,P,3		K	
Animalia	Aves	Alcedinidae	0319	*Ceyx azureus*	Azure Kingfisher	P		1	
Animalia	Aves	Alcedinidae	0322	*Dacelo novaeguineae*	Laughing Kookaburra	P		23	
Animalia	Aves	Alcedinidae	0325	*Todiramphus pyrrhopygius*	Red-backed Kingfisher	P		9	
Animalia	Aves	Alcedinidae	0326	*Todiramphus sanctus*	Sacred Kingfisher	P		82	
Animalia	Aves	Meropidae	0329	*Merops ornatus*	Rainbow Bee-eater	P	J	31	
Animalia	Aves	Coraciidae	0318	*Eurystomus orientalis*	Dollarbird	P		1	
Animalia	Aves	Climacteridae	0561	*Climacteris affinis*	White-browed Treecreeper population in Carrathool local government area south of the Lachlan River and Griffith local government area	E2,P		K	

Animalia	Aves	Climacteridae	8126	*Climacteris picumnus picumnus*		P		1	
Animalia	Aves	Climacteridae	8127	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		18	
Animalia	Aves	Maluridae	9971	*^Amytornis modestus inexpectatus*	Thick-billed Grasswren (central NSW subspecies)	E4A,P,2		P	
Animalia	Aves	Maluridae	0513	*Amytornis striatus*	Striated Grasswren	V,P		P	
Animalia	Aves	Maluridae	0529	*Malurus cyaneus*	Superb Fairy-wren	P		203	
Animalia	Aves	Maluridae	0536	*Malurus lamberti*	Variegated Fairy-wren	P		34	
Animalia	Aves	Maluridae	0535	*Malurus leucopterus*	White-winged Fairy-wren	P		65	
Animalia	Aves	Maluridae	0532	*Malurus splendens*	Splendid Fairy-wren	P		4	
Animalia	Aves	Acanthizidae	0476	*Acanthiza apicalis*	Inland Thornbill	P		2	
Animalia	Aves	Acanthizidae	0486	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	P		17	
Animalia	Aves	Acanthizidae	0471	*Acanthiza nana*	Yellow Thornbill	P		20	
Animalia	Aves	Acanthizidae	0484	*Acanthiza reguloides*	Buff-rumped Thornbill	P		2	
Animalia	Aves	Acanthizidae	0481	*Acanthiza uropygialis*	Chestnut-rumped Thornbill	P		198	
Animalia	Aves	Acanthizidae	0466	*Aphelocephala leucopsis*	Southern Whiteface	P		40	
Animalia	Aves	Acanthizidae	0504	*Chthonicola sagittata*	Speckled Warbler	V,P		1	
Animalia	Aves	Acanthizidae	0463	*Gerygone fusca*	Western Gerygone	P		24	
Animalia	Aves	Acanthizidae	0497	*Pyrrholaemus brunneus*	Redthroat	V,P		K	
Animalia	Aves	Acanthizidae	0465	*Smicrornis brevirostris*	Weebill	P		22	
Animalia	Aves	Pardalotidae	0565	*Pardalotus punctatus*	Spotted Pardalote	P		3	
Animalia	Aves	Pardalotidae	0976	*Pardalotus striatus*	Striated Pardalote	P		51	
Animalia	Aves	Meliphagidae	0640	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater	P		2	
Animalia	Aves	Meliphagidae	0603	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	CE	K	
Animalia	Aves	Meliphagidae	0602	*Certhionyx variegatus*	Pied Honeyeater	V,P		20	
Animalia	Aves	Meliphagidae	0641	*Entomyzon cyanotis*	Blue-faced Honeyeater	P		13	
Animalia	Aves	Meliphagidae	0448	*Epthianura albifrons*	White-fronted Chat	V,P		94	
Animalia	Aves	Meliphagidae	0450	*Epthianura aurifrons*	Orange Chat	P		18	
Animalia	Aves	Meliphagidae	0449	*Epthianura tricolor*	Crimson Chat	P		18	
Animalia	Aves	Meliphagidae	0608	*Gavicalis virescens*	Singing Honeyeater	P		26	
Animalia	Aves	Meliphagidae	0598	*Grantiella picta*	Painted Honeyeater	V,P	V	K	
Animalia	Aves	Meliphagidae	0635	*Manorina flavigula*	Yellow-throated Miner	P		21	
Animalia	Aves	Meliphagidae	0634	*Manorina melanocephala*	Noisy Miner	P		29	
Animalia	Aves	Meliphagidae	0583	*Melithreptus brevirostris*	Brown-headed Honeyeater	P		1	
Animalia	Aves	Meliphagidae	8303	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)	V,P		K	
Animalia	Aves	Meliphagidae	0646	*Philemon citreogularis*	Little Friarbird	P		40	
Animalia	Aves	Meliphagidae	0645	*Philemon corniculatus*	Noisy Friarbird	P		1	
Animalia	Aves	Meliphagidae	0585	*Plectorhyncha lanceolata*	Striped Honeyeater	P		11	
Animalia	Aves	Meliphagidae	0625	*Ptilotula penicillatus*	White-plumed Honeyeater	P		39	
Animalia	Aves	Meliphagidae	0589	*Sugomel niger*	Black Honeyeater	P		4	
Animalia	Aves	Pomatostomidae	0446	*Pomatostomus ruficeps*	Chestnut-crowned Babbler	P		1	
Animalia	Aves	Pomatostomidae	8388	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)	V,P		34	
Animalia	Aves	Psophodidae	0437	*Cinclosoma castanotum*	Chestnut Quail-thrush	V,P		P	
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*	Varied Sittella	V,P		K	
Animalia	Aves	Campephagidae	0423	*Coracina maxima*	Ground Cuckoo-shrike	P		2	
Animalia	Aves	Campephagidae	0424	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	P		40	
Animalia	Aves	Campephagidae	0425	*Coracina papuensis*	White-bellied Cuckoo-shrike	P		1	
Animalia	Aves	Campephagidae	0430	*Lalage sueurii*	White-winged Triller	P		22	
Animalia	Aves	Pachycephalidae	0408	*Colluricincla harmonica*	Grey Shrike-thrush	P		35	
Animalia	Aves	Pachycephalidae	0416	*Falcunculus frontatus frontatus*	Eastern Shrike-tit	P		1	
Animalia	Aves	Pachycephalidae	0403	*Pachycephala inornata*	Gilbert's Whistler	V,P		K	

Animalia	Aves	Pachycephalidae	0398	*Pachycephala pectoralis*		Golden Whistler	P		1	
Animalia	Aves	Pachycephalidae	0401	*Pachycephala rufiventris*		Rufous Whistler	P		33	
Animalia	Aves	Artamidae	0546	*Artamus cinereus*		Black-faced Woodswallow	P		3	
Animalia	Aves	Artamidae	8519	*Artamus cyanopterus cyanopterus*		Dusky Woodswallow	V,P		7	
Animalia	Aves	Artamidae	0543	*Artamus leucorynchus*		White-breasted Woodswallow	P		12	
Animalia	Aves	Artamidae	0544	*Artamus personatus*		Masked Woodswallow	P		17	
Animalia	Aves	Artamidae	0545	*Artamus superciliosus*		White-browed Woodswallow	P		20	
Animalia	Aves	Artamidae	0700	*Cracticus nigrogularis*		Pied Butcherbird	P		45	
Animalia	Aves	Artamidae	0705	*Cracticus tibicen*		Australian Magpie	P		77	
Animalia	Aves	Artamidae	0702	*Cracticus torquatus*		Grey Butcherbird	P		26	
Animalia	Aves	Rhipiduridae	0361	*Rhipidura albiscapa*		Grey Fantail	P		21	
Animalia	Aves	Rhipiduridae	0364	*Rhipidura leucophrys*		Willie Wagtail	P		79	
Animalia	Aves	Corvidae	0691	*Corvus bennetti*		Little Crow	P		3	
Animalia	Aves	Corvidae	0930	*Corvus coronoides*		Australian Raven	P		61	
Animalia	Aves	Corvidae	0954	*Corvus mellori*		Little Raven	P		64	
Animalia	Aves	Corvidae	9067	*Corvus sp.*		Unidentified Corvid	P		1	
Animalia	Aves	Monarchidae	0415	*Grallina cyanoleuca*		Magpie-lark	P		81	
Animalia	Aves	Monarchidae	9955	*Myiagra inquieta*		Restless Flycatcher	P		17	
Animalia	Aves	Corcoracidae	0693	*Corcorax melanorhamphos*		White-winged Chough	P		14	
Animalia	Aves	Corcoracidae	0675	*Struthidea cinerea*		Apostlebird	P		4	
Animalia	Aves	Petroicidae	8367	*Melanodryas cucullata cucullata*		Hooded Robin (south-eastern form)	V,P		1	
Animalia	Aves	Petroicidae	0377	*Microeca fascinans*		Jacky Winter	P		11	
Animalia	Aves	Petroicidae	0380	*Petroica boodang*		Scarlet Robin	V,P		K	
Animalia	Aves	Petroicidae	0381	*Petroica goodenovii*		Red-capped Robin	P		126	
Animalia	Aves	Petroicidae	0382	*Petroica phoenicea*		Flame Robin	V,P		K	
Animalia	Aves	Alaudidae	0648	*Mirafra javanica*		Horsfield's Bushlark	P		23	
Animalia	Aves	Cisticolidae	0525	*Cisticola exilis*		Golden-headed Cisticola	P		10	
Animalia	Aves	Acrocephalidae	0524	*Acrocephalus australis*		Australian Reed-Warbler	P		71	
Animalia	Aves	Megaluridae	0508	*Cincloramphus cruralis*		Brown Songlark	P		28	
Animalia	Aves	Megaluridae	0509	*Cincloramphus mathewsi*		Rufous Songlark	P		30	
Animalia	Aves	Megaluridae	0522	*Megalurus gramineus*		Little Grassbird	P		44	
Animalia	Aves	Timaliidae	0574	*Zosterops lateralis*		Silvereye	P		4	
Animalia	Aves	Hirundinidae	0357	*Hirundo neoxena*		Welcome Swallow	P		34	
Animalia	Aves	Hirundinidae	0360	*Petrochelidon ariel*		Fairy Martin	P		33	
Animalia	Aves	Hirundinidae	0359	*Petrochelidon nigricans*		Tree Martin	P		49	
Animalia	Aves	Turdidae	0991	*Turdus merula*	*	Eurasian Blackbird			3	
Animalia	Aves	Sturnidae	0999	*Sturnus vulgaris*	*	Common Starling			38	
Animalia	Aves	Nectariniidae	0564	*Dicaeum hirundinaceum*		Mistletoebird	P		9	
Animalia	Aves	Estrildidae	0652	*Stagonopleura guttata*		Diamond Firetail	V,P		1	
Animalia	Aves	Estrildidae	0655	*Taeniopygia bichenovii*		Double-barred Finch	P		1	
Animalia	Aves	Estrildidae	0653	*Taeniopygia guttata*		Zebra Finch	P		36	
Animalia	Aves	Passeridae	0995	*Passer domesticus*	*	House Sparrow			34	
Animalia	Aves	Motacillidae	0647	*Anthus novaeseelandiae*		Australian Pipit	P		55	
Animalia	Mammalia	Ornithorhynchidae	1001	*Ornithorhynchus anatinus*		Platypus	P		1	
Animalia	Mammalia	Tachyglossidae	1003	*Tachyglossus aculeatus*		Short-beaked Echidna	P		20	
Animalia	Mammalia	Dasyuridae	1008	*Dasyurus maculatus*		Spotted-tailed Quoll	V,P	E	1	
Animalia	Mammalia	Dasyuridae	1050	*Planigale gilesi*		Paucident Planigale	P		11	
Animalia	Mammalia	Dasyuridae	1048	*Planigale tenuirostris*		Narrow-nosed Planigale	P		18	
Animalia	Mammalia	Dasyuridae	1072	*Sminthopsis crassicaudata*		Fat-tailed Dunnart	P		22	
Animalia	Mammalia	Dasyuridae	1061	*Sminthopsis murina*		Common Dunnart	P		1	
Animalia	Mammalia	Thylacomyidae	1106	*Macrotis lagotis*		Bilby	E4,P	V	1	
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	V,P	V	K	
Animalia	Mammalia	Vombatidae	1165	*Vombatus ursinus*		Common Wombat	P		1	

Animalia	Mammalia	Phalangeridae	T082	*Trichosurus sp.*		brushtail possum	P		2	
Animalia	Mammalia	Phalangeridae	1113	*Trichosurus vulpecula*		Common Brushtail Possum	P		20	
Animalia	Mammalia	Macropodidae	1263	*Macropus fuliginosus*		Western Grey Kangaroo	P		50	
Animalia	Mammalia	Macropodidae	1265	*Macropus giganteus*		Eastern Grey Kangaroo	P		124	
Animalia	Mammalia	Macropodidae	1275	*Macropus rufus*		Red Kangaroo	P		72	
Animalia	Mammalia	Macropodidae	T085	*Macropus sp.*		kangaroo / wallaby	P		1	
Animalia	Mammalia	Macropodidae	1242	*Wallabia bicolor*		Swamp Wallaby	P		3	
Animalia	Mammalia	Pteropodidae	1281	*Pteropus scapulatus*		Little Red Flying-fox	P		1	
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*		Yellow-bellied Sheathtail-bat	V,P		K	
Animalia	Mammalia	Molossidae	1324	*Austronomus australis*		White-striped Freetail-bat	P		33	
Animalia	Mammalia	Molossidae	9044	*Mormopterus "Species 4" (big penis)*			P		12	
Animalia	Mammalia	Molossidae	T299	*Mormopterus petersi*		Inland Free-tailed Bat	P		12	
Animalia	Mammalia	Molossidae	1326	*Mormopterus planiceps*		Little Mastiff-bat	P		1	
Animalia	Mammalia	Molossidae	1938	*Mormopterus ridei*		Eastern Free-tailed Bat	P		2	
Animalia	Mammalia	Molossidae	T091	*Mormopterus sp.*		mastiff-bat	P		10	
Animalia	Mammalia	Vespertilionidae	1349	*Chalinolobus gouldii*		Gould's Wattled Bat	P		41	
Animalia	Mammalia	Vespertilionidae	1351	*Chalinolobus morio*		Chocolate Wattled Bat	P		26	
Animalia	Mammalia	Vespertilionidae	1352	*Chalinolobus picatus*		Little Pied Bat	V,P		1	
Animalia	Mammalia	Vespertilionidae	1357	*Myotis macropus*		Southern Myotis	V,P		4	
Animalia	Mammalia	Vespertilionidae	T315	*Nyctophilus corbeni*		Corben's Long-eared Bat	V,P	V	K	
Animalia	Mammalia	Vespertilionidae	1335	*Nyctophilus geoffroyi*		Lesser Long-eared Bat	P		13	
Animalia	Mammalia	Vespertilionidae	1334	*Nyctophilus gouldi*		Gould's Long-eared Bat	P		4	
Animalia	Mammalia	Vespertilionidae	T092	*Nyctophilus sp.*		long-eared bat	P		5	
Animalia	Mammalia	Vespertilionidae	1364	*Scotorepens balstoni*		Inland Broad-nosed Bat	P		14	
Animalia	Mammalia	Vespertilionidae	1362	*Scotorepens greyii*		Little Broad-nosed Bat	P		4	
Animalia	Mammalia	Vespertilionidae	T089	*Scotorepens sp.*		Unidentified broad-nosed bat	P		3	
Animalia	Mammalia	Vespertilionidae	1382	*Vespadelus baverstocki*		Inland Forest Bat	V,P		K	
Animalia	Mammalia	Vespertilionidae	1378	*Vespadelus regulus*		Southern Forest Bat	P		20	
Animalia	Mammalia	Vespertilionidae	T088	*Vespadelus sp.*		Unidentified Eptesicus	P		3	
Animalia	Mammalia	Vespertilionidae	1379	*Vespadelus vulturnus*		Little Forest Bat	P		100	
Animalia	Mammalia	Muridae	1415	*Hydromys chrysogaster*		Water-rat	P		3	
Animalia	Mammalia	Muridae	1412	*Mus musculus*	*	House Mouse			31	
Animalia	Mammalia	Canidae	1905	*Canis lupus familiaris*	*	Dog			11	
Animalia	Mammalia	Canidae	1532	*Vulpes vulpes*	*	Fox			93	
Animalia	Mammalia	Felidae	1536	*Felis catus*	*	Cat			12	
Animalia	Mammalia	Leporidae	1511	*Lepus capensis*	*	Brown Hare			17	
Animalia	Mammalia	Leporidae	1510	*Oryctolagus cuniculus*	*	Rabbit			68	
Animalia	Mammalia	Suidae	1514	*Sus scrofa*	*	Pig			32	
Animalia	Mammalia	Bovidae	1518	*Bos taurus*	*	European cattle			7	
Animalia	Mammalia	Bovidae	1521	*Capra hircus*	*	Goat			1	
Animalia	Mammalia	Bovidae	1522	*Ovis aries*	*	Sheep (feral)			1	
Animalia	Mammalia	Cervidae	9112	*Cervus sp.*	*	Unidentified Deer			1	
Animalia	Arachnida	Urodacidae	I074	*Urodacus manicatus*		black rock scorpion			1	
Animalia	Actinopterygii	Clupeidae	T361	*Nematalosa erebi*		Bony Bream			2	
Animalia	Actinopterygii	Melanotaeniidae	T360	*Melanotaenia fluviatilis*		Murray River Rainbowfish			5	

Plantae	Flora	Aizoaceae	7082	*Disphyma crassifolium subsp. clavellatum*				65
Plantae	Flora	Aizoaceae	6381	*Glinus lotoides*		Hairy Carpet-weed		16
Plantae	Flora	Aizoaceae	1034	*Mesembryanthemum crystallinum*	*	Common Ice Plant		8
Plantae	Flora	Aizoaceae	1035	*Mesembryanthemum nodiflorum*	*	Small Ice Plant		6
Plantae	Flora	Aizoaceae	1036	*Psilocaulon tenue*	*	Wiry Noon-flower		1
Plantae	Flora	Aizoaceae	1037	*Sarcozona praecox*		Sarcozona		7
Plantae	Flora	Aizoaceae	10540	*Tetragonia moorei*				12
Plantae	Flora	Aizoaceae	11185	*Tetragonia tetragonioides*		New Zealand Spinach		142
Plantae	Flora	Aizoaceae	6504	*Zaleya galericulata*		Hogweed		3
Plantae	Flora	Aizoaceae	7094	*Zaleya galericulata subsp. australis*				2
Plantae	Flora	Aizoaceae	8525	*Zaleya galericulata subsp. galericulata*				2
Plantae	Flora	Alismataceae	1044	*Damasonium minus*		Starfruit		8
Plantae	Flora	Alliaceae	8963	*Nothoscordum borbonicum*	*	Onion Weed		1
Plantae	Flora	Amaranthaceae	7113	*Alternanthera angustifolia*				5
Plantae	Flora	Amaranthaceae	6478	*Alternanthera denticulata*		Lesser Joyweed		149
Plantae	Flora	Amaranthaceae	7079	*Alternanthera nana*		Hairy Joyweed		8
Plantae	Flora	Amaranthaceae	1049	*Alternanthera nodiflora*		Common Joyweed		5
Plantae	Flora	Amaranthaceae	7191	*Alternanthera pungens*	*	Khaki Weed		1
Plantae	Flora	Amaranthaceae	8485	*Alternanthera sp. A*				1
Plantae	Flora	Amaranthaceae	ALTE	*Alternanthera spp.*		Joyweed		6
Plantae	Flora	Amaranthaceae	1057	*Amaranthus macrocarpus*		Dwarf Amaranth		2
Plantae	Flora	Amaranthaceae	9092	*Amaranthus macrocarpus var. macrocarpus*				8
Plantae	Flora	Amaranthaceae	1059	*Amaranthus muricatus*	*	Roughfruit Amaranth		2
Plantae	Flora	Amaranthaceae	1064	*Amaranthus viridis*	*	Green Amaranth		5
Plantae	Flora	Amaranthaceae	6599	*Ptilotus exaltatus var. exaltatus*		Tall Mulla Mulla	P	4
Plantae	Flora	Amaranthaceae	1078	*Ptilotus nobilis*		Yellowtails		2
Plantae	Flora	Amaranthaceae	8523	*Ptilotus semilanatus*		Lambs tails		5
Plantae	Flora	Amaranthaceae	7822	*Ptilotus spathulatus f. spathulatus*		Pussy-tails		8
Plantae	Flora	Amaranthaceae	PTIL	*Ptilotus spp.*				1
Plantae	Flora	Amaryllidaceae	3537	*Calostemma purpureum*		Garland Lily		16
Plantae	Flora	Amygdalaceae	5625	*Prunus persica*	*			1
Plantae	Flora	Amygdalaceae	PRUN	*Prunus spp.*	*			1
Plantae	Flora	Anacardiaceae	1086	*Schinus areira*	*	Pepper Tree		5
Plantae	Flora	Anthericaceae	3518	*Arthropodium minus*		Small Vanilla Lily		23
Plantae	Flora	Anthericaceae	DICO	*Dichopogon spp.*		Chocolate Lily		2
Plantae	Flora	Anthericaceae	3571	*Thysanotus baueri*		Fringe-lily		2
Plantae	Flora	Anthericaceae	3573	*Thysanotus patersonii*		Twining Fringe-Lily		1
Plantae	Flora	Anthericaceae	3574	*Thysanotus tuberosus*		Common Fringe-lily		4
Plantae	Flora	Anthericaceae	6427	*Thysanotus tuberosus subsp. tuberosus*				2
Plantae	Flora	Apiaceae	1098	*Ammi majus*	*	Bishop's Weed		1

Plantae	Flora	Apiaceae	1109	*Daucus glochidiatus*		Native Carrot			110	
Plantae	Flora	Apiaceae	10108	*Daucus glochidiatus f. G*		Native Carrot			1	
Plantae	Flora	Apiaceae	10681	*Eryngium ovinum*		Blue Devil			1	
Plantae	Flora	Apiaceae	10871	*Eryngium paludosum*		Long Eryngium			1	
Plantae	Flora	Apiaceae	ERYN	*Eryngium spp.*					2	
Plantae	Flora	Apocynaceae	MARS	*Marsdenia spp.*					3	
Plantae	Flora	Apocynaceae	10204	*Nerium oleander*	*	Oleander			1	
Plantae	Flora	Arecaceae	11354	*Phoenix canariensis*	*	Canary Island Date Palm			1	
Plantae	Flora	Asparagaceae	3521	*Asparagus officinalis*	*	Asparagus			1	
Plantae	Flora	Asphodelaceae	3530	*Bulbine alata*		Native Onion			2	
Plantae	Flora	Asphodelaceae	3531	*Bulbine bulbosa*		Bulbine Lily			31	
Plantae	Flora	Asphodelaceae	3532	*Bulbine semibarbata*		Wild Onion			144	
Plantae	Flora	Asphodelaceae	BULI	*Bulbine spp.*					2	
Plantae	Flora	Asteraceae	1253	*Actinobole uliginosum*		Flannel Cudweed			14	
Plantae	Flora	Asteraceae	1265	*Angianthus brachypappus*		Spreading Cup-flower			4	
Plantae	Flora	Asteraceae	1273	*Arctotheca calendula*	*	Capeweed			112	
Plantae	Flora	Asteraceae	ARCT	*Arctotheca spp.*	*				1	
Plantae	Flora	Asteraceae	1280	*Aster subulatus*	*	Wild Aster			24	
Plantae	Flora	Asteraceae	ASTRC	*Asteraceae indeterminate*	*	Daisies			10	
Plantae	Flora	Asteraceae	10401	*Brachyscome basaltica var. gracilis*		Swamp Daisy			40	
Plantae	Flora	Asteraceae	7902	*Brachyscome ciliaris*		Variable Daisy			10	
Plantae	Flora	Asteraceae	6887	*Brachyscome ciliaris var. ciliaris*		Variable Daisy			3	
Plantae	Flora	Asteraceae	6714	*Brachyscome ciliaris var. lanuginosa*		Variable Daisy			1	
Plantae	Flora	Asteraceae	11056	*Brachyscome dentata*					2	
Plantae	Flora	Asteraceae	7562	*Brachyscome goniocarpa*		Dwarf Daisy			2	
Plantae	Flora	Asteraceae	6861	*Brachyscome lineariloba*		Hard-headed Daisy			114	
Plantae	Flora	Asteraceae	6558	*Brachyscome muelleroides*		Claypan Daisy	V	V	K	
Plantae	Flora	Asteraceae	6893	*Brachyscome papillosa*		Mossgiel Daisy	V	V	36	
Plantae	Flora	Asteraceae	10409	*Brachyscome perpusilla var. tenella*		Tiny Daisy			1	
Plantae	Flora	Asteraceae	11012	*Brachyscome smithwhitei*					53	
Plantae	Flora	Asteraceae	BRAC	*Brachyscome spp.*					10	
Plantae	Flora	Asteraceae	1332	*Calocephalus sonderi*		Pale Beauty-heads			191	
Plantae	Flora	Asteraceae	1335	*Calotis anthemoides*		Cut-leaved Burr-daisy			1	
Plantae	Flora	Asteraceae	1337	*Calotis cuneifolia*		Purple Burr-Daisy			2	
Plantae	Flora	Asteraceae	1340	*Calotis erinacea*		Tangled Burr-daisy			6	
Plantae	Flora	Asteraceae	1342	*Calotis hispidula*		Bogan Flea			110	
Plantae	Flora	Asteraceae	9457	*Calotis moorei*		A burr-daisy	E1	E	1	
Plantae	Flora	Asteraceae	1347	*Calotis scabiosifolia*		Rough Burr-daisy			189	
Plantae	Flora	Asteraceae	7929	*Calotis scabiosifolia var. scabiosifolia*					15	
Plantae	Flora	Asteraceae	1348	*Calotis scapigera*		Tufted Burr-daisy			17	
Plantae	Flora	Asteraceae	1354	*Carduus pycnocephalus*	*	Slender Thistle			6	
Plantae	Flora	Asteraceae	CARD	*Carduus spp.*	*				3	
Plantae	Flora	Asteraceae	1355	*Carduus tenuiflorus*	*	Winged Slender Thistle			11	
Plantae	Flora	Asteraceae	1358	*Carthamus lanatus*	*	Saffron Thistle			36	
Plantae	Flora	Asteraceae	1378	*Centaurea calcitrapa*	*	Star Thistle			2	
Plantae	Flora	Asteraceae	1382	*Centaurea melitensis*	*	Maltese Cockspur			46	
Plantae	Flora	Asteraceae	1383	*Centaurea solstitialis*	*	St Barnabys Thistle			2	
Plantae	Flora	Asteraceae	12715	*Centipeda crateriformis subsp. compacta*					2	
Plantae	Flora	Asteraceae	1384	*Centipeda cunninghamii*		Common Sneezeweed			46	
Plantae	Flora	Asteraceae	14360	*Centipeda minima subsp. minima*		spreading sneezeweed			48	
Plantae	Flora	Asteraceae	CENT	*Centipeda spp.*					1	

Plantae	Flora	Asteraceae	1386	*Centipeda thespidioides*		Desert Sneezeweed		12	
Plantae	Flora	Asteraceae	1391	*Chondrilla juncea*	*	Skeleton Weed		4	
Plantae	Flora	Asteraceae	8559	*Chrysocephalum apiculatum*		Common Everlasting		40	
Plantae	Flora	Asteraceae	8562	*Chrysocephalum semipapposum*		Clustered Everlasting		2	
Plantae	Flora	Asteraceae	1395	*Chthonocephalus pseudevax*		Ground-heads		3	
Plantae	Flora	Asteraceae	1397	*Cichorium intybus*	*	Chicory		1	
Plantae	Flora	Asteraceae	1400	*Cirsium vulgare*	*	Spear Thistle		147	
Plantae	Flora	Asteraceae	1404	*Conyza bonariensis*	*	Flaxleaf Fleabane		22	
Plantae	Flora	Asteraceae	CONY	*Conyza spp.*	*	A Fleabane		13	
Plantae	Flora	Asteraceae	10442	*Conyza sumatrensis*	*	Tall fleabane		5	
Plantae	Flora	Asteraceae	1412	*Cotula australis*		Common Cotula		9	
Plantae	Flora	Asteraceae	1413	*Cotula bipinnata*	*	Ferny Cotula		48	
Plantae	Flora	Asteraceae	1414	*Cotula coronopifolia*	*	Water Buttons		3	
Plantae	Flora	Asteraceae	10154	*Craspedia haplorrhiza*		Billy Buttons	P	5	
Plantae	Flora	Asteraceae	CRAP	*Craspedia spp.*		Billy Buttons	P	3	
Plantae	Flora	Asteraceae	8634	*Craspedia variabilis*		Common Billy-buttons	P	1	
Plantae	Flora	Asteraceae	1433	*Dittrichia graveolens*	*	Stinkwort		1	
Plantae	Flora	Asteraceae	7903	*Eclipta platyglossa*		Yellow Twin-heads		68	
Plantae	Flora	Asteraceae	7425	*Epaltes australis*		Spreading Nut-heads		1	
Plantae	Flora	Asteraceae	1438	*Epaltes cunninghamii*		Tall Nut-heads		3	
Plantae	Flora	Asteraceae	1445	*Eriochlamys behrii*		Woolly Mantle		1	
Plantae	Flora	Asteraceae	12744	*Eriochlamys squamata*				5	
Plantae	Flora	Asteraceae	9904	*Euchiton involucratus*		Star Cudweed		5	
Plantae	Flora	Asteraceae	11439	*Euchiton japonicus*				1	
Plantae	Flora	Asteraceae	9690	*Euchiton sphaericus*		Star Cudweed		26	
Plantae	Flora	Asteraceae	EUCH	*Euchiton spp.*		A Cudweed		2	
Plantae	Flora	Asteraceae	7236	*Flaveria australasica*		Speedy Weed		2	
Plantae	Flora	Asteraceae	9111	*Gazania rigens*	*			1	
Plantae	Flora	Asteraceae	7316	*Gnaphalium polycaulon*	*	Many-stemmed Cudweed, Indian Cudweed		1	
Plantae	Flora	Asteraceae	7714	*Gnephosis arachnoidea*		Erect Yellow-heads		3	
Plantae	Flora	Asteraceae	7468	*Hedypnois rhagadioloides*	*	Cretan Weed		79	
Plantae	Flora	Asteraceae	8913	*Hedypnois rhagadioloides subsp. cretica*	*	Cretan Weed		103	
Plantae	Flora	Asteraceae	HEDY	*Hedypnois spp.*	*			10	
Plantae	Flora	Asteraceae	1474	*Helianthus tuberosus*	*	Jerusalem Artichoke		1	
Plantae	Flora	Asteraceae	1494	*Helichrysum leucopsideum*		Satin Everlasting		3	
Plantae	Flora	Asteraceae	HELI	*Helichrysum spp.*				3	
Plantae	Flora	Asteraceae	9778	*Helminthotheca echioides*	*	Ox-tongue		2	
Plantae	Flora	Asteraceae	9083	*Hyalosperma glutinosum subsp. glutinosum*				4	
Plantae	Flora	Asteraceae	9413	*Hyalosperma praecox*				2	
Plantae	Flora	Asteraceae	8515	*Hyalosperma semisterile*				11	
Plantae	Flora	Asteraceae	1540	*Hypochaeris glabra*	*	Smooth Catsear		113	
Plantae	Flora	Asteraceae	8788	*Hypochaeris radicata*	*	Catsear		13	
Plantae	Flora	Asteraceae	HYPC	*Hypochaeris spp.*	*	A Catsear		2	
Plantae	Flora	Asteraceae	1542	*Isoetopsis graminifolia*		Grass Cushion		36	
Plantae	Flora	Asteraceae	IXIL	*Ixiolaena spp.*				4	
Plantae	Flora	Asteraceae	1548	*Kippistia suaedifolia*		Fleshy Minuria	E1	K	
Plantae	Flora	Asteraceae	1549	*Lactuca saligna*	*	Willow-leaved Lettuce		3	
Plantae	Flora	Asteraceae	1550	*Lactuca serriola*	*	Prickly Lettuce		38	
Plantae	Flora	Asteraceae	LACT	*Lactuca spp.*	*			1	
Plantae	Flora	Asteraceae	12766	*Leiocarpa brevicompta*		Flat Billy-buttons		21	
Plantae	Flora	Asteraceae	12767	*Leiocarpa leptolepis*		Pale Plover-daisy		62	
Plantae	Flora	Asteraceae	12049	*Leiocarpa panaetioides*		Wooly Buttons		24	
Plantae	Flora	Asteraceae	LEIO	*Leiocarpa spp.*				1	
Plantae	Flora	Asteraceae	12105	*Leiocarpa tomentosa*		Woolly Plover-daisy		5	
Plantae	Flora	Asteraceae	12769	*Leiocarpa websteri*				4	

Plantae	Flora	Asteraceae	11295	*Leptorhynchos orientalis*		Lanky Buttons	E1	K	
Plantae	Flora	Asteraceae	8924	*Leucochrysum molle*		Hoary Sunray		12	
Plantae	Flora	Asteraceae	1566	*Microseris lanceolata*		Yam Daisy		15	
Plantae	Flora	Asteraceae	9416	*Millotia perpusilla*		Tiny Bow-flower		1	
Plantae	Flora	Asteraceae	1571	*Minuria cunninghamii*		Bush Minuria		75	
Plantae	Flora	Asteraceae	1572	*Minuria denticulata*				8	
Plantae	Flora	Asteraceae	1573	*Minuria integerrima*		Smooth Minuria		13	
Plantae	Flora	Asteraceae	1574	*Minuria leptophylla*				6	
Plantae	Flora	Asteraceae	MINU	*Minuria spp.*				4	
Plantae	Flora	Asteraceae	1576	*Myriocephalus rhizocephalus*		Woolly-heads		15	
Plantae	Flora	Asteraceae	8884	*Onopordum acanthium subsp. acanthium*	*	Scotch Thistle		2	
Plantae	Flora	Asteraceae	1620	*Onopordum acaulon*	*	Stemless Thistle		9	
Plantae	Flora	Asteraceae	1635	*Podolepis muelleri*		Small Copper-wire Daisy		103	
Plantae	Flora	Asteraceae	PODO	*Podolepis spp.*				1	
Plantae	Flora	Asteraceae	7634	*Pogonolepis muelleriana*				9	
Plantae	Flora	Asteraceae	11144	*Polycalymma stuartii*		Poached Eggs		1	
Plantae	Flora	Asteraceae	7780	*Pseudognaphalium luteoalbum*		Jersey Cudweed		17	
Plantae	Flora	Asteraceae	10155	*Pycnosorus chrysanthes*		Golden Billy-buttons	P	5	
Plantae	Flora	Asteraceae	8911	*Pycnosorus globosus*		Drumsticks	P	9	
Plantae	Flora	Asteraceae	8912	*Pycnosorus pleiocephalus*			P	8	
Plantae	Flora	Asteraceae	PYCN	*Pycnosorus spp.*			P	2	
Plantae	Flora	Asteraceae	10163	*Pycnosorus thompsonianus*			P	3	
Plantae	Flora	Asteraceae	1641	*Reichardia tingitana*	*	False Sowthistle		10	
Plantae	Flora	Asteraceae	8919	*Rhodanthe corymbiflora*		Small White Sunray		373	
Plantae	Flora	Asteraceae	8513	*Rhodanthe diffusa*		Ascending Sunray		3	
Plantae	Flora	Asteraceae	8920	*Rhodanthe floribunda*		Common White Sunray		36	
Plantae	Flora	Asteraceae	8921	*Rhodanthe moschata*				11	
Plantae	Flora	Asteraceae	9084	*Rhodanthe polygalifolia*		Brilliant Sunray		2	
Plantae	Flora	Asteraceae	9384	*Rhodanthe pygmaea*		Pigmy Sunray		45	
Plantae	Flora	Asteraceae	RHOA	*Rhodanthe spp.*				5	
Plantae	Flora	Asteraceae	11159	*Scorzonera laciniata*	*			116	
Plantae	Flora	Asteraceae	8627	*Senecio cunninghamii var. cunninghamii*				62	
Plantae	Flora	Asteraceae	1661	*Senecio glossanthus*		Streaked Poverty Bush		169	
Plantae	Flora	Asteraceae	1666	*Senecio lautus*		Variable Groundsel		1	
Plantae	Flora	Asteraceae	7753	*Senecio murrayanus*				2	
Plantae	Flora	Asteraceae	12811	*Senecio pinnatifolius var. pinnatifolius*				2	
Plantae	Flora	Asteraceae	1674	*Senecio platylepis*				2	
Plantae	Flora	Asteraceae	12813	*Senecio productus subsp. productus*				2	
Plantae	Flora	Asteraceae	1675	*Senecio quadridentatus*		Cotton Fireweed		52	
Plantae	Flora	Asteraceae	1676	*Senecio runcinifolius*		Tall Groundsel		136	
Plantae	Flora	Asteraceae	SENE	*Senecio spp.*		Groundsel, Fireweed		8	
Plantae	Flora	Asteraceae	1684	*Silybum marianum*	*	Variegated Thistle		2	
Plantae	Flora	Asteraceae	7851	*Soliva sessilis*	*	Bindyi		1	
Plantae	Flora	Asteraceae	1688	*Soliva stolonifera*	*	Jo-jo		1	
Plantae	Flora	Asteraceae	1689	*Sonchus asper*	*	Prickly Sowthistle		26	
Plantae	Flora	Asteraceae	1690	*Sonchus oleraceus*	*	Common Sowthistle		313	
Plantae	Flora	Asteraceae	SONC	*Sonchus spp.*		Sowthistle		1	
Plantae	Flora	Asteraceae	1693	*Stuartina hamata*		Hooked Cudweed		4	
Plantae	Flora	Asteraceae	1694	*Stuartina muelleri*		Spoon Cudweed		2	
Plantae	Flora	Asteraceae	STUA	*Stuartina spp.*				1	
Plantae	Flora	Asteraceae	1698	*Taraxacum officinale*	*	Dandelion		2	
Plantae	Flora	Asteraceae	14051	*Tragopogon porrifolius subsp. porrifolius*	*	Salsify		3	
Plantae	Flora	Asteraceae	8925	*Triptilodiscus pygmaeus*		Common Sunray		19	
Plantae	Flora	Asteraceae	1705	*Urospermum picroides*	*	False Hawkbit		13	

Plantae	Flora	Asteraceae	10164	*Verbesina encelioides subsp. encelioides*	*	Crownbeard			1	
Plantae	Flora	Asteraceae	1711	*Vittadinia cuneata*		A Fuzzweed			107	
Plantae	Flora	Asteraceae	6737	*Vittadinia cuneata var. cuneata*		A Fuzzweed			27	
Plantae	Flora	Asteraceae	1712	*Vittadinia dissecta*					1	
Plantae	Flora	Asteraceae	1714	*Vittadinia gracilis*		Woolly New Holland Daisy			15	
Plantae	Flora	Asteraceae	1717	*Vittadinia pterochaeta*		Rough Fuzzweed			8	
Plantae	Flora	Asteraceae	VITT	*Vittadinia spp.*		Fuzzweed			6	
Plantae	Flora	Asteraceae	7130	*Xanthium occidentale*	*	Noogoora Burr			24	
Plantae	Flora	Asteraceae	1729	*Xanthium spinosum*	*	Bathurst Burr			53	
Plantae	Flora	Asteraceae	XANH	*Xanthium spp.*	*				3	
Plantae	Flora	Asteraceae	11377	*Xerochrysum bracteatum*		Golden Everlasting			1	
Plantae	Flora	Azollaceae	9260	*Azolla filiculoides*		Pacific Azolla			7	
Plantae	Flora	Azollaceae	8049	*Azolla pinnata*					2	
Plantae	Flora	Bignoniaceae	8688	*Jacaranda mimosifolia*	*	Jacaranda			1	
Plantae	Flora	Boraginaceae	1742	*Amsinckia calycina*	*	hairy Fiddleneck			1	
Plantae	Flora	Boraginaceae	1743	*Amsinckia intermedia*	*	Common Fiddleneck			5	
Plantae	Flora	Boraginaceae	1744	*Amsinckia lycopsoides*	*				2	
Plantae	Flora	Boraginaceae	1751	*Echium plantagineum*	*	Patterson's Curse			224	
Plantae	Flora	Boraginaceae	ECHU	*Echium spp.*	*				2	
Plantae	Flora	Boraginaceae	1761	*Heliotropium europaeum*	*	Potato Weed			69	
Plantae	Flora	Boraginaceae	1762	*Heliotropium supinum*	*	Prostrate Heliotrope			11	
Plantae	Flora	Boraginaceae	1771	*Omphalolappula concava*		Burr Stickseed			1	
Plantae	Flora	Boraginaceae	11141	*Plagiobothrys plurisepaleus*					10	
Plantae	Flora	Boraginaceae	PLAG	*Plagiobothrys spp.*					2	
Plantae	Flora	Brassicaceae	1775	*Alyssum linifolium*	*	Flax-leaf Alyssum			16	
Plantae	Flora	Brassicaceae	1778	*Arabidella nasturtium*					9	
Plantae	Flora	Brassicaceae	1787	*Brassica juncea*	*	Indian Mustard			1	
Plantae	Flora	Brassicaceae	14753	*Brassica rapa subsp. campestris*	*	Turnip			1	
Plantae	Flora	Brassicaceae	BRAS	*Brassica spp.*	*	Brassica			2	
Plantae	Flora	Brassicaceae	1790	*Brassica tournefortii*	*	Mediterranean Turnip			5	
Plantae	Flora	Brassicaceae	1794	*Capsella bursa-pastoris*	*	Shepherd's Purse			31	
Plantae	Flora	Brassicaceae	10569	*Cardamine moirensis*					8	
Plantae	Flora	Brassicaceae	1798	*Carrichtera annua*	*	Ward's Weed			9	
Plantae	Flora	Brassicaceae	1802	*Cuphonotus humistratus*		Mother-of-misery			1	
Plantae	Flora	Brassicaceae	1810	*Geococcus pusillus*					25	
Plantae	Flora	Brassicaceae	1811	*Harmsiodoxa blennodioides*					8	
Plantae	Flora	Brassicaceae	1812	*Harmsiodoxa brevipes*					1	
Plantae	Flora	Brassicaceae	7102	*Harmsiodoxa brevipes var. brevipes*					1	
Plantae	Flora	Brassicaceae	HARM	*Harmsiodoxa spp.*					1	
Plantae	Flora	Brassicaceae	1814	*Hirschfeldia incana*	*	Buchan Weed			1	
Plantae	Flora	Brassicaceae	1815	*Lepidium africanum*	*	Common Peppercress			8	
Plantae	Flora	Brassicaceae	1820	*Lepidium fasciculatum*		Bundled Peppercress			18	
Plantae	Flora	Brassicaceae	1824	*Lepidium monoplocoides*		Winged Peppercress	E1	E	4	
Plantae	Flora	Brassicaceae	1827	*Lepidium papillosum*		Warty Peppercress			4	
Plantae	Flora	Brassicaceae	6643	*Lepidium pseudohyssopifolium*		Peppercress			30	
Plantae	Flora	Brassicaceae	1831	*Lepidium sagittulatum*					2	
Plantae	Flora	Brassicaceae	LEPI	*Lepidium spp.*		A Peppercress			6	
Plantae	Flora	Brassicaceae	1835	*Menkea australis*		Fairy Spectacles			1	
Plantae	Flora	Brassicaceae	1839	*Raphanus raphanistrum*	*	Wild Radish			2	
Plantae	Flora	Brassicaceae	1841	*Rapistrum rugosum*	*	Turnip Weed			80	
Plantae	Flora	Brassicaceae	1843	*Rorippa eustylis*					1	
Plantae	Flora	Brassicaceae	1846	*Rorippa laciniata*					36	
Plantae	Flora	Brassicaceae	7382	*Rorippa palustris*	*	Yellow Cress			5	
Plantae	Flora	Brassicaceae	SINA	*Sinapis spp.*	*				1	
Plantae	Flora	Brassicaceae	1851	*Sisymbrium altissimum*	*				3	
Plantae	Flora	Brassicaceae	1852	*Sisymbrium erysimoides*	*	Smooth Mustard			113	

Plantae	Flora	Brassicaceae	1853	*Sisymbrium irio*	*	London Rocket	116
Plantae	Flora	Brassicaceae	1854	*Sisymbrium officinale*	*	Hedge Mustard	1
Plantae	Flora	Brassicaceae	1855	*Sisymbrium orientale*	*	Indian Hedge Mustard	8
Plantae	Flora	Brassicaceae	SISY	*Sisymbrium spp.*	*		20
Plantae	Flora	Brassicaceae	1857	*Stenopetalum lineare*		Threadcress	1
Plantae	Flora	Cactaceae	OPUN	*Opuntia spp.*	*		1
Plantae	Flora	Callitrichaceae	1908	*Callitriche sonderi*			1
Plantae	Flora	Callitrichaceae	CALH	*Callitriche spp.*		Starwort	1
Plantae	Flora	Callitrichaceae	1909	*Callitriche stagnalis*	*	Common Starwort	5
Plantae	Flora	Callitrichaceae	1910	*Callitriche umbonata*		Winged Water-starwort	2
Plantae	Flora	Campanulaceae	1929	*Wahlenbergia communis*		Tufted Bluebell	6
Plantae	Flora	Campanulaceae	1931	*Wahlenbergia fluminalis*		River Bluebell	28
Plantae	Flora	Campanulaceae	1933	*Wahlenbergia gracilenta*		Annual Bluebell	15
Plantae	Flora	Campanulaceae	1934	*Wahlenbergia gracilis*		Sprawling Bluebell	12
Plantae	Flora	Campanulaceae	WAHL	*Wahlenbergia spp.*		Bluebell	7
Plantae	Flora	Campanulaceae	1938	*Wahlenbergia stricta*		Tall Bluebell	1
Plantae	Flora	Campanulaceae	7883	*Wahlenbergia tumidifructa*			5
Plantae	Flora	Campanulaceae	9975	*Wahlenbergia victoriensis*			2
Plantae	Flora	Caryophyllaceae	AREN	*Arenaria spp.*	*		1
Plantae	Flora	Caryophyllaceae	1960	*Cerastium glomeratum*	*	Mouse-ear Chickweed	2
Plantae	Flora	Caryophyllaceae	1974	*Paronychia brasiliana*	*	Chilean Whitlow Wort, Brazilian Whitlow	1
Plantae	Flora	Caryophyllaceae	13845	*Petrorhagia dubia*	*		1
Plantae	Flora	Caryophyllaceae	1979	*Polycarpon tetraphyllum*	*	Four-leaved Allseed	1
Plantae	Flora	Caryophyllaceae	1980	*Sagina apetala*	*	Annual Pearlwort	4
Plantae	Flora	Caryophyllaceae	1987	*Scleranthus minusculus*			1
Plantae	Flora	Caryophyllaceae	SCLT	*Scleranthus spp.*			1
Plantae	Flora	Caryophyllaceae	1990	*Silene apetala*	*		1
Plantae	Flora	Caryophyllaceae	1991	*Silene gallica*	*	French Catchfly	1
Plantae	Flora	Caryophyllaceae	13841	*Spergularia brevifolia*			3
Plantae	Flora	Caryophyllaceae	1998	*Spergularia diandra*	*	Lesser Sand-spurry	6
Plantae	Flora	Caryophyllaceae	2000	*Spergularia marina*		Lesser Sea-spurrey	3
Plantae	Flora	Caryophyllaceae	2001	*Spergularia rubra*	*	Sandspurry	127
Plantae	Flora	Caryophyllaceae	SPEG	*Spergularia spp.*			7
Plantae	Flora	Caryophyllaceae	2002	*Stellaria angustifolia*		Swamp Starwort	12
Plantae	Flora	Caryophyllaceae	2006	*Stellaria media*	*	Common Chickweed	7
Plantae	Flora	Caryophyllaceae	9804	*Stellaria sp. B*			1
Plantae	Flora	Casuarinaceae	2013	*Allocasuarina luehmannii*		Bulloak	1
Plantae	Flora	Casuarinaceae	9006	*Casuarina cunninghamiana subsp. cunninghamiana*		River Oak	1
Plantae	Flora	Chenopodiaceae	2045	*Atriplex angulata*		Fan Saltbush	4

Plantae	Flora	Chenopodiaceae	2047	*Atriplex conduplicata*			6
Plantae	Flora	Chenopodiaceae	2049	*Atriplex eardleyae*		Small Saltbush	8
Plantae	Flora	Chenopodiaceae	2053	*Atriplex holocarpa*		Pop Saltbush	24
Plantae	Flora	Chenopodiaceae	6368	*Atriplex leptocarpa*		Slender-fruit Saltbush	331
Plantae	Flora	Chenopodiaceae	2055	*Atriplex limbata*			2
Plantae	Flora	Chenopodiaceae	2056	*Atriplex lindleyi*		Eastern Flat-top Saltbush	164
Plantae	Flora	Chenopodiaceae	2063	*Atriplex nummularia*		Old Man Saltbush	92
Plantae	Flora	Chenopodiaceae	9614	*Atriplex prostrata*	*		1
Plantae	Flora	Chenopodiaceae	2066	*Atriplex pseudocampanulata*			100
Plantae	Flora	Chenopodiaceae	2070	*Atriplex semibaccata*		Creeping Saltbush	351
Plantae	Flora	Chenopodiaceae	2071	*Atriplex spinibractea*		Spiny-fruit Saltbush	7
Plantae	Flora	Chenopodiaceae	ATRI	*Atriplex spp.*		A Saltbush	17
Plantae	Flora	Chenopodiaceae	2075	*Atriplex suberecta*			6
Plantae	Flora	Chenopodiaceae	2078	*Atriplex vesicaria*		Bladder Saltbush	194
Plantae	Flora	Chenopodiaceae	7620	*Atriplex vesicaria subsp. macrocystidia*		Bladder Saltbush	3
Plantae	Flora	Chenopodiaceae	8532	*Atriplex vesicaria subsp. sphaerocarpa*			1
Plantae	Flora	Chenopodiaceae	8533	*Atriplex vesicaria subsp. variabilis*			3
Plantae	Flora	Chenopodiaceae	CHENC	*Chenopodiaceae indeterminate*	*	Salt-bushes	4
Plantae	Flora	Chenopodiaceae	2084	*Chenopodium album*	*	Fat Hen	1
Plantae	Flora	Chenopodiaceae	2085	*Chenopodium ambrosioides*	*	Mexican Tea	1
Plantae	Flora	Chenopodiaceae	2087	*Chenopodium auricomum*		Queensland Bluebush	2
Plantae	Flora	Chenopodiaceae	2089	*Chenopodium cristatum*		Crested Goosefoot	10
Plantae	Flora	Chenopodiaceae	2090	*Chenopodium curvispicatum*			1
Plantae	Flora	Chenopodiaceae	2091	*Chenopodium desertorum*		Desert Goosefoot	2
Plantae	Flora	Chenopodiaceae	6779	*Chenopodium desertorum subsp. microphyllum*			3
Plantae	Flora	Chenopodiaceae	2095	*Chenopodium melanocarpum*		Black Crumbweed	2
Plantae	Flora	Chenopodiaceae	2096	*Chenopodium multifidum*	*	Scented Goosefoot	1
Plantae	Flora	Chenopodiaceae	2097	*Chenopodium murale*	*	Nettle-leaf Goosefoot	8
Plantae	Flora	Chenopodiaceae	2098	*Chenopodium nitrariaceum*		Nitre Goosefoot	275
Plantae	Flora	Chenopodiaceae	CHEN	*Chenopodium spp.*		Goosefoot, Crumbweed	4
Plantae	Flora	Chenopodiaceae	2102	*Dissocarpus biflorus*		Twin-horned Cpperburr	13
Plantae	Flora	Chenopodiaceae	6819	*Dissocarpus biflorus var. biflorus*			7
Plantae	Flora	Chenopodiaceae	2103	*Dissocarpus paradoxus*		Cannonball Burr	24
Plantae	Flora	Chenopodiaceae	14529	*Dysphania pumilio*		Small Crumbweed	47
Plantae	Flora	Chenopodiaceae	2110	*Einadia hastata*		Berry Saltbush	2
Plantae	Flora	Chenopodiaceae	2111	*Einadia nutans*		Climbing Saltbush	293

Plantae	Flora	Chenopodiaceae	6481	*Einadia nutans subsp. linifolia*	Climbing Saltbush			2	
Plantae	Flora	Chenopodiaceae	6482	*Einadia nutans subsp. nutans*	Climbing Saltbush			87	
Plantae	Flora	Chenopodiaceae	2112	*Einadia polygonoides*	Knotweed Goosefoot			5	
Plantae	Flora	Chenopodiaceae	EINA	*Einadia spp.*				1	
Plantae	Flora	Chenopodiaceae	2113	*Einadia trigonos*	Fishweed			1	
Plantae	Flora	Chenopodiaceae	2114	*Enchylaena tomentosa*	Ruby Saltbush			150	
Plantae	Flora	Chenopodiaceae	2119	*Maireana aphylla*	Cotton Bush			225	
Plantae	Flora	Chenopodiaceae	2120	*Maireana appressa*				9	
Plantae	Flora	Chenopodiaceae	2122	*Maireana brevifolia*				19	
Plantae	Flora	Chenopodiaceae	2124	*Maireana cheelii*	Chariot Wheels	V	V	6	
Plantae	Flora	Chenopodiaceae	2125	*Maireana ciliata*	Fissure Weed			3	
Plantae	Flora	Chenopodiaceae	2126	*Maireana coronata*	Crown Fissure-weed			3	
Plantae	Flora	Chenopodiaceae	2127	*Maireana decalvans*	Black Cotton Bush			55	
Plantae	Flora	Chenopodiaceae	2128	*Maireana enchylaenoides*	Wingless Fissure-weed			4	
Plantae	Flora	Chenopodiaceae	2131	*Maireana excavata*				18	
Plantae	Flora	Chenopodiaceae	2132	*Maireana georgei*	Slit-wing Bluebush			10	
Plantae	Flora	Chenopodiaceae	2137	*Maireana microcarpa*				16	
Plantae	Flora	Chenopodiaceae	2138	*Maireana microphylla*	Small-leaf Bluebush			3	
Plantae	Flora	Chenopodiaceae	2140	*Maireana pentagona*	Hairy Bluebush, Slender Fissure-weed			264	
Plantae	Flora	Chenopodiaceae	2142	*Maireana pyramidata*	Black Bluebush			77	
Plantae	Flora	Chenopodiaceae	8607	*Maireana sclerolaenoides*				2	
Plantae	Flora	Chenopodiaceae	2147	*Maireana sedifolia*	Pearl Bluebush			14	
Plantae	Flora	Chenopodiaceae	MAIR	*Maireana spp.*	Cotton Bush, Bluebush, Fissure-weed			10	
Plantae	Flora	Chenopodiaceae	7610	*Maireana tomentosa subsp. urceolata*				1	
Plantae	Flora	Chenopodiaceae	2150	*Maireana trichoptera*				1	
Plantae	Flora	Chenopodiaceae	2152	*Maireana turbinata*				2	
Plantae	Flora	Chenopodiaceae	2155	*Malacocera tricornis*	Soft Horns			109	
Plantae	Flora	Chenopodiaceae	6919	*Osteocarpum acropterum*	Water Weed			45	
Plantae	Flora	Chenopodiaceae	6683	*Osteocarpum acropterum var. acropterum*				1	
Plantae	Flora	Chenopodiaceae	9665	*Osteocarpum acropterum var. deminuta*	Bonefruit			9	
Plantae	Flora	Chenopodiaceae	2160	*Rhagodia parabolica*				1	
Plantae	Flora	Chenopodiaceae	2161	*Rhagodia spinescens*	Thorny Saltbush			211	
Plantae	Flora	Chenopodiaceae	RHAG	*Rhagodia spp.*				1	
Plantae	Flora	Chenopodiaceae	14594	*Salsola australis*				2	
Plantae	Flora	Chenopodiaceae	7923	*Salsola kali var. kali*	Buckbush			49	
Plantae	Flora	Chenopodiaceae	11152	*Salsola tragus*	Buckbush,Soft Rolpoly, Saltwort			161	

Plantae	Flora	Chenopodiaceae	11153	*Salsola tragus subsp. tragus*		Buckbush,Soft Rolpoly, Saltwort			1	
Plantae	Flora	Chenopodiaceae	2165	*Scleroblitum atriplicinum*		Purple Goosefoot			78	
Plantae	Flora	Chenopodiaceae	2169	*Sclerolaena bicornis*		Goathead Burr			29	
Plantae	Flora	Chenopodiaceae	7243	*Sclerolaena bicornis var. bicornis*					5	
Plantae	Flora	Chenopodiaceae	2170	*Sclerolaena birchii*		Galvinized Burr			20	
Plantae	Flora	Chenopodiaceae	7676	*Sclerolaena brachyptera*		Short-winged Copperburr			172	
Plantae	Flora	Chenopodiaceae	2172	*Sclerolaena calcarata*		Redburr			1	
Plantae	Flora	Chenopodiaceae	2177	*Sclerolaena diacantha*		Grey Copperburr			104	
Plantae	Flora	Chenopodiaceae	2178	*Sclerolaena divaricata*		Tangled Copperburr			126	
Plantae	Flora	Chenopodiaceae	2180	*Sclerolaena intricata*		Poverty Bush			57	
Plantae	Flora	Chenopodiaceae	2182	*Sclerolaena lanicuspis*		Woolly Copperburr			3	
Plantae	Flora	Chenopodiaceae	2185	*Sclerolaena muricata*		Black Rolypoly			366	
Plantae	Flora	Chenopodiaceae	7570	*Sclerolaena muricata var. muricata*		Black Rolypoly			160	
Plantae	Flora	Chenopodiaceae	7656	*Sclerolaena muricata var. semiglabra*		Black Rolypoly			187	
Plantae	Flora	Chenopodiaceae	7799	*Sclerolaena muricata var. villosa*		Black Rolypoly			77	
Plantae	Flora	Chenopodiaceae	6371	*Sclerolaena napiformis*		Turnip Copperburr	E1	E	K	
Plantae	Flora	Chenopodiaceae	2186	*Sclerolaena obliquicuspis*					7	
Plantae	Flora	Chenopodiaceae	2189	*Sclerolaena parviflora*					1	
Plantae	Flora	Chenopodiaceae	12873	*Sclerolaena sp. A*					6	
Plantae	Flora	Chenopodiaceae	12874	*Sclerolaena sp. B*					4	
Plantae	Flora	Chenopodiaceae	SCLR	*Sclerolaena spp.*		Copperburr, Poverty-bush			3	
Plantae	Flora	Chenopodiaceae	6750	*Sclerolaena stelligera*		Star Copperburr			198	
Plantae	Flora	Chenopodiaceae	2192	*Sclerolaena tricuspis*		Giant Redburr			317	
Plantae	Flora	Chenopodiaceae	SCLE	*Sclerostegia spp.*					2	
Plantae	Flora	Chenopodiaceae	14465	*Tecticornia tenuis*					43	
Plantae	Flora	Clusiaceae	7240	*Hypericum gramineum*		Small St John's Wort			1	
Plantae	Flora	Colchicaceae	7699	*Wurmbea dioica subsp. dioica*		Early Nancy			42	
Plantae	Flora	Convolvulaceae	2219	*Convolvulus arvensis*	*	Field Bindweed			4	
Plantae	Flora	Convolvulaceae	2220	*Convolvulus erubescens*		Pink Bindweed			158	
Plantae	Flora	Convolvulaceae	11311	*Convolvulus tedmoorei*		Bindweed	E1		P	
Plantae	Flora	Convolvulaceae	11066	*Cressa australis*					6	
Plantae	Flora	Convolvulaceae	2287	*Cuscuta campestris*	*	Golden Dodder			2	
Plantae	Flora	Convolvulaceae	2290	*Cuscuta suaveolens*	*	Fringed Dodder			2	
Plantae	Flora	Convolvulaceae	2222	*Dichondra repens*		Kidney Weed			6	
Plantae	Flora	Convolvulaceae	8727	*Dichondra sp. A*		Kidney Weed			2	
Plantae	Flora	Convolvulaceae	2223	*Evolvulus alsinoides*		Bindweed			1	
Plantae	Flora	Crassulaceae	2237	*Crassula colorata*		Dense Stonecrop			183	

Plantae	Flora	Crassulaceae	9395	*Crassula colorata var. acuminata*					16	
Plantae	Flora	Crassulaceae	7745	*Crassula decumbens var. decumbens*		Spreading Stonecrop			3	
Plantae	Flora	Crassulaceae	2238	*Crassula helmsii*		Swamp Stonecrop			2	
Plantae	Flora	Crassulaceae	6820	*Crassula peduncularis*		Purple Stonecrop			3	
Plantae	Flora	Crassulaceae	2242	*Crassula sieberiana*		Australian Stonecrop			72	
Plantae	Flora	Crassulaceae	CRAS	*Crassula spp.*		Stonecrop			17	
Plantae	Flora	Crassulaceae	12424	*Crassula tetramera*					1	
Plantae	Flora	Cucurbitaceae	9436	*Citrullus lanatus var. lanatus*	*	Wild Melon, Camel Melon,Bitter			8	
Plantae	Flora	Cucurbitaceae	11072	*Cucumis myriocarpus subsp. leptodermis*	*	Paddy Melon			33	
Plantae	Flora	Cucurbitaceae	CUCU	*Cucumis spp.*					1	
Plantae	Flora	Cupressaceae	6379	*Callitris glaucophylla*		White Cypress Pine			10	
Plantae	Flora	Cupressaceae	7594	*Callitris gracilis*					3	
Plantae	Flora	Cupressaceae	CALR	*Callitris spp.*					2	
Plantae	Flora	Cyperaceae	2311	*Carex bichenoviana*					1	
Plantae	Flora	Cyperaceae	2327	*Carex inversa*		Knob Sedge			16	
Plantae	Flora	Cyperaceae	CARE	*Carex spp.*					1	
Plantae	Flora	Cyperaceae	2351	*Cyperus bifax*		Downs Nutgrass			9	
Plantae	Flora	Cyperaceae	2357	*Cyperus concinnus*		Trim Flat-sedge			3	
Plantae	Flora	Cyperaceae	2364	*Cyperus eragrostis*	*	Umbrella Sedge			6	
Plantae	Flora	Cyperaceae	2366	*Cyperus exaltatus*					1	
Plantae	Flora	Cyperaceae	2376	*Cyperus gymnocaulos*					1	
Plantae	Flora	Cyperaceae	6716	*Cyperus iria*					1	
Plantae	Flora	Cyperaceae	2390	*Cyperus pygmaeus*		Dwarf Flat-sedge			1	
Plantae	Flora	Cyperaceae	2393	*Cyperus rotundus*	*	Nutgrass			1	
Plantae	Flora	Cyperaceae	CYPE	*Cyperus spp.*					1	
Plantae	Flora	Cyperaceae	2408	*Eleocharis acuta*					87	
Plantae	Flora	Cyperaceae	2416	*Eleocharis obicis*		Spike-Rush	V	V	456	
Plantae	Flora	Cyperaceae	2418	*Eleocharis pallens*		Pale Spike Sedge			60	
Plantae	Flora	Cyperaceae	2421	*Eleocharis plana*		Flat Spike-sedge			16	
Plantae	Flora	Cyperaceae	2422	*Eleocharis pusilla*					36	
Plantae	Flora	Cyperaceae	6988	*Eleocharis sphacelata*		Tall Spike Rush			2	
Plantae	Flora	Cyperaceae	ELEO	*Eleocharis spp.*		Spike-rush, Spike-sedge			1	
Plantae	Flora	Cyperaceae	2455	*Isolepis marginata*	*				1	
Plantae	Flora	Cyperaceae	14624	*Isolepis multicaulis*					1	
Plantae	Flora	Cyperaceae	ISOL	*Isolepis spp.*		Club-rush			2	
Plantae	Flora	Cyperaceae	2464	*Isolepis victoriensis*					1	
Plantae	Flora	Elatinaceae	2579	*Elatine gratioloides*		Waterwort			5	
Plantae	Flora	Euphorbiaceae	9193	*Chamaesyce dallachyana*					2	
Plantae	Flora	Euphorbiaceae	8560	*Chamaesyce drummondii*		Caustic Weed			236	
Plantae	Flora	Euphorbiaceae	2715	*Euphorbia helioscopia*	*	Sun Spurge			1	
Plantae	Flora	Euphorbiaceae	2721	*Euphorbia peplus*	*	Petty Spurge			2	
Plantae	Flora	Euphorbiaceae	2722	*Euphorbia planiticola*		Plains Spurge			6	
Plantae	Flora	Euphorbiaceae	6900	*Euphorbia tannensis subsp. eremophila*					2	
Plantae	Flora	Fabaceae (Caesalpinioideae)	6644	*Senna barclayana*		Smooth Senna			1	
Plantae	Flora	Fabaceae (Caesalpinioideae)	12016	*Senna form taxon 'petiolaris'*		Woody Cassia			1	
Plantae	Flora	Fabaceae (Caesalpinioideae)	SENN	*Senna spp.*					1	
Plantae	Flora	Fabaceae (Faboideae)	10668	*Cullen cinereum*		Annual Verbine			2	
Plantae	Flora	Fabaceae (Faboideae)	9987	*Cullen parvum*		Small Scurf-pea	E1		K	
Plantae	Flora	Fabaceae (Faboideae)	10674	*Cullen tenax*		Emu-foot			3	
Plantae	Flora	Fabaceae (Faboideae)	2862	*Glycyrrhiza acanthocarpa*		Native Liquorice			2	
Plantae	Flora	Fabaceae (Faboideae)	2908	*Lotus cruentus*		Red-flowered Lotus			5	

Plantae	Flora	Fabaceae (Faboideae)	2916	*Medicago arabica*	*	Spotted Burr Medic			1	
Plantae	Flora	Fabaceae (Faboideae)	2918	*Medicago laciniata*	*	Cut-leaved Medic			22	
Plantae	Flora	Fabaceae (Faboideae)	2920	*Medicago minima*	*	Woolly Burr Medic			126	
Plantae	Flora	Fabaceae (Faboideae)	2922	*Medicago polymorpha*	*	Burr Medic			477	
Plantae	Flora	Fabaceae (Faboideae)	2923	*Medicago praecox*	*	Small-leaved Burr Medic			215	
Plantae	Flora	Fabaceae (Faboideae)	MEDI	*Medicago spp.*	*	A Medic			24	
Plantae	Flora	Fabaceae (Faboideae)	2926	*Medicago truncatula*	*	Barrel Medic			250	
Plantae	Flora	Fabaceae (Faboideae)	2928	*Melilotus indicus*	*	Hexham Scent			5	
Plantae	Flora	Fabaceae (Faboideae)	9998	*Swainsona affinis*					2	
Plantae	Flora	Fabaceae (Faboideae)	3036	*Swainsona burkittii*					3	
Plantae	Flora	Fabaceae (Faboideae)	3046	*Swainsona microphylla*					3	
Plantae	Flora	Fabaceae (Faboideae)	3048	*Swainsona murrayana*		Slender Darling Pea	V	V	28	
Plantae	Flora	Fabaceae (Faboideae)	3051	*Swainsona oroboides*					4	
Plantae	Flora	Fabaceae (Faboideae)	3054	*Swainsona plagiotropis*		Red Darling Pea	V	V	K	
Plantae	Flora	Fabaceae (Faboideae)	3055	*Swainsona procumbens*		Broughton Pea			20	
Plantae	Flora	Fabaceae (Faboideae)	8538	*Swainsona sericea*		Silky Swainson-pea	V		K	
Plantae	Flora	Fabaceae (Faboideae)	SWAI	*Swainsona spp.*					4	
Plantae	Flora	Fabaceae (Faboideae)	3059	*Swainsona swainsonioides*		Downy Swainson-pea			3	
Plantae	Flora	Fabaceae (Faboideae)	3072	*Trifolium angustifolium*	*	Narrow-leaved Clover			1	
Plantae	Flora	Fabaceae (Faboideae)	3073	*Trifolium arvense*	*	Haresfoot Clover			10	
Plantae	Flora	Fabaceae (Faboideae)	3079	*Trifolium glomeratum*	*	Clustered Clover			8	
Plantae	Flora	Fabaceae (Faboideae)	3080	*Trifolium hirtum*	*	Rose Clover			1	
Plantae	Flora	Fabaceae (Faboideae)	3085	*Trifolium repens*	*	White Clover			7	
Plantae	Flora	Fabaceae (Faboideae)	3086	*Trifolium resupinatum*	*	Shaftal Clover			1	
Plantae	Flora	Fabaceae (Faboideae)	TRIF	*Trifolium spp.*	*	A Clover			5	
Plantae	Flora	Fabaceae (Faboideae)	3089	*Trifolium subterraneum*	*	Subterranean Clover			3	
Plantae	Flora	Fabaceae (Faboideae)	3091	*Trifolium tomentosum*	*	Woolly Clover			10	
Plantae	Flora	Fabaceae (Mimosoideae)	3705	*Acacia aneura*		Mulga			2	
Plantae	Flora	Fabaceae (Mimosoideae)	3710	*Acacia baileyana*		Cootamundra Wattle			1	
Plantae	Flora	Fabaceae (Mimosoideae)	3722	*Acacia brachystachya*		Umbrella Mulga			1	
Plantae	Flora	Fabaceae (Mimosoideae)	3743	*Acacia colletioides*		Wait-a-while			1	
Plantae	Flora	Fabaceae (Mimosoideae)	3761	*Acacia decora*		Western Silver Wattle			1	
Plantae	Flora	Fabaceae (Mimosoideae)	3786	*Acacia hakeoides*		Hakea Wattle			3	

Plantae	Flora	Fabaceae (Mimosoideae)	3791	*Acacia homalophylla*		Yarran	1
Plantae	Flora	Fabaceae (Mimosoideae)	3825	*Acacia melvillei*		Yarran	5
Plantae	Flora	Fabaceae (Mimosoideae)	3843	*Acacia oswaldii*		Miljee	19
Plantae	Flora	Fabaceae (Mimosoideae)	3848	*Acacia pendula*		Weeping Myall, Boree	9
Plantae	Flora	Fabaceae (Mimosoideae)	3872	*Acacia salicina*		Cooba	20
Plantae	Flora	Fabaceae (Mimosoideae)	ACAC	*Acacia spp.*		Wattle	2
Plantae	Flora	Fabaceae (Mimosoideae)	3879	*Acacia stenophylla*		River Cooba	79
Plantae	Flora	Fabaceae (Mimosoideae)	9701	*Acacia victoriae subsp. arida*		Prickly Wattle	1
Plantae	Flora	Frankeniaceae	3115	*Frankenia angustipetala*			1
Plantae	Flora	Frankeniaceae	3116	*Frankenia connata*			6
Plantae	Flora	Frankeniaceae	7040	*Frankenia latior*			1
Plantae	Flora	Frankeniaceae	3121	*Frankenia serpyllifolia*			19
Plantae	Flora	Fumariaceae	7396	*Fumaria capreolata subsp. capreolata*	*	Climbing Fumitory	1
Plantae	Flora	Fumariaceae	3126	*Fumaria densiflora*	*	Narrow-leaved Fumitory	2
Plantae	Flora	Fumariaceae	9367	*Fumaria muralis subsp. muralis*	*	Wall Fumitory	2
Plantae	Flora	Gentianaceae	3133	*Centaurium tenuiflorum*	*	Branched Centaury, Slender centaury	4
Plantae	Flora	Gentianaceae	13834	*Schenkia spicata*		Spike Centaury	6
Plantae	Flora	Geraniaceae	3139	*Erodium botrys*	*	Long Storksbill	2
Plantae	Flora	Geraniaceae	3141	*Erodium cicutarium*	*	Common Crowfoot	141
Plantae	Flora	Geraniaceae	3142	*Erodium crinitum*		Blue Crowfoot	174
Plantae	Flora	Geraniaceae	3144	*Erodium malacoides*	*		5
Plantae	Flora	Geraniaceae	3145	*Erodium moschatum*	*	Musky Crowfoot	10
Plantae	Flora	Geraniaceae	EROI	*Erodium spp.*		Crowfoot	11
Plantae	Flora	Geraniaceae	3156	*Geranium solanderi*		Native Geranium	28
Plantae	Flora	Geraniaceae	8226	*Geranium solanderi var. solanderi*			6
Plantae	Flora	Geraniaceae	GERA	*Geranium spp.*			1
Plantae	Flora	Goodeniaceae	3181	*Goodenia fascicularis*		Mallee Goodenia	139
Plantae	Flora	Goodeniaceae	3183	*Goodenia glauca*		Pale Goodenia	36
Plantae	Flora	Goodeniaceae	3185	*Goodenia gracilis*			1
Plantae	Flora	Goodeniaceae	3189	*Goodenia heteromera*			20
Plantae	Flora	Goodeniaceae	3193	*Goodenia pinnatifida*		Scrambles Eggs	16
Plantae	Flora	Goodeniaceae	3194	*Goodenia pusilliflora*			90
Plantae	Flora	Goodeniaceae	GOOD	*Goodenia spp.*			29
Plantae	Flora	Goodeniaceae	8489	*Goodenia willisiana*			1
Plantae	Flora	Haloragaceae	3249	*Haloragis aspera*		Rough Raspwort	21
Plantae	Flora	Haloragaceae	7455	*Haloragis glauca f. glauca*			47
Plantae	Flora	Haloragaceae	3252	*Haloragis heterophylla*		Variable Raspwort	1
Plantae	Flora	Haloragaceae	7123	*Myriophyllum caput-medusae*		Cat-tail	1
Plantae	Flora	Haloragaceae	6724	*Myriophyllum crispatum*			1

Plantae	Flora	Haloragaceae	7738	*Myriophyllum papillosum*			13
Plantae	Flora	Haloragaceae	3265	*Myriophyllum propinquum*			3
Plantae	Flora	Haloragaceae	MYRI	*Myriophyllum spp.*			4
Plantae	Flora	Haloragaceae	6546	*Myriophyllum verrucosum*		Red Water-milfoil	14
Plantae	Flora	Hypoxidaceae	7493	*Hypoxis glabella var. glabella*		Tiny Star	28
Plantae	Flora	Hypoxidaceae	HYPO	*Hypoxis spp.*			1
Plantae	Flora	Iridaceae	10862	*Moraea setifolia*	*	Thread Iris	2
Plantae	Flora	Iridaceae	3304	*Romulea minutiflora*	*	Small-flowered Onion Grass	1
Plantae	Flora	Iridaceae	7477	*Romulea rosea var. australis*	*	Onion Grass	1
Plantae	Flora	Juncaceae	3313	*Juncus amabilis*			1
Plantae	Flora	Juncaceae	3315	*Juncus aridicola*		Tussock Rush	63
Plantae	Flora	Juncaceae	3318	*Juncus bufonius*	*	Toad Rush	6
Plantae	Flora	Juncaceae	3330	*Juncus flavidus*			47
Plantae	Flora	Juncaceae	3332	*Juncus holoschoenus*			1
Plantae	Flora	Juncaceae	3344	*Juncus radula*			22
Plantae	Flora	Juncaceae	8521	*Juncus remotiflorus*			1
Plantae	Flora	Juncaceae	10310	*Juncus semisolidus*			2
Plantae	Flora	Juncaceae	JUNC	*Juncus spp.*		A Rush	52
Plantae	Flora	Juncaceae	3348	*Juncus subsecundus*		Finger Rush	3
Plantae	Flora	Juncaceae	3350	*Juncus usitatus*			5
Plantae	Flora	Juncaginaceae	3364	*Triglochin calcitrapa*		Spurred Arrowgrass	1
Plantae	Flora	Juncaginaceae	3366	*Triglochin dubia*			1
Plantae	Flora	Juncaginaceae	3368	*Triglochin procera*		Water Ribbons	1
Plantae	Flora	Juncaginaceae	13144	*Triglochin sp. B*			1
Plantae	Flora	Lamiaceae	3371	*Ajuga australis*		Austral Bugle	3
Plantae	Flora	Lamiaceae	3377	*Lamium amplexicaule*	*	Dead Nettle	1
Plantae	Flora	Lamiaceae	3381	*Marrubium vulgare*	*	White Horehound	35
Plantae	Flora	Lamiaceae	3383	*Mentha australis*		River Mint	8
Plantae	Flora	Lamiaceae	3386	*Mentha pulegium*	*	Pennyroyal	1
Plantae	Flora	Lamiaceae	3387	*Mentha satureioides*		Native Pennyroyal	1
Plantae	Flora	Lamiaceae	3427	*Prostanthera rotundifolia*		Round-leaved Mint-bush	1
Plantae	Flora	Lamiaceae	3440	*Prunella vulgaris*	*	Self-heal	1
Plantae	Flora	Lamiaceae	3446	*Salvia verbenaca*	*	Vervain	1
Plantae	Flora	Lamiaceae	3450	*Stachys arvensis*	*	Stagger Weed	2
Plantae	Flora	Lamiaceae	6895	*Teucrium albicaule*			1
Plantae	Flora	Lamiaceae	3452	*Teucrium corymbosum*		Forest Germander	8
Plantae	Flora	Lamiaceae	3453	*Teucrium racemosum*		Grey Germander	55
Plantae	Flora	Linaceae	3583	*Linum marginale*		Native Flax	28
Plantae	Flora	Lobeliaceae	1922	*Pratia concolor*		Poison Pratia	101
Plantae	Flora	Loranthaceae	6394	*Amyema miquelii*		Box Mistletoe	12
Plantae	Flora	Loranthaceae	3607	*Amyema pendula*			3
Plantae	Flora	Loranthaceae	3608	*Amyema preissii*			5
Plantae	Flora	Loranthaceae	7630	*Amyema quandang var. quandang*		Grey Mistletoe	1
Plantae	Flora	Loranthaceae	AMYE	*Amyema spp.*		Mistletoe	1
Plantae	Flora	Loranthaceae	3615	*Lysiana exocarpi*			2
Plantae	Flora	Loranthaceae	8227	*Lysiana exocarpi subsp. exocarpi*			1
Plantae	Flora	Lythraceae	7877	*Ammannia multiflora*		Jerry-jerry	1
Plantae	Flora	Lythraceae	3623	*Lythrum hyssopifolia*		Hyssop Loosestrife	29
Plantae	Flora	Malvaceae	3628	*Abutilon grandifolium*	*		1
Plantae	Flora	Malvaceae	3629	*Abutilon halophilum*			21
Plantae	Flora	Malvaceae	ABUT	*Abutilon spp.*		Lantern-bush	2
Plantae	Flora	Malvaceae	3633	*Abutilon theophrasti*	*		2
Plantae	Flora	Malvaceae	6128	*Brachychiton populneus*		Kurrajong	2
Plantae	Flora	Malvaceae	9445	*Brachychiton populneus subsp. trilobus*			1
Plantae	Flora	Malvaceae	HIBI	*Hibiscus spp.*			1
Plantae	Flora	Malvaceae	3648	*Hibiscus trionum*		Flower-of-an-hour	10

Plantae	Flora	Malvaceae	3657	*Malva parviflora*	*	Small-flowered Mallow			58	
Plantae	Flora	Malvaceae	13837	*Malva preissiana*		Native Hollyhock			69	
Plantae	Flora	Malvaceae	MALV	*Malva spp.*		Mallow			3	
Plantae	Flora	Malvaceae	3660	*Modiola caroliniana*	*	Red-flowered Mallow			2	
Plantae	Flora	Malvaceae	3663	*Sida ammophila*		Sand Sida			3	
Plantae	Flora	Malvaceae	3664	*Sida corrugata*		Corrugated Sida			215	
Plantae	Flora	Malvaceae	3666	*Sida cunninghamii*		Ridge Sida			4	
Plantae	Flora	Malvaceae	6711	*Sida fibulifera*		Pin Sida			9	
Plantae	Flora	Malvaceae	3667	*Sida filiformis*					1	
Plantae	Flora	Malvaceae	3669	*Sida intricata*					55	
Plantae	Flora	Malvaceae	SIDA	*Sida spp.*					7	
Plantae	Flora	Malvaceae	3674	*Sida trichopoda*		High Sida			370	
Plantae	Flora	Marsileaceae	9632	*Marsilea costulifera*					9	
Plantae	Flora	Marsileaceae	8803	*Marsilea drummondii*		Common Nardoo			192	
Plantae	Flora	Marsileaceae	8138	*Marsilea hirsuta*		Short-fruited Nardoo			1	
Plantae	Flora	Marsileaceae	8140	*^^Pilularia novae-hollandiae*		Austral Pillwort	E1,3		K	
Plantae	Flora	Martyniaceae	4654	*Proboscidea louisianica*	*	Purple-flowered Devil's Claw			1	
Plantae	Flora	Menyanthaceae	7725	*Nymphoides crenata*		Wavy Marshwort			1	
Plantae	Flora	Myoporaceae	3942	*Eremophila longifolia*		Emubush			4	
Plantae	Flora	Myoporaceae	3955	*Myoporum montanum*		Western Boobialla			1	
Plantae	Flora	Myoporaceae	3957	*Myoporum platycarpum*		Sugarwood			1	
Plantae	Flora	Myrtaceae	4003	*Callistemon brachyandrus*		Prickly Bottlebrush			2	
Plantae	Flora	Myrtaceae	CALL	*Callistemon spp.*					1	
Plantae	Flora	Myrtaceae	6360	*Eucalyptus camaldulensis*		River Red Gum			199	
Plantae	Flora	Myrtaceae	4083	*Eucalyptus dumosa*		White Mallee			1	
Plantae	Flora	Myrtaceae	4109	*Eucalyptus intertexta*		Gum Coolibah			1	
Plantae	Flora	Myrtaceae	4114	*Eucalyptus largiflorens*		Black Box			192	
Plantae	Flora	Myrtaceae	6961	*Eucalyptus leucoxylon subsp. pruinosa*		Yellow Gum	V		1	
Plantae	Flora	Myrtaceae	4125	*Eucalyptus melliodora*		Yellow Box			1	
Plantae	Flora	Myrtaceae	4181	*Eucalyptus sideroxylon*		Mugga Ironbark			2	
Plantae	Flora	Myrtaceae	EUCA	*Eucalyptus spp.*					1	
Plantae	Flora	Nitrariaceae	6345	*Nitraria billardierei*		Dillon Bush			90	
Plantae	Flora	Nyctaginaceae	6753	*Boerhavia coccinea*		Tarvine			2	
Plantae	Flora	Nyctaginaceae	6841	*Boerhavia dominii*		Tarvine			93	
Plantae	Flora	Nyctaginaceae	BOER	*Boerhavia spp.*					4	
Plantae	Flora	Oleaceae	11424	*Fraxinus spp.*	*				1	
Plantae	Flora	Oleaceae	4324	*Olea europaea*	*	Common Olive			2	
Plantae	Flora	Onagraceae	7952	*Epilobium billardierianum subsp. cinereum*					1	
Plantae	Flora	Onagraceae	4330	*Epilobium hirtigerum*					3	
Plantae	Flora	Onagraceae	4336	*Ludwigia palustris*	*				1	
Plantae	Flora	Onagraceae	7375	*Ludwigia peploides subsp. montevidensis*		Water Primrose			15	
Plantae	Flora	Orchidaceae	6800	*^Caladenia arenaria*		Sand-hill Spider Orchid	E1,P,2	E	K	
Plantae	Flora	Orchidaceae	4447	*Diuris maculata*		Spotted Doubletail	P		1	
Plantae	Flora	Orchidaceae	11197	*^Diuris sp. (Oaklands, D.L. Jones 5380)*		Oaklands Diuris	E1,P,2		K	
Plantae	Flora	Orchidaceae	4457	*^Diuris tricolor*		Pine Donkey Orchid	V,P,2		K	
Plantae	Flora	Orchidaceae	4540	*Pterostylis biseta*		Rustyhood	P		3	
Plantae	Flora	Orchidaceae	PTER	*Pterostylis spp.*		Greenhood	P		1	
Plantae	Flora	Oxalidaceae	4613	*Oxalis corniculata*	*	Creeping Oxalis			12	
Plantae	Flora	Oxalidaceae	4615	*Oxalis exilis*					2	
Plantae	Flora	Oxalidaceae	4621	*Oxalis perennans*					277	
Plantae	Flora	Oxalidaceae	OXAL	*Oxalis spp.*					11	
Plantae	Flora	Papaveraceae	4638	*Papaver hybridum*	*	Rough Poppy			1	
Plantae	Flora	Phormiaceae	8725	*Dianella longifolia var. longifolia*		A Blue Flax Lily			1	
Plantae	Flora	Phormiaceae	10901	*Dianella porracea*					1	
Plantae	Flora	Phormiaceae	3542	*Dianella revoluta*		Blueberry Lily			1	

Plantae	Flora	Phyllanthaceae	2748	*Phyllanthus lacunarius*						1
Plantae	Flora	Pittosporaceae	11202	*Pittosporum angustifolium*		Butterbush				5
Plantae	Flora	Plantaginaceae	4689	*Plantago coronopus*	*	Buck's-horn Plaintain				1
Plantae	Flora	Plantaginaceae	6996	*Plantago coronopus subsp. commutata*	*					1
Plantae	Flora	Plantaginaceae	4690	*Plantago cunninghamii*		Sago-weed				235
Plantae	Flora	Plantaginaceae	4692	*Plantago drummondii*		Dark Sago-weed				37
Plantae	Flora	Plantaginaceae	4694	*Plantago gaudichaudii*		Narrow Plantain				1
Plantae	Flora	Plantaginaceae	4699	*Plantago lanceolata*	*	Lamb's Tongues				1
Plantae	Flora	Plantaginaceae	PLAA	*Plantago spp.*		Plantain				4
Plantae	Flora	Plantaginaceae	4704	*Plantago turrifera*		Small Sago-weed				90
Plantae	Flora	Plantaginaceae	4705	*Plantago varia*						1
Plantae	Flora	Plantaginaceae	6000	*Veronica anagallis-aquatica*	*	Blue Water-speedwell				1
Plantae	Flora	Plantaginaceae	10221	*Veronica catenata*	*	Pink Water-speedwell				1
Plantae	Flora	Plantaginaceae	6007	*Veronica peregrina*	*	Wandering Speedwell				25
Plantae	Flora	Plantaginaceae	13400	*Veronica peregrina subsp. xalapensis*	*					1
Plantae	Flora	Plumbaginaceae	9890	*Limonium lobatum*	*	Winged Sea Lavender				1
Plantae	Flora	Poaceae	6547	*Aira elegantissima*	*	Delicate Hairgrass				2
Plantae	Flora	Poaceae	4735	*Alopecurus geniculatus*	*	Marsh Foxtail				23
Plantae	Flora	Poaceae	4740	*Amphibromus macrorhinus*		Long-nosed Swamp Wallaby-grass				6
Plantae	Flora	Poaceae	6842	*Amphibromus nervosus*		Swamp Wallaby Grass				38
Plantae	Flora	Poaceae	AMPH	*Amphibromus spp.*						2
Plantae	Flora	Poaceae	14896	*Anthosachne scabra*		Wheatgrass, Common Wheatgrass				7
Plantae	Flora	Poaceae	4754	*Aristida behriana*		Bunch Wiregrass				5
Plantae	Flora	Poaceae	7611	*Aristida contorta*		Bunched Kerosene Grass				1
Plantae	Flora	Poaceae	6933	*Aristida jerichoensis var. subspinulifera*		Jericho Wiregrass				1
Plantae	Flora	Poaceae	10384	*Austrostipa aristiglumis*		Plains Grass				16
Plantae	Flora	Poaceae	10373	*Austrostipa drummondii*						1
Plantae	Flora	Poaceae	10367	*Austrostipa elegantissima*		Feather Speargrass				7
Plantae	Flora	Poaceae	10375	*Austrostipa nitida*						14
Plantae	Flora	Poaceae	10376	*Austrostipa nodosa*		A Speargrass				12
Plantae	Flora	Poaceae	10369	*Austrostipa platychaeta*		Flat-awn Speargrass				2
Plantae	Flora	Poaceae	10377	*Austrostipa scabra*		Speargrass				195
Plantae	Flora	Poaceae	10379	*Austrostipa scabra subsp. falcata*		Rough Speargrass				282
Plantae	Flora	Poaceae	10378	*Austrostipa scabra subsp. scabra*		Rough Speargrass				14
Plantae	Flora	Poaceae	AUSO	*Austrostipa spp.*		A Speargrass				21
Plantae	Flora	Poaceae	10368	*Austrostipa tuckeri*		Tucker's Spear-grass				1
Plantae	Flora	Poaceae	10388	*Austrostipa wakoolica*		A spear-grass	E1	E	P	
Plantae	Flora	Poaceae	4779	*Avena barbata*	*	Bearded Oats				3
Plantae	Flora	Poaceae	4780	*Avena fatua*	*	Wild Oats				256
Plantae	Flora	Poaceae	4782	*Avena sativa*	*	Oats				1
Plantae	Flora	Poaceae	AVEN	*Avena spp.*	*	Oats				4
Plantae	Flora	Poaceae	10328	*Bromus alopecuros*	*					2
Plantae	Flora	Poaceae	4804	*Bromus arenarius*		Sand Brome				15
Plantae	Flora	Poaceae	7813	*Bromus catharticus*	*	Praire Grass				7
Plantae	Flora	Poaceae	4806	*Bromus diandrus*	*	Great Brome				25
Plantae	Flora	Poaceae	4807	*Bromus hordeaceus*	*	Soft Brome				2
Plantae	Flora	Poaceae	4810	*Bromus madritensis*	*	Madrid Brome				4

Plantae	Flora	Poaceae	4811	*Bromus molliformis*	*	Soft Brome	10
Plantae	Flora	Poaceae	4813	*Bromus rubens*	*	Red Brome	28
Plantae	Flora	Poaceae	BROM	*Bromus spp.*		A Brome	2
Plantae	Flora	Poaceae	4817	*Bromus sterilis*	*	Sterile Brome	1
Plantae	Flora	Poaceae	14903	*Cenchrus clandestinus*	*	Kikuyu Grass	1
Plantae	Flora	Poaceae	14862	*Cenchrus longisetus*	*	Feathertop, White Foxtail	1
Plantae	Flora	Poaceae	CHLO	*Chloris spp.*			4
Plantae	Flora	Poaceae	4833	*Chloris truncata*		Windmill Grass	281
Plantae	Flora	Poaceae	4834	*Chloris ventricosa*		Tall Chloris	1
Plantae	Flora	Poaceae	6540	*Cynodon dactylon*		Common Couch	22
Plantae	Flora	Poaceae	7178	*Dactyloctenium radulans*		Button Grass	8
Plantae	Flora	Poaceae	7485	*Dichanthium sericeum*		Queensland Bluegrass	1
Plantae	Flora	Poaceae	6857	*Digitaria brownii*		Cotton Panic Grass	2
Plantae	Flora	Poaceae	4920	*Diplachne fusca*		Brown Beetle Grass	7
Plantae	Flora	Poaceae	7897	*Diplachne parviflora*		Small-flowered Beetle Grass	1
Plantae	Flora	Poaceae	7607	*Echinochloa colona*		Awnless Barnyard Grass	1
Plantae	Flora	Poaceae	4923	*Echinochloa crus-galli*	*	Barnyard Grass	2
Plantae	Flora	Poaceae	ECHI	*Echinochloa spp.*			3
Plantae	Flora	Poaceae	4937	*Ehrharta erecta*	*	Panic Veldtgrass	1
Plantae	Flora	Poaceae	4938	*Ehrharta longiflora*	*	Annual Veldtgrass	4
Plantae	Flora	Poaceae	7196	*Eleusine indica*	*	Crowsfoot Grass	1
Plantae	Flora	Poaceae	13430	*Elymus rectisetus*			1
Plantae	Flora	Poaceae	6720	*Enneapogon avenaceus*		Bottle Washers	3
Plantae	Flora	Poaceae	4941	*Enneapogon cylindricus*		Jointed Nineawn	1
Plantae	Flora	Poaceae	4945	*Enneapogon nigricans*		Niggerheads	2
Plantae	Flora	Poaceae	ENNE	*Enneapogon spp.*		Nineawn Grass, Bottlewashers	3
Plantae	Flora	Poaceae	6721	*Enteropogon acicularis*		Curly Windmill Grass	199
Plantae	Flora	Poaceae	6722	*Enteropogon ramosus*		Curly Windmill Grass	9
Plantae	Flora	Poaceae	ENTE	*Enteropogon spp.*		Windmill Grass	1
Plantae	Flora	Poaceae	4949	*Eragrostis australasica*		Canegrass	126
Plantae	Flora	Poaceae	6387	*Eragrostis cilianensis*	*	Stinkgrass	4
Plantae	Flora	Poaceae	4952	*Eragrostis curvula*	*	African Lovegrass	1
Plantae	Flora	Poaceae	4954	*Eragrostis dielsii*		Mallee Lovegrass	2
Plantae	Flora	Poaceae	4955	*Eragrostis elongata*		Clustered Lovegrass	1
Plantae	Flora	Poaceae	4958	*Eragrostis lacunaria*		Purple Lovegrass	15
Plantae	Flora	Poaceae	4967	*Eragrostis parviflora*		Weeping Lovegrass	12
Plantae	Flora	Poaceae	6378	*Eragrostis setifolia*		Neverfail	6
Plantae	Flora	Poaceae	ERAG	*Eragrostis spp.*		A Lovegrass	2
Plantae	Flora	Poaceae	4983	*Eriochloa crebra*		Cup Grass, Tall Cupgrass	4
Plantae	Flora	Poaceae	7335	*Eriochloa pseudoacrotricha*		Early Spring Grass	17
Plantae	Flora	Poaceae	4996	*Glyceria australis*		Australian Sweetgrass	1
Plantae	Flora	Poaceae	5000	*Hainardia cylindrica*	*	Common Barbgrass	3
Plantae	Flora	Poaceae	5010	*Hordeum glaucum*	*	Northern Barley Grass	8
Plantae	Flora	Poaceae	5011	*Hordeum hystrix*	*	Mediterranean Barley Grass	3
Plantae	Flora	Poaceae	5012	*Hordeum leporinum*	*	Barley Grass	457
Plantae	Flora	Poaceae	5013	*Hordeum marinum*	*	Sea Barley Grass	18
Plantae	Flora	Poaceae	HORD	*Hordeum spp.*	*	A Barley Grass	57
Plantae	Flora	Poaceae	5019	*Iseilema membranaceum*		Small Flinders Grass	1
Plantae	Flora	Poaceae	11388	*Lachnagrostis filiformis*			117
Plantae	Flora	Poaceae	LACH	*Lachnagrostis spp.*			2
Plantae	Flora	Poaceae	5023	*Lamarckia aurea*	*	Goldentop	33
Plantae	Flora	Poaceae	7726	*Leptochloa digitata*		Umbrella Canegrass	1
Plantae	Flora	Poaceae	5030	*Lolium loliaceum*	*	Stiff Ryegrass	4
Plantae	Flora	Poaceae	5032	*Lolium perenne*	*	Perennial Ryegrass	432
Plantae	Flora	Poaceae	5033	*Lolium rigidum*	*	Wimmera Ryegrass	277
Plantae	Flora	Poaceae	LOLI	*Lolium spp.*	*	A Ryegrass	3
Plantae	Flora	Poaceae	5037	*Microlaena stipoides*		Weeping Grass	1
Plantae	Flora	Poaceae	5054	*Panicum coloratum*	*	Coolah Grass	2
Plantae	Flora	Poaceae	6395	*Panicum decompositum*		Native Millet	20
Plantae	Flora	Poaceae	5055	*Panicum effusum*		Hairy Panic	3
Plantae	Flora	Poaceae	7773	*Panicum laevinode*		Pepper Grass	6

Plantae	Flora	Poaceae	5064	*Panicum queenslandicum*		Yadbila Grass	10
Plantae	Flora	Poaceae	9331	*Panicum queenslandicum var. queenslandicum*		Yabila Grass	1
Plantae	Flora	Poaceae	5066	*Panicum simile*		Two-colour Panic	1
Plantae	Flora	Poaceae	PANI	*Panicum spp.*		Panicum	6
Plantae	Flora	Poaceae	5070	*Parapholis incurva*	*	Coast Barb Grass	19
Plantae	Flora	Poaceae	5077	*Paspalidium constrictum*		Knottybutt Grass	2
Plantae	Flora	Poaceae	5082	*Paspalidium jubiflorum*		Warrego Grass	99
Plantae	Flora	Poaceae	5086	*Paspalum dilatatum*	*	Paspalum	2
Plantae	Flora	Poaceae	5087	*Paspalum distichum*		Water Couch	6
Plantae	Flora	Poaceae	PASP	*Paspalum spp.*			1
Plantae	Flora	Poaceae	5102	*Pentaschistis airoides*	*	False Hairgrass	7
Plantae	Flora	Poaceae	5106	*Phalaris aquatica*	*	Phalaris	6
Plantae	Flora	Poaceae	5108	*Phalaris canariensis*	*	Canary Grass	2
Plantae	Flora	Poaceae	5110	*Phalaris minor*	*	Lesser Canary Grass	16
Plantae	Flora	Poaceae	5111	*Phalaris paradoxa*	*	Paradoxa Grass	73
Plantae	Flora	Poaceae	PHAA	*Phalaris spp.*	*		3
Plantae	Flora	Poaceae	5112	*Phleum pratense*	*	Timothy	2
Plantae	Flora	Poaceae	5113	*Phragmites australis*		Common Reed	6
Plantae	Flora	Poaceae	5129	*Poa fordeana*		Sweet Swamp-grass	71
Plantae	Flora	Poaceae	11196	*Poa labillardierei var. labillardierei*		Tussock	12
Plantae	Flora	Poaceae	POAC	*Poaceae indeterminate*	*	Grasses, reeds and bamboos	3
Plantae	Flora	Poaceae	5145	*Polypogon monspeliensis*	*	Annual Beardgrass	5
Plantae	Flora	Poaceae	POLP	*Polypogon spp.*	*		1
Plantae	Flora	Poaceae	5148	*Pseudoraphis spinescens*		Spiny Mudgrass	3
Plantae	Flora	Poaceae	5151	*Puccinellia stricta*		Australian Saltmarsh Grass	1
Plantae	Flora	Poaceae	7878	*Rostraria cristata*	*	Annual Cat's Tail	1
Plantae	Flora	Poaceae	7857	*Rostraria pumila*	*	Roughtail	2
Plantae	Flora	Poaceae	14303	*Rytidosperma auriculatum*		Lobed Wallaby Grass	1
Plantae	Flora	Poaceae	14304	*Rytidosperma bipartitum*		Wallaby Grass	1
Plantae	Flora	Poaceae	14305	*Rytidosperma caespitosum*		Ringed Wallaby Grass	418
Plantae	Flora	Poaceae	14307	*Rytidosperma duttonianum*		Brown-back Wallaby Grass	1
Plantae	Flora	Poaceae	14308	*Rytidosperma erianthum*		Wallaby Grass	11
Plantae	Flora	Poaceae	14309	*Rytidosperma fulvum*		Wallaby Grass	6
Plantae	Flora	Poaceae	14322	*Rytidosperma setaceum*		Small-flowered Wallaby-grass	302
Plantae	Flora	Poaceae	RYTI	*Rytidosperma spp.*			16
Plantae	Flora	Poaceae	5156	*Schismus barbatus*	*	Arabian Grass	40
Plantae	Flora	Poaceae	13468	*Setaria parviflora*	*		2
Plantae	Flora	Poaceae	5169	*Setaria verticillata*	*	Whorled Pigeon Grass	1
Plantae	Flora	Poaceae	5177	*Sporobolus caroli*		Fairy Grass	311
Plantae	Flora	Poaceae	5182	*Sporobolus mitchellii*		Rat's Tail Couch	6
Plantae	Flora	Poaceae	SPOR	*Sporobolus spp.*		Rat's Tail Couch	1
Plantae	Flora	Poaceae	14048	*Thinopyrum ponticum*	*	Tall Wheat Grass	1
Plantae	Flora	Poaceae	5224	*Tragus australianus*		Small Burrgrass	4
Plantae	Flora	Poaceae	5229	*Tripogon loliiformis*		Fiveminute Grass	2
Plantae	Flora	Poaceae	5234	*Triticum aestivum*	*	Wheat	1
Plantae	Flora	Poaceae	TRIM	*Triticum spp.*	*		1
Plantae	Flora	Poaceae	5239	*Vulpia bromoides*	*	Squirrel Tail Fesque	12
Plantae	Flora	Poaceae	8516	*Vulpia muralis*	*	Wall Fescue	93
Plantae	Flora	Poaceae	5242	*Vulpia myuros*	*	Rat's Tail Fescue	88
Plantae	Flora	Poaceae	VULP	*Vulpia spp.*	*	Rat's-tail Fescue	29
Plantae	Flora	Poaceae	13475	*Walwhalleya proluta*			246
Plantae	Flora	Polygonaceae	5264	*Acetosa vesicaria*	*	Bladder Dock	1
Plantae	Flora	Polygonaceae	14542	*Duma florulenta*		Lignum	283
Plantae	Flora	Polygonaceae	14544	*Duma horrida subsp. horrida*			1
Plantae	Flora	Polygonaceae	5266	*Emex australis*	*	Spiny Emex	2
Plantae	Flora	Polygonaceae	MUEH	*Muehlenbeckia spp.*			1

Plantae	Flora	Polygonaceae	7568	*Persicaria decipiens*		Slender Knotweed		8	
Plantae	Flora	Polygonaceae	5281	*Persicaria hydropiper*		Water Pepper		4	
Plantae	Flora	Polygonaceae	5282	*Persicaria lapathifolia*		Pale Knotweed		2	
Plantae	Flora	Polygonaceae	5284	*Persicaria orientalis*		Princes Feathers		1	
Plantae	Flora	Polygonaceae	5285	*Persicaria prostrata*		Creeping Knotweed		8	
Plantae	Flora	Polygonaceae	PERC	*Persicaria spp.*		Knotweed		1	
Plantae	Flora	Polygonaceae	5287	*Polygonum arenastrum*	*	Wireweed		4	
Plantae	Flora	Polygonaceae	5288	*Polygonum aviculare*	*	Wireweed		37	
Plantae	Flora	Polygonaceae	5291	*Polygonum plebeium*		Small Knotweed		4	
Plantae	Flora	Polygonaceae	POLG	*Polygonum spp.*				2	
Plantae	Flora	Polygonaceae	5296	*Rumex brownii*		Swamp Dock		14	
Plantae	Flora	Polygonaceae	5298	*Rumex crispus*	*	Curled Dock		16	
Plantae	Flora	Polygonaceae	5299	*Rumex crystallinus*		Shiny Dock		18	
Plantae	Flora	Polygonaceae	5300	*Rumex dumosus*		Wiry Dock		4	
Plantae	Flora	Polygonaceae	RUME	*Rumex spp.*		Dock		14	
Plantae	Flora	Polygonaceae	7277	*Rumex stenoglottis*				1	
Plantae	Flora	Polygonaceae	5304	*Rumex tenax*		Shiny Dock		108	
Plantae	Flora	Portulacaceae	5311	*Calandrinia eremaea*		Small Purslane		55	
Plantae	Flora	Portulacaceae	CALN	*Calandrinia spp.*		A Purslane		1	
Plantae	Flora	Portulacaceae	5317	*Calandrinia volubilis*				13	
Plantae	Flora	Portulacaceae	5324	*Portulaca oleracea*		Pigweed		11	
Plantae	Flora	Potamogetonaceae	7023	*Potamogeton tricarinatus*		Floating Pondweed		4	
Plantae	Flora	Proteaceae	13501	*Grevillea ilicifolia subsp. ilicifolia*		Holly-leaf Grevillea	E4A	P	
Plantae	Flora	Proteaceae	5404	*Grevillea striata*		Beefwood		1	
Plantae	Flora	Proteaceae	5417	*Hakea leucoptera*		Needlewood		1	
Plantae	Flora	Proteaceae	9758	*Hakea leucoptera subsp. leucoptera*				1	
Plantae	Flora	Proteaceae	HAKE	*Hakea spp.*				1	
Plantae	Flora	Proteaceae	5426	*Hakea tephrosperma*		Hooked Needlewood		5	
Plantae	Flora	Ranunculaceae	13523	*Myosurus australis*		Mousetail		12	
Plantae	Flora	Ranunculaceae	5507	*Ranunculus inundatus*		River Buttercup		4	
Plantae	Flora	Ranunculaceae	5508	*Ranunculus lappaceus*		Common Buttercup		14	
Plantae	Flora	Ranunculaceae	5511	*Ranunculus muricatus*	*	Sharp Buttercup		1	
Plantae	Flora	Ranunculaceae	5516	*Ranunculus pentandrus*				6	
Plantae	Flora	Ranunculaceae	12097	*Ranunculus pentandrus var. platycarpus*				23	
Plantae	Flora	Ranunculaceae	8810	*Ranunculus pumilio var. pumilio*				2	
Plantae	Flora	Ranunculaceae	5525	*Ranunculus sessiliflorus*		Small-flowered Buttercup		9	
Plantae	Flora	Ranunculaceae	9640	*Ranunculus sessiliflorus var. pilulifer*		Common Buttercup		18	
Plantae	Flora	Ranunculaceae	RANU	*Ranunculus spp.*				8	
Plantae	Flora	Ranunculaceae	5527	*Ranunculus trilobus*	*			1	
Plantae	Flora	Ranunculaceae	5528	*Ranunculus undosus*		Swamp Buttercup		26	
Plantae	Flora	Rosaceae	5635	*Rosa rubiginosa*	*	Sweet Briar		1	
Plantae	Flora	Rosaceae	ROSA	*Rosa spp.*	*			1	
Plantae	Flora	Rubiaceae	5653	*Asperula conferta*		Common Woodruff		38	
Plantae	Flora	Rubiaceae	10203	*Asperula gemella*		Twin-leaved Bedstraw		82	
Plantae	Flora	Rubiaceae	5679	*Galium aparine*	*	Goosegrass		11	
Plantae	Flora	Rubiaceae	5684	*Galium gaudichaudii*		Rough Bedstraw		6	
Plantae	Flora	Rubiaceae	5687	*Galium murale*	*	Small Bedstraw		4	
Plantae	Flora	Rubiaceae	GALI	*Galium spp.*				13	
Plantae	Flora	Rubiaceae	14630	*Galium spurium*	*			1	
Plantae	Flora	Rubiaceae	5711	*Richardia brasiliensis*	*	Mexican Clover		1	
Plantae	Flora	Rubiaceae	RUBIC	*Rubiaceae indeterminate*	*	Woodruffs, currants, bedstraws and coffee		1	
Plantae	Flora	Rutaceae	5800	*Geijera parviflora*		Wilga		2	
Plantae	Flora	Salicaceae	5851	*Salix babylonica*	*	Weeping Willow		5	

Plantae	Flora	Santalaceae	5868	*Santalum acuminatum*		Sweet Quandong			3	
Plantae	Flora	Santalaceae	6384	*Santalum lanceolatum*		Northern Sandalwood			2	
Plantae	Flora	Sapindaceae	7015	*Alectryon oleifolius*		Western Rosewood			17	
Plantae	Flora	Sapindaceae	7067	*Dodonaea sinuolata subsp. acrodentata*		A Hopbush	E1		P	
Plantae	Flora	Sapindaceae	7830	*Dodonaea viscosa subsp. angustissima*		Narrow-leaf Hop-bush			5	
Plantae	Flora	Scrophulariaceae	5966	*Gratiola pedunculata*					3	
Plantae	Flora	Scrophulariaceae	7558	*Kickxia elatine subsp. crinita*	*	Twining Toadflax			1	
Plantae	Flora	Scrophulariaceae	5972	*Limosella australis*		Australian Mudwort			3	
Plantae	Flora	Scrophulariaceae	5973	*Limosella curdieana*		Large Mudwort			7	
Plantae	Flora	Scrophulariaceae	5974	*Linaria arvensis*	*				1	
Plantae	Flora	Scrophulariaceae	5978	*Linaria pelisseriana*	*	Pelisser's Toadflax			1	
Plantae	Flora	Scrophulariaceae	5982	*Mimulus gracilis*		Slender Monkey-flower			20	
Plantae	Flora	Scrophulariaceae	5985	*Mimulus prostratus*		Small Monkey-flower			1	
Plantae	Flora	Scrophulariaceae	9288	*Stemodia florulenta*		Bluerod			4	
Plantae	Flora	Scrophulariaceae	VERB	*Verbascum spp.*	*				3	
Plantae	Flora	Scrophulariaceae	5999	*Verbascum virgatum*	*	Twiggy Mullein			1	
Plantae	Flora	Solanaceae	6038	*Lycium australe*		Australian Boxthorn			3	
Plantae	Flora	Solanaceae	6040	*Lycium ferocissimum*	*	African Boxthorn			117	
Plantae	Flora	Solanaceae	LYCI	*Lycium spp.*					1	
Plantae	Flora	Solanaceae	6050	*Nicotiana suaveolens*		Native Tobacco			2	
Plantae	Flora	Solanaceae	PHYS	*Physalis spp.*					1	
Plantae	Flora	Solanaceae	7043	*Solanum americanum*		Glossy Nightshade			2	
Plantae	Flora	Solanaceae	6081	*Solanum esuriale*		Quena			168	
Plantae	Flora	Solanaceae	6086	*Solanum karsense*		Menindee Nightshade	V	V	1	
Plantae	Flora	Solanaceae	6091	*Solanum nigrum*	*	Black-berry Nightshade			28	
Plantae	Flora	Solanaceae	6103	*Solanum rostratum*	*	Pincushion Nightshade			3	
Plantae	Flora	Typhaceae	7224	*Typha domingensis*		Narrow-leaved Cumbungi			6	
Plantae	Flora	Typhaceae	6217	*Typha orientalis*		Broad-leaved Cumbungi			12	
Plantae	Flora	Typhaceae	TYPH	*Typha spp.*					3	
Plantae	Flora	Urticaceae	6231	*Parietaria debilis*		Native Pellitory			9	
Plantae	Flora	Urticaceae	6237	*Urtica incisa*		Stinging Nettle			1	
Plantae	Flora	Urticaceae	6238	*Urtica urens*	*	Small Nettle			6	
Plantae	Flora	Verbenaceae	11134	*Phyla canescens*	*	Lippia			8	
Plantae	Flora	Verbenaceae	6252	*Phyla nodiflora*	*	Carpet Weed			27	
Plantae	Flora	Verbenaceae	11187	*Verbena africana*	*				1	
Plantae	Flora	Verbenaceae	10717	*Verbena gaudichaudii*		Verbena			2	
Plantae	Flora	Verbenaceae	6259	*Verbena officinalis*	*	Common Verbena			14	
Plantae	Flora	Verbenaceae	VERE	*Verbena spp.*					1	
Plantae	Flora	Verbenaceae	6261	*Verbena supina*	*	Trailing Verbena			6	
Plantae	Flora	Zygophyllaceae	TRIB	*Tribulus spp.*		Cat-head, Caltrop			2	
Plantae	Flora	Zygophyllaceae	7655	*Tribulus terrestris*	*	Cat-head			31	
Plantae	Flora	Zygophyllaceae	6349	*Zygophyllum ammophilum*		Sand Twinleaf			22	
Plantae	Flora	Zygophyllaceae	6350	*Zygophyllum apiculatum*		Common Twinleaf			1	
Plantae	Flora	Zygophyllaceae	6352	*Zygophyllum crenatum*		Lobed Twinleaf			1	
Plantae	Flora	Zygophyllaceae	6354	*Zygophyllum glaucum*		Pale Twinleaf			14	
Plantae	Flora	Zygophyllaceae	6357	*Zygophyllum iodocarpum*		Violet Twinleaf			28	
Plantae	Flora	Zygophyllaceae	ZYGO	*Zygophyllum spp.*					29	
Community				*Acacia loderi shrublands*		Acacia loderi shrublands	E3		P	

Community	*Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions*	Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	E3		K
Community	*Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions*	Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions	E3	E	K
Community	*Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions*	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	E3	E	K
Community	*Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions*	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	E3	E	K
Community	*Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions*	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	E3		K
Threat	*Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands*	Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	KTP		P
Threat	*Anthropogenic Climate Change*	Anthropogenic Climate Change	KTP	KTP	P
Threat	*Bushrock removal*	Bushrock removal	KTP		P
Threat	*Clearing of native vegetation*	Clearing of native vegetation	KTP	KTP	P
Threat	*Competition and grazing by the feral European Rabbit, Oryctolagus cuniculus (L.)*	Competition and grazing by the feral European Rabbit, Oryctolagus cuniculus (L.)	KTP	KTP	P
Threat	*Competition and habitat degradation by Feral Goats, Capra hircus Linnaeus 1758*	Competition and habitat degradation by Feral Goats, Capra hircus Linnaeus 1758	KTP	KTP	P
Threat	*Competition from feral honey bees, Apis mellifera L.*	Competition from feral honey bees, Apis mellifera L.	KTP		P
Threat	*Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners*	Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	KTP		P
Threat	*Herbivory and environmental degradation caused by feral deer*	Herbivory and environmental degradation caused by feral deer	KTP		P
Threat	*High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition*	High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	KTP		P

Threat	*Importation of Red Imported Fire Ants Solenopsis invicta Buren 1972*	Importation of Red Imported Fire Ants Solenopsis invicta Buren 1972	KTP	KTP	P	
Threat	*Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations*	Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations	KTP	KTP	P	
Threat	*Infection of frogs by amphibian chytrid causing the disease chytridiomycosis*	Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	KTP	KTP	P	
Threat	*Infection of native plants by Phytophthora cinnamomi*	Infection of native plants by Phytophthora cinnamomi	KTP	KTP	P	
Threat	*Introduction of the Large Earth Bumblebee Bombus terrestris (L.)*	Introduction of the Large Earth Bumblebee Bombus terrestris (L.)	KTP		P	
Threat	*Invasion and establishment of exotic vines and scramblers*	Invasion and establishment of exotic vines and scramblers	KTP		P	
Threat	*Invasion and establishment of Scotch Broom (Cytisus scoparius)*	Invasion and establishment of Scotch Broom (Cytisus scoparius)	KTP		P	
Threat	*Invasion and establishment of the Cane Toad (Bufo marinus)*	Invasion and establishment of the Cane Toad (Bufo marinus)	KTP	KTP	P	
Threat	*Invasion of native plant communities by African Olive Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif.*	Invasion of native plant communities by African Olive Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif.	KTP		P	
Threat	*Invasion of native plant communities by Chrysanthemoides monilifera*	Invasion of native plant communities by Chrysanthemoides monilifera	KTP		P	
Threat	*Invasion of native plant communities by exotic perennial grasses*	Invasion of native plant communities by exotic perennial grasses	KTP		P	
Threat	*Invasion of the Yellow Crazy Ant, Anoplolepis gracilipes (Fr. Smith) into NSW*	Invasion of the Yellow Crazy Ant, Anoplolepis gracilipes (Fr. Smith) into NSW	KTP		P	
Threat	*Invasion, establishment and spread of Lantana (Lantana camara L. sens. Lat)*	Invasion, establishment and spread of Lantana (Lantana camara L. sens. Lat)	KTP		P	
Threat	*Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants*	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	KTP	KTP	P	
Threat	*Loss of Hollow-bearing Trees*	Loss of Hollow-bearing Trees	KTP		P	
Threat	*Loss or degradation (or both) of sites used for hill-topping by butterflies*	Loss or degradation (or both) of sites used for hill-topping by butterflies	KTP		P	
Threat	*Predation and hybridisation by Feral Dogs, Canis lupus familiaris*	Predation and hybridisation by Feral Dogs, Canis lupus familiaris	KTP		P	

Threat	*Predation by Gambusia holbrooki Girard, 1859 (Plague Minnow or Mosquito Fish)*	Predation by Gambusia holbrooki Girard, 1859 (Plague Minnow or Mosquito Fish)	KTP		P	
Threat	*Predation by the European Red Fox Vulpes Vulpes (Linnaeus, 1758)*	Predation by the European Red Fox Vulpes Vulpes (Linnaeus, 1758)	KTP	KTP	P	
Threat	*Predation by the Feral Cat Felis catus (Linnaeus, 1758)*	Predation by the Feral Cat Felis catus (Linnaeus, 1758)	KTP	KTP	P	
Threat	*Predation, habitat degradation, competition and disease transmission by Feral Pigs, Sus scrofa Linnaeus 1758*	Predation, habitat degradation, competition and disease transmission by Feral Pigs, Sus scrofa Linnaeus 1758	KTP	KTP	P	
Threat	*Removal of dead wood and dead trees*	Removal of dead wood and dead trees	KTP		P	

EPBC Act Protected Matters Report

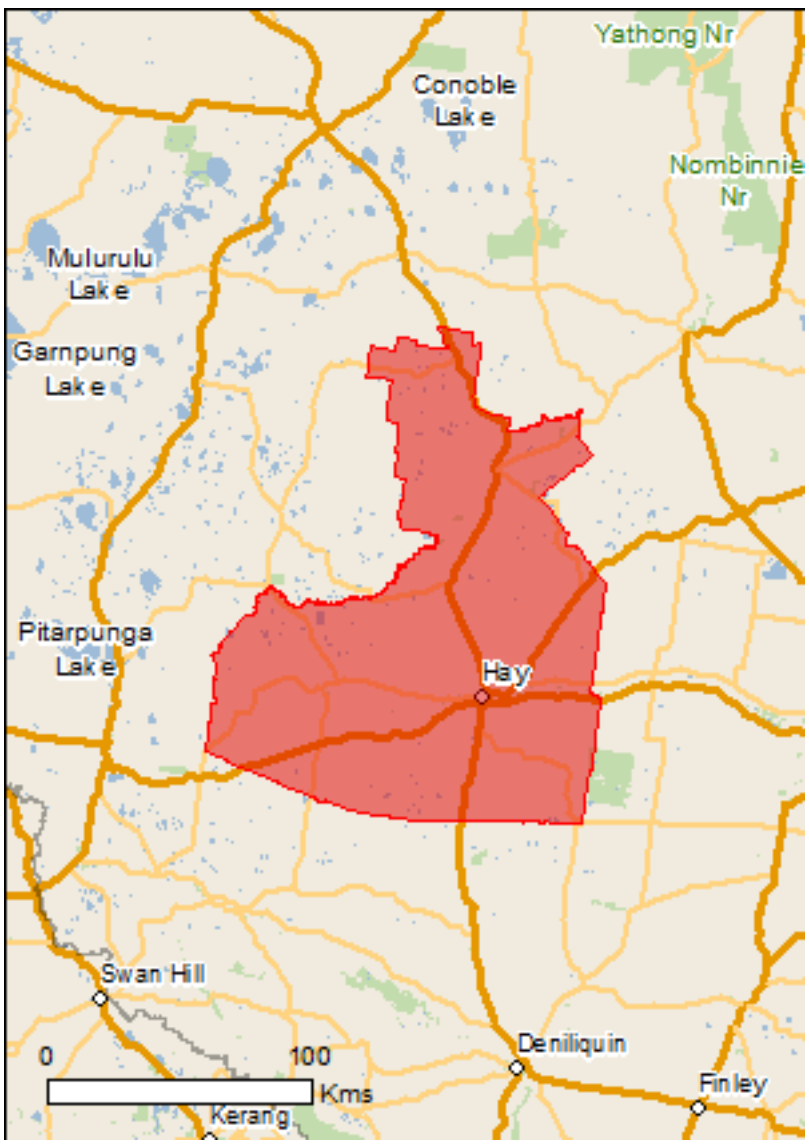
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

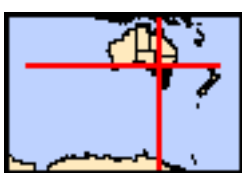
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

LGA HAY SHIRE COUNCIL, NSW

Report created: 08/02/19 13:02:07





Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Threatened Ecological Communities:	3
Threatened Species:	25
Migratory Species:	10

Other Matters Protected by the EPBC Act

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

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

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits-and-application-forms

Commonwealth Lands:	7
Commonwealth Heritage Places:	1
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	9
Regional Forest Agreements:	None
Invasive Species:	26
Nationally Important Wetlands:	5

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	300 - 400km upstream
Hattah-kulkyne lakes	100 - 150km upstream
Riverland	200 - 300km upstream
The coorong, and lakes alexandrina and albert wetland	400 - 500km upstream

Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Threatened Species [Resource Information]

Name	Status	Type of Presence
BIRDS		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
FISH		

Name	Status	Type of Presence
Galaxias rostratus		
Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Maccullochella macquariensis		
Trout Cod [26171]	Endangered	Species or species habitat may occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
FROGS		
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
MAMMALS		
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
PLANTS		
Austrostipa metatoris		
[66704]	Vulnerable	Species or species habitat may occur within area
Austrostipa wakoolica		
[66623]	Endangered	Species or species habitat may occur within area
Brachyscome papillosa		
Mossgiel Daisy [6625]	Vulnerable	Species or species habitat known to occur within area
Eleocharis obicis		
a spike rush [15320]	Vulnerable	Species or species habitat likely to occur within area
Lepidium monoplocoides		
Winged Pepper-cress [9190]	Endangered	Species or species habitat likely to occur within area
Maireana cheelii		
Chariot Wheels [8008]	Vulnerable	Species or species habitat likely to occur within area
Solanum karsense		
Menindee Nightshade [7776]	Vulnerable	Species or species habitat known to occur within area
Swainsona murrayana		
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area

Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Name
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Commonwealth Bank of Australia
Commonwealth Land - Commonwealth Trading Bank of Australia
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Telstra Corporation Limited

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Hay Post Office	NSW	Listed place

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Breeding known to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
[Chrysococcyx osculans](#) Black-eared Cuckoo [705]		Species or species habitat known to occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat may occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Kalyarr	NSW
Lachlan Valley	NSW
Lachlan Valley	NSW
Lachlan Valley	NSW
Murrumbidgee Valley	NSW
Murrumbidgee Valley	NSW
Oolambeyan	NSW
Thelangerin	NSW
Toogimbie	NSW

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Booligal Wetlands	NSW
Great Cumbungi Swamp	NSW
Lachlan Swamp (Part of mid Lachlan Wetlands)	NSW
Lake Merrimajeel/Murrumbidgil Swamp	NSW
Lowbidgee Floodplain	NSW

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Acknowledgements

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

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

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

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

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

ATTACHMENT C

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 0119

Client Service ID : 396964

Zenith Town Planning

P O Box 591
Moruya New South Wales 2537

Attention: Allen Grimwood

Email: zenithplan@bigpond.com

Date: 06 February 2019

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 110, DP:DP1187931 with a Buffer of 0 meters, conducted by Allen Grimwood on 06 February 2019.

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

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

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

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

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

Important information about your AHIMS search

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

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

ATTACHMENT D

FORGESOLAR GLARE ANALYSIS

Project: **Hay 1A**
Proposed 5MW solar facility

Site configuration: **Hay 1A**
Analysis conducted by at 03:49 on 23 Dec, 2018.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	N/A	No flight paths analyzed
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 23841.4187

PV Array(s)

Name: Main PV Array
Axis tracking: Single-axis rotation
Tracking axis orientation: 0.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.36 kW
Panel material: Light textured glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-34.495748	144.858781	92.81	2.90	95.71
2	-34.500275	144.858116	90.75	2.90	93.65
3	-34.498861	144.861163	90.78	2.90	93.68
4	-34.494546	144.861613	91.68	2.90	94.58

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (m)	Height (m)
OP 1	1	-34.504166	144.872442	92.73	1.50
OP 2	2	-34.501831	144.873472	91.30	1.50
OP 3	3	-34.500155	144.874674	91.98	1.50
OP 4	4	-34.496176	144.873816	91.73	1.50
OP 5	5	-34.492176	144.868880	92.93	1.50
OP 6	6	-34.492547	144.860984	93.19	1.50
OP 7	7	-34.491964	144.863559	93.00	1.50
OP 8	8	-34.493820	144.857830	91.36	1.50
OP 9	9	-34.495218	144.856778	91.98	1.50
OP 10	10	-34.497039	144.851242	91.04	1.50
OP 11	11	-34.500205	144.852100	93.96	1.50
OP 12	12	-34.500806	144.852508	94.58	1.50
OP 13	13	-34.501372	144.858473	90.18	1.50
OP 14	14	-34.501336	144.857336	90.44	1.50
OP 15	15	-34.500881	144.853914	92.39	1.50
OP 16	16	-34.502190	144.857063	89.97	1.50
OP 17	17	-34.502176	144.856682	91.15	1.50
OP 18	18	-34.502128	144.856424	91.63	1.50
OP 19	19	-34.502110	144.856199	92.12	1.50
OP 20	20	-34.502092	144.855936	92.48	1.50
OP 21	21	-34.502070	144.855716	92.69	1.50
OP 22	22	-34.502039	144.855324	93.11	1.50
OP 23	23	-34.501911	144.854783	93.89	1.50
OP 24	24	-34.501911	144.854552	93.68	1.50
OP 25	25	-34.501893	144.854343	93.40	1.50
OP 26	26	-34.501858	144.854101	93.07	1.50
OP 27	27	-34.501809	144.853871	93.03	1.50
OP 28	28	-34.501774	144.853645	93.09	1.50

Route Receptor(s)

Name: Bourke Street
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-34.504700	144.857057	91.93	1.65	93.58
2	-34.500579	144.857722	91.54	1.65	93.19

Name: Mid Western Highway
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-34.501358	144.853109	94.12	1.65	95.77
2	-34.501304	144.853989	93.07	1.65	94.72
3	-34.500827	144.856918	91.09	1.65	92.74
4	-34.500588	144.857937	91.21	1.65	92.86
5	-34.498015	144.863816	91.62	1.65	93.27
6	-34.497449	144.864782	92.17	1.65	93.82
7	-34.495964	144.866756	91.00	1.65	92.65

Name: Murray Street
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-34.501446	144.852744	94.53	1.65	96.18
2	-34.503126	144.866842	91.24	1.65	92.89

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
Main PV Array	SA tracking	SA tracking	0	0	1,137.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 28	0	0
Bourke Street	0	0
Mid Western Highway	0	0
Murray Street	0	0

Results for: Main PV Array

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
Bourke Street	0	0
Mid Western Highway	0	0
Murray Street	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Route: Bourke Street

0 minutes of yellow glare

0 minutes of green glare

Route: Mid Western Highway

0 minutes of yellow glare
0 minutes of green glare

Route: Murray Street

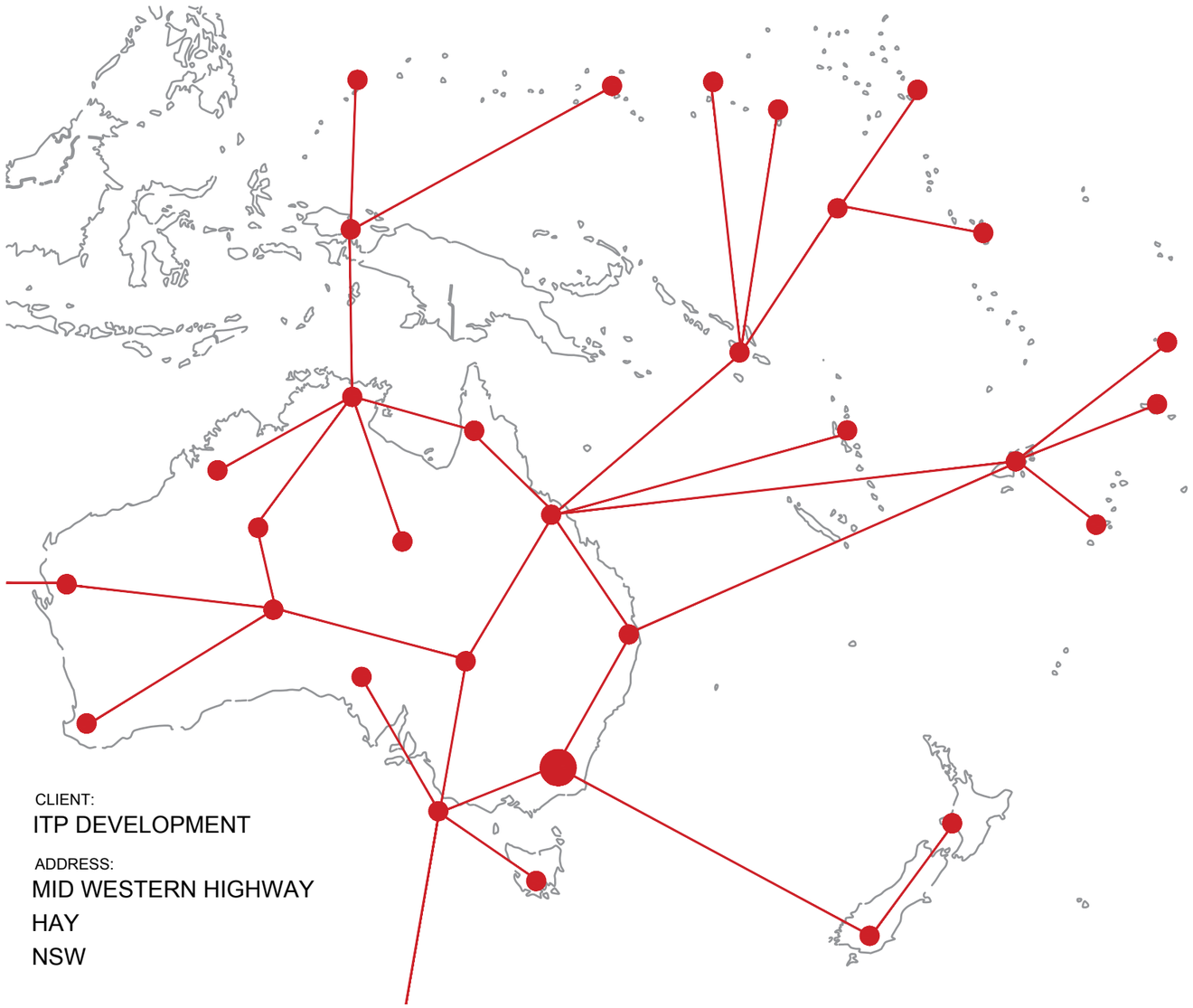
0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

HAY 1A

A000 - **DEVELOPMENT APPLICATION**



CLIENT:
ITP DEVELOPMENT

ADDRESS:
MID WESTERN HIGHWAY
HAY
NSW

SHEET LIST	
Sheet Number	**Sheet Title**
G-010	MAIN TITLE SHEET
G-040	LOCATION PLAN
G-211	GENERAL ARRANGEMENT PLAN
C-130	SITE ELEVATION
C-430	INVERTER STATION FOOTING DETAILS
C-530	FENCING DETAIL
C-630	ACCESS R0AD PLAN
C-631	ACCESS ROAD SECTION
E-310	ARRAY LAYOUT
E-341	ARRAY DETAIL
E-430	INVERTER STATION DETAILS

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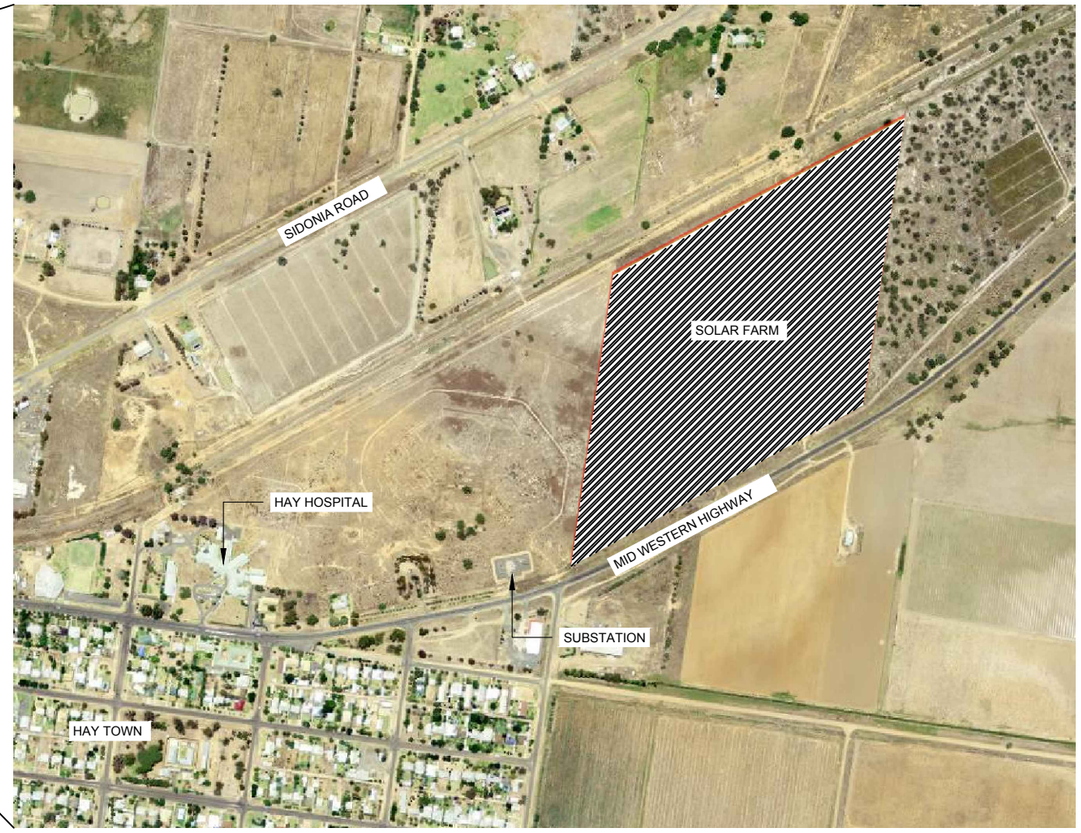
IT Power (Australia)

1 - LOCATION MAP

SCALE: 1:100,000

0 100m 200m



2 - LOCATION PLAN

SCALE: 1:10,000

0 10m 20m

DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
2	####	####
3	####	####
4	####	####
5	####	####
6	####	####

NOTES

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AUSTRALIA

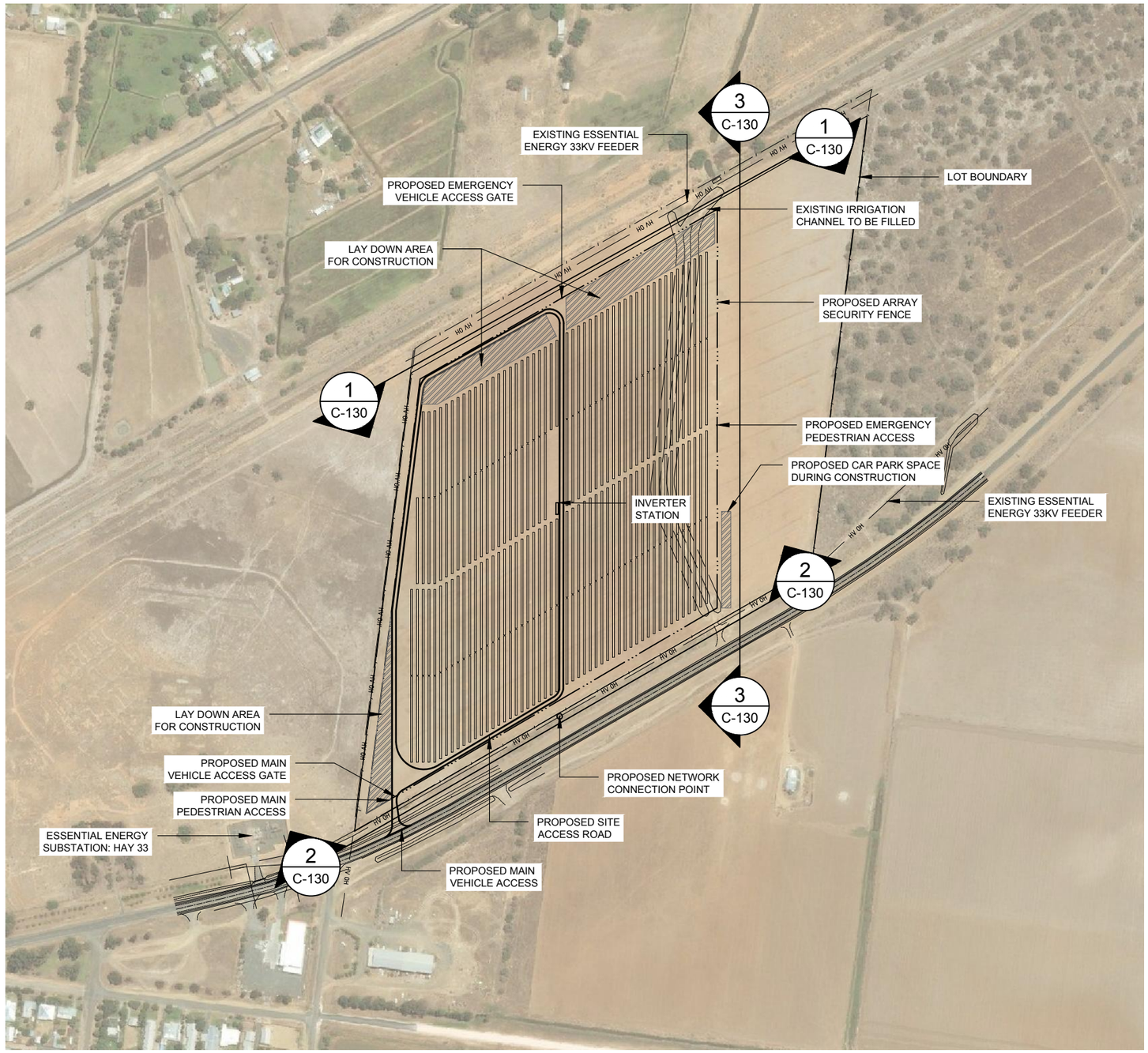
DRAWN WJ
CHECKED LF
APPROVED ----

DRAWING **LOCATION PLAN**

PROJECT HAY 1A
CLIENT ITP DEVELOPMENT
ADDRESS MID WESTERN HIGHWAY
HAY, NSW

DRAWING NO. **A000-G-040**

SCALE AS NOTED
SHEET SIZE A3
ORIG. DATE 18/1/19
REV. DATE 11/2/19
REV NO. **02**



1 - GENERAL ARRANGEMENT

SCALE: 1:5000

0 50m 100m

SITE INFORMATION

LOT / DP	110 / 1187931
ADDRESS	MID WESTERN HIGHWAY, HAY 2711, NSW
LGA	HAY SHIRE
LAT / LONG	-34.500307, 144.858074
ELEVATION	93m
LOT AREA	20.7 Ha
FENCED AREA	14.0 Ha
DNSP	ESSENTIAL ENERGY

PROJECT INFORMATION

DC CAPACITY	6.048 MW
AC CAPACITY	5.0 MW
DC/AC RATIO	1.21
INVERTERS	5MW AC
MOUNTING	SINGLE AXIS TRACKER
MODULE CAPACITY	360W - 72 CELL MONO (1500V)
STRING CONFIGURATION	28 MODULES PER STRING
TRACKER	3 STRINGS PER TRACKER
NO. TRACKERS	200 TRACKERS
SPECIFIC YIELD	2,049 kWh/kWp/annum
ANNUAL GENERATION	12.4 GWh
CONNECTION VOLTAGE	33kV
CONNECTION FEEDER	EXISTING ESSENTIAL ENERGY FEEDER HAT32
CONNECTION SUBSTATION	EXISTING ESSENTIAL ENERGY HAY 33 / 11 ZONE SUBSTATION

DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
2	####	####
3	####	####
4	####	####
5	####	####
6	####	####

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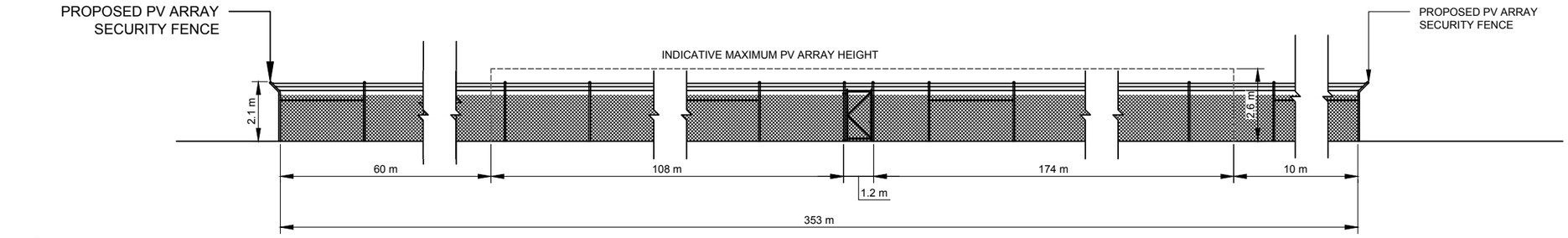
DRAWING **GENERAL ARRANGEMENT PLAN**

PROJECT HAY 1A
CLIENT ITP DEVELOPMENT
ADDRESS MID WESTERN HIGHWAY HAY, NSW

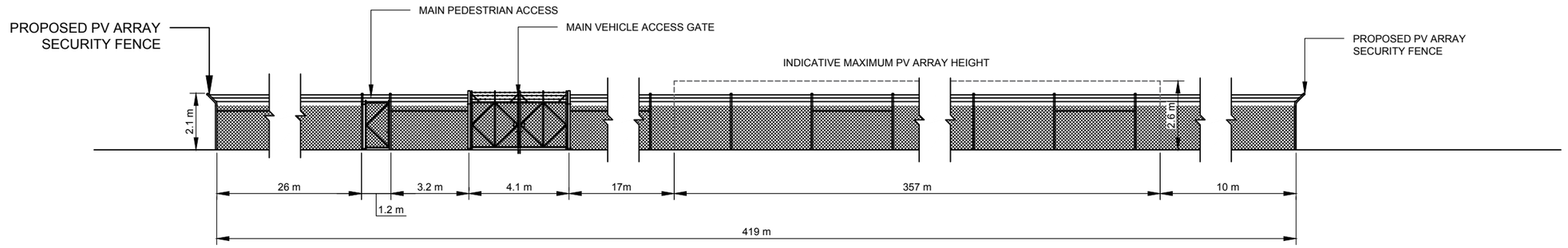
DRAWING NO. **A000-G-211**

SCALE AS NOTED
SHEET SIZE A3
ORIG. DATE 6/2/19
REV. DATE 11/2/19
REV NO. **02**



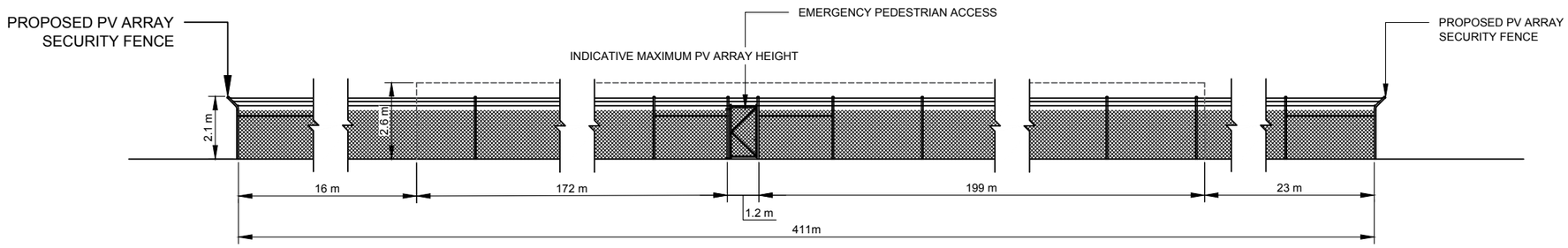
1 - SITE ELEVATION (NORTH)

SCALE: 1:200
0 2m 4m



2 - SITE ELEVATION (SOUTH)

SCALE: 1:200
0 2m 4m



3 - SITE ELEVATION (EAST)

SCALE: 1:200
0 2m 4m

DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
2	####	####
3	####	####
4	####	####
5	####	####
6	####	####

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AUSTRALIA

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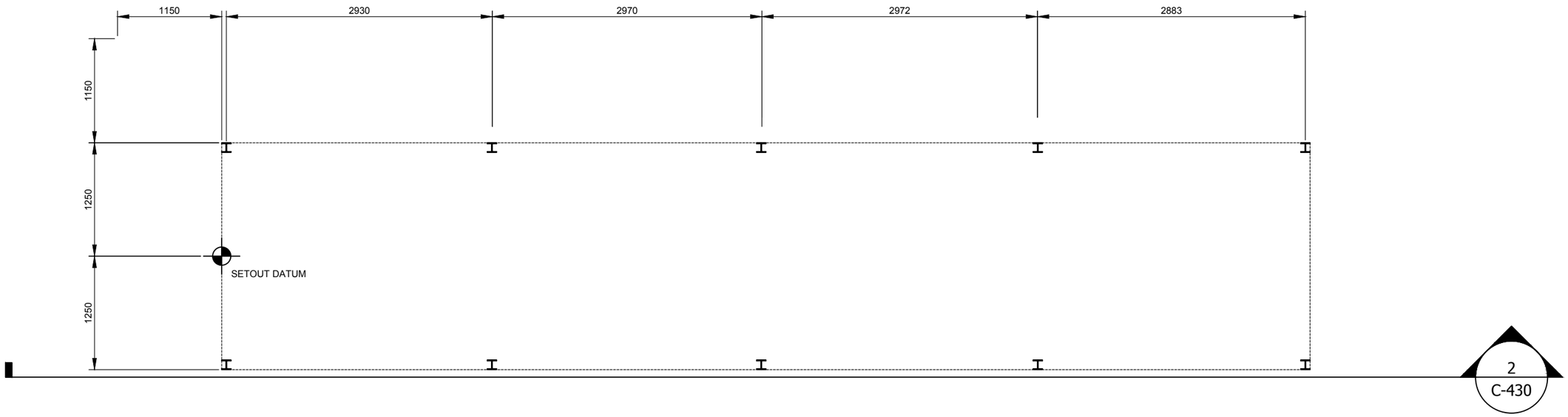
CHECKED LF
APPROVED ----

DRAWING **SITE ELEVATION**

PROJECT HAY 1A
CLIENT ITP DEVELOPMENT
ADDRESS MID WESTERN HIGHWAY
HAY, NSW

SCALE AS NOTED
SHEET SIZE A3
ORIG. DATE 17/1/19
REV. DATE 11/2/19

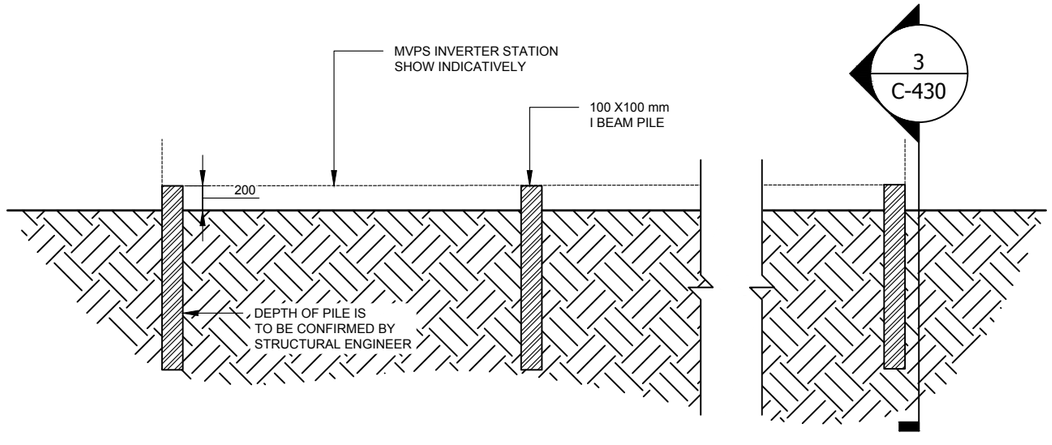
DRAWING NO. **A000-C-130**
REV NO. **02**



1 C-430 **PLAN VIEW**

SCALE: 1:50

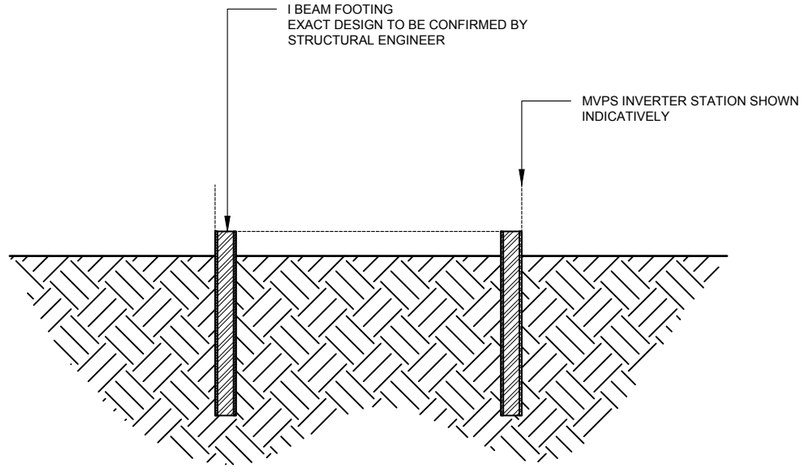
0 0.5m 1m



2 C-430 **SIDE CROSS SECTION**

SCALE: 1:50

0 0.5m 1m



3 C-430 **END CROSS SECTION**

SCALE: 1:50

0 0.5m 1m

DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
2	####	####
3	####	####
4	####	####
5	####	####
6	####	####

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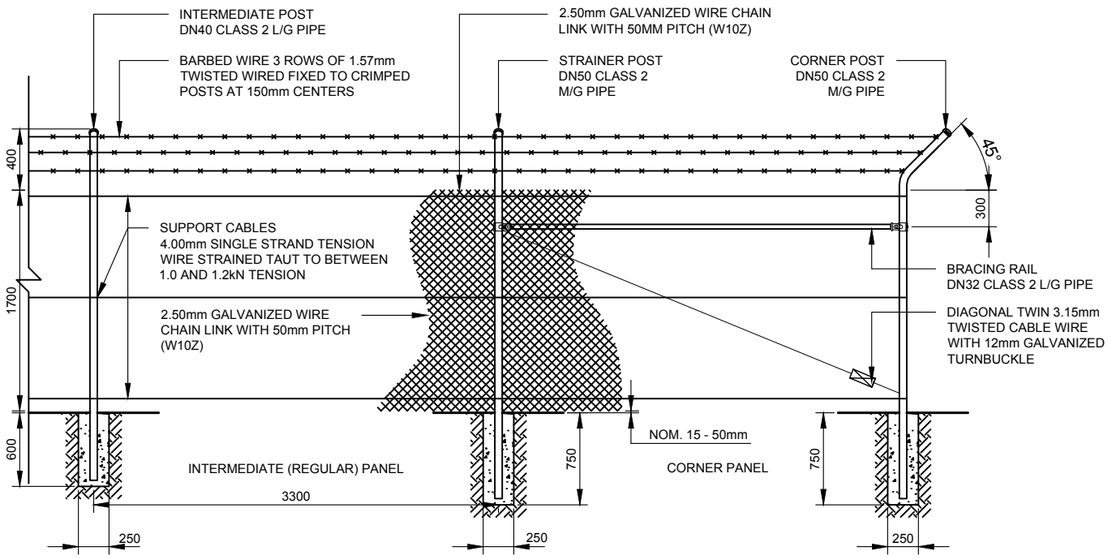
DRAWN	WJ
CHECKED	LF
APPROVED	----

DO NOT SCALE.
ALL MEASUREMENTS IN MM UNLESS OTHERWISE STATED.

DRAWING **INVERTER STATION FOOTING DETAILS**

PROJECT	HAY 1A
CLIENT	ITP DEVELOPMENT
ADDRESS	MID WESTERN HIGHWAY HAY, NSW
DRAWING NO.	**A000-C-430**

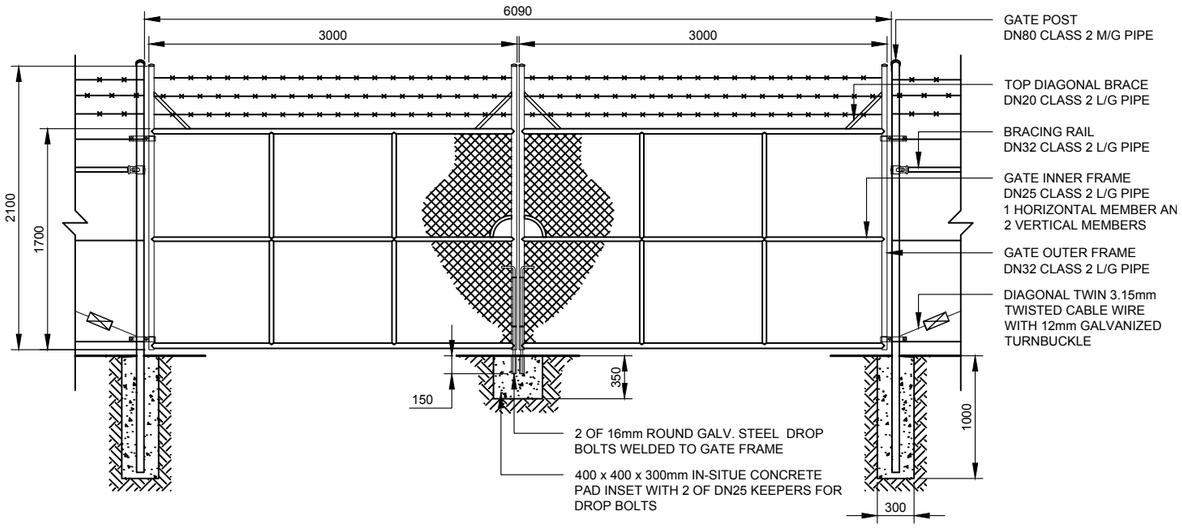
SCALE	AS NOTED
SHEET SIZE	A3
ORIG. DATE	17/1/19
REV. DATE	11/2/19
REV NO.	**02**



1 - TYPICAL FENCE SECTION

SCALE: 1:50

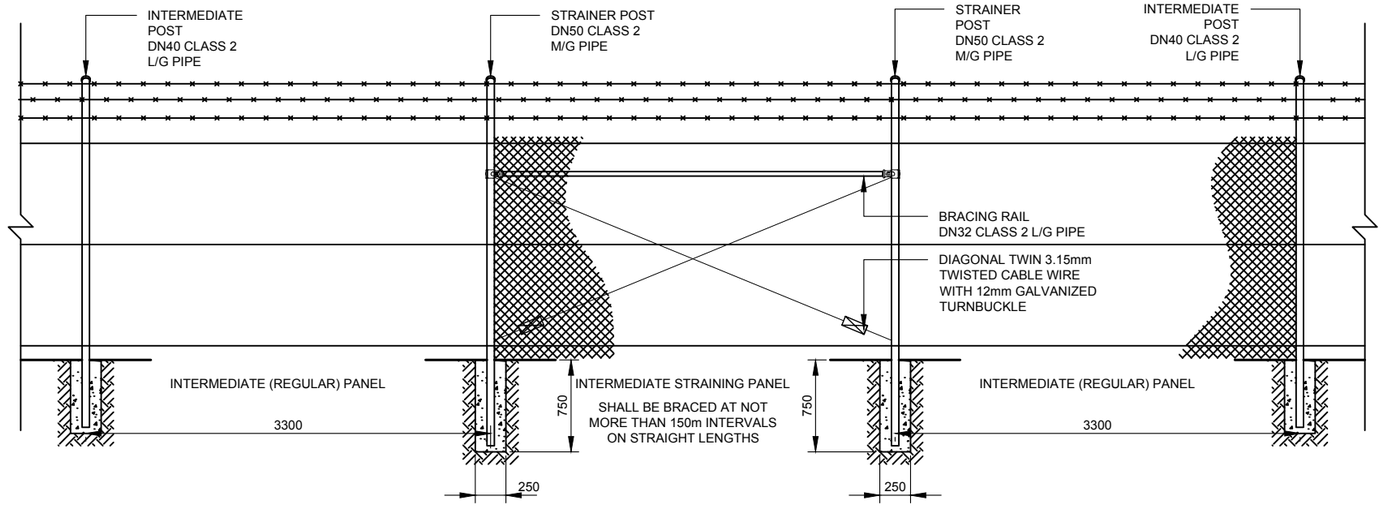
0 0.5m 1m



3 - DOUBLE LEAF 6 METER GATE SECTION

SCALE: 1:50

0 0.5m 1m

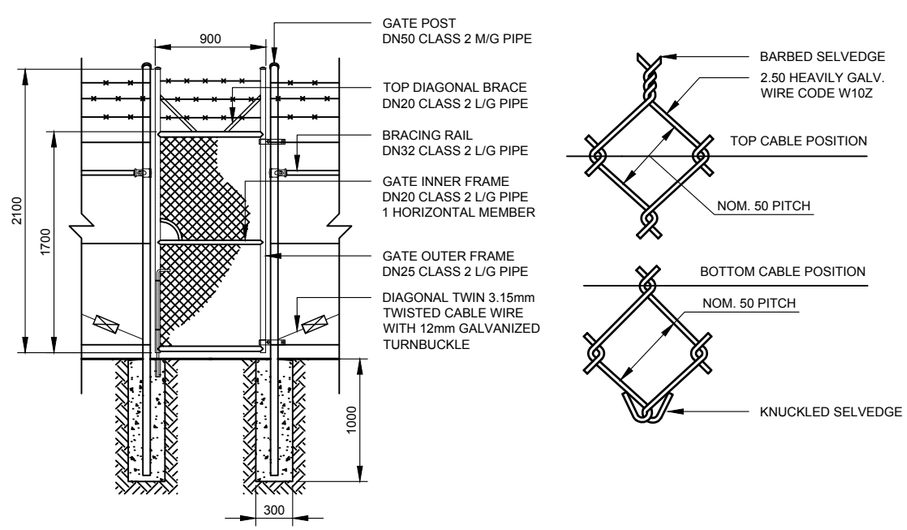


2 - INTERMEDIATE STRAINING PANEL FENCE SECTION

SCALE: 1:50

0 0.5m 1m

FENCE AND GATES TO BE DESIGNED AND CONSTRUCTED TO AS 1725 PART 1



4 - SINGLE LEAF GATE SECTION

SCALE: 1:50

0 0.5m 1m

DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
2	####	####
3	####	####
4	####	####
5	####	####
6	####	####

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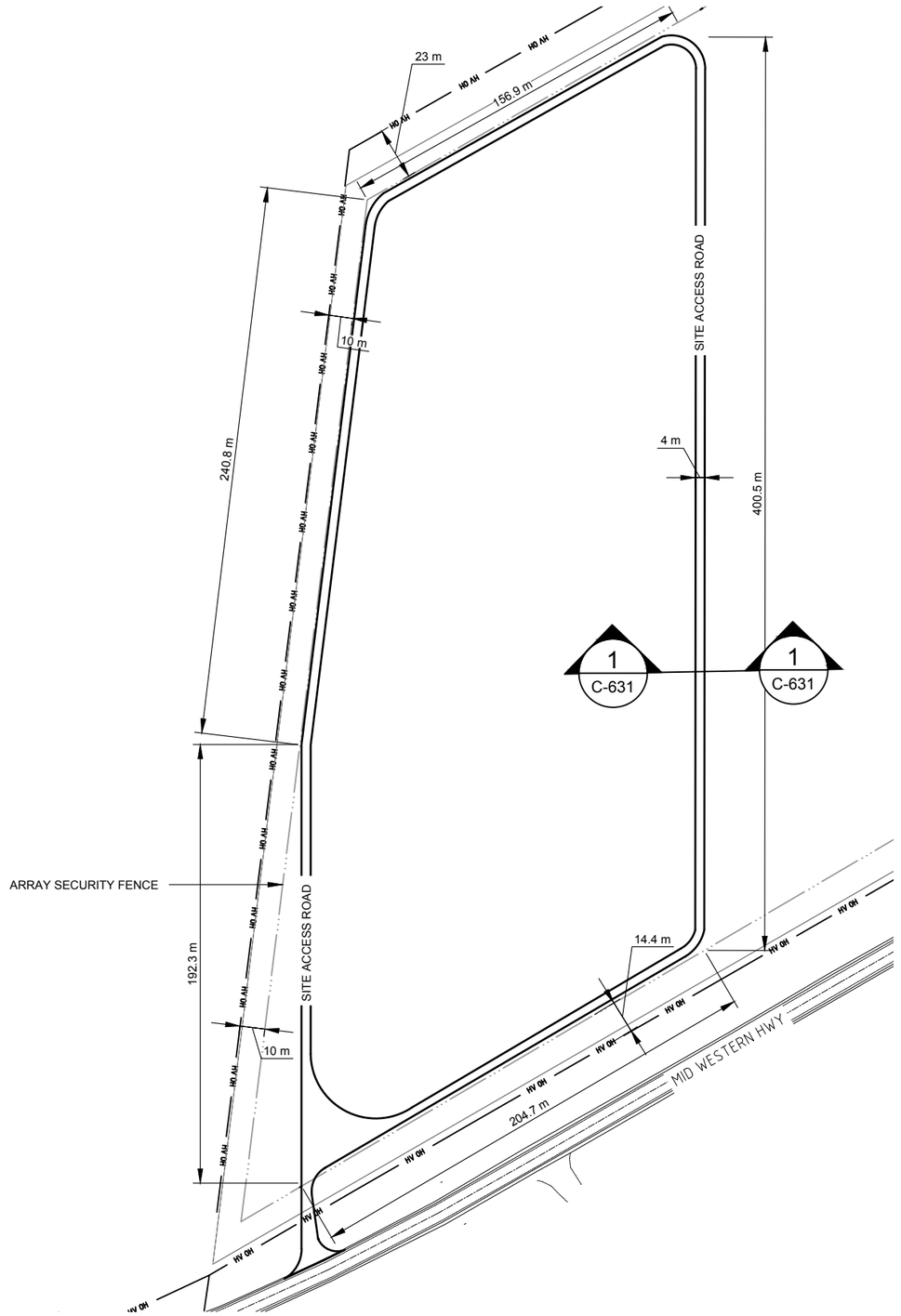
AUSTRALIA

DRAWN	WJ
CHECKED	JK
APPROVED	----

DRAWING **FENCING DETAIL**

PROJECT	HAY 1A
CLIENT	ITP DEVELOPMENT
ADDRESS	MID WESTERN HIGHWAY HAY, NSW
DRAWING NO.	**A000-C-530**

SCALE	AS NOTED
SHEET SIZE	A3
ORIG. DATE	17/1/19
REV. DATE	8/2/19
REV NO.	**02**



1 - ACCESS ROAD PLAN

SCALE: 1:2500

0 25m 50m

DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
2	####	####
3	####	####
4	####	####
5	####	####
6	####	####

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AUSTRALIA

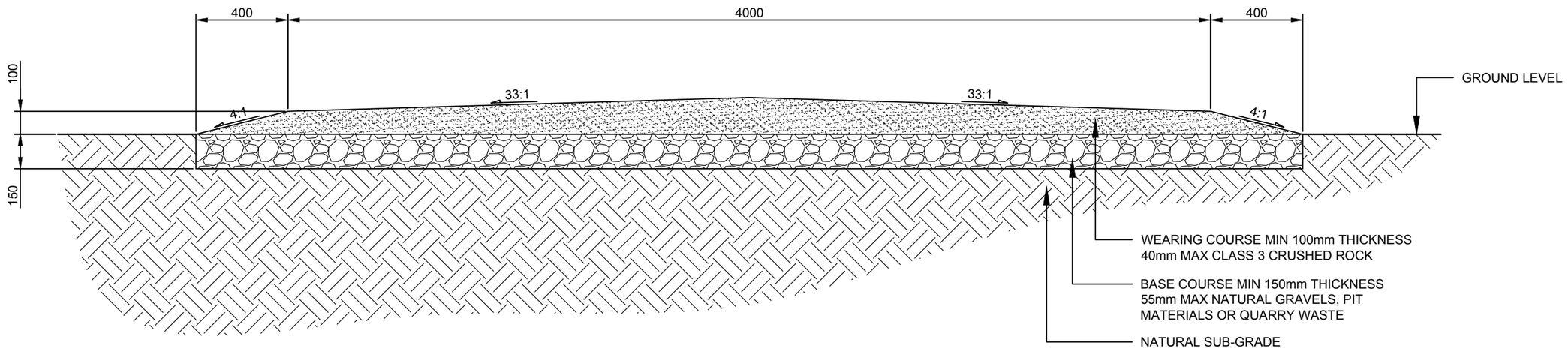
DRAWN WJ
CHECKED JK
APPROVED ----

DRAWING **ACCESS R0AD PLAN**

PROJECT HAY 1A
CLIENT ITP DEVELOPMENT
ADDRESS MID WESTERN HIGHWAY
HAY, NSW

SCALE AS NOTED
SHEET SIZE A3
ORIG. DATE 8/2/19
REV. DATE 11/2/19

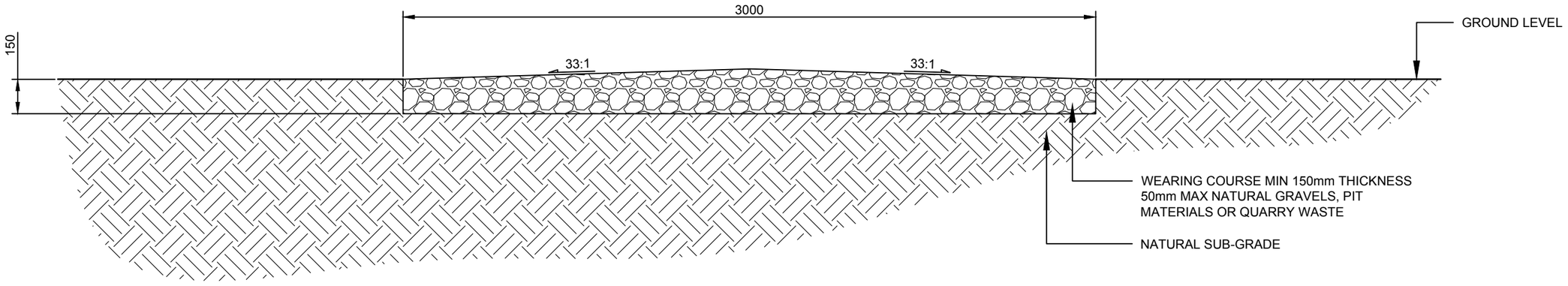
DRAWING NO. **A000-C-610**
REV NO. **02**



1 - CROSS SECTION - MAIN ACCESS ROAD

SCALE: 1:20

0 0.2m 0.4m



2 - CROSS SECTION - SECONDARY ACCESS ROAD

SCALE: 1:20

0 0.2m 0.4m

DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
2	####	####
3	####	####
4	####	####
5	####	####
6	####	####

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AUSTRALIA

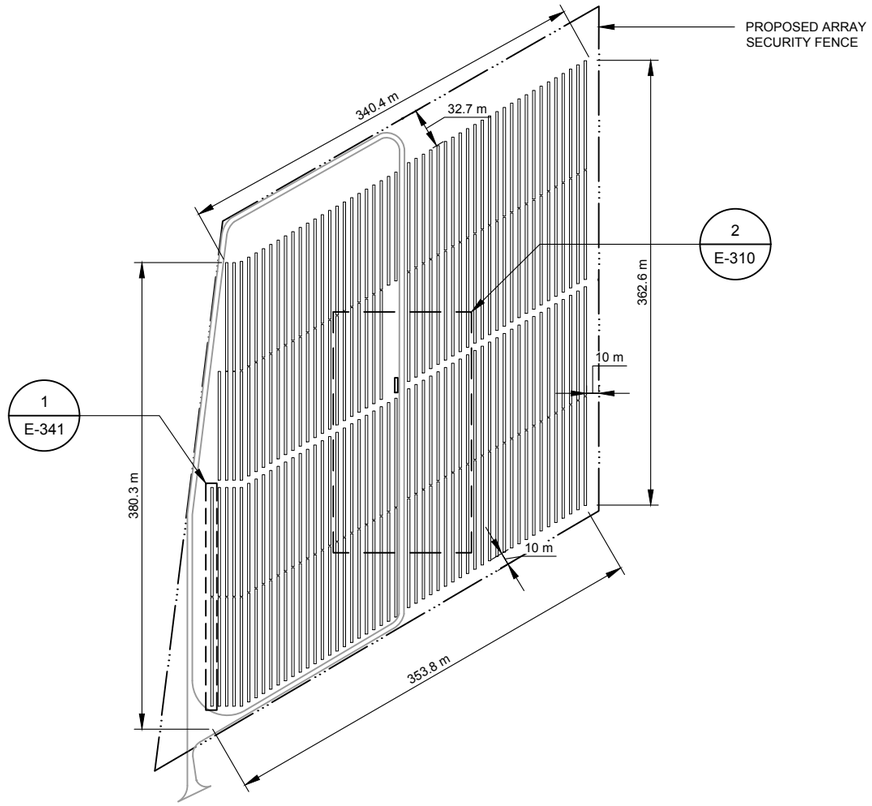
DRAWN WJ
CHECKED LF
APPROVED ----

DRAWING **ACCESS ROAD SECTION**

PROJECT HAY 1A
CLIENT ITP DEVELOPMENT
ADDRESS MID WESTERN HIGHWAY
HAY, NSW

DRAWING NO. **A000-C-631**

SCALE AS NOTED
SHEET SIZE A3
ORIG. DATE 17/1/19
REV. DATE 11/2/19
REV NO. **02**



1 - ARRAY LAYOUT

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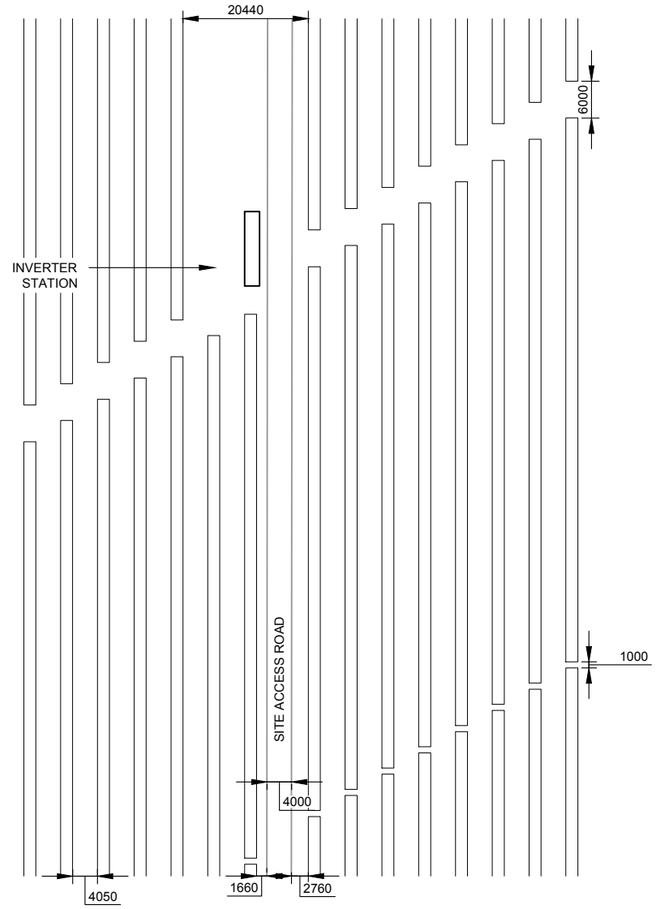

2 - PARTIAL ARRAY PLAN

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DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
2	####	####
3	####	####
4	####	####
5	####	####
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NOTES

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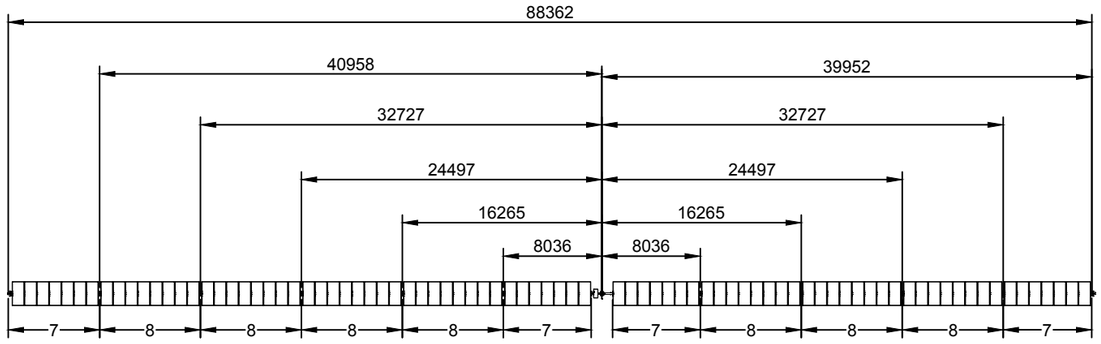
DRAWN WJ
CHECKED LF
APPROVED ----

DRAWING **ARRAY LAYOUT**

PROJECT HAY 1A
CLIENT ITP DEVELOPMENT
ADDRESS MID WESTERN HIGHWAY
HAY, NSW

DRAWING NO. **A000-E-310**

SCALE AS NOTED
SHEET SIZE A3
ORIG. DATE 7/2/19
REV. DATE 11/2/19
REV NO. **02**



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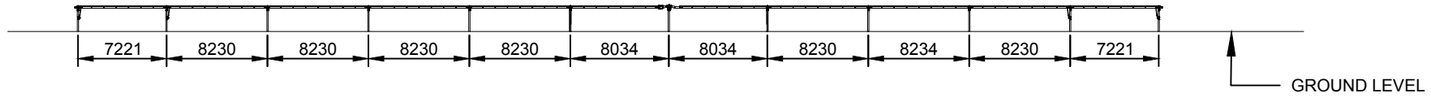

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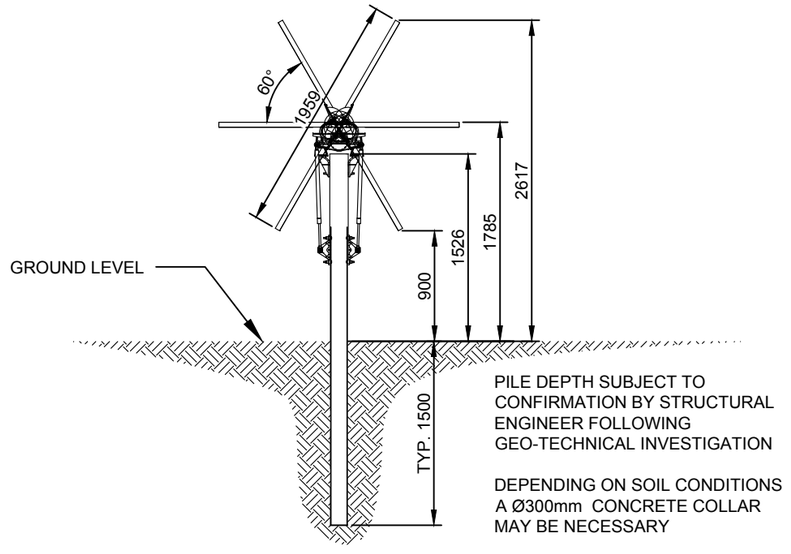

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DEVELOPMENT APPLICATION

NO.	STAGE	DATE
1	####	####
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NOTES

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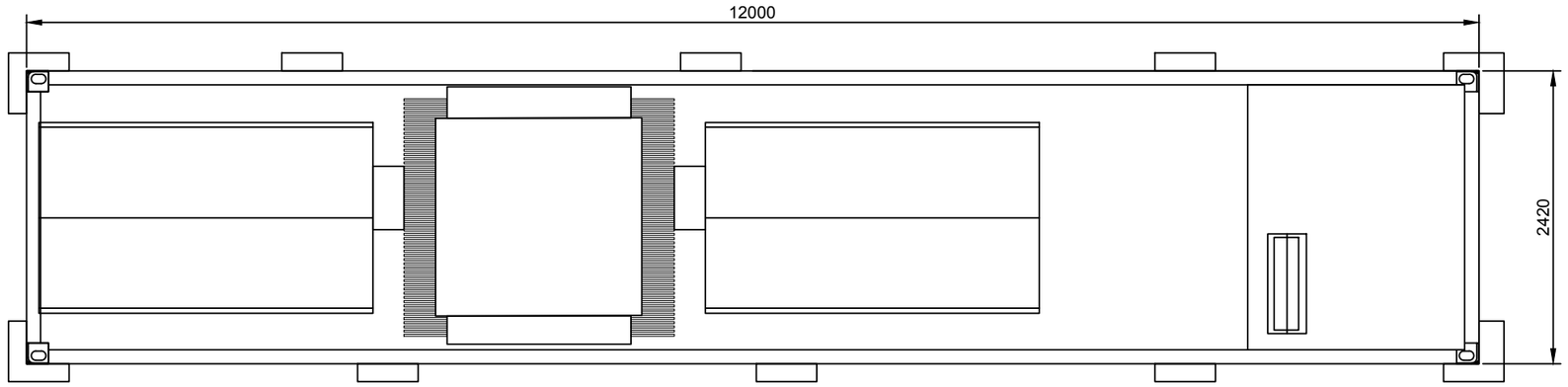
DRAWING **ARRAY DETAIL**

PROJECT HAY 1A
CLIENT ITP DEVELOPMENT
ADDRESS MID WESTERN HIGHWAY
HAY, NSW

DRAWING NO. **A000-E-341**

SCALE AS NOTED
SHEET SIZE A3
ORIG. DATE 17/1/19
REV. DATE 11/2/19
REV NO. **02**



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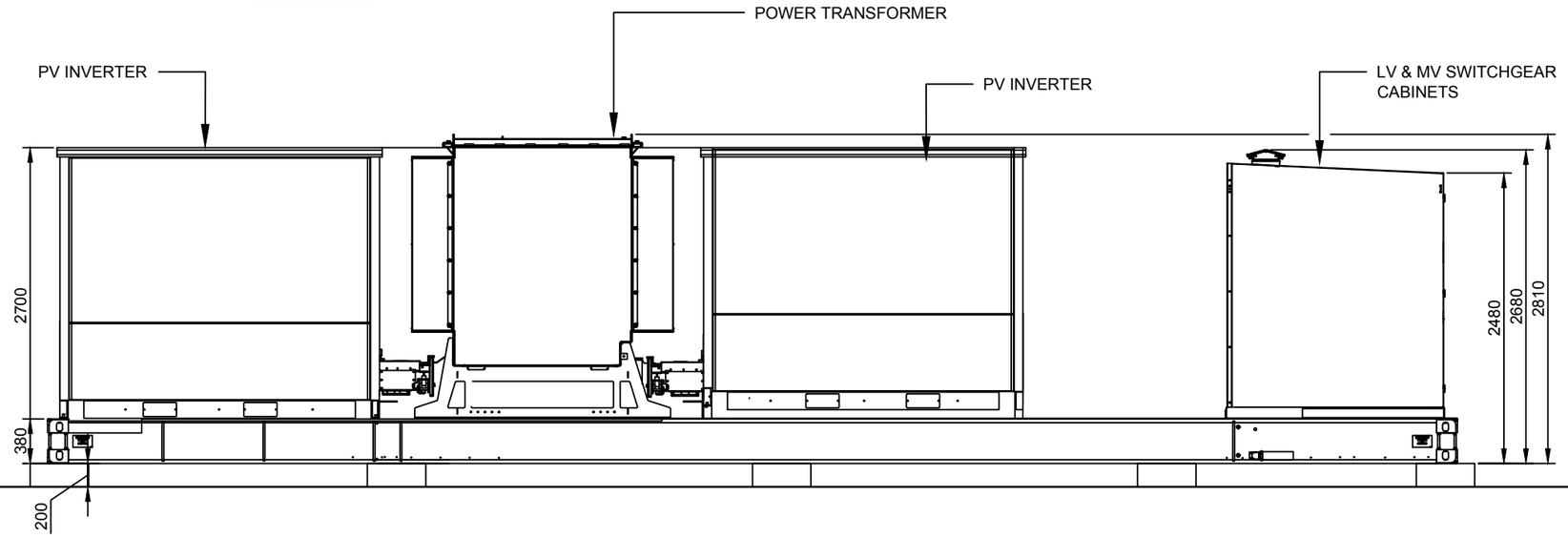

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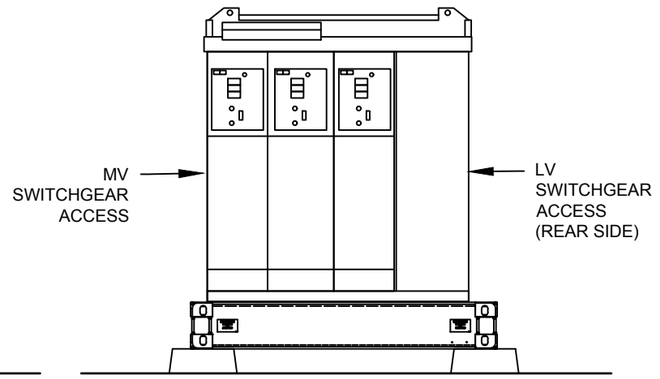

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DEVELOPMENT APPLICATION

NO.	STAGE	DATE
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4	####	####
5	####	####
6	####	####

NOTES

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DRAWN WJ
CHECKED LF
APPROVED ----

DO NOT SCALE.
ALL MEASUREMENTS IN MM UNLESS OTHERWISE STATED.

DRAWING **INVERTER STATION DETAILS**

PROJECT HAY 1A
CLIENT ITP DEVELOPMENT
ADDRESS MID WESTERN HIGHWAY HAY, NSW

DRAWING NO. **A000-E-430**

SCALE AS NOTED
SHEET SIZE A3
ORIG. DATE 18/1/19
REV. DATE 11/2/19
REV NO. **02**

Noise Assessment

Hay 1A Solar Farm
Hay, NSW.

Prepared for: IT Power (Australia) Pty Ltd
January 2019
MAC180781-01RP1

Muller Acoustic Consulting

Document Information

Noise Assessment

Hay 1A Solar Farm

Hay, NSW.

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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180781-01RP1	Final	21 January 2019	Rod Linnett		Oliver Muller	

CONTENTS

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been engaged by IT Power (Australia) Pty Ltd (ITP) to complete a Noise Assessment (NA) for the proposed Hay 1A Solar Farm near Hay, NSW (the 'project'). This report presents the methodology and findings of the NA for the construction and operation of the project.

1.1 Purpose and Objectives

A NA is required as part of the Environmental Impact Statement (EIS) to be submitted to Hay Shire Council as part of the Development Application (DA). The purpose of the NA is to quantify potential environmental noise emissions associated with the construction and operation of the project. Where impacts are identified, the assessment includes recommendations for potential noise mitigation and management measures.

1.2 Scope of the Assessment

The NA includes the following key tasks:

- review construction and operating activities to identify key noise generating plant, equipment, machinery or activities proposed to be undertaken as part of the project;
- identify the closest and/or potentially most affected receptors situated within the area of influence to the project;
- establish existing noise levels to determine project-specific construction Noise Management Levels (NMLs), and operational noise criteria;
- undertake 3D noise modelling to predict levels that may occur as a result of the construction and operation of the project at the closest and/or potentially most affected receptors;
- provide a comparison of predicted noise levels against relevant construction NMLs and operational criteria;
- assess the potential noise impacts associated with construction and operational aspects of the project; and
- provide feasible and reasonable noise mitigation and management measures, and monitoring options, where NMLs or operational criteria may be exceeded.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A.**

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2 Project Description

2.1 Background

ITP proposes to construct and operate a 5 Megawatt (MW) solar farm using photovoltaic (PV) technology at a 15 hectare site at Hay, NSW.

2.2 Description of Proposed Construction Works

The project includes installation of groups of north facing PV modules (approximately 2m x 1m) on mounting structures up to approximately 4m in height. An estimated 16,000 PV panels will be installed using a single axis tracking system, tilted +/- 60° along the north-south axis. The PV mounting structure would comprise steel posts driven up to approximately 2.5m below ground using a small pile driver. Additional support structures would be attached to the piles, which would then support the PV panels.

Earthworks will primarily involve trenching which is required for cabling of each PV array/module to inverters and a substation. Other minor earthworks would be completed for the preparation of the site and in most cases a concrete slab would be required to support the ancillary infrastructure. Most of the infrastructure would be pre-fabricated off-site, delivered and assembled on-site.

It is anticipated that the solar farm would be constructed in one-hectare stages, with up to 10 stages in construction at any one time over a three to six month period during standard construction hours.

All vehicles would access the project from Mid Western Highway (B64) during construction and operational phases.

During construction, traffic generated by the project would include employee and delivery vehicles. During the peak construction period, the daily traffic volume is expected to be up to four heavy vehicles (semi-trailers or b-doubles) per hour and 20 light commercial vehicles or equivalent mini buses for worker transport during the morning and afternoon peaks.

2.3 Description of Proposed Operation

PV infrastructure on site will comprise of groups of PV panels installed in 188 rows (approx. 94m long and 2m wide) running north to south. Each row of PV modules will rotate to track the sun across the sky from east to west each day. There is approximately 6m spacing between each row. The hub height of each tracker is 2m with the peak of the modules reaching a height of 2.5m when the array is fully tilted.

Electrical cabling would be attached beneath the modules and would connect the individual PV modules to each other. Inverters will be located centrally to groups of PV panels and connected to each other by underground cables. The PV modules will be on a single axis tracker system which will follow the sun and move in an east to west direction.

The project will be contained solely within the site, including areas required for stockpiling and materials laydown during construction as shown in Figure 1.

The project would operate 24 hours a day, 7 days a week, with no permanent staff on site. During operation, the PV panels would generate electricity which would be fed into the power grid via the substation. Key noise emissions from the operation of the project are associated with the inverter and transformer(s). It is noted that emissions from these sources are anticipated to be acoustically insignificant compared to ambient background noise levels at assessed receptors.

When required, maintenance activities will occur during standard working hours (except for emergencies) and are expected to include:

- panel cleaning;
- repairs or replacement of infrastructure, as required; and
- land management including mowing to control vegetation as required.

Typical noise sources associated with maintenance activities would include light vehicle movements on site and maintenance of equipment.

2.4 Potentially Sensitive Receptors

Using aerial photography, geospatial information and other project information, MAC has identified the following potentially sensitive receptors that may be affected by noise from operation or construction activities and related road traffic. **Table 1** presents a summary of receiver identification address and coordinates. These are reproduced graphically in **Figure 1.**

Table 1 Noise Sensitive Receptors

ID	Description/Address	Coordinates (MGA 55)	
		Easting	Northing
R1	Rural Receiver Mid Western Highway	303796	6180333
R2	Suburban Receiver Murray Street & Bourke Street	303284	6180070
R3	Suburban Receiver Bourke St	303262	6179936
R4	Suburban Receiver Murray Street & Stephen Street	303065	6180094
R5	Suburban Receiver Mid Western Highway (House)	302984	6180214
R6	Rural Receiver Sidonia Road	303235	6180817
R7	Rural Receiver Sidonia Road	303324	6180982
R8	Rural Receiver Sidonia Road	303605	6181131
R9	Rural Receiver Piper Street	303833	6181210
R10	Rural Receiver Between Piper Street & Mid Western Highway	304319	6181165
C1	Commercial Receiver Bourke Street	303300	6180165
C2	Commercial Receiver Bourke Street	303380	6180147
H1	Hay Hospital	302814	6180249

MAC
Muller Acoustic Consulting

FIGURE 1

PROJECT LAYOUT

REF: MAC180781

3 Noise Policy and Guidelines

This Noise Assessment has been conducted in accordance with the following key policy and guidelines:

- NSW Department of Environment and Climate Change, NSW Interim Construction Noise Guideline (ICNG), 2009;
- Environment Protection Authority's (EPA's), Noise Policy for Industry (NPI), 2017; and
- NSW Department of Environment, Climate Change and Water (DECCW), NSW Road Noise Policy (RNP), 2011.

The assessment has also considered and applied the following additional policy, guidelines and standards where relevant:

- Australian Standard AS 2436–2010 (R2016) (AS 2436) – Guide to Noise and Vibration Control on Construction, Demolition and Maintenance sites;
- Australian Standard AS 1055:2018 – Description and Measurement of Environmental Noise;
- Australian Standard AS IEC 61672.1–2004 (AS 61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring; and
- Australian Standard AS IEC 60942-2004 (AS 60942) – Electroacoustics – Sound Calibrators.

3.1 Interim Construction Noise Guideline

The assessment and management of noise from construction work is completed with reference to the Interim Construction Noise Guideline (ICNG). The ICNG is specifically aimed at managing noise from construction work regulated by the EPA and is used to assist in setting statutory conditions in licences or other regulatory instruments. The types of construction regulated by the EPA under the POEO Act (1997), include construction, maintenance and renewal activities carried out by a public authority, such as road upgrades as described in Schedule 1 of the POEO Act.

The ICNG sets out procedures to identify and address the impact of construction noise on residences and other sensitive land uses. This section provides a summary of noise objectives that are applicable to the assessment.

The ICNG provides two methodologies for the assessment of construction noise emissions:

- Quantitative, which is suited to major construction projects with typical durations of more than three weeks; or
- Qualitative, which is suited to short term infrastructure maintenance (for projects with a typical duration of less than three weeks).

The methodology for a quantitative assessment requires a more complex approach, involving noise emission predictions from construction activities to the nearest relevant receptors. The qualitative assessment methodology is a more simplified approach that relies more on noise management strategies. This study has adopted a quantitative assessment approach.

The quantitative approach includes identification of potentially affected receptors, description of activities involved in the project, derivation of the construction noise management levels, quantification of potential noise impact at receptors and, provides management and mitigation recommendations. **Table 2** summarises the ICNG recommended standard hours for construction.

Table 2 Recommended Standard Hours for Construction

Period	Preferred Construction Hours
Day (Standard construction hours)	Monday to Friday - 7am to 6pm Saturdays - 8am to 1pm Sundays or Public Holidays - No construction

The recommended hours do not apply in the event of direction from police, or other relevant authorities, for safety reasons or where required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm. Work conducted outside of standard hours are considered out of hours work (OOH). OOH periods are divided into two categories representing evening and night periods and cover the hours listed below:

Period 1 (evening/low risk period): Monday to Friday – 6pm to 10pm, Saturdays – 1pm to 6pm, Sundays – 8am to 6pm.

Period 2 (night/medium to high risk period): Monday to Friday – 10pm to 7am, Saturdays/Sundays – 6pm to 7am (8am on Sunday mornings).

There are no out of hours work proposed for this project.

3.1.1 Construction Noise Management Levels

Section 4 of the ICNG details the quantitative assessment method involving predicting noise levels and comparing them with the Noise Management Level (NML) and are important indicators of the potential level of construction noise impact. **Table 3** provides the ICNG recommended $LA_{eq(15min)}$ NMLs and how they are to be applied.

Table 3 Noise Management Levels		
Time of Day	Management Level $LA_{eq(15min)}$[1]	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays.	Noise affected RBL + 10dB.	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $LA_{eq(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dBA.	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise (such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences; and if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours.	Noise affected RBL + 5dB.	A strong justification would typically be required for work outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community.
Commercial	70dBA	Offices, retail outlets
Hospital	45dBA (internal) 55dBA (external)	Assuming 10dB loss through open window

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

3.1.2 Construction Sleep Disturbance

Section 4.3 of the ICNG (DECC, 2009) states that a sleep disturbance assessment is required where construction activities are planned to occur for more than two consecutive nights. Given that construction activities are anticipated to occur during standard construction hours, sleep disturbance has not been considered in this assessment.

3.2 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing operational noise criteria for development consents and/or licenses where the EPA regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997. The objectives of the NPI are to:

- provide noise criteria to assess the change in both short term and long term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management during operation, including:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels, above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.
2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.
3. Compare the predicted or measured noise level with the PNTLs, assessing impacts and the need for noise mitigation and management measures.
4. Consider residual noise impacts, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.

5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.

6. Monitor and report environmental noise levels from the development.

3.2.1 Project Noise Trigger Levels

The policy sets out the procedure to determine the PNTLs for an industrial development. The PNTL is the lower (ie, the more stringent) value of the **Project Intrusiveness Noise Level** (PINL) and **Project Amenity Noise Level** (PANL) determined in accordance with Section 2.3 and Section 2.4 of the NPI.

3.2.2 Project Intrusiveness Noise Level

The PINL ($LA_{eq(15min)}$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. When assessing intrusiveness, background noise levels needs to be measured, from which RBLs are determined.

3.2.3 Project Amenity Noise Level

PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended amenity noise levels specified in Table 2.2 (of the NPI) and are reproduced in **Table 4**. The NPI defines two categories of amenity noise levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area.
- **Project Amenity Noise Levels (PANL)** – is the recommended levels for a receiver area, specifically focusing the project being assessed.

Additionally, Section 2.4 of the NPI states: "*to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise levels applies for each new source of industrial noise as follows*":

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

Notwithstanding, where the PANL is applicable and can be satisfied, the assessment of cumulative industrial noise is not required.

Table 4 Amenity Criteria

Receiver Type	Noise Amenity Area	Time of day	Recommended amenity noise level LAeq, dBA
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5dBA above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom – internal	All	Noisiest 1-hour period when in use	35
Hospital ward - internal - external	All	 Noisiest 1 hour Noisiest 1 hour	 35 50
Place of worship – internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Active recreation area (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5dBA to recommended noise amenity area

Notes: The recommended amenity noise levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7.

Time of day is defined as follows: (These periods may be varied where appropriate, for example, see A3 in Fact Sheet A.)

- day – the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays;
- evening – the period from 6pm to 10pm;
- night – the remaining periods.

In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable LAeq noise level may be increased to 40dB LAeq(1hr).

3.2.4 Maximum Noise Level Assessment

The potential for sleep disturbance from maximum noise level events from a project during the night-time period needs to be considered. The NPI considers sleep disturbance to be both awakenings and disturbance to sleep stages.

Where night-time noise levels from a development/premises at a residential location exceed:

- $L_{Aeq(15min)}$ 40dBA or the prevailing RBL plus 5dB, whichever is the greater, and/or
- L_{Amax} 52dBA or the prevailing RBL plus 15dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

A detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Other factors that may be important in assessing the impacts on sleep disturbance include:

- how often the events would occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the development;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current understanding of effects of maximum noise level events at night.

4 Assessment Criteria

Background noise monitoring has not been conducted for this project and hence, the minimum applicable Rating Background Levels (RBL) of 35dBA for the daytime period and 30dBA for the evening and night time periods have been adopted in accordance with NPI methodology.

4.1 Construction Noise Management Levels

Noise Management Levels (NMLs) for construction activities at all residential receivers are 45dB $LA_{eq(15min)}$ (RBL +10dB). Construction activities are planned for standard hours, however the relevant NML standard construction hours and out of hours periods are summarised in **Table 5**.

Table 5 Construction Noise Management Levels

Location	Assessment Period[1]	RBL, dBA	NML dB $LA_{eq(15min)}$
All Residential Receivers	Day (Standard Hours)	35	45 (RBL+10dBA)
	Evening (OOH Period 1)	30	35 (RBL+5dBA)
	Night (OOH Period 2)	30	35 (RBL+5dBA)
Commercial	When in Use	N/A	70
Hospital	When in Use	N/A	55

Note 1: See table 2 for Recommended Standard Hours for Construction

4.2 Operational Noise Criteria

4.2.1 Project Intrusiveness Noise Levels

The PINLs for the project are presented in **Table 6** and have been determined based on the RBLs +5dBA.

Table 6 Project Intrusiveness Noise Levels

Receiver	Period[1]	Adopted RBL dB LA_{90}	PINL dB $LA_{eq(15min)}$
All Residential Receivers	Day	35	40
	Evening	30	35
	Night	30	35

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.2.2 Project Amenity Noise Levels

The PANLs for receivers potentially affected by the project are presented in **Table 7.**

Table 7 Project Amenity Noise Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	Recommended ANL dB $LA_{eq,period}$[2]	PANL dB $LA_{eq,period}$[3]	PANL dB $LA_{eq(15min)}$[4]
Residential	Rural	Day	50	50	53
		Evening	45	45	48
		Night	40	40	43
Commercial	n/a	When in Use	65	65	68
Hospital	n/a	External	50	50	53

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Recommended amenity noise levels as per Table 2.2 of the NPI.

Note 3: Project Amenity Noise Level equals the amenity noise level as there is no other industry in the area.

Note 4: Includes a +3dB adjustment to the amenity period level to convert to a fifteen-minute assessment period as per Section 2.2 of the NPI.

4.2.3 Project Noise Trigger Levels

The PNTLs are the lower of either the PINLs or the PANLs. **Table 8** presents the derivation of the PNTLs in accordance with the methodologies outlined in the NPI. For this assessment the night time PNTL of 35dB $LA_{eq(15min)}$ is the limiting criteria for residential receivers.

Table 8 Project Noise Trigger Levels

Catchment	Assessment Period[1]	PINL dB $LA_{eq(15min)}$	PANL dB $LA_{eq(15min)}$	PNTL dB $LA_{eq(15min)}$
Residential Receivers (Rural)	Day	40	53	40
	Evening	35	48	35
	Night	35	43	35
Commercial	When in Use	n/a	65	68
Hospital	External	n/a	50	53

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.2.4 Maximum Noise Level Screening Criterion

The maximum noise level screening criterion shown in **Table 9** is based on night time RBLs and trigger values as per Section 2.5 of the NPI.

Table 9 Maximum Noise Assessment Trigger Levels

Residential Receivers			
$L_{Aeq(15min)}$		L_{Amax}	
40dB $L_{Aeq(15min)}$ or RBL + 5dB		52dB L_{Amax} or RBL + 15dB	
Trigger	40	Trigger	52
RBL +5dB	35	RBL +15dB	45
Highest	**40**	**Highest**	**52**

Note: As per Section 2.5 of the NPI, the highest of the two criteria are adopted as the screening criteria.

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5 Modelling Methodology

A computer model was developed to quantify project noise emissions to neighbouring receivers for typical construction activities and operations. DGMR's iNoise (Version 2018.2) noise modelling software was used to assess potential noise impacts associated with the project. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. Additionally, the model uses relevant noise source data, ground type, shielding such as barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Plant and equipment were modelled at various locations and heights, representative of realistic construction and operational conditions for assessed scenarios.

The model calculation method used to predict noise levels was in accordance with ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation'.

5.1 Construction Assessment Methodology

Construction activities are proposed to be progressive (trenching, piling and assembly) and will occur at several locations simultaneously. Noise emissions were modelled for the following four scenarios:

- Earthworks for internal road and compound construction including the stripping of topsoil and unsuitable soil and the placement and compaction of road base;
- earthworks involving trenching for cabling;
- piling of panel supports; and
- assembly of the panels.

It is envisaged that all four construction scenarios have the potential to occur simultaneously at up to two locations across the site. Noise emission data and assumptions used in this assessment are summarised in Table 10. All significant noise generating construction activities will be limited to standard construction hours. Where low intensity construction activities are required to be undertaken outside standard construction hours, such as cabling, minor assembly, use of hand tools etc, they will be managed such that they are not audible at any residential receivers.

Table 10 Construction Equipment Sound Power Levels, Lw dBA re 10^{-12} W				
Noise Source/Item	Utilisation %	Quantity	Lw/Item	Total Lw
Trenching & Earthworks				
Backhoe	80	1	104	103
Light vehicle	25	2	76	73
Total – Trenching & Earthworks				**103**
Piling				
Piling Rig (hydraulic)	80	1	113	112
Tele-handler	75	1	106	105
Light vehicle	25	2	76	73
Total – Piling				**113**
Assembly				
Mobile Crane/HIAB	75	1	104	103
Tele-handler	75	1	106	105
Light vehicle	25	2	76	73
Hand tools/Power tools	50	1	102	99
Welder	50	1	105	102
Total – Assembly				**109**
Transport (on site)				
Heavy vehicle	40	1	104	101
Tele-handler	50	1	106	103
Total – Transport				**105**

5.2 Operational Assessment Methodology

5.2.1 Operational Noise Modelling Scenarios

For this assessment, noise predictions were modelled for a typical worst-case operational scenario over a 15-minute assessment period based on the assumptions and sound power levels in **Table 11.** Plant noise emission data used in modelling for this assessment were obtained from manufacturers data or the MAC database. Where relevant, modifying factors in accordance with Section 3.3 and Fact Sheet D of the NPI have been applied to calculations.

Table 11 Operational Equipment Sound Power Levels, Lw dBA re 10^{-12} W				
Noise Source/Item	Activity	Quantity	Lw/Item	Total Lw
PV Panel Tracking Motor[1, 2]	All tracking motors in operation 1 minute per 15-minute period	150-200	78	84
2.5MW Inverter[2]	Constant	2	81	94
5MVA Transformer[2]	Constant	1	77	87

Note 1: Tracking motor is situated underneath the PV panel, -5dB attenuation applied to account for shielding provided by the panel.

Note 2: Modifying factor penalty of +5dB added for low frequency and +5dB added for tonality.

5.2.2 Meteorological Analysis

Noise emissions from industry can be significantly influenced by prevailing weather conditions. Light stable winds (<3m/s) and temperature inversions have the potential to increase noise at a receiver.

Fact Sheet D of the NPI provide two options when considering meteorological effects:

- adopt the noise enhancing conditions for all assessment periods without an assessment of how often the conditions occur – a conservative approach that considers a source to receiver winds for all receivers and F class temperature inversions with wind speeds up to 2m/s at night; or
- determine the significance of noise enhancing conditions. This requires assessing the significance of temperature inversions (F and G Class stability categories) for the night time period and the significance of light winds up to 3m/s for all assessment periods during stability categories other than E, F or G.

Given that a detailed analysis of the significance of noise enhancing conditions has not been undertaken the meteorological conditions adopted in the noise modelling assessment are summarised in **Table 12**.

Table 12 Modelled Site Specific Meteorological Parameters				
Assessment Condition[1]	Temperature	Wind Speed / Direction	Relative Humidity	Stability Class
Day - Calm	20°C	3m/s all directions	50%	D
Evening - Calm	10°C	3m/s all directions	50%	D
Night - Calm	10°C	2m/s all directions	50%	F

Note 1: Day 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening 6pm to 10pm; Night - the remaining periods.

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6 Results

6.1 Construction Noise Results

Noise levels were predicted to each assessed receptor assuming receiver heights of 1.5m above ground level for typical construction activities. **Table 13** summarises the maximum predicted noise level from each of the construction scenarios (trenching, piling and assembly) at identified residential receptors.

Table 13 Predicted Construction Noise Levels

Receiver ID	Description/Address	Predicted Noise Level Range dB $LA_{eq(15min)}$[1]	Highest Predicted Noise Level dB $LA_{eq(15min)}$	NML Standard Hours dB $LA_{eq(15min)}$	Compliance
R1	Rural Receiver Mid Western Highway	47-53	53	45	No
R2	Suburban Receiver Murray Street & Bourke Street	39-45	45	45	Yes
R3	Suburban Receiver Bourke St	30-33	33	45	Yes
R4	Suburban Receiver Murray Street & Stephen Street	38-42	42	45	Yes
R5	Suburban Receiver Mid Western Highway (House)	42-46	46	45	No[2]
R6	Rural Receiver Sidonia Road	47-52	52	45	No
R7	Rural Receiver Sidonia Road	45-53	53	45	No
R8	Rural Receiver Sidonia Road	43-51	51	45	No[2]
R9	Rural Receiver Piper Street	41-47	47	45	No[2]
R10	Rural Receiver Between Piper Street & Mid Western Highway	38-41	41	45	Yes
C1	Commercial Receiver Bourke Street	44-52	52	70	Yes
C2	Commercial Receiver Bourke Street	45-54	54	70	Yes
H1	Hay Hospital	40-43	43	55	Yes

Note 1: Noise levels from construction activities vary due to their location across the project site

Note 2: Noise levels exceed NMLs when construction activities are at their nearest point to receivers.

6.2 Operational Noise Results

Noise levels were predicted at each assessed receptor assuming receiver heights of 1.5m above ground level. **Table 14** summarises the predicted operational noise levels which are demonstrated to comply with the PNTLs at all residential receptors.

Table 14 Predicted Operational Noise Levels

Receiver ID	Address	Predicted Noise Level dB $L_{Aeq(15min)}$	Limiting Night PNTL dB $L_{Aeq(15min)}$	Compliance
R1	Rural Receiver Mid Western Highway	<30	35	Yes
R2	Suburban Receiver Murray Street & Bourke Street	<30	35	Yes
R3	Suburban Receiver Bourke St	<30	35	Yes
R4	Suburban Receiver Murray Street & Stephen Street	<30	35	Yes
R5	Suburban Receiver Mid Western Highway (House)	<30	35	Yes
R6	Rural Receiver Sidonia Road	<30	35	Yes
R7	Rural Receiver Sidonia Road	<30	35	Yes
R8	Rural Receiver Sidonia Road	<30	35	Yes
R9	Rural Receiver Piper Street	<30	35	Yes
R10	Rural Receiver Between Piper Street & Mid Western Highway	<30	35	Yes
C1	Commercial Receiver Bourke Street	<30	68	Yes
C2	Commercial Receiver Bourke Street	<30	68	Yes
H1	Hay Hospital	<30	53	Yes

6.3 Maximum Noise Level Assessment - Operations

A detailed maximum noise level assessment is not required as predicted noise levels for night time operations do not exceed the maximum noise level screening criterion of 40dB $LA_{eq(15min)}$ and/or 52dB LA_{max}.

6.4 Road Traffic Noise Assessment

The route via the Mid Western Highway would be the major transport route for all vehicles to the project site. During construction, traffic generated by the project include employee/subcontractor and delivery vehicles. The traffic volume over a typical day for standard construction hours is expected to be up to four heavy vehicles (semi-trailers or b-doubles) per hour and 20 light commercial vehicles or equivalent mini buses for worker transport during the morning and afternoon peak hour periods.

Predicted $LA_{eq(1hr)}$ noise levels from project related construction traffic at the closest receivers situated along Murray Street (Mid Western Highway) within the town limits and R5 which is situated outside the township has been completed using the United States (US) Environment Protection Agency's road traffic calculation method is presented in **Table 15**.

Table 15 Predicted Construction Road Traffic Noise Levels

Road Name	Nearest Offset Distance to Receiver	Predicted Noise Level	RTN Criteria	Comply
Murray Street Receivers	15m	52dB $LA_{eq,1hr}$	60dB $LA_{eq(15hr)}$	Yes
R5 Mid Western Highway	40m	46dB $LA_{eq,1hr}$	60dB $LA_{eq(15hr)}$	Yes

Results demonstrate that project construction traffic noise levels would comply with the relevant RNP criteria.

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7 Recommendations

7.1 Construction Noise Recommendations

It is noted that construction noise emissions are expected to exceed the relevant NMLs depending on proximity of activities to receivers. Recommendations for consideration during construction activities to reduce emissions to the surrounding community for this project may include:

- a construction noise management protocol to minimise noise emissions, manage out of hours (minor) works to be inaudible, and to respond to potential concerns from the community;
- where possible use localised mobile screens or construction hoarding around plant to act as barriers between construction works and receivers, particularly where equipment is near the site boundary and/or a residential receiver including areas in constant or regular use (eg unloading and laydown areas);
- operating plant in a conservative manner (no over-revving), shutdown when not in use, and be parked/started at farthest point from relevant assessment locations;
- selection of the quietest suitable machinery available for each activity;
- avoidance of noisy plant/machinery working simultaneously where practicable;
- minimise impact noise wherever possible;
- utilise a broadband reverse alarm in lieu of the traditional high frequency type reverse alarm;
- provide toolbox meetings, training and education to drivers and contractors visiting the site during construction so they are aware of the location of noise sensitive receivers and to be cognisant of any noise generating activities;
- signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site; and
- utilise project related community consultation forums to notify residences within close proximity of the site with project progress, proposed/upcoming potentially noise generating works, its duration and nature and complaint procedure.

7.2 Operational Noise Recommendations

Operational noise predictions identify that relevant noise criteria would be satisfied at all receivers. Notwithstanding, it is recommended that the proponent actively minimise potential noise emissions from the project. To assist in noise management for the project it is recommended that a one-off noise validation monitoring assessment be completed to quantify emissions from site and to confirm emissions meet relevant criteria.

8 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has been engaged by IT Power (Australia) Pty Ltd (ITP) to complete a Noise Assessment (NA) for the proposed Hay 1A Solar Farm near Hay, NSW. The assessment has quantified potential noise emissions associated with the construction and operation of the project.

The results of the NA demonstrate that construction noise levels have potential to exceed relevant construction NMLs at some receiver locations depending on their proximity to construction activities. Recommendations have been provided to minimise the potential noise impacts from construction, albeit of a temporary nature during the daytime over a three to six month construction period.

Operational noise levels satisfy the NPI PNTLs for assessed receivers. However, recommendations to ensure noise levels are verified have been provided in this report.

Based on the NA results, there are no noise related issues which would prevent the approval of the project. The results of the assessment shows compliance with the relevant operational and road noise criteria. Accordingly, no ameliorative measures will be required.

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Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in Table A1.

Table A1 Glossary of Terms

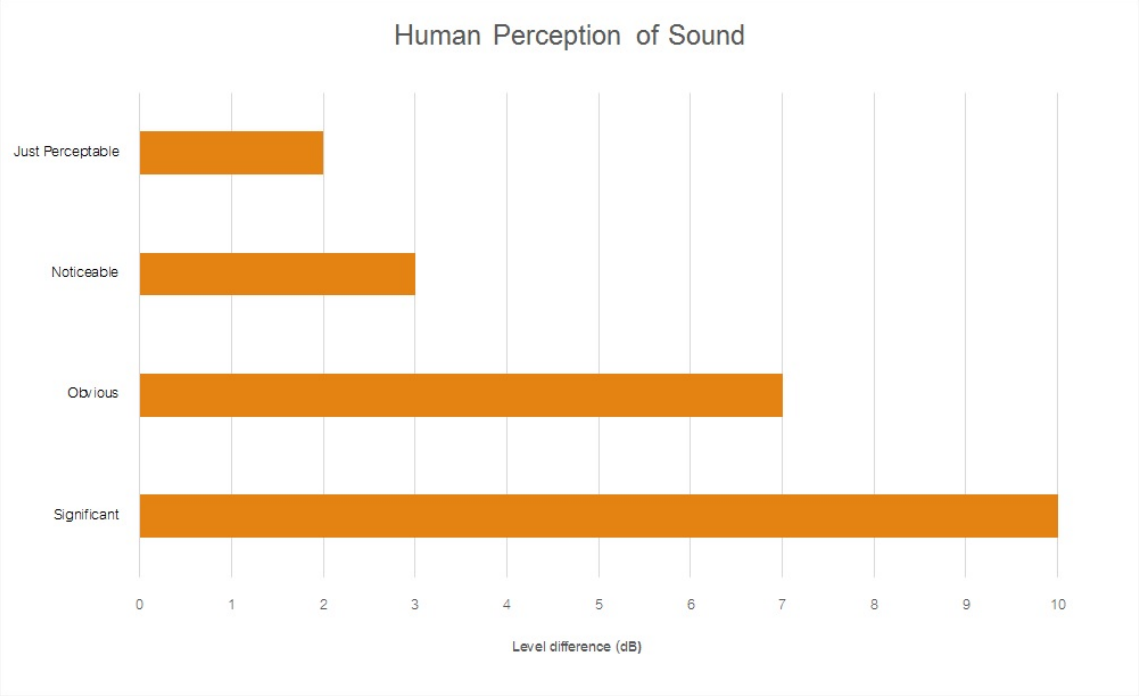
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Hay Solar Farm Development
Traffic Impact Assessment Report

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SURVEYING

ENGINEERING

IRRIGATION

PROJECT MANAGEMENT

Version	Doc version	Written by	Approved by	Date issued
1	Draft	Mark Carter		10/02/2019
2	Issued for Approval	Mark Carter	Mark Carter	15/02/2019

Project Details

Project Name	Hay Solar Farm
Client	ITP Renewables
Report Authors	Mark Carter
PMC Project Reference	F8487

Author: Price Merrett Consulting Pty. Ltd.

Table of Contents

1 Introduction

This report entails a Traffic Impact Assessment Report (TIAR) for the development of the Hay Solar Farm on the Mid Western Highway (B64). The TIAR will review, traffic volumes, traffic growth and accident statistics to evaluate the adequacy of the proposed works for safe operation of the intersection into the future. A new site access has been proposed on the south west of the Mid Western Highway.

The traffic and transport implications of the proposed development are documented in this report.

2 Existing Conditions

2.1 Location

The subject site is within the 'Primary Production' land zone. The site is located on Lot 110 DP1187931, Mid Western Hwy, Hay, NSW 2711 (referred to as "Hay 1A"). The development falls within the Hay Shire Council area.

The site is located north of the Mid Western Highway on the outskirt of Hay township. Across the unmade roadway to the west, the site adjoins RU5 zoned land. There is a power substation facility on the adjoining land west of the site. The proposed solar site is currently used for primary production and has been flood irrigated via a central channel.

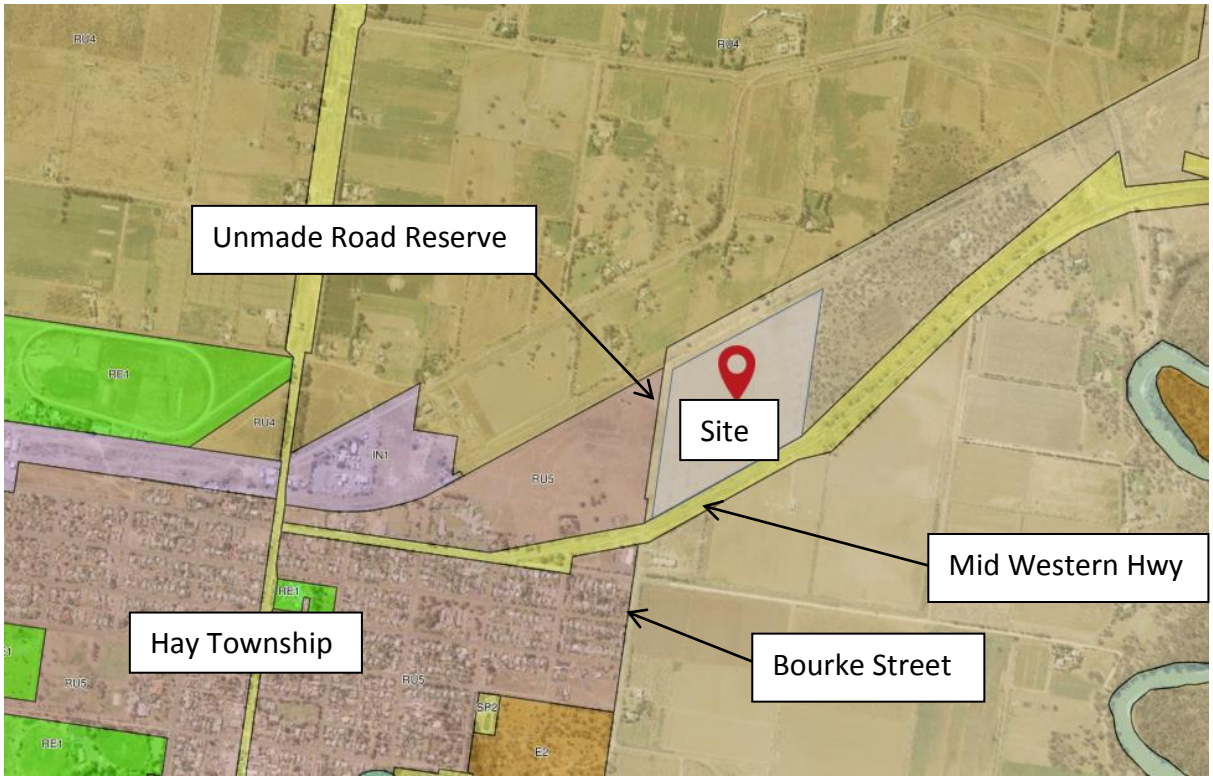


Figure 1 – Site Location (Image from NSW Planning Portal)

Property Report for Mid Western Highway, Hay, 2711

Property Details

Address:	Mid Western Highway, Hay, 2711
Lot/Section/Plan no:	110/-/DP1187931
Council:	HAY

Planning Controls associated with this property

Land Zoning

- RU1 - Primary Production : (pub. 2011-12-09)

Bushfire Prone Land

- Vegetation Buffer

Land Application LEP

- Included : Hay Local Environmental Plan 2011 (pub. 2011-12-09)

Minimum Lot Size

- AC - 90.00 ha : Range [500000 - 999999 sqm (50 - 99.9 ha)] (pub. 2011-12-09)

Other spatial data associated with this property

Local Government Area

- Hay

Suburbs

- Hay

Figure 2 – Property details

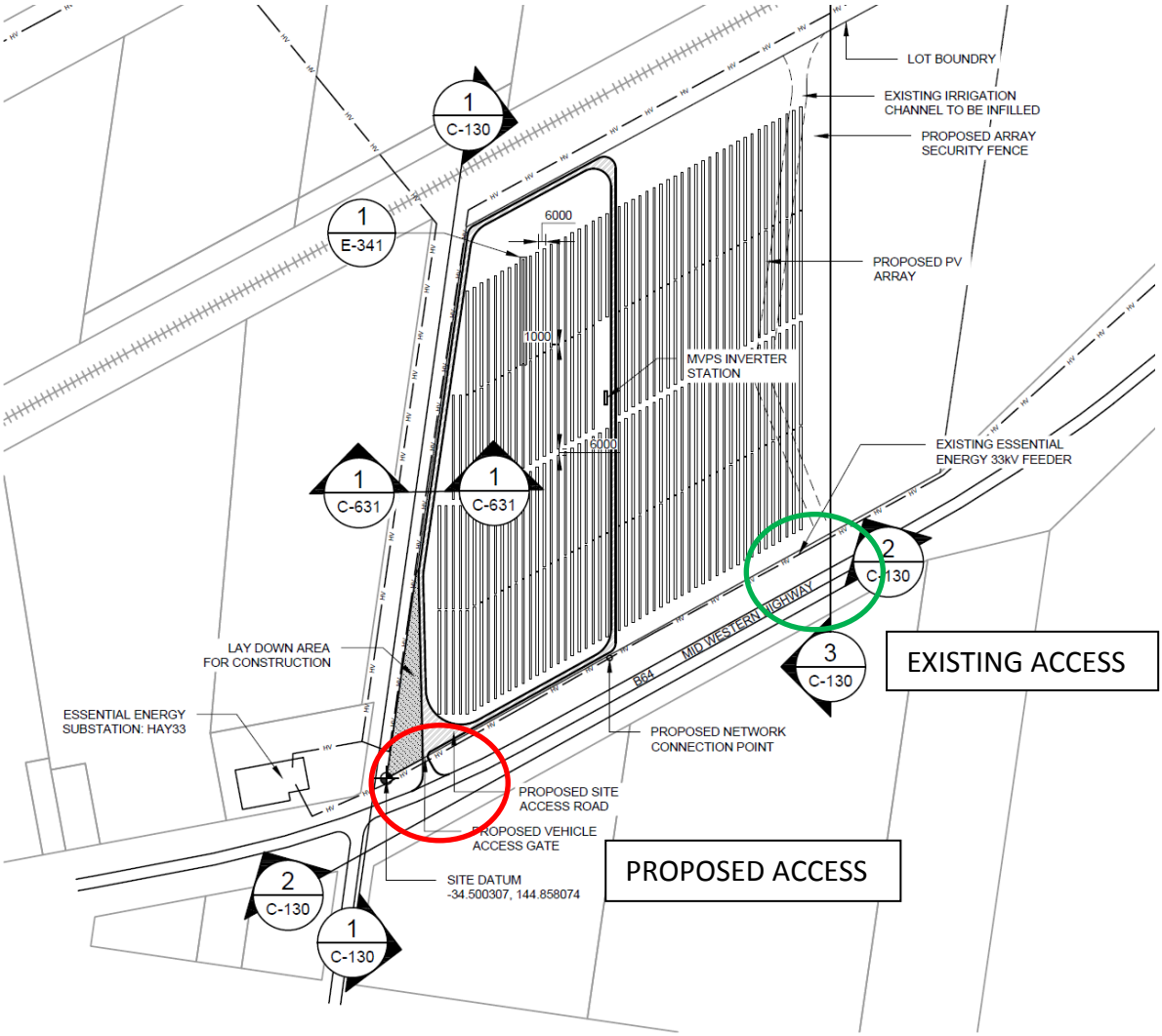


Figure 3 – Proposed Solar development and access point

2.2 Existing Access Arrangement

The existing site is accessed from the Mid Western Hwy (B64) at the south east side of the property as shown in Figure 3. There is an unmade road reserve running along the western and northern boundary to the property.

The existing access to the property is located approximately 115m from the eastern boundary of the site. The access is dirt surface and gate is located approximately 27m from the edge line. .

Safe intersection site distances should be provided for access points. The existing access is within the 110 km/hr zone and therefore would have SISD of 285m for a reaction time of 2.0 sec.

2.3 Mid Western Highway

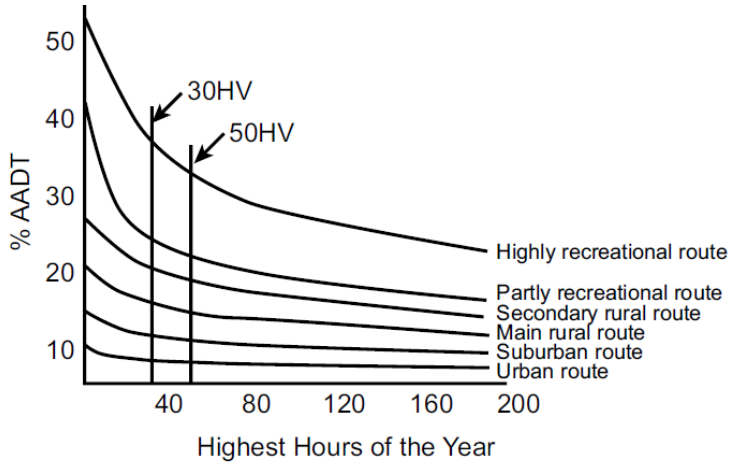
Mid Western Highway is is a 522-kilometre state highway located in the central western and northern Riverina regions of New South Wales, Australia. The highway services rural communities and links the Great Western, Mitchell, Olympic, Newell, Cobb and Sturt highways. The Mid-Western Highway forms part of the most direct route road link between Sydney and Adelaide, with its eastern terminus in Bathurst and western terminus in Hay.

The speed limit on the Mid Western Highway road fronting the site ranges from 50km/hr on the west end and changes to 110 km/hr approximately 165m from the western boundary.

Lane widths on the Mid Western Highway near the western boundary are approximately 3.5m with 0.8m sealed shoulders and roughly 0.6m unsealed shoulder.

Traffic count data on the Mid Western Highway at the location of the solar site are:

- Two way, average daily volume : 776
- Heavy vehicle percentages (class 3 to 12) : 44 %



- Peak hourly can be estimated based on 15% ADT based on the Austroads chart, which is 58 VPH.

3 Proposal

The solar farm is to have a DC capacity of 6 MW and will cover an area of approximately 14 ha which will take up approximately half of the site.

During construction phase there will be a large number of heavy vehicles (19m) accessing the site delivering panel components.

It is likely take up to 10 weeks to complete delivery of equipment. Installation of the components will be occurring during delivery therefore completion of the site should occur within approximately 12 weeks. Upon completion of construction, the traffic generation at the site will be very low and only comprise the infrequent service vehicles.

During the construction phase the work site will involve the following:

Week 1 – 2

Establishment phase

Earthworks and general site establishment and fencing to construct new access and site compound development. This will comprise graders, rollers and water carts.

The existing access would be used during the initial works until the new western access point is accessible.

Likely traffic generation during this period is:

- 6 to 8 light vehicle trips per day (earthworks contractor's staff 4-5).
- 10-15 Truck and trailer loads of gravel over approximately 2-3 days

Week 3-10

Construction Phase

Main construction of piers, installation of panels and underground infrastructure.

Site operation includes:

- 50 construction workers
- Operating hours 7am to 4pm Monday to Friday
- Potential shuttle bus service to and from the site.

Expected traffic generation during the construction phase will be:

- 33 Semi Trailers (19m articulated) including

- 6 for site establishment (buildings etc)
- 2 for delivery of inverters
- 12 for delivery of mounting systems
- 7 for delivery of balance of system
- 6 for demobilisation

- 20 x B Double (26m articulated) for PV Module delivery

Week 10-12

Commissioning

Specialist electrical contractors will commission the site through light or heavy rigid vehicles 12m.

- 10 construction workers
- Operating hours 7am to 4pm Monday to Friday

Transport Route

The trucks delivering the solar system will likely come from Melbourne which would take a route through Shepparton, Tocumwal, Finley, Deniliquin and up the B75 to Hay and turn onto the B64- Mid Western Highway.

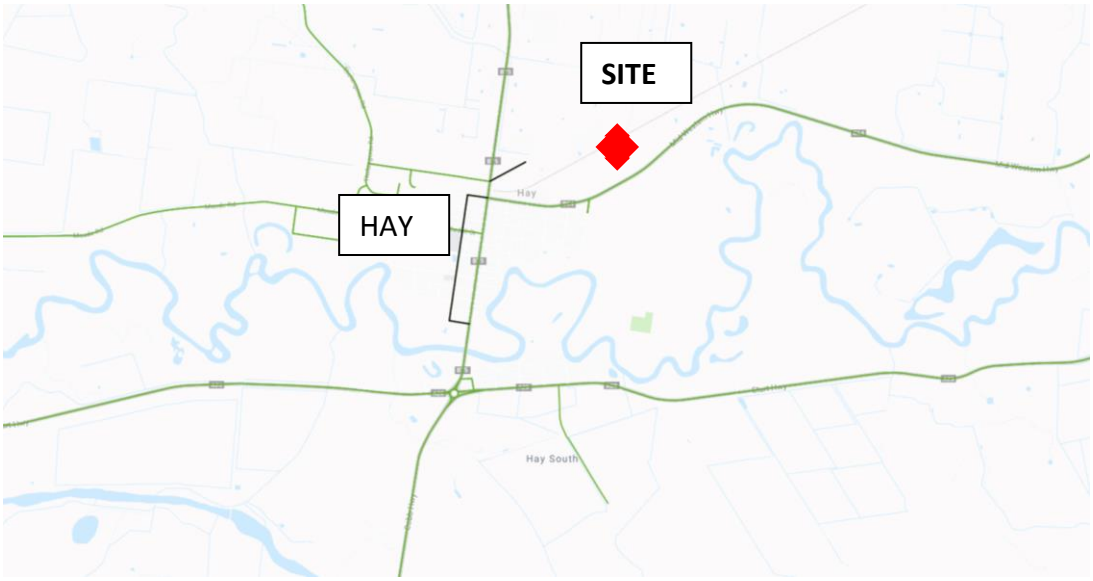


Figure 4 – B Double approved Roads – RMS interactive map.

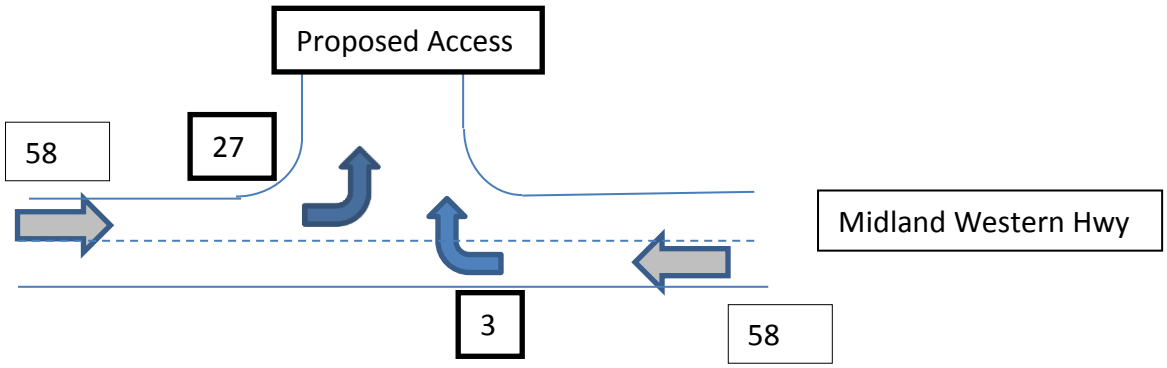
4 Traffic Engineering Assessment

4.1 Traffic Impacts

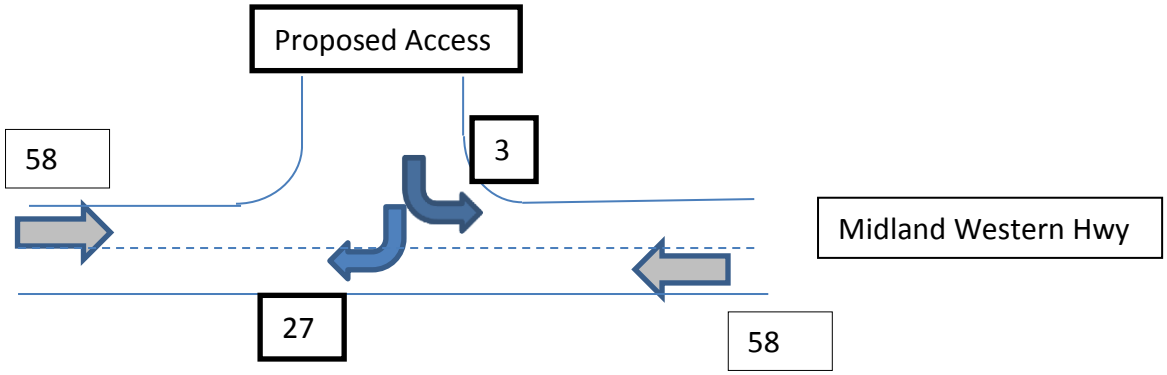
During the 12-week construction period up to 48 semi-articulated trucks and 20 B-Doubles will access the site with an expected daily maximum likelihood of 4 trucks. The trucks will access the site throughout the day generally between 10am and 2 pm and would therefore not contribute to morning or afternoon peak hour.

Construction workers are likely to be in the order of 20-30 vehicles entering the site in the morning between 6:30 to 8:00am and leaving at the afternoon peak around 4:00 to 5:00pm. These will be light vehicles and or shuttle bus service. These movements are expected to be 90% between Hay township and the site, therefor predominately left turn in to the site during the morning peak and right turn out of the site in the afternoon.

AM Peak



PM Peak



The turning movements are very low and impacts from short term construction works will be minimal.

4.1 Proposed Site Access

The proposed access for the development has been located towards the western end of the site within the 50 km/hr zone. The reduced speed zone will lessen the impact if the current site access were to be used and also move the access closer to the RU5 zoneing. The proposed access would be located on the inside of a large radius bend (900m) however this would not impact the sight lines.

The new access would accommodate a 19m vehicle and have minor alterations to the fence to allow 30m between the new gate and the northern edge line of the Mid Western Highway.

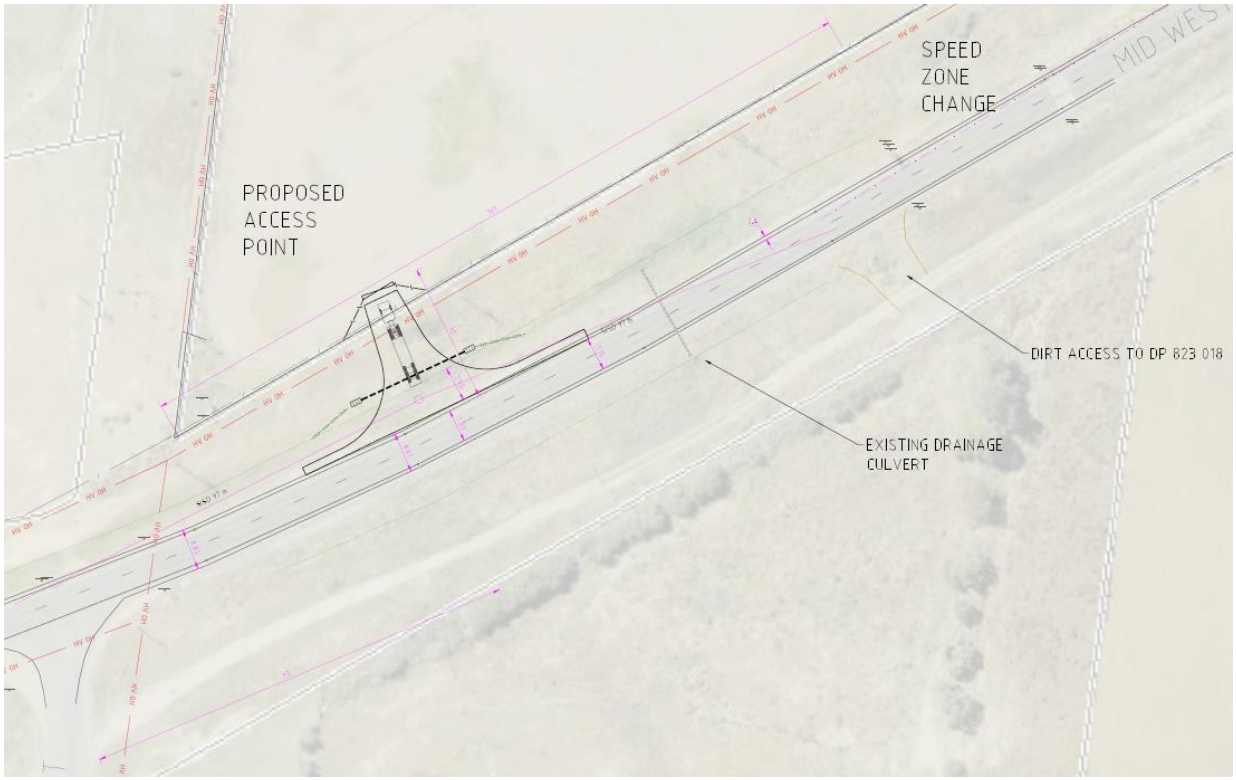


Figure 5 – Proposed western access arrangement

5 Conclusion

The relevant documents, plans and traffic counts have been perused for access requirements to the proposed solar farm development off the Mid Western Highway.

The main findings and proposed upgrades are outlined below:

Recommendations

i. The existing access point to Lot 110 DP 1187931 should be relocated to improve safety during the construction phase.
ii. Proposed access point is suitable and there are no major geometry issues.
iii. Dilapidation survey to be undertaken prior to construction works.

Findings

iv. Sight lines for the proposed access are adequate.
v. Separation distances from existing driveways to the proposed access are adequate.

Proposed Works

iii. New culvert under proposed western access.
iv. New access to be designed and constructed to a standard to accommodate initial construction phase.
v. Construction vehicle signs to be erected during construction phase to notify motorist.

6 References

- Austroads Guide to Road Design Part4A: Unsignalised and Signalised Intersections (2017)
- Austroads Guide to Road Design : Part 3 (2016)
- Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (2017)
- RTA traffic NSW Guide to Traffic Generating Developments (2002)

REPORT

Hay 1A Solar Farm

Water Assessment

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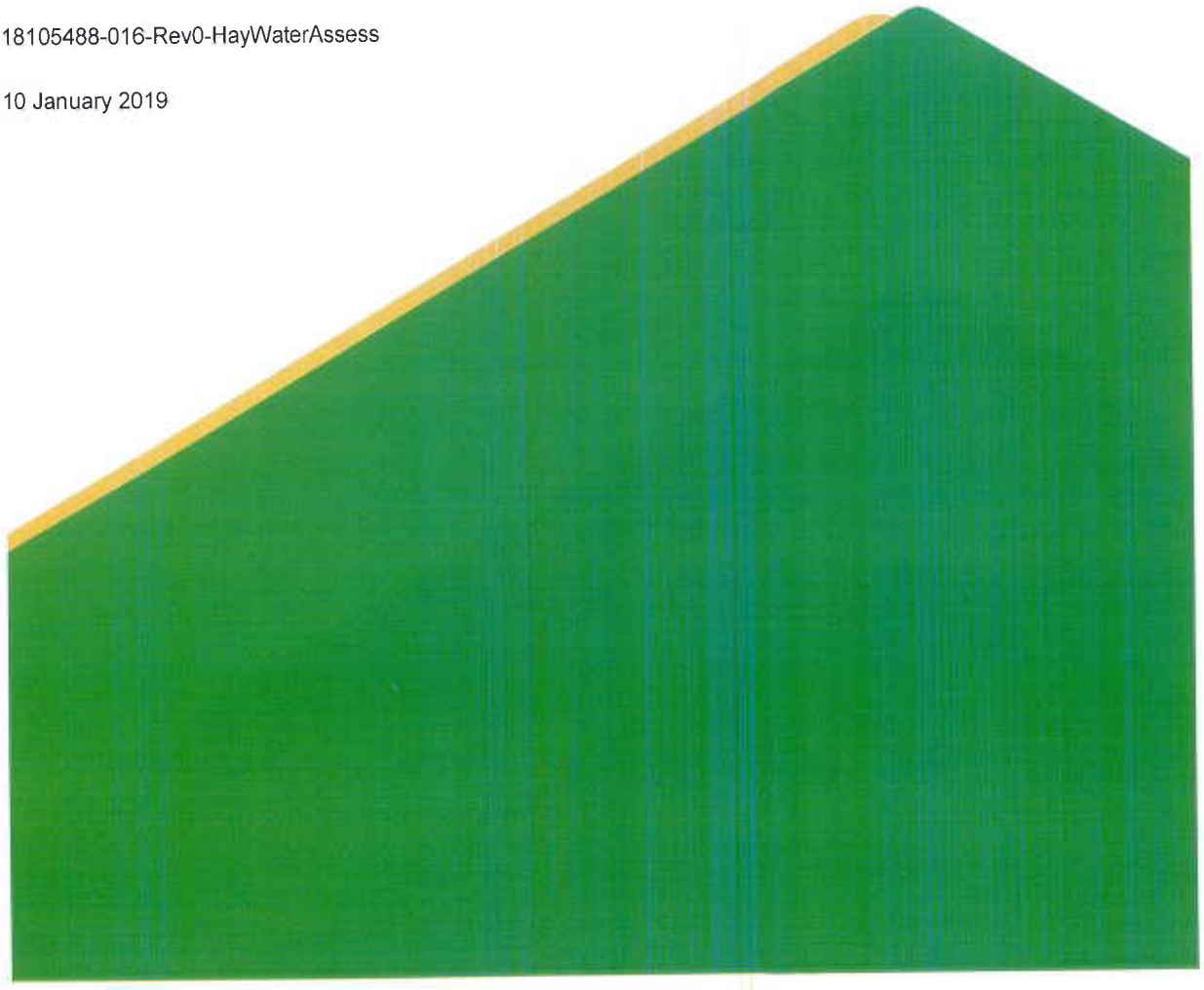
18105488-016-Rev0-HayWaterAssess

10 January 2019



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TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

The proposed Hay 1A Solar Farm is located at Lot/DP 110/1187931 on the Mid Western Highway, Hay north east of the Hay township, within the Hay Shire Council area. ITP Renewables (Australia) Pty Ltd (ITP Renewables) proposes to construct a 5 MW solar facility within the site, which is currently used for agriculture.

This report, which provides a desktop flood assessment to support the Development Application for the project, includes a:

- Desktop review of local hydrology and catchment and water quality data.
- Desktop review of surface and groundwater quality data.
- Desktop review of the flood risk potential against the published references, Local Environmental Plan and Land-use Plan.
- Desktop impact assessment against New South Wales (NSW) policies and referenced industry standards for solar arrays.
- Desktop management assessment with mitigation measures recommend for construction and operation.

1.1 Limitations of assessment

The assessment is based on publicly available information and data and does not include any additional hydrological and/or hydraulic modelling.

1.2 Important information relating to this report

Your attention is drawn to the document titled - "Important Information Relating to this Report", which is included in Appendix "A" of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

2.0 PROJECT DESCRIPTION

The proposed Hay Solar Farm is located on Mid Western Highway in Hay within the Hay Shire Council area. Figure 1 indicates the area of the proposed facility. ITP Renewables propose to construct a solar farm with a DC array capacity of 6.175 MWp and an AC output of 4.99 MW on a site that is currently used for agriculture.

There are to be 19,200 solar modules installed in 188 rows (each row being ~94 m long and ~4 m wide) running north to south. Each row of PV modules will rotate to track the sun across the sky from east to west each day. There is approximately 6 m spacing between each row. The hub height of each tracker is 2 m with the peak of the modules reaching a height of 3.7 m when the array is fully tilted to 60 degrees from horizontal.

The solar farm will also consist of two 2.5 MW inverter stations. These inverters are to be located within the array and are each mounted on a 20 ft skid. Each of these inverter stations incorporate the High/Medium voltage switchgear and transformers.

The mounting system will be constructed on piles that are driven in to the ground. During construction, which is expected to take approximately 3 months, there is likely to be around 50 personnel on site working from 7 am – 4 pm Monday to Friday. Once operational the site will be unmanned with maintenance expected to be carried out quarterly by a crew of 2 – 3 people.

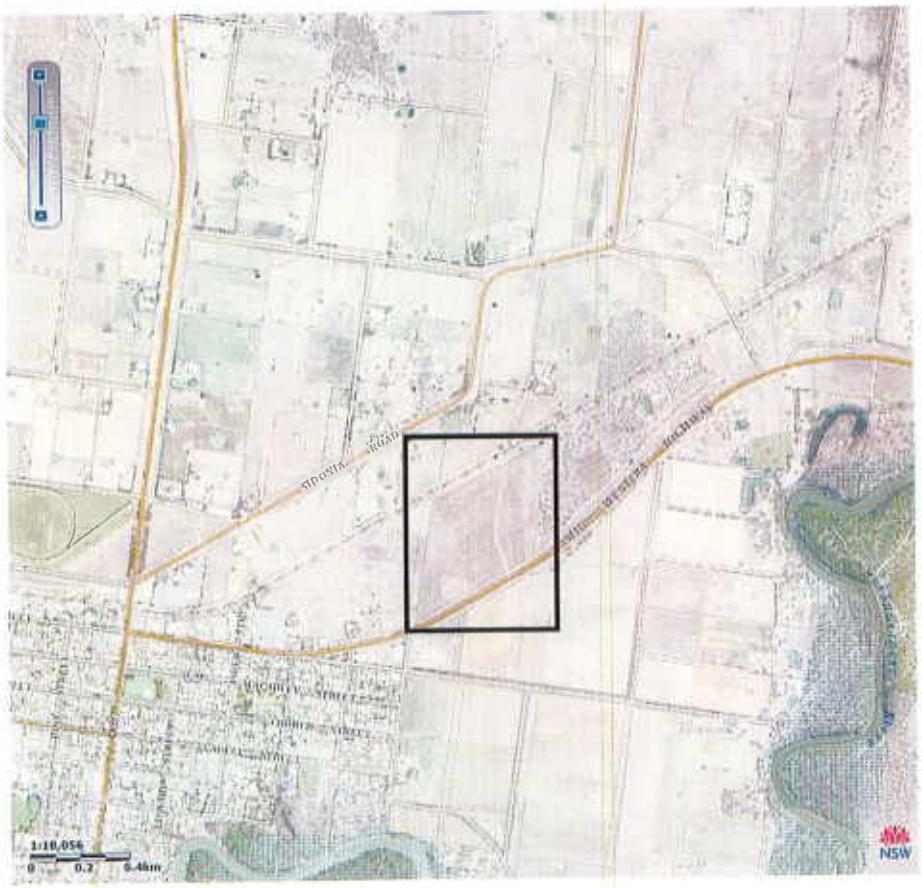

Figure 1: Location of proposed Hay Solar Farm (indicated by black rectangle)[1]

[1] (Spatial Services, 2018)

3.0 CATCHMENT AND FLOOD HISTORY

The site is located north east of Hay within the boundary of the Hay Private Irrigation District (HPID) area and the Murrumbidgee Valley district of the Murrumbidgee regulated river system. In 2016, the HPID was awarded funds under the Australian Government's Private Irrigation Infrastructure Operators Program to upgrade the irrigation delivery system from an open channel to a low pressure pipeline.

Hay township has 2 levees - north and south of the Murrumbidgee River. The Hay town levee, which is approximately 5.7km long and is formed by a combination of embankments, elevated roadways and naturally higher ground, protected Hay township from inundation during the 1956, 1974, 2010 and 2012 flood events. The site of the proposed facility is behind this levee. Even with major inundation of the township due to levee failure or overtopping, the site is considered to be outside of the impacted zone as indicated in Figure 2. The scenario considered in Figure 2 is a "1956 style" event with levee failure or overtopping.

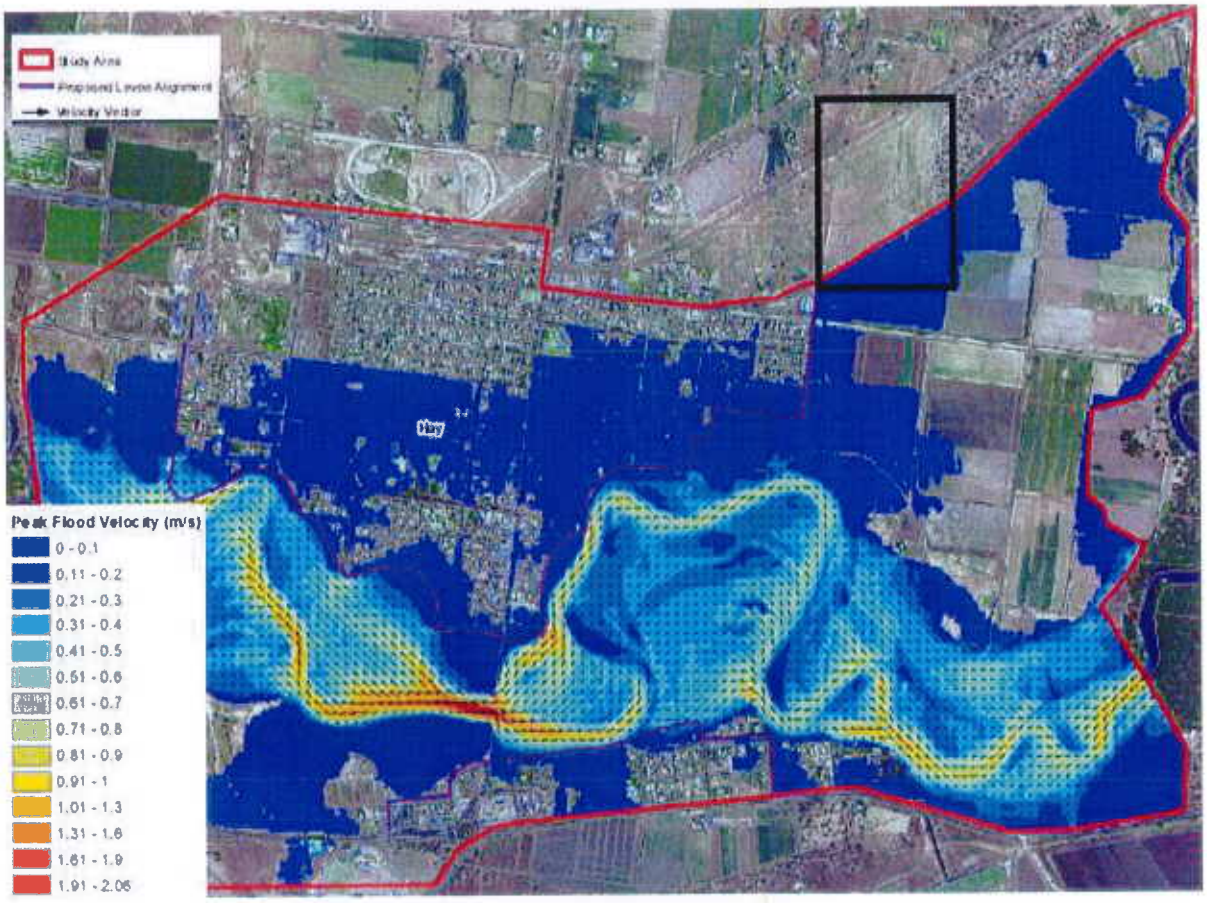

Figure 2: Predicted inundation of Hay in the event of levee failure[2]

[2] Map 5, Hay Local Flood Plan (as amended 10 October 2012), a Sub-Plan of the Hay Shire Local Disaster Plan

4.0 LEGISLATIVE CONTEXT

NSW has a comprehensive legislative and policy framework for the management of floodplain risk and flood prone areas of the state with clear areas of responsibility as outlined below in Figure 3.

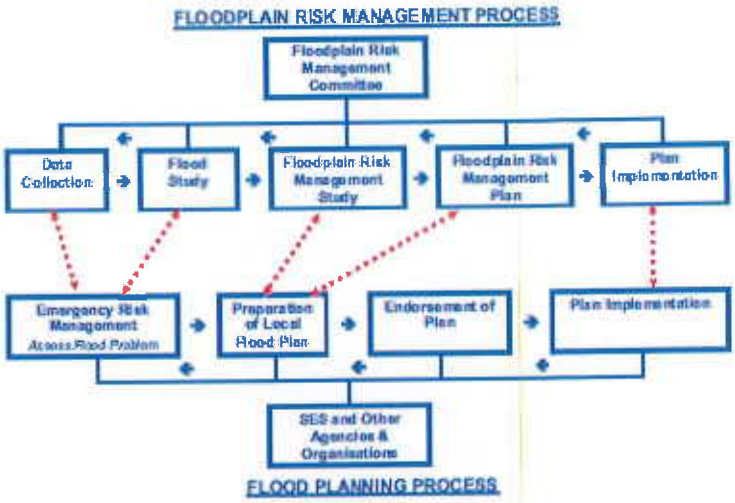

Figure 3: Floodplain Risk Management and Planning Process

4.1 Local Government Act 1993

This Act provides a legal framework for the NSW system of local government. The Floodplain Management Manual was gazetted in 2005 as the manual relating to the development of flood-liable land for the purposes of section 733. This section exempts councils from liability in relation to flood prone land provided they have undertaken assessments substantially in accordance with the latest manual.

The Floodplain Development Manual (NSW Government, 2005) is the approved Section 733 manual for flood prone land. The manual supports the NSW Government's Flood Prone Land Policy in providing for the development of sustainable strategies for the management of floodplains specifically in relation to human occupation. It provides a framework for councils to implement the policy and a process for managing floodplain risk.

4.2 Water Management Act 2000

The Act provides for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. Water management principles intended to guide decision making under the Act in relation to floodplain management require the existing and future risk to human life and property arising from occupation of the floodplain to be minimised.

4.3 Hay Local Environmental Plan 2011

The Hay Local Environmental Plan 2011 (hereby referred to as the Plan) aims to make local environmental planning provisions for land in Hay in accordance with the relevant standard environmental planning instrument.

The Plan does provide specific management requirements for flood planning which applies to land at or below the flood planning level (1 in 100 ARI plus 0.5m freeboard). It requires that development consent cannot be granted unless the proposed development is compatible with the flood hazard of the land and it will not cause significantly adverse impacts to other developments, the environment and the community.

The Plan provides additional provisions for earthworks to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.

The Plan provides the prohibited and permitted types of development within the local area. Some types of development are also regulated by particular State environmental planning policies.

4.4 State Environmental Planning Policy (Infrastructure) 2007

Division 4 of the State Environmental Planning Policy (Infrastructure) 2007 relates to 'Electricity generating works or solar energy systems'. The policy relates to the approval process for solar energy systems, and there are specific details required for flood liable land which means land that is susceptible to flooding by the probable maximum flood event. The policy states consultation with the relevant council is required if the proposal will alter flood patterns other than to a minor extent and their response must be taken into consideration.

4.5 Protection of the Environment Operations (POEO) Act 1997

The POEO Act aims to protect and restore and enhance the quality of the environment in NSW, while still having regard to ecologically sustainable development.

With relevance to releases from the site, the Act aims to reduce risks to human health and to prevent degradation of the environment by promoting pollution prevention and the reduction in the use of materials and the re-use, recovery or recycling of materials. The Act contains the requirements for the management of such discharges and also the offences that relate to pollution. Section 148 requires that any pollution incidents or those that threaten material harm to the environment must be notified to the relevant authority (e.g., NSW Environment Protection Authority).

4.6 Soil Conservation Act 1938

This Act makes provision for the conservation of soil resources and for the mitigation of erosion. The act allows the Minister for Primary Industries[3] to issue soil conservation notices, declare areas to be sites of erosion hazard, proclaim works in catchment areas and outlines specific regulations in regards to the Rural Assistance Act 1989.

Of general relevance to this project is the promotion of sustainable use and prevention of loss of soil resources from a site.

[3] Except Parts 2A, 3 and 4, and sections 15 and 30A in so far as they relate to Parts 2A, 3 and 4, jointly with the Minister for the Environment

5.0 AVAILABLE DATA

Climatic data and water quantity and quality monitoring information are available in the region as outlined in the following sections.

5.1 Rainfall

The Bureau of Meteorology (BOM) has operated a single long-term station in the Hay region, although there are also two shorter duration stations, one of which is still open. None of these stations are located within the local catchment of the site. However, the associated records are indicative of the rainfall that can be expected in the region.

Table 1 outlines the average annual, maximum annual, maximum daily and maximum monthly rainfall values for the available rainfall stations which are indicated on Figure 4. Hay (Miller Street) is the only long-term station in the region and consequently the statistics derived from this record are less influenced by outlier events than for the sites with records of significantly shorter durations. The Hay CSIRO station period of record excludes rainfalls associated with the large historical regional flood events of 1956, 1974, 2010 and 2012 and this is reflected in the statistics for this station. The Hay Airport station has an average annual mean close to that for Hay (Miller Street) with comparable maximum monthly values. It is noted, however, that the statistics are not based on comparable periods of data.

Table 1: Rainfall Stations

Station Number	Station Name	Period of Record	Rainfall (mm)			
			Average Annual	Highest Annual	Maximum Daily	Highest Monthly
075031	Hay (Miller Street)	1877 - 2015	367.4	836.8	121.9	203.7
075175	Hay CSIRO AWS	1989 - 2007	256.5	418.4	51.0	84.6
075019	Hay Airport AWS	2007 -	362.9	662.6	85.8	184.8

Average monthly values for the three rainfall stations are presented in Table 2. Comparing a particular monthly value for the three stations demonstrates the point made previously in regard to comparing statistics for long-term stations against shorter term records. Mean monthly values for February, November and December are significantly higher for Hay Airport station than for Hay (Miller Street) station, which is a direct consequence of the bias of the wet 2010 and 2011 years on the shorter record for Hay Airport.

Table 2: Average Monthly Rainfall

Station Number	Rainfall (mm)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
075031	27.3	29.7	30.1	27.7	34.6	35.8	31.1	31.9	31.2	34.6	25.8	26.8
075175	28.7	18.5	15.9	12.8	20.5	24.9	27.7	23.8	22.9	26.4	20.7	16.6
075019	24.9	43.1	28.9	21.4	27.6	24.7	20.8	22.8	22.7	20.5	47.7	39.7

LEGEND

- Rainfall Stations
- Electricity Transmission Line
- Cadastre
- Lot DP1187931

FOR DISCUSSION PURPOSES ONLY

DRAFT

0 500 1,000

1:30,000 @A3 METRES

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

NOTES
Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

REFERENCE(S)
Electricity Transmission Lines, Cadastre: © State of NSW (Spatial Services - Department of Finance, Services and Innovation) 2018
Rainfall Stations: Web-MIM

CLIENT
ITP RENEWABLES

PROJECT
DARLINGTON POINT SOLAR - WATER ASSESSMENT

CONSULTANT
GOLDER

PREPARED	HS
REVIEWED	DP
APPROVED	JP

TITLE
FIGURE 4 AVAILABLE DATA

PROJECT NO	CONTROL	REV	FIGURE
18105488	016	A	4

Flood-producing weather systems across the region include inland troughs, cold fronts, and thunderstorms. Consequently, each rainfall event is a function of the prevailing meteorological conditions. Therefore, the longer Hay (Miller Street) record is considered to provide useful information on expected seasonal rainfalls in the area.

5.2 Streamflow

Streamflow records (Table 3) are available from the WaterNSW portal for a number of stream gauging stations in the region. Figure 4 indicates the location of these stations with reference to the proposed facility.

Table 3: Stream Gauging Stations

Station Number	Station Name	Available/Relevant Data	Comments
410001	Wagga Wagga, Murrumbidgee River	Flow, EC	Murrumbidgee regional flooding
410005	Narrandera, Murrumbidgee River	flow	Murrumbidgee regional flooding
410021	Darlington Point, Murrumbidgee River	flow	Murrumbidgee regional flooding
410136	Downstream Hay Weir Murrumbidgee River	flow	Murrumbidgee regional flooding

Generally, data from the available stream gauges do not provide specific information on local site flooding but are more useful in the context of assessing major regional flooding events that may impact on site access. This information is publicly available from the WaterNSW Real-time data portal and could be incorporated into site management plans.

5.3 Groundwater

The facility is located within an area underlain by the Murrumbidgee Alluvium, which comprises 4 groundwater units consisting of the Lower Murrumbidgee Shallow Alluvium, Lower Murrumbidgee Deep Alluvium, Mid Murrumbidgee Alluvium and Lake George Alluvium. The Lower Murrumbidgee Deep Alluvium and the Wagga Wagga area of the Mid Murrumbidgee Alluvium are the units from where the majority of groundwater is extracted.

Groundwater sourced from the Mid Murrumbidgee Alluvium supports agriculture in the nearby major irrigation districts of Murrumbidgee Irrigation Area (MIA) and the Coleambally Irrigation Area (CIA). Recharge to the Mid Murrumbidgee Alluvium also occurs through leakage from the Murrumbidgee River and its various tributaries and anabranches, infiltration from rainfall and irrigation activities.

Hay is situated above the Lower Murrumbidgee groundwater units, which have lower rates of extraction. Recharge to the Lower Murrumbidgee Shallow Alluvium occurs through leakage from the Murrumbidgee River and its various tributaries and anabranches, infiltration from rainfall and irrigation activity while inflow to the underlying Lower Murrumbidgee Deep Alluvium occurs primarily through downward leakage from overlying shallow alluvium.

Rising groundwater in selected areas of the Murrumbidgee River catchment has been a significant problem historically due to the risk of rising salinity concentrations in the root zone. The NSW government maintains

482 monitoring bores at 283 sites across the Murrumbidgee Alluvium. Figure 5 indicates the change in groundwater levels from the non-pumping period from 2005 – 2006 compared to the groundwater levels during the non-pumping period of 2015 – 2016, demonstrating there has been limited impact on groundwater levels around Hay over this period. The rise in groundwater level in the Mid Murrumbidgee Alluvium relates to recharge events from floods in 2010 and 2012.

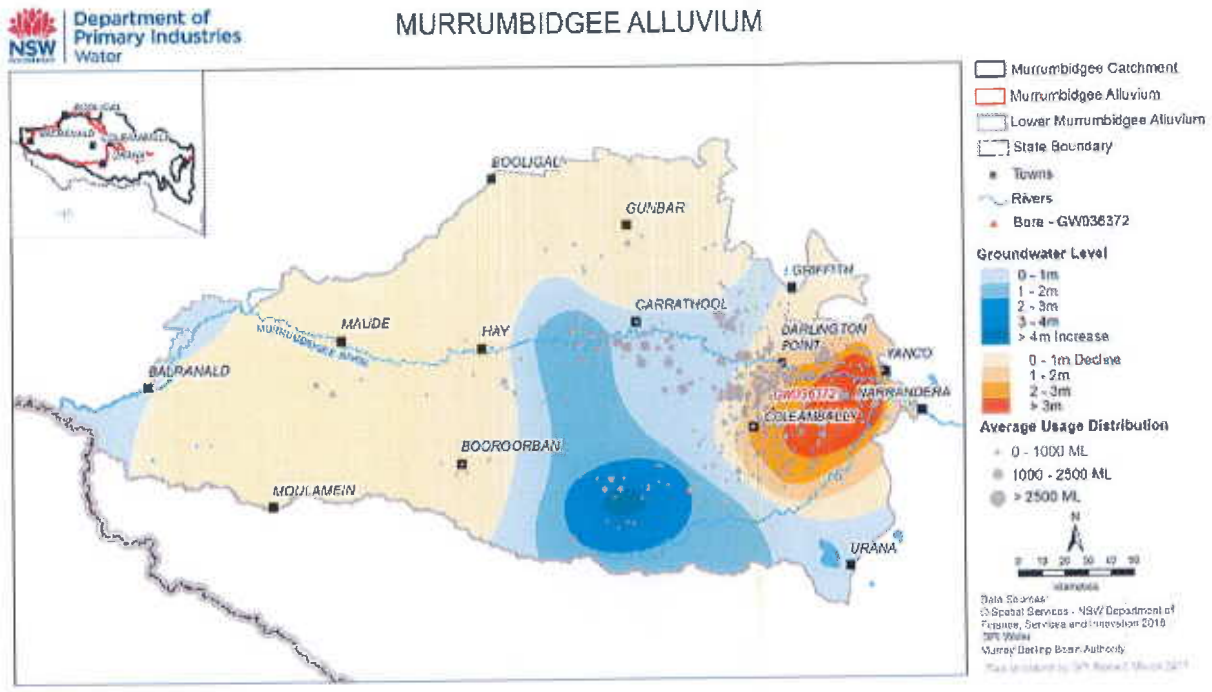

Figure 5: The change in groundwater levels during the non-pumping periods in the deep aquifer system of the Lower Murrumbidgee Alluvium from 2005-2006 compared to those of the 2015-2016 water years.[4]

[4] Figure 12 (SIP 2017)

6.0 POTENTIAL IMPACTS

Based on the current available information, potential adverse surface water-related impacts to the site include:

- Site accessibility and
- Managing downstream actionable nuisance.

6.1 Groundwater

The site is not located within an area listed as groundwater vulnerable in accordance with Hay Local Environmental Plan 2011 Clause 6.9. Although the site is within the broader Murrumbidgee River catchment area, which has a history of rising groundwater levels over the longer term in certain areas, this is not expected to be a concern at this site.

6.2 Flooding

Flooding associated with the Murrumbidgee River is not expected to result in inundation of the site. However, regional flooding may disrupt site activities particularly access to the site during construction for the workforce and material suppliers. Consequently, it would be prudent to incorporate monitoring of relevant gauging sites (rainfall and streamflow) with appropriate mitigation and/or management measures incorporated into relevant project plans.

6.3 Water Quality

The project has the potential to alter existing catchment conditions within the site. The impervious area of solar facilities is typically only marginally increased owing to associated hardstand and building areas. However, the panels may impact the nature of vegetation coverage on the site, which has the potential to increase surface runoff and peak discharge. Increased flow concentration off the panels also has the potential to erode soil at the base of solar panels (Cook & McCuen, 2013).

Furthermore, as the site has been historically used for agriculture there is very little natural ground cover vegetation as it has been mostly cleared for cropping and may have a build-up of residual agricultural-related pollutants. It is understood that soil types within the Lower Murrumbidgee vary considerably and include:

- Grey silty clay loams occur along ancestral stream and floodplain complexes in the Lowbidgee district and along the Murrumbidgee River.
- Grey, brown and red clays occur on the beds and floodplains of the Murrumbidgee River and associated creek systems.
- Red-brown earths occupy a large part of the eastern Riverine Plain, covering at least half of the Lower Murrumbidgee. These are moderately fertile and hold water well but are prone to erosion.

There is also limited available soil data in the Hay area although it is known to have dispersive, sodic grey soils. Consequently, there is the potential for site runoff to downstream drainage lines to contain increased sediments, resulting in increased turbidity, and elevated concentrations of other water quality parameters. With the limited topographic relief of the site, these issues are considered manageable.

7.0 PROPOSED MITIGATION MEASURES

7.1 Site Accessibility

The site accessibility issues may be managed in the project's risk management register(s) owing to the regional nature of the events and the potential to impact whole of site works. It would be prudent to consider engaging with local emergency management agencies.

7.2 Downstream Actionable Nuisance

Impacts associated with erosion and sedimentation resulting from construction activities can be minimised by undertaking works in accordance with provisions of the NSW government's best practice sediment and erosion control series Managing Urban Stormwater: Soils and Construction.

Proposed mitigation measures associated with managing downstream actionable nuisance are outlined in Table 4.

Table 4: Proposed Mitigation Measures

Stage	Measure	Activities/Approach
Design	Site drainage and water quality controls	Design Basis • Undertake hydrological assessment of the sites catchment in accordance with relevant methods outlined in Australian Rainfall and Runoff; • Determine sediment management targets and drainage control standards in accordance with Managing Urban Stormwater: Soils and Construction Vol 1 (Blue Book); • Develop a site erosion and sediment control plan in accordance with the Blue Book; • Develop site drainage design incorporating detention basins and sedimentation management structures where relevant. • Permanent site drainage should coincide with temporary arrangements where possible.
Construction and/or Demolition	Site drainage and water quality controls	General site works: • Catch drains to be located downslope of any proposed road works; • Install location appropriate sediment fences or other applicable control measures depending on whether the feature is upstream or downstream of a disturbed part of the site or will need to be trafficable; • All stormwater collection points need to have appropriate sedimentation and erosion controls; • Undertake ongoing inspections of stormwater facilities and water control measures to assess their effectiveness; • Vibration grids or wash bays at all construction exits • Level spreaders at locations where concentrated flow is discharged offsite to ensure sheet flow like conditions are maintained; • Flat land erosion control options include erosion control blankets, gravelling, mulching, soil binder, turfing and revegetation.
Construction and/or Demolition	Stormwater point source control	In the event of concrete works: • Do not undertake works if chance of heavy rain;

Stage	Measure	Activities/Approach
		• Store rinsate[5] water, if applicable, separately to other water on site and dispose of offsite as appropriate; • Block on site drains in the area of the works and remove any contaminated runoff. In the event that dewatering practices are required: • Pump hose intakes for withdrawing water from excavations will be elevated to minimise sediment pumping and directed to a containment area for settling prior to discharge; • Limit direct discharge off site (consistent with the design requirements for sediment pond discharge) Stormwater collected on site should be reused where possible. Controls should be inspected and maintained on a regular basis. All water released from sediment basins should be clear or disposed off site by vehicle. Material and waste storage areas should be designed and operated to minimise interaction with surface waters. Vehicle washdown areas should be located away from water courses.

[5] A dilute solution of chemical resulting from washing the container and equipment with water, as defined by NSW EPA accessed 20 December 2018 https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/authorised-officers/glossary#r

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https://golderassociates.sharepoint.com/sites/29921g/deliverables/r-016-water-hay1a/18105488-016-rev0-haywaterassess.docx

APPENDIX A

Important Information Relating to this Report

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