



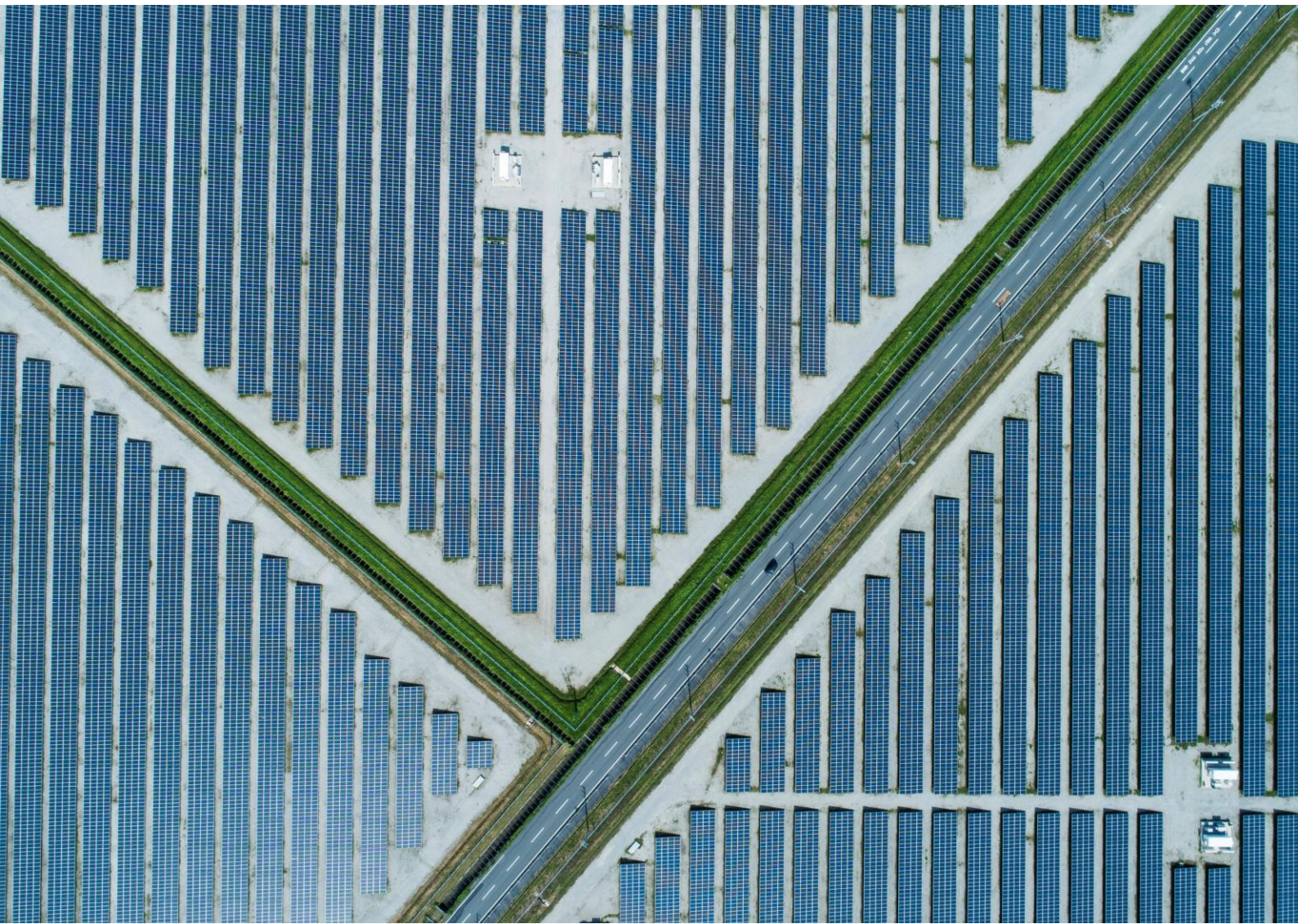
Silverleaf Solar Farm

Amendment Report

Silverleaf Solar Farm Pty Ltd

27 September 2021

→ The Power of Commitment





GHD Pty Ltd | ABN 39 008 488 373

Level 3, 24 Honeysuckle Drive

Newcastle, New South Wales 2000, Australia

T +61 2 4979 9999 | **F** +61 2 9475 0725 | **E** ntlmail@ghd.com | **ghd.com**

Document status

Revision	Author	Reviewer		Approved for issue		
		Name	Signature	Name	Signature	Date
0	E Marsh	L King A Quin		D Mees		24/08/2021
1	L King	D Mees		D Mees		10/09/2021
2	D. Mees	L. King		D Mees		27/09/2021

© GHD 2021

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Executive summary

Background

Silverleaf Solar Farm Pty Ltd (ENGIE) is seeking to amend their State Significant Development (SSD) application for the Silverleaf Solar Farm (SSD-9358) project (the proposal).

The proposal consists of the following components:

- Solar arrays consisting of about 440,000 single-axis tracking panels up to four metres in height, supported by about 5,150 tracker units
- Construction of a transmission corridor, supporting 132 kilovolt (kV) power lines, connecting the Project site to the existing TransGrid substation located on Stoney Creek Road
- Inverter and transformer stations evenly distributed across the site, with onsite cabling and electrical connections between solar arrays and panel inverters
- Internal solar farm substation
- Cables and trenches
- Internal access tracks including car parking areas
- Operational and maintenance office including staff amenities block
- Perimeter security fencing
- Landscaping around the perimeter of the site where required.

Approval for the proposal is sought under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposal is classified as SSD and the Minister for Planning and Public Spaces is the consent authority. Pursuant to Section 4.12(8) of the EP&A Act, an Environmental Impact Statement (EIS) is required to support the development application for the proposal.

The EIS was prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) and submitted to the NSW Department of Planning, Industry and Environment (DPIE) in August 2019. The EIS was placed on exhibition from 4 September 2019 to 1 October 2019 to seek feedback from the community and stakeholders. A total of 20 submissions were received for the proposal, five from the community and 15 from government agencies.

A Response to Submissions (RtS) report was prepared to summarise and respond to the issues raised during exhibition of the EIS. The RtS also provided amended and additional mitigation measures and minor amendments to the Project area since the lodgement of the EIS. The RtS was submitted in November 2020.

A revised RtS has been prepared for the proposal (at the request of DPIE) and is provided in Appendix A.

Purpose of this Amendment Report

ENGIE proposes to amend the proposal following the response from stakeholders received during EIS exhibition and as outlined in the revised RtS report. This Amendment Report has been prepared to describe the proposed amendments, which include design changes and refinements related to the proposal footprint, a transmission line at the Newell Highway intersection and the location of the inverter station.

This Amendment Report has been prepared in accordance with the *State significant development guidelines – preparing an amendment report* (DPIE, 2021). The guidelines form part of the Rapid Assessment Framework reforms that came into effect on 1 July 2021.

Summary of proposed amendments

The proposed amendments to the proposal as described in this EIS are outlined as follows:

- Relocation of the intersection of the transmission line with Newell Highway
- Relocation and revision of the substation footprint as per TransGrid recommendations

- Relocation of the inverter station
- Redesign of the proposal footprint to avoid potential impacts to the Plant Community Type (PCT) 397 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion.

The proposed amendments have been made as part of the ongoing development of the proposal since the EIS was exhibited. The amendments are minor in nature and considered to be consistent with the proposal as described in the EIS.

Assessment of impacts

The need to amend the proposal was identified in the RtS report. The EIS included a range of environmental mitigation measures to avoid, monitor, offset and manage impacts associated with the proposal. Where required, additional or amended environmental mitigation measures are proposed herein to manage additional or enhanced impacts due to the proposed amendments. In some cases, the proposed amendments have resulted in a reduction of anticipated impacts from those described in the EIS.

Biodiversity

An updated Biodiversity Development Assessment Report (BDAR) has been prepared for the proposed amendments (see Appendix B) related to the redesign of the proposal footprint to avoid impacts to the PCT 397 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion that is present in the northwest of the proposal area. The EIS assessed this PCT as having no conservation significance under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or NSW *Biodiversity Conservation Act 2016* (BC Act).

Since the preparation of the EIS, the Poplar Box Grassy Woodland on Alluvial Plains ecological community has been listed under the EPBC Act as a Threatened Ecological Community (TEC). Woodland associated with PCT 397 is associated with the Poplar Box Grassy Woodland on Alluvial Plains TEC, which was not assessed within the BDAR previously prepared for the EIS.

A previous updated of the BDAR was submitted in October 2020. A revised version of that BDAR is appended to this report.

The updated BDAR assesses the formation of PCT 397 to determine if the vegetation present would meet the key characteristics of the Poplar Box Grassy Woodland on Alluvial Plains TEC. The assessment determined that the woodland formation of the PCT 397 in the proposal area did not conform to the TEC listing under the EPBC Act. Additional approvals or assessment under the EPBC Act are not required for the proposal, however the footprint has been redesigned to exclude the PCT 397 area and avoid any direct impacts. The redesign of the footprint to exclude the PCT 397 area reduces the extent of biodiversity impacts identified within the EIS. Potential indirect impacts to the PCT would be managed through the implementation of mitigation measures provided in the EIS and Amendment Report.

Design refinements

The proposed design refinements, for the transmission line, substation and investor station, will occur within the proposal footprint assessed in the EIS, with only slight relocation as suggested or described within the RtS report. The proposed refinements are minor in nature and do not require additional assessment, approvals or mitigation measures. Amended mitigation measures related to these changes are provided to reflect the proposed amendments.

Strategic context

Australia is one of the largest emitters of carbon dioxide per capita, with a historic reliance on coal-fired power generation. As such, Australia has both international and Federal commitments to reduce greenhouse gas emissions within set emission reduction targets. These targets have shaped and created both Federal and NSW state government policy regarding strategies and framework to achieve these emission reduction targets.

Renewable energy projects are one of the most effective ways to reduce greenhouse gas emissions. The proposal would provide a source of renewable energy and reduce greenhouse gas emissions, aligning with Australia's emission reduction commitments and improving reliability of the electricity market and energy supplies. The proposal strategically aligns with both Commonwealth and State plans to achieve renewable energy targets while providing a secure and affordable source of renewable energy for NSW, while minimising environmental impacts to the surrounding environment.

The Silverleaf Solar Farm sits within the NSW N1 North West Renewable Energy Zone (N1 REZ), which is identified as a key renewable energy resource area for NSW and a target for future network development. The proposed connection location at Narrabri substation has multiple redundant connection paths providing strong network reliability including 132 kilovolt (kV) connections direct to Tamworth; to Tamworth via Gunnedah; and north to Moree. The Australian Energy Market Operator (AEMO) Integrated System Plan also outlines plans for upgrades to the Queensland – New South Wales interconnector (QNI) including two 500kV lines connecting directly into the N1 REZ, further supporting the development of new projects in this region.

Engie are working with Transgrid to finalise the connection to their transmission network. A Connection Enquiry has been completed, with the subsequent Connection Process Agreement executed between the two parties to continue this process of finalising connection works. The grid connection process is being progressed by Engie and Transgrid as part of the standard process with AEMO and providers for establishing connections to the transmission and distribution networks in the National Energy Market.

Statutory context

The proposal is classified as SSD, as it requires development consent under Part 4 of the EP&A Act and is listed under Schedule 1(20) of the *State Environment Planning Policy (State and Regional Development) 2011* (SRD SEPP), being development for the purposes of electricity generating works with a capital investment value greater than \$30 million. The Minister for Planning and Public Spaces is the consent authority for the proposal.

The proposed amendments are minor in nature and do not require any approvals in addition to those identified and described in the EIS. Offset and biodiversity credits requirements under the BC Act are addressed within the updated BDAR in Appendix B.

State Environmental Planning Policy No. 44 – Koala Protection (SEPP 44), which was addressed in the EIS, has since been repealed and replaced by *State Environmental Planning Policy (Koala Habitat Protection) 2020* (Koala SEPP 2020) and *State Environmental Planning Policy (Koala Habitat Protection) 2021* (Koala SEPP 2021). Koala SEPP 2020 applies to the proposal as it is within the Narrabri local government area, listed in Schedule 1 of Koala SEPP 2021, and zoned as RU1 - Primary Production. However, as the site does not represent potential or core koala habitat, the development control provisions of Koala SEPP 2020 do not apply.

Ongoing community and stakeholder consultation

Additional consultation with community members and stakeholders was not undertaken for this Amendment Report, as the proposed amendments are in response to submissions received and documented in the RtS report.

Conclusion

The proposed amendments for the proposal are minor in nature and do not differ from the overall objectives, assessment and approvals assessed within the EIS. The amendments will not have any additional or significant impacts, and in some cases will reduce the anticipated impacts described in the EIS. Mitigation measures have been amended where necessary to consider the proposed amendments.

Contents

1.	Introduction	1
1.1	Background	1
1.2	The applicant	1
1.3	The proposal as described in the EIS	1
1.4	Proposed amendments	3
1.5	Purpose of this Amendment Report	3
2.	Strategic context	4
3.	Description of amendments	5
3.1	Summary of amendments	5
3.2	Detailed amendment descriptions	5
3.2.1	Transmission line	5
3.2.2	Substation footprint	8
3.2.3	Inverter location	8
3.2.4	Proposal footprint	8
4.	Statutory context	10
5.	Community engagement	13
5.1	Engagement to date	13
5.2	Additional consultation	13
5.3	DPIE information requests	13
5.3.1	Offset liability and offset strategy	13
5.3.2	Tabulation of vegetation impacts	13
5.3.3	Evidence of landowner consent	14
5.3.4	Evidence of consultation with Santos	14
5.3.5	Kamilaroi Highway/Logans Road intersection	14
5.3.6	Tabulation of land and soil capability impacts	14
5.3.7	Visual impact mitigation at R005	15
5.4	Future and ongoing engagement	15
6.	Assessment of impacts	17
6.1	Biodiversity	17
6.1.1	Existing environment	17
6.1.2	Proposed amendment impacts	17
7.	Justification of the amended proposal	18
7.1	Economic impacts	18
7.2	Environmental impacts	18
7.3	Social impacts	18
7.4	Ecologically sustainable development	18
7.4.1	The precautionary principle	19
7.4.2	Intergenerational equity	19
7.4.3	Conservation of biological diversity and ecological integrity	19
7.4.4	Improved valuation, pricing and incentive mechanisms	19
7.5	Conclusion	19

Table index

Table 3.1	Summary of amendments	5
Table 4.1	Legislation applicable to the proposed amendments	10
Table 5.1	Summary of vegetation types	13
Table 5.2	Summary of land capability mapping	15

Figure index

Figure 1.1	Site location	2
Figure 3.1	Overview of the proposal - EIS	6
Figure 3.2	Overview of the proposal - revised	7
Figure 3.3	Substation (red) location in the EIS	9
Figure 3.4	Amended location of substation (red)	9
Figure 5.1	Proposed intersection upgrade	14
Figure 5.2	Land and soil capability mapping	16

Appendices

Appendix A	Response to Submissions report
Appendix B	Biodiversity Development Assessment Report
Appendix C	Updated statutory compliance table
Appendix D	Updated mitigation measures

Terms and definitions

Term	Definition
BC Act	<i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
Crown Land Act	<i>Crown Land Management Act 2016</i>
DPIE	Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
ENGIE	Silverleaf Solar Farm Pty Ltd
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GHD	GHD Pty Ltd
Koala SEPP 2020	State Environmental Planning Policy (Koala Habitat Protection) 2020
Koala SEPP 2021	State Environmental Planning Policy (Koala Habitat Protection) 2021
LGA	Local government area
Major Projects Regulation	<i>Environmental Planning and Assessment Amendment (Major Projects) Regulation 2020</i>
MNES	Matters of National Environmental Significance
PCT	Plant Community Type
PCT 397	Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion PCT
REAP	Renewable Energy Action Plan
RET	Renewable Energy Target
RMS	Roads and Maritime Services
Roads Act	<i>Roads Act 1993</i>
RtS	Response to Submissions
SEARs	Secretary's Environmental Assessment Requirements
SEPP 44	State Environmental Planning Policy No. 44 – Koala Protection
SRD SEPP	State Environment Planning Policy State and Regional Development
SSD	State Significant Development
TEC	Threatened Ecological Community
TfNSW	Transport for NSW

1. Introduction

1.1 Background

Silverleaf Solar Farm Pty Ltd (ENGIE) is seeking to amend their State Significant Development (SSD) application for the Silverleaf Solar Farm (SSD-9358) project (the proposal). The proposal would provide a source of renewable energy and reduce greenhouse gas emissions, aligning with Australia's emission reduction commitments and improving reliability of the electricity market and energy supplies.

The proposal consists of the following components:

- Solar arrays consisting of about 440,000 single-axis tracking panels up to four metres in height, supported by about 5,150 tracker units
- Construction of a transmission corridor, supporting 132 kilovolt (kV) power lines, connecting the Project site to the existing TransGrid substation located on Stoney Creek Road
- Inverter and transformer stations evenly distributed across the site, with onsite cabling and electrical connections between solar arrays and panel inverters
- Internal solar farm substation
- Cables and trenches
- Internal access tracks including car parking areas
- Operational and maintenance office including staff amenities block
- Perimeter security fencing
- Landscaping around the perimeter of the site where required

An Environmental Impact Statement (EIS) was prepared by GHD Pty Ltd (GHD), in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Industry and Environment (DPIE) on 22 June 2018. The EIS was submitted to DPIE in August 2019 and placed on exhibition 4 September 2019 to 1 October 2019, allowing community members and stakeholders to provide comments. DPIE received a total of 20 submissions, including 15 from various government agencies and five from members of the community. A RtS report was prepared by GHD and submitted to DPIE in November 2020 addressing and responding to the submissions received. A revised RtS report is provided in Appendix A.

ENGIE now seeks a number of amendments to the EIS, as outlined in Section 1.4.

1.2 The applicant

ENGIE is a multinational energy and services company operating primarily in low-carbon electricity generating infrastructure developments. Within Australia, ENGIE S.A. is a joint venture with Mitsui & Co. Ltd. Currently, they own and operate approximately 1,200 megawatt (MW) (gross) of renewable wind and gas-fired plants in South Australia and Western Australia. Silverleaf Solar Farm Pty Ltd is the company established by ENGIE ANZ to develop and operate the proposal.

1.3 The proposal as described in the EIS

The proposal as described in the EIS included the construction and operation of a 120 MW solar farm located in the North West Slopes region of NSW, about four kilometres north of Narrabri, between the Newell Highway in the east and Logans Lane in the west. Figure 1.1 provides a map of the proposal area in its regional setting as described in the EIS.

The proposal is expected to take nine to 12 months to complete construction once planning approval is granted. The proposal has a planned operational lifespan of 35 years, with the possibility of additional time if reconditioned with updated technology. The proposal will produce a renewable energy source and aligns with Australia's commitments to reducing greenhouse gas emissions.

1.4 Proposed amendments

ENGIE proposes to amend the proposal following further design development and in response to recommendations provided by stakeholders during the EIS exhibition. The amendments respond to these design and stakeholder issues and, in some instances, reduce potential impacts as described in the EIS.

The proposed amendments to the proposal are:

- Relocation of the intersection of the transmission line with Newell Highway
- Relocation and revision of the substation footprint as per TransGrid recommendations
- Relocation of the inverter station
- Redesign of the footprint to avoid potential impacts to the PCT 397 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion.

The proposed amendments are described in greater detail in Section 3.

1.5 Purpose of this Amendment Report

This Amendment Report has been prepared in accordance with the *State significant development guidelines – preparing an amendment report* (DPIE, 2021). The guidelines form part of the Rapid Assessment Framework reforms that came into effect on 1 July 2021.

2. Strategic context

The proposal provides a number of complimentary benefits and aligns with a range of Federal and State government strategic plans and energy targets. The Australian Government Clean Energy Regulator has an established Renewable Energy Target (RET) Scheme, which operates targets related to large scale and small-scale developments. The large-scale renewable energy target encourages investment in large-scale renewable developments and reduces emissions of greenhouse gases within the electricity sector. Investment into renewable energy developments contributes to Australia's commitments to action on climate change agreements, such as the United Nations Framework Convention on Climate Change in Paris.

The NSW Government implemented the NSW Renewable Energy Action Plan (REAP) in 2018, which details the Government's strategy and goals to increase renewable energy development. The three goals under the REAP are:

- Attract renewable energy investment
- Build community support for renewable energy
- Grow and attract renewable energy expertise.

The proposal strategically aligns with both Commonwealth and State plans to achieve renewable energy targets, while providing a secure and affordable source of renewable energy for NSW. By providing a source of renewable energy, the proposal provides a range of cumulative benefits such as:

- Reduction of greenhouse gas emissions
- Improved reliability of electricity supply while reducing energy supply costs
- Provision of a renewable energy source, which assists both the NSW and Commonwealth governments to achieve renewable energy targets.

3. Description of amendments

3.1 Summary of amendments

A summary of the proposed amendments is provided in Table 3.1. Detailed descriptions of each proposed amendment is provided in Section 3.2.

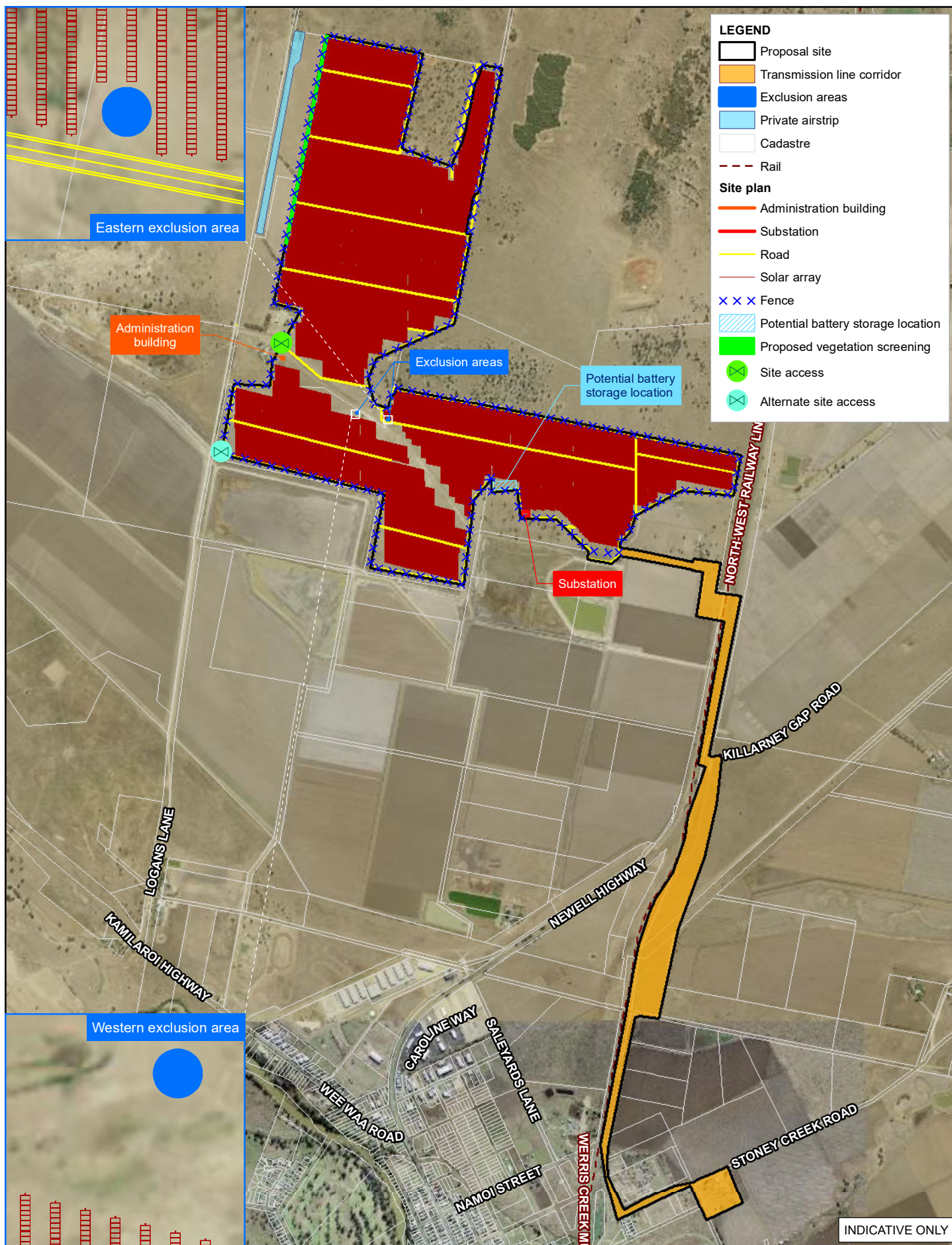
Table 3.1 *Summary of amendments*

Element	Original proposal	Amended proposal
Proposal area		
Proposal footprint	450 ha	439 ha
Vegetation impacts	PCT 397 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion was not listed as having any conservation significance and a patch was included within the proposal footprint to the northwest.	Proposal area footprint re-designed to avoid the patch of PCT 397 and include Logans Lane and Kamilaroi Highway intersection.
Physical layout and design		
Substation footprint	55 m x 40 m	120 m x 100 m
Inverter location	25-30 inverter and transformer stations installed across proposal area.	Within the substation footprint. See Figure 3.3 and Figure 3.4.
Key uses and activities		
Transmission line	See Figure 3.1	See Figure 3.2

3.2 Detailed amendment descriptions

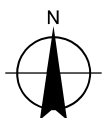
3.2.1 Transmission line

In response to TransGrid requests, the location of the transmission line intersection with the Newell Highway and Killarney Gap Road has been adjusted by about three metres to ensure less vegetation disturbance and more direct route to substation. An overview of the proposal included in the EIS is provided in Figure 3.1, with an overview of the revised proposal, including the amended transmission line location, shown in Figure 3.2.



Paper Size ISO A4
0 400 800
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

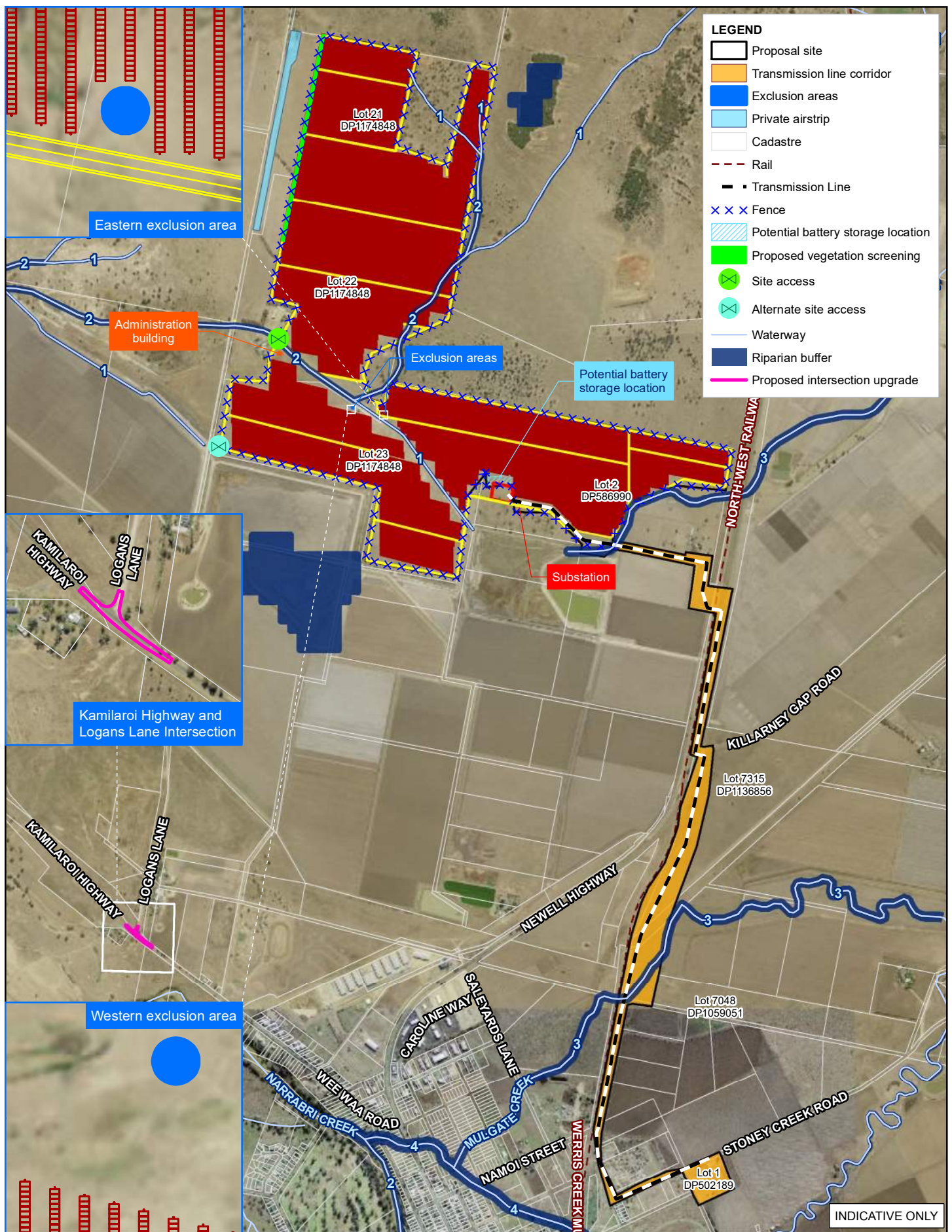


ENGIE
Silverleaf Solar Farm EIS
Amendment Report

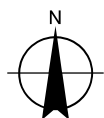
Project No. 12551870
Revision No. 0
Date 01 Sep 2021

The proposal – as exhibited

FIGURE 3-1



Paper Size ISO A4
0 400 800
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



ENGIE
Silverleaf Solar Farm EIS
Amendment Report

Project No. 12551870
Revision No. 0
Date 24 Sep 2021

The proposal – as revised

FIGURE 3-2

3.2.2 Substation footprint

In consultation with TransGrid, the footprint of the substation has been increased to an area of approximately 1.2 hectares (120 metres x 100 metres) to accommodate a 20 metre buffer around the substation. To achieve this the location of the substation has been moved slightly to the northwest (see Figure 3.3 and Figure 3.4).

3.2.3 Inverter location

The EIS indicated that between 25-30 inverter and transformer stations would be installed across the site, with each station containing a centralised inverter and transformer. No exact locations were indicated in the EIS, with the exact location to be confirmed during the detailed design stage.

It is now proposed that the inverter will be contained within the larger substation site (see Figure 3.3 and Figure 3.4).

3.2.4 Logans Lane and Kamilaroi Highway Intersection

In consultation with Council, trafficable access to the site would be via Logans Lane, with traffic needing to access the site for delivery of materials, staff etc. via Kamilaroi Highway. This new access arrangement requires the upgrade of the intersection of Logans Lane and Kamilaroi Highway. As identified in Figure 3.2 and in Section 5.3.5, upgrade works are proposed entirely within the cleared, previously disturbed road reserve. No vegetation would require removal. Accordingly, vegetation survey was not deemed necessary and this area is not included in the area assessed for the Biodiversity Development Assessment Report (BDAR).

3.2.5 Proposal footprint

As shown in Table 3.1, there has been a reduction in the proposal footprint from 450 to 439 hectares, due to exclusion areas being increased by five hectares and land to be cleared reduced to 390 hectares from 396 hectares. The impacts associated with the construction and operation of the transmission line would be restricted to the installation of poles spaced approximately 50 metres apart. For each pole an impact area of five square metres has been assumed. There would be approximately 18 poles constructed within areas of native vegetation.

The PCT 397 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion (PCT 397) was noted in the EIS as having no conservation significance under either the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *NSW Biodiversity Conservation Act 2016* (BC Act).

PCT 397 was included as an amendment to the EPBC Act listing of Poplar Box Grassy Woodland on Alluvial Plains Endangered Ecological Community (EEC) in 2019. Woodland formation within the PCT 397 can form part of this EEC, though the formation present within the surrounds of the proposal is assessed as not meeting the requirements for this listing. Despite this, the proposal footprint has been amended to avoid the PCT 397 woodland present to avoid any significant impacts on this community.

Further assessment of biodiversity impacts is provided in Section 6.1 and an updated BDAR is provided in Appendix B. This BDAR supersedes that submitted with the EIS and an additional revision provided to DPIE in October 2020.

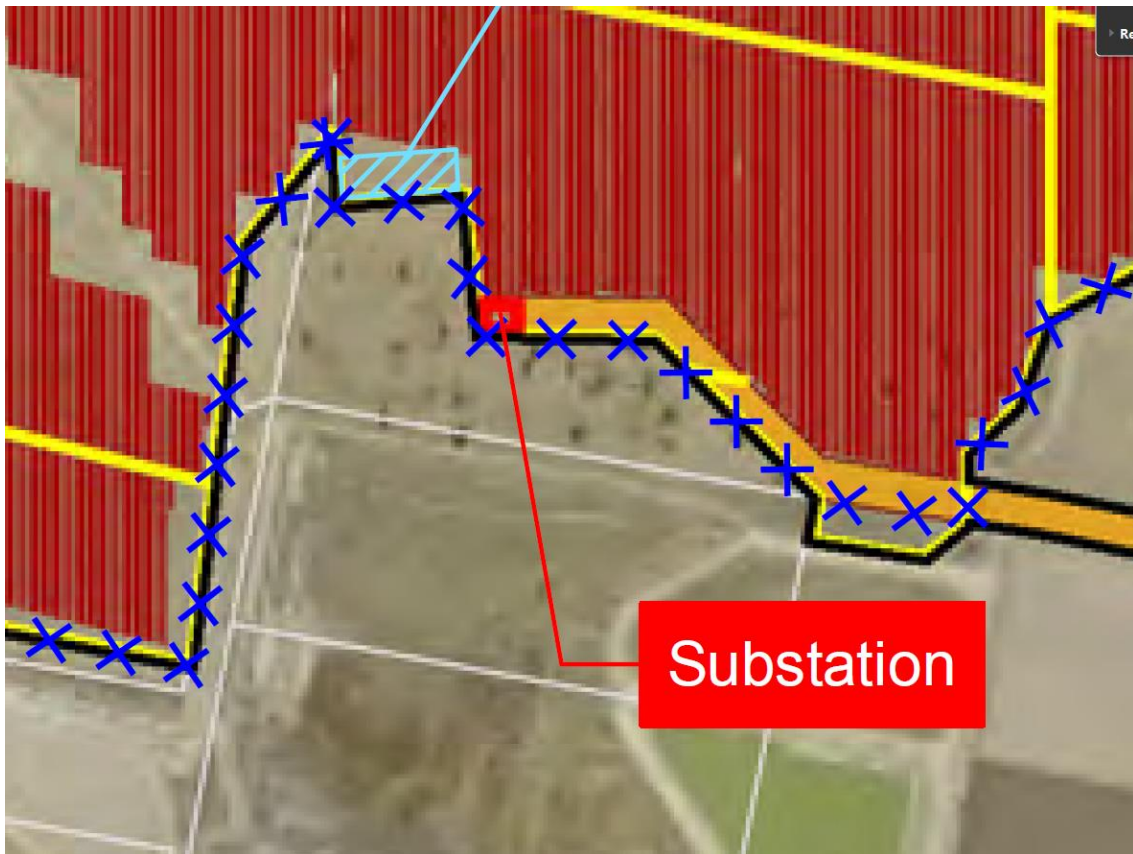


Figure 3.3 Substation (red) location in the EIS

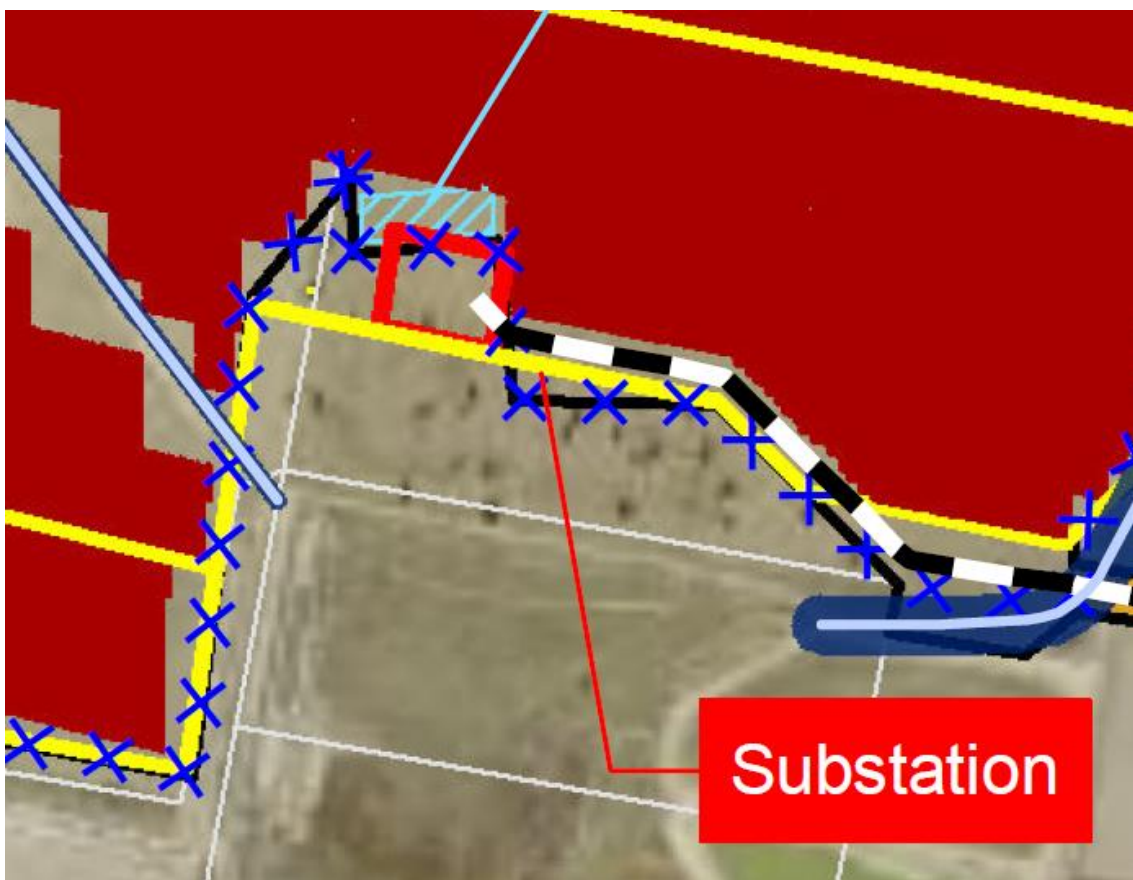


Figure 3.4 Amended location of substation (red)

4. Statutory context

The proposed amendments to the proposal do not require any additional approvals. The statutory context has not significantly changed since the EIS was submitted. The proposed amendments are minor in nature and will not trigger any additional statutory requirements that were not already addressed in the EIS.

The statutory requirements applicable to assessing and evaluating the proposed amendments are included in Table 4.1. Appendix C identifies all the relevant statutory requirements for the proposal.

Table 4.1 *Legislation applicable to the proposed amendments*

Legislation	Considerations	Applicability
Federal		
EPBC Act	The EPBC Act provides protection of the environment, particularly matters considered to be of National Environmental Significance (MNES). Approvals may be required where an 'action' may have a significant impact on any MNES or the environment of Commonwealth land. Investigations and assessments undertaken for the EIS indicated that the proposal is unlikely to significantly impact on any MNES or Commonwealth land, and a referral to the Minister was not required.	<p>The proposed amendments to the proposal are minor in nature and unlikely to impact on any MNES.</p> <p>The footprint of the proposal has been amended to avoid PCT 397.</p> <p>The EPBC Act was amended in 2019 to include Poplar Box Grassy Woodland on Alluvial Plains as a threatened ecological community (TEC). The woodland formation of PCT 397 can form a part of this TEC. This was not assessed in the EIS as at the time of writing, as this PCT held no conservation significance under the EPBC Act or BC Act at that time.</p> <p>Additional assessment in an updated BDAR determined the vegetation associated with the PCT does not conform to the key diagnostic features of the TEC (refer to Section 6.1 and Appendix B).</p> <p>Additional approvals under the EPBC Act will not be required for the proposed amendment.</p>
State		
EP&A Act	The EP&A Act provides the framework for assessing environmental impacts and determining planning approvals for developments within NSW. Part 4, Division 7 outlines the approval process for development that is considered to be SSD. The proposal is considered to be SSD as per Schedule 1(20) of State Environment Planning Policy (State and Regional Development) 2011 (SRD SEPP). The Minister for Planning and Public Spaces is the consent authority.	The proposed amendments do not require any additional development consent or planning approvals under the EP&A Act.
BC Act	The BC Act aims to conserve biodiversity and deliver ecologically sustainable development. The BC Act establishes the process for the calculation of biodiversity credits for SSD that will impact upon biodiversity values, referred to as a biodiversity assessment methodology. A BDAR was undertaken as part of the EIS.	<p>A BDAR was prepared by GHD to address biodiversity impacts of the proposal for the EIS. The BDAR has been revised to assess the proposed amendments and to address agency submissions on the EIS (Appendix B).</p> <p>The amendments will not create additional biodiversity impacts. Further details on assessment of biodiversity impacts are discussed in Section 6.1.</p>

Legislation	Considerations	Applicability
<i>Roads Act 1993 (Roads Act)</i>	<p>The Roads Act establishes the framework for works carried out on roads within NSW. At the time of writing of the EIS, the Act was administered by Roads and Maritime Services (RMS). RMS has now been incorporated into Transport for NSW (TfNSW). Under the Roads Act, TfNSW has jurisdiction over classified roads, local councils have jurisdiction over non-classified roads and DPIE – Crown Lands manages Crown roads.</p> <p>The EIS identified that consent would be required from TfNSW (RMS at the time) under Section 138 for works to be carried out on a public road.</p>	<p>The proposal requires an upgrade to the intersection of the Kamilaroi Highway and Logans Lane, which requires approval from TfNSW and Narrabri Shire Council. The EIS identified that no works were proposed for Newell Highway.</p> <p>The proposed amendment includes the adjustment of the transmission line to intersect with Newell Highway, which is a classified road. Additional approval from TfNSW will be required for these works.</p>
<i>Crown Land Management Act 2016 (Crown Land Act)</i>	<p>The Crown Land Act provides for the ownership, use and management of the Crown land of New South Wales. It requires environmental, social, cultural heritage and economic considerations to be taken into account in decision-making about Crown land. The EIS identified the transmission corridor will traverse parcels of Crown land and approval from DPIE would be required for the construction of transmission infrastructure.</p>	<p>Consultation with DPIE – Crown Lands has been ongoing. DPIE – Crown Lands have advised ENGIE that the most appropriate method for the transmission infrastructure on Crown land is through the creation of an easement. The easement is currently being sought.</p>
Environmental planning instruments		
SRD SEPP	<p>The SRD SEPP identifies development which is considered to be SSD and to which assessment and approvals under Part 4 of the EP&A Act applies. Development specified in Schedule 1 or Schedule 2 is declared to be SSD under the SRD SEPP. Schedule 1(20) relates to electricity generating developments which are considered to be SSD. The proposal is SSD as it is development for the purposes of generating electricity from a solar source and has a capital investment of over \$30 million.</p>	<p>The proposed amendments are minor in nature and do not alter the nature of the development being classified as SSD under Schedule 1(20) of the SRD SEPP. The capital investment remains unchanged.</p>
Koala SEPP 2021	<p>At the time of writing of the EIS, SEPP 44 was in force. It has since been repealed by the Koala SEPP 2020 and 2021. The EIS identified that the Narrabri local government area (LGA) was listed within Schedule 1 of SEPP 44 as an area to which the policy applies. The biodiversity assessment undertaken for the EIS determined that woodland patches present constitute potential habitat for Koalas under SEPP 44, but was unlikely to be core habitat. No evidence of Koalas were observed during the survey, and vegetation requiring removal for the proposal does not form important habitat for Koalas.</p>	<p>The revised BDAR (Appendix B) notes that no Koalas were sighted during the three surveys undertaken and habitat present does not form significant habitat for Koalas.</p> <p>Koala SEPP 2020 applies to the Project as it is within Narrabri LGA, listed in Schedule 1 of Koala SEPP 2021, and zoned as RU1 - Primary Production. However, as the site does not represent potential or core koala habitat, the development control provisions of Koala SEPP 2020 do not apply.</p>

The proposal is classified as SSD requiring development consent from the Minister of Planning and Public Spaces. It has been assessed under Part 4 of the EP&A Act. The proposed amendments will not require any additional approval conditions or trigger any additional statutory requirements.

5. Community engagement

5.1 Engagement to date

Stakeholder and community engagement has not been undertaken for this Amendment Report. The amendments presented in this Amendment Report have been prepared in response to feedback during and after the exhibition of the EIS.

A total of 20 submissions were received following the exhibition of the EIS. Each submission was individually reviewed and responded to in the RtS report undertaken by GHD. A revised RtS is currently being prepared.

5.2 Additional consultation

Additional consultation has been undertaken by ENGIE with stakeholders who lodged a submission during exhibition of the EIS. A summary of this and previous consultation is provided in the revised RtS report in Appendix A.

ENGIE is also continuing to engage with neighbours, with all correspondence recorded in a stakeholder management database.

5.3 DPIE information requests

Ongoing liaison has been undertaken with DPIE since the EIS exhibition regarding the requirements for the application. Issues raised during these discussions are responded to as follows:

5.3.1 Offset liability and offset strategy

The requirements for offsetting are addressed in detail in Section 9 of the BDAR (refer Appendix B).

5.3.2 Tabulation of vegetation impacts

The DPIE have requested a clear tabulation of vegetation types within the site, including disturbance areas. This is provided in Table 5.1 along with the area requiring assessment in BDAR, which is reduced due to some of the land being assessed at Category 1 exempt land.

Table 5.1 Summary of vegetation types

Vegetation type	Area within proposal area (ha)	Area proposed to be disturbed within proposal area (ha)	Area assessed as category 1 exempt land (ha)	Area requiring assessment in BDAR (ha)
PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	0.69	0.69	0	0.69
PCT 35 Derived Native Grasslands	26.81	26.81	26.04	0.77
PCT 55 Derived Native Grasslands	121.96	115.93	68.07	53.89
PCT 397 Derived Native Grasslands	32.69	32.69	21.98	10.71
Planted vegetation	7.88	7.88	7.88	0
Cropped/predominantly exotic grassland	198.20	198.20	159.79	38.41
Cleared	8.11	8.11	1.42	6.69
TOTAL	396.34	390.31	285.18	111.16

5.3.3 Evidence of landowner consent

ENGIE will provide landowner consent documentation to DPIE separately.

5.3.4 Evidence of consultation with Santos

As discussed in Section 2.3 of the RtS report, ENGIE have discussed the proposal with Santos, who did not raise any objections.

5.3.5 Kamilaroi Highway/Logans Road intersection

An overview of the proposed Kamilaroi Highway/Logans Road intersection upgrade is shown in Figure 5.1. Upgrade works are proposed entirely within the cleared, previously disturbed road reserve. No vegetation would require removal. Accordingly vegetation survey was not deemed necessary. This area was not included in the area assessed in the BDAR.



Figure 5.1 Proposed intersection upgrade

5.3.6 Tabulation of land and soil capability impacts

The DPIE have requested a clear tabulation of land capability areas within the site, including new disturbance areas. This is provided in Table 5.2 and shown in Figure 5.2.

Table 5.2 *Summary of land capability mapping*

Land and soil capability class	Are to be disturbed (ha)
2	32.00
3	15.88
5	342.12
TOTAL	390.00

5.3.7 Visual impact mitigation at R005

The DPIE have highlighted that visual impacts on viewpoint 1 [R005] are considered high to moderate. Should screening vegetation be provided, overall impacts would reduce to moderate due to the reduction in the magnitude of impacts. They have requested confirmation of proposed mitigation of visual impacts at R005.

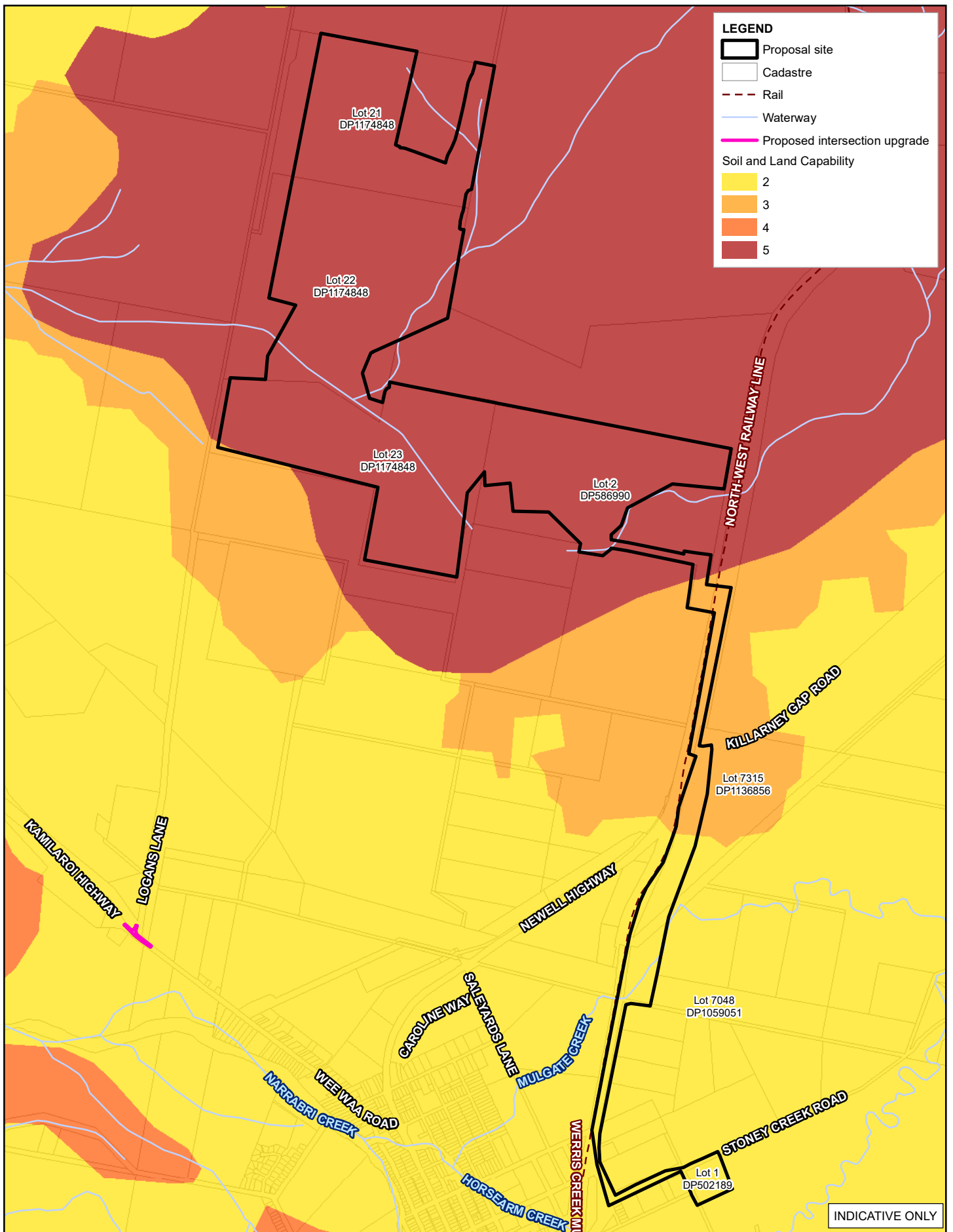
Landscape screening is proposed to provide mitigation for visual impacts, including at R005. A landscape plan will be prepared in consultation with affected residents. ENGIE will continue to engage with neighbours and other stakeholders to development appropriate mitigation.

5.4 Future and ongoing engagement

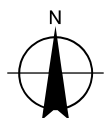
ENGIE have committed to future and ongoing consultation with stakeholders and landowners regarding concerns raised during and after the EIS exhibition. Responses to these submissions are addressed in the RtS report (GHD, 2020).

ENGIE have also committed to ongoing stakeholder engagement for future stages of the proposal. A stakeholder engagement plan has been developed to identify relevant tasks during the following future phases of the proposal:

- Post-approval/pre-construction
- Construction
- Operation



Paper Size ISO A4
0 400 800
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



ENGIE
Silverleaf Solar Farm EIS
Amendment Report

Project No. 12551870
Revision No. 0
Date 01 Sep 2021

Soil and Land Capability

FIGURE 5-2

6. Assessment of impacts

The proposed amendments and legislation changes have the potential for additional impacts to biodiversity. No other impacts are considered likely. Updated and amended mitigation measures are included in Appendix D.

6.1 Biodiversity

Biodiversity impacts applicable to proposed amendment of the proposal footprint are discussed below.

6.1.1 Existing environment

The biodiversity elements surrounding the proposal area are as described in the EIS.

6.1.2 Proposed amendment impacts

During the biodiversity assessment for the EIS, it was determined that the area of the site containing vegetation described as PCT 397 covers a total of 10.71 hectares.

The Poplar Box Grassy Woodland on Alluvial Plains Community is a type of temperate to semi-arid grassy eucalypt woodland that is sparsely scattered throughout NSW and Queensland. This community was listed as endangered under the EPBC Act in 2013. An amendment to the Act was enacted on 24 July 2019 as follows:

Section 182 Critically endangered, endangered and vulnerable communities

(2) An ecological community is eligible to be included in the endangered category at a particular time if, at that time:

(a) it is not critically endangered; and

(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

The criteria for inclusion under Section 182 of the EPBC Act is set out in Division 7.1 of the Environment Protection and Biodiversity Conservation Regulation 2000. The Poplar Box Grassy Woodland on Alluvial Plains community was assessed to meet the following criteria under Division 7.1.

- Criterion 1 as endangered because it has undergone a severe decline in geographic extent
- Criterion 4 as endangered because the reduction in integrity across most of its geographic distribution is severe, as indicated by severe degradation of the community, and that regeneration is unlikely in the near future.
- Criterion 5 as vulnerable because its rate of continuing detrimental change is substantial as indicated by the degree of ongoing degradation or disruption of community processes.

For development, that is not an exempt activity, and likely to have a significant impact on a TEC listed under the EPBC Act, a referral must be made to the Minister of Environment for assessment and approval.

The BDAR undertaken for the EIS was updated to include consideration of PCT 397 and its conformation with the EPBC Act listing of the Poplar Box Grassy Woodland on Alluvial Plains EEC. The assessment determined that the PCT 397 features present within the proposal area do not meet the criteria as set out in the approved conservation advice for the Poplar Box Grassy Woodland on Alluvial Plains EEC listing.

Regardless, the proposal layout has been redesigned to avoid any direct impacts to the woodland formation of the PCT 397. Additional assessment information is provided in the updated BDAR (Appendix B). Indirect impacts on this PCT would be avoided through the safeguards and mitigation measures provided in Appendix D.

7. Justification of the amended proposal

The proposal involves developing a 120 MW solar farm, consisting of about 440,000 solar arrays and including ancillary infrastructure such as electrical infrastructure, transmission corridor, access roads, fencing, landscaping and site amenities. The site layout and technology to be used would be determined during detailed design once a contractor has been appointed by ENGIE. The proposed amendments do not relate to any changes of the function of the proposal, are minor in nature, and will have minor or beneficial impacts associated with them.

All proposed changes relate to functionality of design in the layout of the solar farm, reduction in native vegetation impacts via reduction of the proposal footprint, more efficient substation and inverter location selection, which results in increased power production, accessibility and constructability. The proposed location of the inverter is such that no additional noise impacts are created. The inclusion of the upgrade of the Logans Lane and Kamilaroi Highway intersection has occurred after further consultation with Council, which identified the need for trafficable access to the site via Logans Lane and delivery vehicle access via the Kamilaroi Highway.

The proposal and the proposed amendments outlined in this report are considered to be justified as it meets the objectives as outlined in the EIS. The primary objective outlined for the proposal was to develop a commercial scale solar farm that minimises impacts on the surrounding environment. The proposal will also assist in reducing Australia's greenhouse gas emission and aligns with Commonwealth and State energy targets commitments both nationally and internationally.

The proposal amendments will have negligible impacts on economic, environmental, and/ or social matters and the principles of ecologically sustainable development, and do not require additional approvals or assessment from those provided in the EIS. These matters are discussed in greater detail below.

7.1 Economic impacts

The proposed amendments to the proposal will not significantly impact on any economic factors related to the project. Capital investment remains unchanged. The proposal will continue to provide beneficial economic impacts by providing an alternative form of energy that reduces greenhouse gas emissions without a significant cost to the consumer.

7.2 Environmental impacts

The proposed amendment will reduce the proposal footprint to avoid the area containing the PCT 397, located to the northwest of the site. The proposed amendment will reduce environmental impacts as the woodland formation comprising the PCT 397 will be completely avoided in the revised footprint. No additional approval conditions are triggered by the footprint amendment, which instead results in environmental benefits to the biodiversity of the surrounding environment.

7.3 Social impacts

The proposed amendments will have no additional or significant impacts to social impacts in addition to those described in the EIS.

7.4 Ecologically sustainable development

An objective of the EP&A Act is to encourage ecologically sustainable development. The principles of ecologically sustainable development have been considered throughout development of the Project and are also considered for the proposed amendments.

7.4.1 The precautionary principle

The precautionary principle states *“if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation”*.

There would be no threats of serious or irreversible damage as a result of the proposed amendments to the proposal. The proposed reduction in footprint will have a positive impact on the surrounding environment. The additional proposed amendments are minor in nature and will not create an impact that has not been assessed in the EIS.

7.4.2 Intergenerational equity

The intergenerational equity principle states, *“the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations”*.

The proposed amendments will not adversely impact on the health, diversity or productivity of the environment for future generations. Consideration of this principle remains unchanged from that described in the EIS.

7.4.3 Conservation of biological diversity and ecological integrity

The biological diversity and ecological integrity principle states the *“diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival”*.

The proposed amendment to reduce the proposal footprint to avoid the PCT 397 will better enable biological diversity and ecological integrity of the surrounding environment to be protected.

7.4.4 Improved valuation, pricing and incentive mechanisms

This principle states that *“costs to the environment should be factored into the economic costs of a project”*.

The proposed amendments will have no additional impacts to pricing and financial arrangements reflecting the social and environmental costs of the use of resource. Consideration of this principle remains unchanged from that described in the EIS.

7.5 Conclusion

This Amendment Report has assessed the potential impacts associated with the proposed amendments of the proposal. The proposed amendments are minor in nature and are not anticipated to require any additional assessment or approvals. The proposed amendments will contribute to the overall principles and objectives as described in the EIS and will not result in any significant impacts to the surrounding environment or community.

Appendices

Appendix A

Response to Submissions report



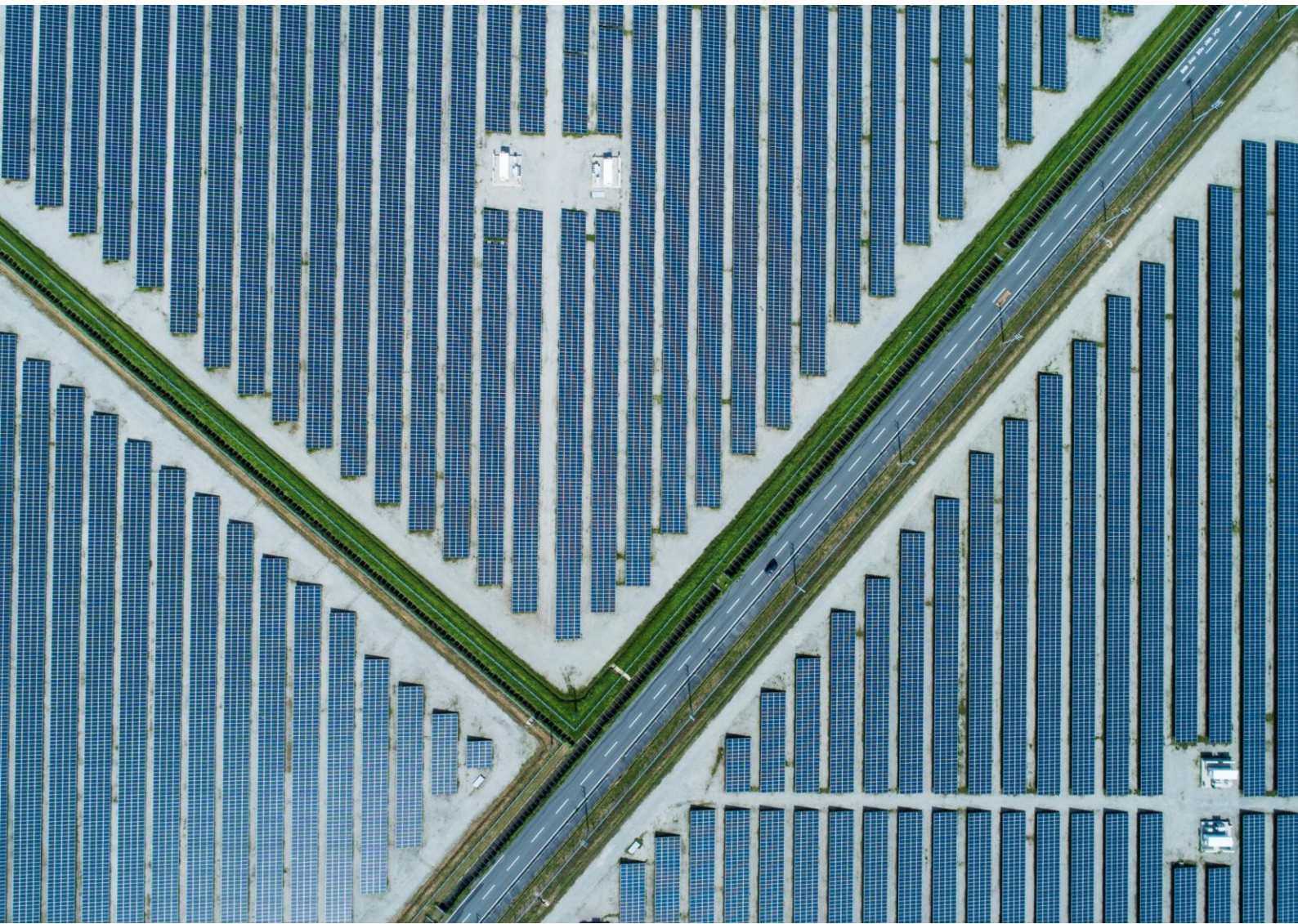
Silverleaf Solar Farm

Response to Submissions

Silverleaf Solar Farm Pty Ltd

27 September 2021

→ The Power of Commitment





GHD Pty Ltd | ABN 39 008 488 373

GHD Tower, Level 3, 24 Honeysuckle Drive
Newcastle, New South Wales 2300, Australia

T +61 2 4979 9999 | **F** +61 2 9475 0725 | **E** ntlmail@ghd.com | **ghd.com**

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	J McDonough E Holland	D Mees		D Mees		27/11/2020
S4	1	L King	A Quin		D Mees		24/08/2021
S4	2	L King	D Mees		D Mees		10/09/2021
S4	3	D Mees	L King		D Mees		27/09/2021

© GHD 2021

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Executive summary

Background

Silverleaf Solar Farm Pty Ltd (ENGIE) is seeking approval to construct and operate a 120 megawatt (MW) solar farm, known as the Silverleaf Solar Farm. The site is about four kilometres north of Narrabri between the Newell Highway in the east, and Logans Lane in the west ('the proposal').

The proposal would consist of the following components:

- Solar arrays consisting of about 440,000 single-axis tracking panels up to four metres in height, supported by about 5,150 tracker units
- Construction of a transmission corridor, supporting 132 kV power lines, connecting the proposal site to the existing TransGrid substation located on Stoney Creek Road
- Inverter and transformer stations evenly distributed across the site, with onsite cabling and electrical connections between solar arrays and panel inverters
- Internal solar farm substation
- Cables and trenches
- Internal access tracks including car parking areas
- Operational and maintenance office including staff amenities block
- Perimeter security fencing
- Landscaping around the perimeter of the site where required

Approval is sought for the proposal under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

In accordance with the Secretary's Environmental Assessment Requirements (SEARs), an Environmental Impact Statement (EIS) was prepared to support the development application. The EIS identifies and assesses the environmental issues associated with the proposal. The EIS was exhibited by the NSW Department of Planning, Industry and Environment from 4 September 2019 to 1 October 2019. A total of 20 submissions were received about the proposal.

Purpose of this report

The Response to Submissions report summarises the issues raised through public consultation on the EIS for the proposal. This report also outlines mitigation measures that have been amended or added and minor amendments to the total area of the proposal site since lodgement of the EIS.

This report provides an update to the original that was submitted in November 2020.

Key issues raised by submissions to the EIS

A total of 20 submissions were received about the proposal, of which five submissions were from the community and 15 were from government agencies, including Narrabri Shire Council. The most common issues raised by all respondents were:

- Land use, soils and land capability – six submissions
- Hydrology, groundwater and water quality – five submissions
- Consultation – four submissions

Contents

1.	Introduction	1
1.1	Background	1
1.2	Overview of submissions	1
1.3	Purpose of the report	2
2.	Stakeholder engagement	3
2.1	Prior to EIS exhibition	3
2.2	During and after EIS exhibition	3
2.2.1	EIS exhibition	3
2.2.2	Stakeholder consultation	3
2.3	Since the previous RtS report	6
2.4	Ongoing stakeholder engagement	7
2.4.1	Consultation and community feedback	8
2.4.2	Complaints management	8
3.	Response to government agency submissions	9
3.1	Respondents	9
3.2	Narrabri Shire Council	10
3.2.1	Logans Lane upgrade	10
3.2.2	Hydrology, groundwater and water quality	10
3.2.3	Bushfire	11
3.3	Department of Primary Industries	11
3.4	Environment Protection Authority	11
3.5	TransGrid	11
3.6	Geological Survey of NSW	12
3.6.1	Consultation	12
3.7	NSW Heritage Council	13
3.7.1	Visual impacts on non-Aboriginal heritage	13
3.8	NSW Health	14
3.8.1	Water supply	14
3.9	Natural Resources Access Regulator	14
3.9.1	Water supply	14
3.9.2	Management and mitigation	14
3.9.3	Erosion	15
3.10	Biodiversity Conservation Division	15
3.10.1	Offsetting	15
3.10.2	Vegetation mapping	16
3.10.3	Vegetation clearing	17
3.10.4	Vegetation integrity scores	17
3.10.5	Targeted flora surveys	18
3.10.6	Planted vegetation	19
3.11	NSW Rural Fire Service	19
3.11.1	Bushfire management and mitigation	19
3.12	Transport for NSW	20
3.12.1	Management and mitigation	20

3.13	Roads and Maritime Services	21
3.13.1	Design	21
3.13.2	Management and mitigation	22
3.13.3	Works in road reserve	24
3.14	Crown Lands	24
3.14.1	Land acquisition	24
3.14.2	Agency consultation	25
3.14.3	Aboriginal land claims	25
3.15	Department of Planning, Industry and Environment	26
3.15.1	Landowners classification and consent	26
3.15.2	Noise impacts	28
3.15.3	Traffic impacts	29
4.	Response to community submissions	30
4.1	Respondents	30
4.2	General support for the proposal	30
4.3	Land use, soils and capability	30
4.3.1	Property values	30
4.3.2	Land use conflict	31
4.4	Consultation	31
4.4.1	Stakeholder identification and consultation	31
4.5	Hydrology, groundwater and water quality	32
4.5.1	Flooding and overland flows	32
4.6	Landscape and visual	33
4.7	Project description	33
4.7.1	Inland Rail corridor	33
4.8	Biodiversity	34
5.	Design refinements	35
6.	Revised environmental management measures	36
7.	Conclusion	48
8.	References	49

Table index

Table 1.1	Summary of submissions received	1
Table 2.1	Consultation activities undertaken during and after EIS exhibition	3
Table 2.2	ENGIE response to landowner concerns	5
Table 2.3	Summary of engagement since November 2020	6
Table 2.4	Proposed consultation activities	7
Table 3.1	List of respondents – government agencies	9
Table 3.2	Landownership details for the development land parcels	26
Table 3.3	Noise exceedance and their justifications	28
Table 4.1	List of respondents – community	30
Table 6.1	Revised summary of environmental management measures	37

Figure index

Figure 3.1 Overview of the revised proposal

27

Appendices

Appendix A Logans Lane/ Kamilaroi Highway upgrade concept design
Appendix B Figures supporting category 1 exempt land assessment
Appendix C Landowner statutory declarations

1. Introduction

1.1 Background

Silverleaf Solar Farm Pty Ltd (ENGIE) proposes to construct and operate a 120 megawatt (MW) solar farm about four kilometres north of Narrabri, between the Newell Highway in the east and Logans Lane in the west (referred to as the 'proposal').

ENGIE is seeking development consent under Division 4.7 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the proposal. The Minister for Planning (or delegate) is the consent authority for the proposal.

An Environmental Impact Statement (EIS) was prepared by GHD Pty Ltd (GHD) on behalf of ENGIE for the proposal. The EIS was placed on public exhibition by the NSW Department of Planning Industry and Environment (DPIE) between the 4 September and 1 October 2019. In addition to undertaking consultation with key stakeholders prior to EIS exhibition, ENGIE also undertook consultation during and after EIS exhibition.

This report provides an update to the original that was submitted in November 2020. Consultation has been ongoing since that time, with additional responses documented herein.

1.2 Overview of submissions

Submissions in response to the EIS were accepted by DPIE during the public exhibition period. A total of 20 submissions were received about the proposal, of which five submissions were from the community and 15 were from government agencies, including Narrabri Shire Council (Table 1.1).

Each submission was examined individually to identify and understand the issues raised. The content of each submission was reviewed and categorised according to the key issues (e.g. land use, soils and land capability).

Table 1.1 Summary of submissions received

Submission group type	Number of separate respondents
Government agencies	
State government agencies	13
Narrabri Shire Council	1
Energy provider	1
Community	
Individual	5
Interest groups/organisations	0

The most common issues raised by all respondents were:

- Land use, soils and land capability – six submissions
- Hydrology, groundwater and water quality – five submissions
- Consultation – five submissions

When making a submission, respondents were able to identify if their submission was an objection to the proposal, support for the proposal or comments only. The results of this were as follows:

- Object – Two community submissions
- Support – Two community submissions
- Comments only – 16, including agency and community submissions

Consultation for the proposal continued during EIS exhibition and post-exhibition, in response to concerns raised by relevant agencies in their submissions and to fulfil commitments made in the EIS. A summary of these consultation activities and ongoing stakeholder engagement is provided in Section 2.

1.3 Purpose of the report

The Secretary of DPIE required ENGIE to prepare a Response to Submissions (RtS) report in accordance with clause 82 of the *Environmental Planning and Assessment Regulation 2000* to respond to issues raised in submissions received during the EIS exhibition (see requested dated 3 October 2019).

An RtS report was prepared and submitted in November 2020. This report provides an update and amendment of the first report based on ongoing consultation with stakeholders.

This report also outlines mitigation measures that have been amended or added and minor changes to the proposal site since lodgement of the EIS.

2. Stakeholder engagement

2.1 Prior to EIS exhibition

Section 4 of the EIS describes the consultation undertaken for the proposal to inform development of the EIS.

2.2 During and after EIS exhibition

2.2.1 EIS exhibition

During and after the exhibition period, government agencies, key stakeholders (including interest groups and organisations), and the community were invited to make written submissions on the proposal. A summary of the engagement activities and tools used to encourage community and stakeholder participation during and after the exhibition period is provided in Table 2.1.

The EIS made available to the public from 4 September and 1 October 2019 at the following locations:

- DPIE – 320 Pitt Street, Sydney
- Nature Conservation Council of NSW – 338 Pitt Street, Sydney
- Narrabri Shire Council – 46-48 Maitland Street, Narrabri
- Service NSW Centre website.

The EIS was also available on the Major Projects website at: <https://www.planningportal.nsw.gov.au/major-projects/project/9716>.

Table 2.1 Consultation activities undertaken during and after EIS exhibition

Activity	Detail
Project website	Information about exhibition of the EIS was included on the ENGIE website: https://www.engie.com.au/home/what-we-do/our-assets/silverleaf/
Toll free community information line and project email	Requests for information were responded to by ENGIE's project team, as relevant. With details available on the ENGIE website: Phone: 1800 066 243 Email: silverleaf@au.engie.com
Email notification	Some impacted and adjacent landowners, Narrabri High School and Inland Rail were contacted via email about the proposal and invited to consult and provide input on the project.
Phone discussions	Some impacted and adjacent landowners were contacted via phone about the proposal and invited to consult and provide input on the project.
Letter notification	Some impacted and adjacent landowners were contacted via letter about the proposal and invited to consult and provide input on the project.
Face-to-face meetings	Face-to-face meetings were held with all available impacted and adjacent landowners about the proposal and invited to consult and provide input on the project. Face-to-face meetings about the project were held with representatives from Narrabri Shire Council and Narrabri High School. Both stakeholders indicated that they were supportive of the project.

2.2.2 Stakeholder consultation

Consultation was also undertaken by ENGIE with a number of key stakeholders during and after EIS exhibition. Key stakeholders who were consulted included TransGrid, Inland Rail, Narrabri Shire Council, Narrabri High School as well as adjacent and impacted landowners. Details of this consultation and the issues raised are outlined in the following sections.

TransGrid consultation

Consultation with TransGrid during exhibition of the EIS resulted in the following comments:

1. **Amendment report:** New 132 kV switchbay at TransGrid's existing Narrabri Substation is not clearly included in the EIS. It is recommended that it should be included in the Amendment Report.
2. **Substation plot area:** As per EIS clause 3.2.6 pg: 31/895: Substation dimensions have been mentioned as 55 metres x 40 metres.

As per current proposed GA drawing substation area is 65 metres x 46 metres.

As discussed, we can recommend to put substation dimensions as approximately 120 metres x 100 metres (it includes 20 metres buffer on each side of the substation) in the amendment report for department's approval.

3. **Access to sub-station:** Provision of access to the substation is the customer's responsibility. In the event that access cannot be provided to the substation from a public road, an easement for access will be required from the public road and it has to be minimum six metres wide and may be required to be up to 20 metres subject to project requirements.

ENGIE response

Item 1, 2 and 3: The new 132 kV switchbay will be located at TransGrid's existing Narrabri Substation (further discussed in Section 5) The general location of the substation has not changed from that which was detailed in the EIS. However, ENGIE acknowledges TransGrid's comments regarding the footprint of the proposed substation and confirms that the footprint for the substation (further discussed in Section 5) has been revised to include the recommended 120 metres x 100 metres dimensions.

Inland Rail

An email was received from Mr Joel Acosta, the Design Manager for the Narramine to Narrabri section of the N2N Project for Inland Rail (Australian Rail Track Group, ARTC) on 2 December 2019. This email requested updates on the status of the proposal, and any interfaces required with their project.

ENGIE response

ENGIE will keep ARTC updated on the status of its activities as it progresses through subsequent project phases and provide information on any interfaces with the N2N Project for Inland Rail as relevant.

Narrabri Shire Council

Email correspondence occurred with the Design Services Manager, Anthony Smetanin and ENGIE. Anthony reviewed section 6.7 Traffic, transport and access of the EIS. On 20 August 2019, Anthony provided some comments regarding traffic and road access, concluding that the majority of the traffic related matter had been covered and that Council would formally lodge their comments via the usual Department referral process. Council's formally lodged comments and ENGIE's responses to these are addressed in section 3.2.

A face-to-face meeting was held on 29 November 2019 with a representative of Council, the Economic Development Manager, Mr Bill Birch. This meeting discussed future opportunities for the project to provide financial support to the community. Mr. Birch indicated that Narrabri Shire Council were supportive of the proposal.

Narrabri High School

A face-to-face meeting was held on 21 February 2020 with representatives of Narrabri High School, Deputy Rozina Broderick and HT Wellbeing Kathryn Bailey. This meeting discussed future opportunities for the project to provide financial support to Narrabri High School. One program discussed was the Operation Flinders Foundation program, with the project to fund one team per year once the project was operational. Narrabri High School were generally supportive of the proposal.

Landowner consultation

Section 4 of the EIS outlines the stakeholder consultation which was undertaken prior to lodgement of the EIS. Additional consultation was also undertaken with landowners and adjacent landowners during and after the EIS exhibition period.

Face-to-face meetings were held with all available impacted and adjacent landowners about the proposal. Landowners were invited to consult and provide input on the project. Impacting and adjoining landowners raised a number of key concerns with the proposal.

ENGIE provides a response to key concerns raised by landowners in Table 2.2.

Table 2.2 *ENGIE response to landowner concerns*

Landowner concern	ENGIE response
Consultation and landownership	ENGIE recognises the concerns raised in relation to consultation and will continue to offer opportunities for engagement, both public forums and individual meetings, to address impacted and adjacent landowner concerns. Landownership of the land adjoining the South-East corner of the proposed solar farm land (Lot 373A DP186621 & Lot 1 DP566857) is recognised and acknowledged.
Water flow and drainage	<p>ENGIE commit to working with landowners during the design of the solar farm to ensure the overland water flow originating from the culverts under the Newell Highway on the Western boundary of Lot 2 DP 586990 to the existing drain on the Northern boundary of Lot 373A DP186621 & Lot 1 DP566857 do not suffer a material impact from the construction of the Silverleaf Solar Farm. ENGIE propose to move the location of the solar farm security fence away from the overland water flow path and from the Northern boundary of Lot 373A DP186621 & Lot 1 DP566857.</p> <p>Overland water flow from North to South of Lot 2 DP 586990, particularly the water flow captured by the existing drain on the Northern boundary of Lot 373A DP186621 & Lot 1 DP566857, are not anticipated to be impacted by the solar farm once built. However, to ensure impact is minimised the internal solar farm access tracks and associated drains constructed on Lot 2 DP 586990 will be designed where possible to allow overland water flows to follow a natural course. This may include the use of swale (also referred to as table) drains with regularly spaced turn outs to disperse water and the use of culverts or other structures to allow the flow of water under the security fence. As stated above, impacted and adjoining landowners will be consulted during the design of the solar farm.</p> <p>ENGIE also commit to reshape the existing drain on Lot 22 and 23 DP 1174848 during construction of the solar farm and maintain the drain during operation of the solar farm. We acknowledge a mapping error regarding direction of water flow for the existing drain on Lot 22 and 23 DP 1174848 and will consider this in detailed design of the solar farm.</p>
Security fence design	ENGIE will consult with impacted and adjacent landowners regarding design of the solar farm security fence to achieve an outcome that will avoid or minimise impact to overland water flows to surrounding properties. This consultation will include the design of the fence, including discussing options such as the type of chain mesh, amount of clearance between the bottom of the chain measure and the natural surface, and an impervious barrier at the base of the fence in select locations to direct water flow along its natural course. The security fence will also be designed and reinforced where necessary to withstand flood waters.
Aerial spraying of crops	<p>ENGIE acknowledges that some impacted and adjacent landowners may aerially spray for crops. We trust that this practice is carried out in accordance with relevant regulations and licencing for aerial spraying, including those set by the NSW Environmental Protection Authority.</p> <p>As per our discussions, we commit to working with landowners during the construction and operation of the solar farm to coordinate with landowner farming activities, including crop spraying. This would include understanding when aerial spraying of crops is intended to be undertaken and the types of chemicals to be used. Where necessary, ENGIE can schedule construction and operational activities at the solar farm to minimise impact to farming activities.</p>
Transmission line	As per our discussion there will be a minimum 30 metre set back from the Northern boundary of Lot 373A DP186621 & Lot 1 DP566857 to the centreline of the overhead transmission line. Additionally, the existing powerline on Lot 373A DP186621 & Lot 1 DP566857 will not be moved from this property.
Vegetation screening	The EIS does not include planting of trees within 100 metres of Lot 373A DP186621 & Lot 1 DP566857.

Landowner concern	ENGIE response
Inland rail	ENGIE is consulting with ARTC regarding the alignment of the inland rail corridor and the design of the solar farm.
Property value	<p>The impact of the proposal on surrounding land and property value was assessed in Section 6.11.2 of the EIS.</p> <p>Studies (Urbis 2016 and Jones et al 2014) have been undertaken around the world for both solar farms and other renewable energy farms such as wind farms. These studies suggest that the operation of renewable energy projects cannot be directly linked to decreases in property values. Solar farms are expected to have significantly less of an impact on land use and property values when compared to wind farms, due to their reduced visual and noise impact. A number of large scale farms have now been operating in Australia for several years and there have been no formal or informal reported impacts on local land values. With the implementation of mitigation measures, in particular the establishment of screening vegetation to mitigate the proposal's potential visual impact, the main potential impact to adjacent properties, would be minimised. No further mitigation measures are proposed.</p>
Site access	ENGIE are committed to maintaining site access for impacted and adjoining landowners. Any restrictions to site access would be discussed and negotiated with relevant landowners.
Dust management	<p>The proposal has the potential to impact on air quality during construction by generating dust from excavation, vegetation clearance, construction vehicles driving over exposed soils or unsealed roads, and wind blowing over stockpiles and exposed surfaces. Impacts due to the generation of dust and exhaust emissions would be short term, covering the anticipated construction period of 12 months. Dust has the potential to impact on the amenity of those occupying nearby properties. Due to the distance to nearby properties, potential impacts would be minor.</p> <p>Measures to minimise impacts on dust including surveillance, covering stockpiled materials and not undertaking dust-generating works during strong winds would be employed, as outlined in the EIS.</p>
Theft during construction	The relative isolation and nature of the boundary fencing is expected to reduce the risk posed by theft/vandalism at the site and with adjacent holdings.
Glare	<p>The EIS concluded that, based on the design of the proposed photovoltaic panels, tracking system, and other infrastructure on the proposal site, glare impacts would be minimal.</p> <p>Further, the installation of appropriate vegetation as screening along the site boundary would assist in minimising visual impacts, including potential glare. This would be discussed with adjoining owners to determine the positioning of screening vegetation, and any potential safety issues.</p>

ENGIE are continuing to engage in consultation with impacted and adjoining landowners to address key concerns via phone calls, emails, letters and face-to-face meetings.

2.3 Since the previous RtS report

ENGIE has continued to engage with stakeholders since the issue of the previous Response to Submissions report in November 2020. This engagement, and where additional responses are provided, is summarised in Table 2.3.

Table 2.3 Summary of engagement since November 2020

Stakeholder	Engagement outcomes	Where addressed/ response
Narrabri Local Aboriginal Land Council	ENGIE have met with the Narrabri Local Aboriginal Land Council, who have indicated support.	ENGIE to continue to engage and negotiate with the Land Council.
Narrabri Shire Council	Discussion with Council regarding need for their approval (as relevant roads authority) of Logans Lane upgrade. Also discussed the potential need for some sealing of Logans Lane.	Section 3.2.1 ENGIE will continue to engage with Council.
Namoi Gwydir Rural Fire Service (RFS)	ENGIE have met with Namoi Gwydir RFS to discuss bushfire management plan, they did not raise any objections and were supportive of the proposal.	Section 3.11

Stakeholder	Engagement outcomes	Where addressed/ response
Santos	ENGIE have liaised with Santos as holder of PEL 238. Santos did not raise any objections to the proposed project, as it is in an area that does not have any proposed exploration activities. Additionally, they indicated their support of the project due to the economic benefits, jobs and energy security for the Narrabri region and more broadly to NSW.	N/A
Biodiversity Conservation Division (BCD)	ENGIE and GHD have met with BCD regarding required updates to the BDAR.	Section 3.10
Neighbours	ENGIE met with adjacent landowners regarding design of the solar farm fence - it was agreed that final alignment of the fence will be determined during detailed design in consultation with landowners, landholders were satisfied with this outcome.	N/A

2.4 Ongoing stakeholder engagement

As described in Section 4.2 of the EIS, ENGIE has developed a stakeholder engagement plan to guide engagement with the local community. Consultation will continue to be undertaken over the next phases:

- Post-approval/pre-construction
- Construction
- Operation

The communication and engagement activities would be tailored for each phase, and would generally include:

- Meetings and briefings
- Community information sessions
- Phone, email and written correspondence
- Project website updates
- Distribution of information, including mail outs

Consultation will continue on a regular basis as guided by this plan. A full list of the activities proposed is provided in Table 2.4.

Table 2.4 *Proposed consultation activities*

Activity	Timing	Post-approval	Construction	Operation
Advertisements	Relevant milestones	✓	✓	
Community engagement team	Ongoing	✓	✓	✓
Community information sessions	Ongoing	✓	✓	
Complaints system	During construction and prior to/during operation		✓	✓
Notifications	As required	✓	✓	
Email and newsletter updates	Relevant milestones and proposal information/ updates		✓	
Engagement with stakeholders including nearby landowners and residents, government agencies, etc.	Ongoing	✓	✓	✓
Fact sheets	Relevant milestones	✓	✓	
Proposal briefings and presentations	Relevant milestones		✓	
Website	Ongoing	✓	✓	✓

2.4.1 Consultation and community feedback

Consultation with the community and key stakeholders will be ongoing in the lead up to, and during, construction works. ENGIE is also continuing to engage with neighbours, with all correspondence recorded in a stakeholder management database.

The consultation activities will ensure that:

- The community and stakeholders have a high level of awareness of all processes and activities associated with the proposal
- Accurate and accessible information is made available
- A timely response is given to issues and concerns raised by the community
- Feedback from the community is encouraged
- Opportunities for input are provided

The 1800 phone number and proposal email address will continue to be available during construction, along with a construction response line. Targeted consultation methods, such as letters, notifications, signage and face-to-face communications, will continue to occur. The ENGIE website will also include updates on the progress of the proposal.

The following communication tools and activities will be used during the construction phase:

- Project email address
- 1800 phone number
- Updates to the ENGIE website
- Targeted consultation and notifications as required, including letters, notifications, and face to face communication
- Construction signage.

2.4.2 Complaints management

The construction contractor engaged to carry out the proposal is required to implement a complaints management system during construction works. This system will be incorporated within the construction environmental management plan (CEMP), which the contractor is required to prepare and have approved by ENGIE and DPIE prior to construction commencing.

3. Response to government agency submissions

3.1 Respondents

Fifteen government agencies made a submission regarding the proposal. Table 3.1 provides a list of these, the submission number and where the ENGIE response is addressed in this report.

Table 3.1 *List of respondents – government agencies*

Respondent	Submission no.	Section number where issues are addressed
Narrabri Shire Council	1	3.2
Department of Primary Industries (DPI)	2	3.3
Environment Protection Authority (EPA)	3	3.4
TransGrid	4	3.5
Geological Survey of NSW, Division of Resources and Geoscience	5	3.6
NSW Heritage Council	6	3.7
NSW Health - Hunter New England Local Health District (NSW Health)	7	3.8
Natural Resources Access Regulator (NRAR)	8	3.9
Biodiversity Conservation Division - Department of Planning, Industry & Environment (BCD)	9	3.10
NSW Rural Fire Service (NSW RFS)	10	3.11
Transport for NSW (TfNSW)	11	3.12
Roads and Maritime Services (Roads and Maritime) ¹	12	3.13
Crown Lands - Department of Planning, Industry and Environment (Crown Lands)	13	3.14
Energy, Resources and Compliance – Department of Planning, Industry and Compliance (DPIE)	14	3.15

Note: 1. Two submissions were received from Roads and Maritime, however they consisted of the same submission with one being sent directly to DPIE and not via the Make a Submission page of the Major Projects website. For the purposes of this report this has been counted as one submission.

Additional input received during ongoing stakeholder liaison following EIS exhibition are also addressed in this section, where relevant. Refer to Table 2.3 for further details.

3.2 Narrabri Shire Council

Council provided comments regarding traffic, transport and access; hydrology, groundwater and water quality; and consultation/bushfire as outlined in the section below.

3.2.1 Logans Lane upgrade

Submission

Council would like to know what the proponent is relying upon to trigger the 'requirement' to upgrade Logans Lane.

ENGIE response

Traffic impacts of the proposal are outlined in the EIS. The site has direct vehicular access to the Newell Highway to the east, and the Kamilaroi Highway (via Logans Lane) to the southwest. Site access will be from the Kamilaroi Highway (via Logans Lane).

During construction, there would be a maximum short-term peak of 60 heavy vehicle movements per day (i.e. to and from site is two movements) for a two or three day period and a limit of approximately 80 heavy vehicle movements per week (13 per day on average) outside this period. This number could be lower if B-doubles are used rather than semi-trailers.

The intersection at Kamilaroi Highway and Logans Lane is proposed to be upgraded for the purpose of allowing B-double access to the site during the construction period. This upgrade will facilitate B-double access to turn right onto Logans Lane from Kamilaroi Highway and to turn left onto Kamilaroi Highway from Logans Lane.

Consultation with both Roads and Maritime and Council has been incorporated into the design for the intersection of the Kamilaroi Highway and Logans Lane (see Appendix A). This is in accordance with EIS commitments detailed in Section 6.7.4 of the EIS.

Engie would consult with Narrabri Shire Council during detailed design in regard to the proposed intersection and road upgrades to Logans Lane. The works will be undertaken in accordance with Council requirements.

3.2.2 Hydrology, groundwater and water quality

Submission

In summary, Council raised the following issues in relation to hydrology, groundwater and water quality:

- The proposed earthworks, more specifically the “Earthworks would be required in the northern part of the proposal site in order to level the ground in the location of an existing borrow pit used by the landowner.... Some earthworks would also potentially be required to fill any existing dams on site that are not to be retained” have the potential to negatively affect stormwater and any future flood waters at and around the site. As such these impacts should be investigated further.
- Clause 6.2 Flood Planning and Clause 6.5 Essential Services of the Narrabri Local Environmental Plan 2012 (LEP) are still not addressed within the EIS.

ENGIE response

Item 1: The proposal would result in infilling of on-site dams and loss of swales/dish drains which divert runoff toward these dams. However, this impact is expected to result in negligible impact to existing overland flows.

This notwithstanding, ENGIE is committed to ensuring existing flows to downstream landowners are not impacted. ENGIE will ensure existing overland flows are maintained in consultation with relevant landowners during detailed design and all stages (i.e. pre-construction, construction, pre-operation and operation).

Item 2: As the proposal is permitted without consent under the Infrastructure SEPP and SEPP SRD, the consent requirements of the LEP do not apply. However, the requirements of these clauses were generally considered in Sections 6.6 and 6.8 respectively of the EIS.

3.2.3 Bushfire

Submission

Council previously requested that the proponent consulted with the NSW Rural Fire Services prior to lodgement of the EIS. However, the EIS states only that “A bushfire management plan would be prepared in consultation with the Rural Fire Service”.

ENGIE response

Consultation for the proposal was undertaken in accordance with the consultation requirements detailed in the SEARs issued on 22 June 2018.

As discussed in Section 6.10 of the EIS, review of the NSW RFS Bushfire Prone Land Mapping Tool determined the bushfire risk for the proposal site to be low, while operation of the proposal is unlikely to result in any substantial additional bushfire risks.

As noted in Council’s submission, ENGIE is committed to working with RFS in preparation of a Bushfire Management Plan in consultation with NSW RFS during detailed design for the proposal.

NSW RFS provided comments in relation to the management and mitigation of potential impacts associated with the proposal. In response to RFS’s comments, ENGIE has revised and provides additional mitigation measures to address potential impacts associated with the proposal. These additional mitigation measures are outlined in Section 6 (Table 6.1) to address NSW RFS comments on the EIS.

3.3 Department of Primary Industries

Submission

DPI reviewed the proposal and provided no comment.

ENGIE response

DPI’s response is noted.

3.4 Environment Protection Authority

Submission

The EPA notes the proposal is not scheduled for POEO Act purposes and provided no comment.

ENGIE response

The EPA’s response is noted.

3.5 TransGrid

Submission

In summary, TransGrid provided the following response on the proposal EIS:

- Please be advised TransGrid is actively working with the developer to finalise the Silverleaf Solar Farm connection to TransGrid’s transmission network. A Connection Enquiry has already been completed and Connection Processes Agreement has been executed between parties in order to finalise the connection works.

ENGIE response

The Silverleaf Solar Farm sits within the NSW N1 North West Renewable Energy Zone (REZ), which is identified as a key renewable energy resource area for NSW and a target for future network development. The proposed connection location at Narrabri substation has multiple redundant connection paths providing strong network reliability including 132kV connections direct to Tamworth; to Tamworth via Gunnedah; and north to Moree. The Australian Energy Market Operator (AEMO) Integrated System Plan also outlines plans for upgrades to the Queensland – New South Wales interconnector (QNI) including two 500kV lines connecting directly into the N1 REZ, further supporting the development of new projects in this region.

Engie are working with Transgrid to finalise the connection to their transmission network. A Connection Enquiry has been completed, with the subsequent Connection Process Agreement executed between the two parties to continue this process of finalising connection works. The grid connection process is being progressed by Engie and Transgrid as part of the standard process with AEMO and providers for establishing connections to the transmission and distribution networks in the National Energy Market.

3.6 Geological Survey of NSW

The GSNSW provided comments regarding consultation, as addressed below.

3.6.1 Consultation

Submission

In summary, GSNSW provided the following comments in relation to consultation:

- The proponent has included a dated MinView search that shows the subject site is covered by current titles. PEL 238 held by SANTOS NSW Pty Ltd covers the site. While PEL 238 expired in August 2016, renewal for this licence has been applied for. Until the renewal application is determined, the licence remains current.
- The proponent should make contact with the titleholder to determine if the solar farm would have an impact on exploration activities and provide evidence of consultation to the Division.
- GSNSW note that at this stage of the planning process, no biodiversity offset methods have been determined. GSNSW would appreciate early consultation in relation to any proposed stewardship sites.

Response

Item 1: Consultation was undertaken as part of the project to identify key stakeholders and issues for consideration. A number of engagement activities were undertaken both prior to EIS exhibition (section 4 of the EIS) as well as during and after EIS exhibition (section 2.2). Government agencies, key stakeholders (including interest groups and organisations), and the community were invited to make written submissions on the proposal. No comments on the project was received from SANTOS NSW PTY LTD ('Santos').

Santos is not a government agency for which consultation is required. The presence of a current licence (PEL 238) over the subject site does not preclude development of the proposal. ENGIE has contacted Santos and they have no objection to the project, see Table 2.3 for further details.

Item 2: The proposal would be required to meet offsetting obligation to address impacts on native vegetation. These obligations have been determined in accordance with the requirements of *Biodiversity Conservation Act 2016* (NSW), calculated using the Biodiversity Assessment Methodology (BAM) and documented in a Biodiversity Development Assessment Report (BDAR).

Section 6.2.5 of the EIS outlines offsetting under the *Biodiversity Conservation Act 2016* (NSW). In accordance with the offset rules established by the *Biodiversity Conservation Regulation 2017* (NSW) there are various means by which offsetting obligations can be met. These include:

- Retiring the appropriate credits from an established stewardship site.
- Monetary payment directly into the Biodiversity Conservation Trust Fund, or
- Funding an approved biodiversity action. Funding a biodiversity action may be available as a last resort, subject to consultation with approval authorities, if all other options are determined to be unsuitable.

The preferred approach to offset the residual impacts of the proposal is to secure and retire appropriate credits from stewardship site/s that fit within the trading rules of the Biodiversity Offset Scheme and in accordance with the 'like for like' report generated by the credit calculator.

Section 9 of the EIS addresses offset requirements for the proposal. The EIS states that a payment to the Biodiversity Conservation Trust (BCT) could be considered if a suitable number and type of biodiversity credits could not be secured from third parties.

ENGIE is committed to meeting offsetting obligations for the proposal, and is open to options to secure appropriate credits. ENGIE welcomes dialogue with any stakeholders with suggestions, advice or questions in regards to securing appropriate credits for the project.

3.7 NSW Heritage Council

The NSW Heritage Council provided comments regarding non-Aboriginal heritage buildings and features.

3.7.1 Visual impacts on non-Aboriginal heritage

Submission

In summary, the NSW Heritage Council raised the following issues in relation to non-Aboriginal heritage associated with the proposal:

- While the proposal would not physically impact any locally or State-heritage listed items, there may be adverse visual impacts associated with the transmission line infrastructure. The EIS contains insufficient visual impact assessment with respect to heritage items.
- It is recommended that if the project is approved, a condition of approval be included requiring further assessment and the inclusion of any necessary mitigation measures to alleviate any visual impacts the project may have on heritage items, their setting and key views and vistas. In particular, the locally listed Old Narrabri Cemetery (I108) on Stoney Creek Road will be impacted as the transmission line will wrap around this cemetery.

ENGIE response

As noted in the NSW Heritage Council's response, the existing State-listed items are located in the township of Narrabri. There are existing transmission lines in the immediate vicinity and numerous other infrastructure and development, which are not in keeping with the aesthetic or character of the State-listed items. Therefore, it is considered that the introduction of an additional transmission line (where a number exist already), more than one kilometre from the nearest State-listed item, would have a negligible visual impact on the aesthetic or character of the State-listed items.

As for potential visual impacts on the aesthetic or character of the locally-listed Old Narrabri Cemetery (I108), there are existing transmission lines on both sides of the road reserve in the vicinity of the item. The proposal would follow the alignment of the existing transmission line on the northern side of Stoney Creek Road. Therefore, it is considered that the proposal would have negligible visual impact on the aesthetic or character of the locally-listed Old Narrabri Cemetery (I108) as such impacts currently already occur due to other transmission lines already in place.

Furthermore, a Historic Heritage Assessment (OzArk, 2019) was prepared for the EIS considering the Criterion identified in the *NSW Heritage Office guidelines for Assessing Heritage Significance* (Heritage Office 2001). This assessment concluded that there are no likely impacts to historic heritage from the activities of the proposal.

For these reasons, ENGIE considers that any requirement to undertake further assessment of the visual impact of the project on historic heritage items is unwarranted.

3.8 NSW Health

NSW Health provided comments regarding hydrology, groundwater and water quality and are addressed in the below sections.

3.8.1 Water supply

Submission

The selected option for the provision of a private potable water supply is likely to require a Quality Assurance Program in accordance with the provisions of the *Public Health Act 2010*. The proponent is encouraged to contact Hunter New England Local Health District with respect to developing a Quality Assurance Program and water carter registration.

ENGIE response

Prior to the commencement of operation, ENGIE will ensure the relevant requirements of the *NSW Private Water Supply Guidelines* (HNEHealth 2014) are addressed with consideration to operational potable water, in consultation with HNEHealth. This would include the preparation of a Quality Assurance Program for operation of the proposal.

See Section 6 for inclusion of this commitment as a relevant management measure.

3.9 Natural Resources Access Regulator

The Natural Resources Access Regulator (NRAR) provided comments regarding hydrology, groundwater and water quality, management and mitigation and land use soils and capability as address in the below section.

3.9.1 Water supply

Submission

Insufficient information has been provided to confirm a viable water supply is available.

ENGIE response

The EIS estimated that up to 20 kilolitres of water would be required per day of construction. Some water may be sourced from the existing farm dams, with supplementary water sourced from a town supply such as Narrabri under a commercial arrangement.

During operation, the proposal is expected to use about 2.5 mega litres of water per year to clean the solar arrays as part of maintenance activities. Rainfall is generally sufficient to clean the solar arrays, and therefore the volume of water required for cleaning is dependent on annual rainfall. A small volume of water would also be required for the amenities building. All water requirements beyond what can be supplied by site water harvesting would be sourced from a town supply such as Narrabri (under a commercial arrangement) and would be trucked to site.

3.9.2 Management and mitigation

Submission

- The proponent should obtain relevant approvals and licences under the *Water Management Act 2000* before commencing any works which intercept or extract groundwater or surface water (including from on-site dams where necessary), or for any works which have the potential to alter the flow of floodwaters.
- Clarification should be provided of the proposed infrastructure layout to meet the buffer requirements from watercourses as defined in the *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018).

ENGIE response

As discussed in Section 5.3.2 of the EIS, the following approvals under the *Water Management Act 2000* (WM Act) do not apply to State significant development (SSD) applications:

- A water use approval under Section 89
- A water management work approval under Section 90
- An activity approval (other than an aquifer interference approval) under Section 91 of the *Water Management Act 2000* (WM Act)

The proposal would require an aquifer interference approval under section 91 of the WM Act. However, DPI – Water (2017) have indicated that requirements for aquifer interference activity approvals have not yet commenced under the WM Act, and as such aquifer interference activities are regulated under Part 5 of the *Water Act 1912*.

During construction of the transmission line, excavation would involve installing poles up to seven metres deep. There is a potential for the foundations for these poles to intercept groundwater. The volume of groundwater to be displaced during construction of the transmission line poles is expected to be minimal. However, while the proposal does not propose to ‘take’ groundwater during construction of the transmission lines, the excavations would likely intercept groundwater. Therefore, a groundwater licence under Part 5 of the *Water Act 1912* would be required.

In relation to on-site dams, the proposal does not involve construction of any dams. Any existing dams to remain on-site are considered part of the proposal site’s Maximum Harvestable Right Dam Capacity (MHRDC). In accordance with advice of the DPIE (2019a) in their publication *Water Access and Licensing During Drought*, if a dam is within the ‘harvestable right’, no approval or water access licence is required.

3.9.3 Erosion

Submission

The proponent should prepare a Construction Environmental Management Plan (incorporating an Erosion and Sediment Control Plan) prior to commencement of activities.

ENGIE response

As stated in Section 6.4.4 of the EIS, an ESCP will be prepared as part of the CEMP prior to construction to minimise impacts on soils during construction.

3.10 Biodiversity Conservation Division

Item 1 and 2: The BCD of the DPIE provided comments regarding offsetting (Section 6.2.5 of the EIS), vegetation mapping (Section 6.2.1 of the EIS), vegetation clearing (Section 6.2.2 of the EIS) and targeted threatened flora surveys (Section 6.1.2 of the EIS).

3.10.1 Offsetting

Submission

The BCD identified the following concerns:

- Identification of Category 1 land: The accredited assessor does not appear to have considered whether the site contains any Category 1 – Exempt Land.
- An assessment should be conducted to determine whether any areas on the development site can be designated as Category 1 – Exempt. Any clearing of native vegetation on Category 1 – Exempt land will not require biodiversity offsets. Evidence must be provided to support areas designated as Category 1 – Exempt.

ENGIE response

Item 1 & 2:

The *Local Land Services Act 2013* categorises land to determine native vegetation management options for landholders (i.e., Category 1 – Exempt Land). The circumstances under which land is to be designated as Category 1 – Exempt and Category 2– Regulated are set out in s.60H-60J of the LLS Act and cl.109-114 of the *Local Land Services Regulation 2014*. Clearing of native vegetation on land that meets the definition of Category 1 - Exempt Land (under the *Local Land Services Act 2013 (LLS Act)*) does not require assessment or offsetting under the BAM (refer to s.6.8 (3) under the BC Act and s.2.3.1.1 of the BAM).

GHD has completed an assessment on behalf of ENGIE to determine if any areas of the development site can be designated as Category 1- Exempt Land. This assessment included a review of historic aerial imagery (prior to 1990), publicly available datasets including land use mapping (2017) (DPIE 2019b), Landsat woody extent mapping (DPIE 2011) and landowner testimonies.

Historic aerial imagery provided in Figure 1 of Appendix A shows approximately 285.18 hectares of the proposal site has been with previously cleared and cropped prior to 1990 or legally cleared (for agricultural activities) post 1990. This evidence is also supported by land use mapping that shows portions of the site are mapped as cropped as well as woody extent mapping which indicates that the majority of the site consist of non woody vegetation (refer to Figure 2 and 3 in Appendix A). Statutory declarations from landowners that attest to historical cropping practices across the site are provided as Appendix B. These testimonies support the historic aerial imagery and land use mapping which all indicate that large areas within the development site were cleared prior to 1990 or legally cleared (for agricultural activities) post 1990.

Areas within the proposal site that ENGIE propose meet the definition of Category 1 exempt land provided in the LLS Act are shown on Figure 4 of Appendix A. The BDAR has been amended and this land excluded from the assessment to reflect this change of land classification.

3.10.2 Vegetation mapping

Submission

The BCD identified the following concerns:

- The native vegetation extent does not appear to have been mapped in accordance with the Biodiversity Assessment Method (BAM). Section 4.3.2 of the BAM requires that both woody and non-woody native vegetation be assessed on the site and within a 1500 metre buffer of the development site.
- Comparing the aerial image with the mapped native vegetation extent (Figure 4-1), it appears that areas of woody vegetation likely to be native have not been fully mapped.
- There is no derived native grassland included with mapped native vegetation extent, despite this being identified on the proposal site. Native vegetation on the proposal site, which includes derived native grasslands shown in Figure 5-1, has not been mapped as part of the native vegetation extent.

Recommendations

- All native vegetation extent, including derived native grassland, be assessed in accordance with section 4.3.2 of the BAM.
- The revised percentage of native vegetation extent be used for BAM calculations.

ENGIE response

Item 1, 2 & 3: Native vegetation extent has been reviewed and Figure 4-1 of the BDAR amended to include small areas of woody vegetation that were not included in the assessment. The native vegetation extent for the 1500 m buffer has been recalculated based on the incorporation of these small areas of woody vegetation that were previously not included in the assessment.

The native vegetation cover polygon on the landscape assessment map has been revised to include areas of derived native grasslands and the percentage native vegetation cover within the 1500 metre buffer has been updated in the BAM calculator accordingly (to 28 percent).

3.10.3 Vegetation clearing

Submission

Poplar Box Grassy Woodland on Alluvial Plains has recently been listed as an endangered ecological community (EEC) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). There is potential for the Poplar Box community on the site to meet the definition of the EEC.

Recommendation

The Poplar Box community on-site be assessed against the conservation advice for the EPBC listed Poplar Box Grassy Woodland on Alluvial Plains.

ENGIE response

The Poplar Box Grassy Woodland on Alluvial Plains was listed on 4 July 2019 as an endangered ecological community (EEC) under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

One of the PCTs that occur within the proposal site (Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion (PCT 397) contains species that may be characteristic of this EEC. This PCT is mapped within the proposal site as both intact woodland (1.15 ha) and derived native grassland (32.69 ha) (where the canopy and mid stratum of this community has been removed) (refer to Figure 6-2 in Section 6 of project EIS).

The approved conservation advice for Poplar Box Grassy Woodland on Alluvial Plains (DEE 2019) outlines the key diagnostic characteristics and condition thresholds for this EEC. For EPBC Act referral, assessment and compliance purposes, vegetation is only protected under national environmental law if it meets the diagnostic characteristics and condition thresholds outlined in the approved conservation advice.

A review of the diagnostic characteristics and condition thresholds for Poplar Box Woodland indicates that the woodland form of PCT 397 within the proposal site does not conform with the EEC listing as although *Eucalyptus populnea* (Poplar Box) occurs occasionally in the canopy layer it is not the dominant species (i.e. does not form 50% or more of the total canopy cover within the community as required under the EPBC listing).

Similarly, areas mapped on Figure 6.4 of the EIS as the derived native grasslands form of PCT 397 are not considered to form part of this nationally listed EEC as patches lacking canopy cover are not considered part of this ecological community (DEE 2019).

Regardless, it has always been the intention of ENGIE to avoid impacts to the woodland form of PCT 397. A slight mapping discrepancy resulted in the inclusion of a narrow fringe of the woodland form of PCT 397 within the proposal site identified in the project EIS. The boundary of proposal site has therefore been amended so that all direct impacts to the woodland form of PCT 397 are now avoided (see Section 5). Indirect impacts on this PCT would be avoided through the safeguards and mitigation measures outlined in section 8 of the BDAR and section 6.2.3 of the EIS.

The BDAR for the proposal has been updated to include an updated project footprint that avoids the full extent of the woodland form of this community.

3.10.4 Vegetation integrity scores

Submission

BCD considers that the reduction in groundcover vegetation scores does not take into account all impacts of the installation and operation of the solar farm and that the installation of approximately 20,000 piles would involve the complete removal of the groundcover for each pile location. In addition, the BDAR does not take into account impacts associated with laying of cables, or construction impacts associated with laydown areas, access tracks and machinery movement. There is no justification for reducing groundcover vegetation scores, and no scientific evidence has been provided to support the percentage reductions.

Recommendation

Biodiversity offset calculations be revised with all groundcover scores for the development being reduced to zero unless the accredited assessor can provide adequate scientific data to support lesser reductions.

ENGIE response

Although it is highly unlikely that the proposal would result in the permanent removal of all native vegetation within the proposal site, there is currently no peer reviewed published scientific data regarding the impacts of shading of solar panels on derived native grasslands in the Narrabri Region. Biodiversity offset calculations have therefore been be revised with all groundcover scores for the development being reduced to zero.

3.10.5 Targeted flora surveys

Submission

The BDAR includes targeted flora surveys for five threatened flora species, which were not located during survey and so have been subsequently discounted from requiring species credits. Three of these species have been recorded in the locality (Finger Panic Grass, Belson's Panic and Spiny Peppercreess).

The BDAR notes that surveys were undertaken during drought conditions, and that the proposal site was very dry at the time of the survey. The NSW Guide to Surveying Threatened Plants states that, where suboptimal conditions such as prolonged drought has substantially affected the site, the proponent may choose to use an expert report to assess the species' presence or absence. Alternatively, the species can be assumed to be present at the development site.

Recommendation

The proponent should discuss the need for expert reports or assumption of presence of threatened flora species likely to occur on the site with BCD.

ENGIE response

Although conditions at within the proposal site was dry at the time of the site surveys, results from the floristic plots that were collected in March 2018 indicate that plant diversity was still relatively high. At the time of the March 2018 survey there was a relatively dense ground cover, with the majority of plant species having reproductive material which allowed for identification to species level. A total of 143 flora species was recorded within the site including 104 native species. Of the 104 native species recorded a total of 42 were grasses with 30 being native grasses. It is therefore considered likely that if *Digitaria porrecta* (Finger Panic Grass), *Digitaria setosum* (Bluegrass) or *Homopholis belsonii* (Belson's Panic) occur within the site it is likely they would have been recorded during the survey.

Regardless as there were good summer rainfalls in the Narrabri area (as of early February 2020) which significantly improved the conditions for the detection of summer flowering grasses, additional targeted threatened flora surveys were completed across the site in ideal conditions (surveys completed 26-28 February 2020). None of the candidate threatened grass species identified for the site were recorded during these surveys and as such *Digitaria porrecta* (Finger Panic Grass), *Digitaria setosum* (Bluegrass) or *Homopholis belsonii* (Belson's Panic) species can be discounted from occurring within the proposal site.

Although the conditions during the September and November 2018 surveys which targeted *Lepidium aschersonii* (Spiny Peppercreess) and *Swainsona murrayana* were much dryer than during the March 2018 surveys. The threatened species profile for Spiny Peppercreess states that an apparent increase in the numbers of this species during drought conditions have been observed (OEH 2020). The profile also states that the species is reported to be salt tolerant and grows well under drought conditions (OEH 2020). Surveys that were completed in September/November 2018 are therefore considered adequate to assess for the presence of this species within the site.

Swainsona murrayana has not been recently recorded in the Narrabri area since 1886. The closest contemporary record of this species is from the Pilliga Nature Reserve and are located approximately 70 km south of the proposal site. Given this species was not recorded during targeted surveys, the lack of local records combined with the disturbed nature of the site it is considered unlikely that this species would occur within the site.

With consideration of the above it is considered that appropriate survey for threatened flora species has been completed at the site. The BDAR has been updated to include details of the additional threatened flora assessment completed at the site under ideal conditions for the detection of threatened grass species identified as having potential to occur within the proposal site.

3.10.6 Planted vegetation

Submission

The BDAR includes areas of planted vegetation. The species that comprise the planted vegetation area not identified in the BDAR, and there is no information regarding the ages of the plantings. There is potential for the planted vegetation to provide some habitat values for threatened species.

Recommendation

- More information on the planted vegetation, including age and species should be included in the BDAR.
- Planted vegetation should be assessed to determine whether it conforms to a PCT.

ENGIE response

Figure 6.4 of the EIS shows three patches of planted native vegetation, totalling an area of 10.95 hectares. One of these patches is located on the northern boundary of the proposal site and two windbreaks run across the site in a roughly east west orientation.

Historic aerial imagery shows that none of the planted vegetation within the proposal site was present in 1998. Aerials from 2006 show the presence of the small patch of planted vegetation in the north of the site as well as the northern windbreak. This indicates this vegetation was planted somewhere between 1998 and 2006 so is likely to be approximately 20 years old. The southern wind break can be seen on aerial imagery from 2011 indicating this vegetation was planted somewhere between 2006 and 2010 and is therefore 10-15 years old.

The planted vegetation on the site includes a variety of planted native species. Species present within this vegetation include a mixture of young eucalyptus and Acacias, most of which were not able to be identified during field surveys due to a lack of reproductive material. Bark, leaves and tree form indicates that species may include *Eucalyptus chloroclada* (Dirty Gum), *Eucalyptus conica* (Fuzzy Gum) and *Acacia saligna* (Golden Wreath Wattle).

The planted vegetation within the site occurs within land that has been determined to meet the definition of Category 1- Exempt land, this vegetation has therefore been excluded from the BDAR (refer to section 3.10.1).

3.11 NSW Rural Fire Service

The NSW RFS provided comments regarding bushfire issues, these are addressed in the below section.

3.11.1 Bushfire management and mitigation

Submission

The NSW RFS provided the following comments in relation to management and mitigation of potential impacts associated with the proposal:

- A Fire Management Plan (FMP) should be prepared in consultation with NSW RFS Namoi Gwydir Fire Control Centre. The FMP should include:
 - 24-hour emergency contact details including alternative telephone contact
 - Site infrastructure plan
 - Firefighting water supply plan
 - Site access and internal road plan
 - Construction of Asset Protection Zones (APZ) and their continued maintenance
 - Location of hazards (Physical, Chemical and Electrical) that will impact on firefighting operations and procedures to manage identified hazards during firefighting operations
 - Such additional matters as required by the NSW RFS District Office (FMP review and updates)

- The proposal site should be managed as an APZ as outlined in Section 4.1.3 and Appendix 5 of 'Planning for Bush Fire Protection 2006' and the NSW Rural Fire Service's document 'Standards for Asset Protection Zones'.
- A 20,000 litre water supply (tank) fitted with a 65 mm storz fitting shall be located adjoining the internal property access road within the required APZ.
- A 10 metre defendable space (APZ) that permits unobstructed vehicle access should be provided around the perimeter of each of the solar array development sites including associate infrastructure.

ENGIE response

Items 1, 2, 3 and 4: A Bushfire Management Plan was identified as an appropriate management and mitigation measure in Section 6.10.3 of the EIS, to be prepared during detailed design.

The revised/additional measures described below will be implemented to address NSW RFS comments, and have been reproduced in Section 6 (Table 6.1).

A bushfire management plan would be prepared in consultation with the [NSW Rural Fire Service \(NSW RFS\) Namoi Gwydir Fire Control Centre and NSW RFS District Office](#). This plan would include but not limited to the following:

- 24-hour emergency contact details, including alternative telephone contact
- Management of fuel loads onsite and identification of hazards (physical, chemical and electrical) at risk of fire ignition with potential to impact fire-fighting operations
- Sub-plans including:
 - Site infrastructure plan
 - Fire-fighting water supply plan
 - Site access and internal road plan
- Operational procedures relating to mitigation and suppression of bush fire relevant to the operation of a solar farm, including management of identified hazards during fire-fighting operations.
 - ~~Management activities with a risk of fire ignition~~
 - ~~Management of fuel loads onsite~~
 - The below requirements of Planning for Bush Fire Protection 2006:
 - Identifying, construction and maintenance of asset protection zones (APZs)
 - Providing adequate egress/access to the site
 - Emergency evacuation measures
- Storage and maintenance of firefighting equipment including siting and provision of adequate water supplies, including provision of an appropriately sized tank within the APZ, located adjacent to the internal access road.

3.12 Transport for NSW

Transport for NSW provided a response with comments regarding the management of traffic and transport, these comments are addressed in the below section.

3.12.1 Management and mitigation

Submission

In summary, Transport for NSW have made the following suggestions in relation to traffic and access management:

- The Traffic Management Plan should take into account buses passing along the Kamilaroi Highway during the construction of the new intersection.
- Bus operators should also be consulted with and informed of any resulting safety measures implemented, such as the reduction of speed limits, to ensure minimal impact on bus services.

- The following draft conditions should be considered if the proposed development is to be approved.
- Construction Pedestrian and Traffic Management: The Applicant should prepare a Construction Pedestrian and Traffic Management Plan (CPTMP) in consultation with Narrabri Shire Council, Roads and Maritime Services and the local bus operator Jeffrey Holmes. The CPTMP needs to specify, but not to be limited to, the following:
 - Location of the proposed work
 - Haulage routes
 - Construction vehicle access arrangements
 - Proposed construction hours
 - Estimated number of construction vehicle movements
 - Construction program
 - Any potential impacts to general traffic, cyclists, pedestrians and bus services within the vicinity of the site from construction vehicles during the construction of the proposed works.
 - Cumulative construction impacts of other developments. Existing CPTMPs for developments within or around the development site should be referenced in the CPTMP to ensure that coordination of work activities are managed to minimise impacts on the road network.
 - Proposed mitigation measures. Should any impacts be identified, the duration of the impacts and measures proposed to mitigate any associated general traffic, public transport, pedestrian and cyclist impacts should be clearly identified and included in the CPTMP.

A copy of the final plan should be submitted to Narrabri Shire Council prior to the commencement of any works.

ENGIE response

It is noted that Roads and Maritime has also provided comment on the EIS relating to the requirements for a TMP during construction of the proposal, with minor differences in applicable requirements (see Section 3.13.2).

In addition, as discussed in Section 6.7.4 of the EIS, ENGIE has committed to preparation of a TMP as part of the CEMP, which includes consultation with the community of changes to the road network. In consideration of TfNSW's comments, this mitigation measure has been revised and reproduced in Section 6, to consider:

- Buses operating along Kamilaroi Highway during the construction of the new intersection
- Consultation with and informing bus operators of any safety measures, such as changing speed limits

3.13 Roads and Maritime Services

Transport for NSW (TfNSW) (formerly Roads and Maritime Services) provided a response with comments regarding the design of the proposal; management and mitigation of impacts; and works in road reserves, all of which are outlined in the below sections.

3.13.1 Design

Submission

In summary, TfNSW made the following suggestions in relation to design of the proposal:

- The proponent should engage a suitably experienced surveyor and/or solicitor to review the physical location of the proposed high voltage transmission line relative to road and rail corridors and existing cadastral boundaries. It is noted that the historic road formation along the proposed transmission alignment may not be contained entirely within public road reserve.

- Above-ground structures in roads including transmission line poles or towers are to be located as per Roads and Maritime's Requirements for Overhead Power Lines.
- The EIS mentions creation of an easement in favour of the private transmission line operator. Generally Roads and Maritime will not support provision of an easement or lease which would burden the public domain for a private purpose, and so as not to inhibit the powers of Council or Roads and Maritime in ensuring the safety, efficiency or integrity of the classified road network and the travelling public.

ENGIE response

Item 1 and 2: The environmental management measures for the proposal have been updated to capture these Roads and Maritime comments (see Section 6).

Item 3: Section 1.2.2 of the EIS states that an easement is required for the 132kV transmission lines which will cross properties owned by Narrabri Shire Council and TfNSW. Landowner consent is required for these transmission lines. Newell Highway and Killarney Gap Road are classified roads, which require the concurrence of Council.

ENGIE has been liaising with the DPIE Crown Lands ('Crown Lands') regarding the best way to authorise the powerlines on Crown land. Crown Lands have advised that the most appropriate method is through the creation of an easement. The easement can be either a private easement, or compulsorily acquired by Essential Energy via agreement. ENGIE will continue to liaise with Crown Lands to investigate the most suitable option for obtaining an easement for the powerlines.

3.13.2 Management and mitigation

Submission

In summary, Roads and Maritime made the following suggestions in relation to management and mitigation measures:

- The Newell Highway access is not to be used by development traffic but is to remain open for general agricultural use.
- A Construction Traffic Management Plan (including a broader Traffic Management Plan for the entire life cycle of the project) is to be prepared in consultation with the Roads and Maritime and Narrabri Shire Council. This should outline measures to manage traffic related issues associated with the delivery and construction of solar plant and ancillary structures, any construction or excavated materials, machinery and personnel involved in the construction, operation and decommissioning process.
- The Plan is to detail the potential impacts associated with the development, measures to be implemented and the procedures to monitor and ensure compliance. The plan should address but not be limited to:
 - The origin, number, size, frequency and destination of vehicles accessing/exiting the site. Although there were some estimations of traffic volumes identified, until greater detail on vehicle size is known this will impact the subsequent traffic volumes.
 - Loads, weights and lengths of haulage and construction related vehicles and number of movements of such vehicles.
 - Existing background traffic, peak hour volumes and types and their interaction with project development related traffic.
 - The management and coordination of construction and staff vehicle movements to the site and measures to limit disruption to other motorists.
 - Scheduling of haulage vehicle movements to minimise convoy length or platoons. Consideration is to be given to minimise the route length for road transport of all over size and over mass loads.
 - Policies and procedures for addressing concerns raised by the community of project related matters.
 - Local climatic conditions that may affect road safety for vehicles used during construction, operation and decommissioning of the project (e.g. dust, fog, wet weather).

- In particular consideration as raised by the local community regarding the current provision of a school bus stop near the intersection of Logans Lane and the Kamilaroi Highway and the impacts to this once the intersection is upgraded.
 - The safety of children accessing school bus pick up/drop off locations along the proposed haulage route should be avoided.
 - A commitment by the proponent for the use of buses to commute employees to and from the site, particularly during the construction phase.
 - Dust mitigating measures by way of an appropriate length of seal along Logans Lane to limit dust impacts on surrounding sensitive receivers.
 - Toolbox meetings to facilitate continuous improvement initiatives and incident awareness.
 - Truckloads are to be covered at all times when being transported, to minimise dust and loss of material onto roads which may form a traffic hazard.
 - Measures to ensure responsible fatigue management and discourage driving under the influence of alcohol and/or drugs, dangers of mobile phone use and driving to the conditions, and adherence to posted speed limits.
- A Road Occupancy Licence (ROL) is required prior to any works commencing within three (3) metres of the travel lanes of a State classified road, or work that has potential to impact traffic flow such as the use of traffic control devices or signage. A Traffic Control Plan (TCP) prepared by an TfNSW-accredited person is to be submitted as part of the ROL application.
 - A temporary speed zone authorisation for use in connection with any oversize or special vehicle deliveries should form part of a Traffic Management Plan and ROL application.
 - Prior to construction, detailed designs for works within the classified road reserves will need to be submitted and approved by Roads and Maritime for concurrence pursuant to Section 138(2) of the *Roads Act 1993*. This includes transmission line work within the Newell Highway (HW17/A39) and Killarney Gap Road (MR133), and road intersection work within the Kamilaroi Highway (HW29).

ENGIE response

Items 1, 2 and 3: Comments are noted. As discussed in Section 6.7.4 of the EIS, a TMP is proposed to be prepared and implemented as part of the CEMP and would be prepared in accordance with any TfNSW and Council requirements pending receipt of consent.

The revised/additional measures described below will be implemented to address Roads and Maritime comments, and have been reproduced in Section 6.

A traffic management plan would be prepared and implemented as part of the CEMP. The plan would be prepared in accordance with any ~~TfNSW Roads and Maritime~~ and Narrabri Shire Council requirements. The plan would include but not be limited to:

- *Details of the haulage routes for the proposal including loads, weights and lengths of haulage and construction related vehicles and number of movements of such vehicles*
- *Avoidance of the Newell Highway access for the proposal, ensuring to remains open for general agricultural use*
- *Measures to maintain access along roads and to properties, including schedule of haulage vehicle movements to minimise convoy length or platoons*
- *Site specific control measures (including signage) to manage and regulate traffic movements*
- *Consultation would be undertaken bus operators; for example, including buses operating along Kamilaroi Highway will be consulted during the construction of the new intersection*
- *The management and coordination of construction and staff vehicle movements to the site and measures to limit disruption to other motorists, including consideration of carpooling/shuttle bus arrangements to minimise the number of vehicles accessing the site each day*
- *Policies and procedures to consult and inform the community of changes to the road network and address any concerns*

- A response plan for any traffic incident including [toolbox meetings to facilitate continuous improvement initiatives and incident awareness](#)
- *Mechanisms to monitor the results of the plan and any subsequent reviews and revisions*
- *Outline timing of deliveries and site access, including construction program, [construction vehicle access arrangements](#), [estimated number of construction vehicle movements](#) and [proposed construction hours](#)*

Item 4, 5 and 6: As discussed in Section 5.3.1 of the EIS, a Section 138 approval under the *Roads Act 1993* will be required from [TfNSW](#) for the proposed upgrade of the Kamilaroi Highway and Logans lane intersection, and for the lowering of the speed limit on the Kamilaroi Highway during construction. While a permit is also required from Council for works on Logans Lane.

Relevant licenses and management plans for construction of the proposal would be prepared in consultation with relevant stakeholders and management plans submitted for approval by DPIE prior to the commencement of construction of the proposal.

3.13.3 Works in road reserve

Submission

In summary, Roads and Maritime raised the following issues in relation to works in the road reserve:

- Prior to commencement of construction of the proposal, the proponent is required to upgrade the intersection of Kamilaroi Highway and Logans Lane to the satisfaction of Roads and Maritime
- A formal agreement in the form of a Works Authorisation Deed (WAD) is required between the Developer and Roads and Maritime prior to works commencing

ENGIE response

Item 1: The design for the intersection of the Kamilaroi Highway and Logans Lane would be completed during detailed design, in consultation with Roads and Maritime and Council. Construction of this intersection forms part of the first stage of construction works (i.e. site establishment and preparation), pending receipt of approval and satisfaction of all pre-construction consent conditions.

Item 2: ENGIE will ensure consultation with Roads and Maritime continues during detailed design and, pending receipt of development consent, that a WAD is entered into with Roads and Maritime prior to the commencement of construction.

3.14 Crown Lands

Crown Lands provided a response with comments regarding land acquisition for the proposed transmission lines, agency consultation and aboriginal land claims, all of which are outlined in the below sections.

3.14.1 Land acquisition

Submission

In summary, Crown Lands made the following suggestions in relation to land acquisition for the transmission lines:

- The EIS states that an approval to construct transmission infrastructure on Crown land will be required prior to construction. However, it does not clarify a process for seeking this approval or the type of approval required.
- The proposed transmission lines described as Option 1 and 2 in the scoping report will both traverse Crown land being TSR Reserves. The proponent is to consult with the department at the earliest opportunity regarding an acquisition of the required land.
- The proponent will need to liaise with the relevant energy provider in order to arrange for the acquisition of the Crown land required for the transmission line under the *Land Acquisition (Just Terms Compensation) Act 1991*.

ENGIE response

Item 1, 2 and 3: ENGIE has been liaising with Crown Lands regarding the best way to authorise the powerlines on Crown land. Crown Lands have advised that the most appropriate method is through the creation of an easement. The easement can be either a private easement, or compulsorily acquired by Essential Energy via agreement. ENGIE will continue to liaise with Crown Lands to investigate the most suitable option for obtaining an easement for the powerlines.

3.14.2 Agency consultation

Submission

In summary, Crown Lands made the following suggestions in relation to agency consultation:

- The proposal should be referred to Local Land Services as the Management body of such TSR Reserves.

ENGIE response

Item 1: Consultation was undertaken as part of the project to identify key stakeholders and issues for consideration. A number of engagement activities were undertaken both prior to EIS exhibition (section 4 of the EIS) as well as during and after EIS exhibition (section 2.2). Government agencies, key stakeholders (including interest groups and organisations), and the community were invited to make written submissions on the proposal. No comment on the project was received from Local Land Services.

Travelling stock reserves (TSR) are reserved primarily for use by travelling stock. TSR are also important in terms of the biodiversity and heritage significance, as well as for use in recreation and emergency management.

The transmission line corridor (see Section 5) is proposed to traverse through a small section of Category 2 TSR approximately between Killarney Gap and Narrabri Bingara Roads.

The transmission line will be installed either below or above ground. Therefore, the creation of an easement to facilitate the transmission line easement is not expected to interfere with the use or enjoyment of this section of TSR. Environmental impacts associated with construction and operation of the transmission line would be addressed as part of the approval process.

3.14.3 Aboriginal land claims

Submission

In summary, Crown Lands made the following suggestions in relation to Aboriginal land claims:

- Lot 7315 DP 1136856 is subject to ALC 32934, lodged 1 November 2010. The claim has not yet been determined. Undetermined Aboriginal Land Claims impact some of the affected TSR Reserves. The proponent shall be responsible for addressing the claims under the *Aboriginal Land Rights Act 1983*.

ENGIE response

ENGIE will continue to monitor the status of ALC 32934 in consultation with Crown Lands. If required, ENGIE will endeavour to enter into an agreement with the claimants following determination of the claim in accordance with the provisions of the *Aboriginal Land Rights Act 1983*.

The proposed intersection upgrade at Logans Lane may impact on an additional claim area (ALC 47488). ENGIE will also endeavour to enter into an agreement with these claimants if required in accordance with the provisions of the *Aboriginal Land Rights Act 1983*.

3.15 Department of Planning, Industry and Environment

DPIE provided a response with comments regarding landowners classification and consent, noise impacts and traffic, all of which are outlined in the below sections.

3.15.1 Landowners classification and consent

Submission

In summary, DPIE made the following submission regarding landowners classification and consent:

- Request for a figure clearly showing the Development Application area for the proposal, a schedule of lands listing all relevant land parcels (inclusive of land parcels associated with the transmission line corridor) as well as the provision of any correspondence to date with Crown Lands in regard to landowners consent is requested (for the purposes of satisfying Clause 49(1) and Clause 50(1)(a) of the EP&A Regulation).
- Confirmation if receiver R15 is an “associated” landowner.

ENGIE response

Item 1: ENGIE has prepared a figure to show the Development Application area for the proposal (Figure 3.1). All relevant land parcels (including all land parcels associated with the transmission line corridor and the proposed intersection upgrade) are shown in Table 3.2.

Table 3.2 Landownership details for the development land parcels

Lot and DP	Landownership	Location
Lot 21 DP 1174848	Private landowner	Solar farm site
Lot 22 DP 1174848	Private landowner	Solar farm site
Lot 23 DP 1174848	Private landowner	Solar farm site
Lot 2 DP 586990	Private landowner	Solar farm site/Transmission line corridor
Lot 7315 DP 1136856	Crown land	Transmission line corridor
Lot 7048 DP 1059051	Crown land	Transmission line corridor
Lot 1 DP 502189	Private landowner	Transmission line corridor
Road reserve	State of NSW/ Council	Logans Lane/ Kamilaroi Highway intersection
Road reserve	State of NSW	Eastern side of Newell Highway

The substation lot (Lot 1 DP 502189) is only being utilised for the purpose of allowing the transmission line to meet the connection point at TransGrid’s Narrabri substation.

Item 2: ENGIE confirms that receiver R15 is an “associated” landowner.



3.15.2 Noise impacts

Submission

In summary, DPIE made the following submission regarding noise impacts:

- The EIS predicts exceedances of the ICNG ‘noise affected’ criteria at receivers (R005 and R015, R04) and along Bailey Street. The Department requests that ENGIE provide further detail regarding any consultation undertaken to date with these landowners. Justification for the acceptability of exceeding the ICNG noise criteria at these receivers is also required.

ENGIE response

Item 1 To date, extensive consultation has been undertaken with adjoining landowners (landowners within a 2 km radius and additional properties up to 3 km south of the project boundary). The purpose of this consultation has been to establish an open dialogue to answer questions, or discuss potential project impacts as they arise. ENGIE established contact with the adjoining landowners through face-to-face doorknocking where residents were provided with a fact sheet about the project (including how to provide feedback), or alternatively given a ‘sorry we missed you’ flyer (with contact details for the project team). The following communication lines remain open:

- The toll free 1800 number to call or speak to a member of the project team and provide feedback or information
- The community inbox for enquiries, complaints and feedback

ENGIE targeted sensitive receivers during consultation (Table 3.3).

Sensitive receivers, their potential noise exceedances and the consultation undertaken with these sensitive receivers is provided in Table 3.3 below.

Table 3.3 Noise exceedance and their justifications

Sensitive receiver	Potential noise exceedance	Consultation
R05	10 dB	The property at R05 is occupied by a tenant. ENGIE engaged with both tenant and landlord of the property. This included doorknocking, in person discussions with the tenant, and subsequent phone discussions with the landowner.
R15	12 dB	ENGIE engaged with this resident, as an “associated” landowner.
R04	2 dB	ENGIE has engaged in consultation with the operator of Oakville Aerodrome.
Bailey Street	12 Bailey Street – more than 75 dB(A) (highly affected noise criteria) All other receivers along Bailey Street- between 45 (construction noise management level) and 75 dB(A)	ENGIE has undertaken consultation activities with dwellings on the overhead transmission line route near Bailey Street and Stoney Creek road. This includes door knocking, letter drop of project information sheets, providing contact information to raise concerns, and invitation to attend the community consultation session.

A conservative approach to modelling has been taken, with the worst-case scenario being modelled. This includes using the loudest items of mechanical plant operating at full power under the worst-case meteorological conditions. The site is very large covering three kilometres (north to south and east to west), and the location of the noise generating works will vary, distributing the impacts.

The noise exceedances outlined above are associated with the construction phase of the project. Construction is expected to take between nine and 12 months. Construction is anticipated to be confined to the standard construction working hours outlined in the *Interim Construction Noise Guideline* (DECC 2009) as:

- Monday to Friday: 7:00 am to 6:00 pm
- Saturday: 8:00 am to 1:00 pm
- Sundays and public holidays: no work

In the unlikely event that work outside these hours would be required, residents would be notified.

The noise exceedance is limited to a maximum timeframe of three days. Potential exceedances are expected to be very short term and would reduce as the plant and equipment move further away from the sensitive receiver.

Potential exceedances at R05 and R15 are associated with installation of the steel post foundations, of which each pile would take approximately ten minutes to install. Potential exceedances are anticipated to be intermittent. Installation would take place at a distance of over 300 metres from R15.

Even though the construction noise levels are anticipated to be elevated along Bailey Street during the construction of the transmission line, the works are scheduled to occur no longer than two days duration.

Sensitive receivers are rural-residential dwellings in the area surrounding the proposal site. Agricultural activities including the associated noise impacts currently exist in this environment. Some noise generating activities are similar to those proposed to be undertaken as part of the construction of the project. For example, pile driving for the solar panel foundations would be undertaken using a machine which screws or hammers poles into the ground, similar to that used for driving farm fence poles into the ground.

Communication with sensitive receivers will be ongoing throughout the construction period, especially for potential noise exceedances.

3.15.3 Traffic impacts

Submission

In summary, DPIE made the following submission regarding traffic impacts:

- The Department requests that ENGIE provide additional information regarding the proposed intersection upgrade works as well as further detail on the extent of any additional surface disturbance that may be required.

ENGIE response

Item 1 Traffic impacts of the proposal are outlined in the EIS. During construction, there would be a maximum short-term peak of 60 heavy vehicle movements per day (i.e. 30 in and 30 out to) for a two or three day period. Outside of this peak period, construction traffic would be limited to approximately 80 heavy vehicle movements per week (13 per day on average). This number could be lower if B-doubles are used rather than semi-trailers. The construction period is anticipated to be for 12 months.

To accommodate the increase in vehicle movements, especially heavy vehicles associated with construction, the intersection of the Kamilaroi Highway and Logans Lane will be upgraded (Appendix A). This upgrade will facilitate B-double access to turn right onto Logans Lane from Kamilaroi Highway and to turn left onto Kamilaroi Highway from Logans Lane.

The road upgrade is for the purpose of allowing B-double access to the site during the construction period. The upgrade of the intersection of Kamilaroi Highway and Logans Lane will be undertaken within the existing road reserve. No additional surface disturbance will be required to facilitate the upgrade.

ENGIE has consulted with both Council and TfNSW. As noted in the SEARs submission, TfNSW does not object to a single vehicular access from the intersection of the Kamilaroi Highway (via Logans Lane). The upgrade will be undertaken in consultation with Council and TfNSW.

4. Response to community submissions

4.1 Respondents

Five community submissions were received. Table 4.1 provides a list of these, submission number, issues raised and where the ENGIE response is provided in this report.

Table 4.1 List of respondents – community

Respondent	Submission no.	Issue	Section number where issues are addressed
Individual	13	Land use, soils and capability (property values) Landscape and visual amenity	4.3 4.6
Individual	14	General support for the proposal	4.2
Individual	15	General Support for the proposal	
Individual	16	Consultation Hydrology, groundwater and water quality Project description (Inland Rail description)	4.4 4.5 4.7
Individual	17	Land use, soils and capability (property values) Consultation Hydrology, groundwater and water quality Biodiversity	4.3 4.4 4.5 4.8

4.2 General support for the proposal

Submission numbers(s)

14 and 15

Submission

The respondents gave general comments of support for the Proposal on the basis of support for the use of renewable energy and benefits to employment.

ENGIE response

The respondents' comments have been noted.

4.3 Land use, soils and capability

4.3.1 Property values

Submission number(s)

13 and 16

Submission

The respondents indicated concern in relation to potential impacts of the proposal on the property values of adjoining landowners.

ENGIE response

The impact of the proposal on surrounding land and property value was assessed in Section 6.11.2 of the EIS.

Studies (Urbis 2016 and Jones et al 2014) have been undertaken around the world for both solar farms and other renewable energy farms such as wind farms. Both studies suggest that the operation of renewable energy projects cannot be directly linked to decreases in property values. Solar farms are expected to have significantly less of an impact on land use and property values when compared to wind farms, due to their reduced visual and noise impact. A number of large scale farms have now been operating in Australia for several years and there have been no formal or informal reported impacts on local land values. With the implementation of mitigation measures, in particular the establishment of screening vegetation to mitigate the proposal's potential visual impact, the main potential impact to adjacent properties, would be minimised. No further mitigation measures are proposed.

4.3.2 Land use conflict

Submission number(s)

16 and 17

Submission

The respondents provided the following comments in relation to potential conflicting land use issues:

- Development of the proposal may inhibit use of airborne application of chemical fertilizers on adjacent cotton farm. Unsure as to whether cotton growing is compatible with a solar farm.
- The proximity of the proposal (i.e. transmission line and screening trees) have the potential to impact on adjacent landowners and their operations.
- Will the existing power line proposed to be removed from the proposal site also be removed through Lot 1 of DP 566857?

ENGIE response

Item 1: The proposal would not impede south easterly winds which the land holders require to conduct chemical and fertiliser application. During operation, the proposal will have a maximum of six employees on site between Monday and Friday, and will also be able to be controlled remotely. It is the land users moral and legal obligation to prevent it drifting and contaminating neighbouring properties. ENGIE are dedicated to working with relevant stakeholders and adjoining landowners to ensure ongoing consultation in relation to having a shared boundary.

Item 2: The use of screening trees in the proposal would be in consultation with the private air strip land owner such that plane and crop duster operations are not compromised. Tree screening is also expected to reduce any glare issues at adjacent properties. A risk assessment based on the Department of Industry's *Land Use Conflict Risk Assessment Guide*, which determined the risks to surrounding properties as a result of the proposal would be low, as outlined in Section 6.6 of the EIS. The proposal has a reversible nature and can be decommissioned and rehabilitated returning the land to its former agricultural use at the end of the operational period.

Item 3: The existing power line would not be moved off Lot 1 DP 566857 as part of the proposal.

4.4 Consultation

4.4.1 Stakeholder identification and consultation

Submission number(s)

16 and 17

Submission

The respondents provided the following comments in relation to potential stakeholder identification and consultation issues:

- The applicant's EIS appears to suggest the neighbour to the south is only AGT, however this is not correct.
- We have not been consulted by the proponent to date.

ENGIE response

Item 1 and 2: ENGIE is currently in the process of undertaking consultation with relevant landowners to ensure concerns are understood and addressed, where practicable.

A high-level summary of these consultation activities is provided in Section 2.2.1, with consultation to be ongoing during detailed design and all stages all stages (i.e. pre-construction, construction, pre-operation and operation).

4.5 Hydrology, groundwater and water quality

4.5.1 Flooding and overland flows

Submission number(s)

16 and 17

Submission

The respondents provided the following comments in relation to potential flooding issues:

- The flow path shown in Figure 2 of the EIS has the water flowing in the wrong direction.
- The development site is affected by overland flows running east to west.
- Proposed fencing will inhibit water flow in creek (debris build up), fence position is vulnerable to flooding, EIS flow figures questioned.
- Development site affected by overland flows, it is critical that overland flows not be blocked or diverted.
- Questions whether flooding has been adequately assessed to factor in significant rainfall events.

ENGIE response

Items 1, 2, and 3: Item 1 refers to Figure 2 of Appendix F of the EIS, this comment is correct. Figure 2 incorrectly identified flows from the proposal site running from the north/north-west to the southern boundary and into the dam which straddles Lot 373A of DP 186621, Lot 171 of DP 754944 and Lot 1 of DP 566857.

Instead, water flows from this dam through the proposal site in a north-westerly direction, as identified in Item 2. However, despite this, discussion and assessment in Section 6.8 of the EIS main text correctly identifies flow direction.

Item 4 and 5: The proposal will result in infilling of on-site dams and loss of swales/dish drains which divert runoff toward these dams. However, this impact is expected to result in negligible impact to existing overland flows and flooding.

This notwithstanding, ENGIE is committed to ensuring existing overland flows to downstream landowners are not impacted. ENGIE will ensure existing overland flows are maintained in consultation with relevant landowners during detailed design and all stages (i.e. pre-construction, construction, pre-operation and operation). Consultation with relevant landowners is currently being undertaken and discussed in Section 2.2.1.

4.6 Landscape and visual

Submission number(s)

13

Submission

The respondents provided concerns in relation to glare emitted from large concentration of solar panels, and in relation to the height of solar panels impeding views from surrounding farmland.

ENGIE response

Section 6.4 of the EIS addresses glare and reflectivity of solar panels associated with operation of the proposal.

The potential for glare associated with non-concentrating photovoltaic systems that do not involve mirrors or lenses, is limited. Any impacts would be short-term at any given vantage point as the angle of the sun moves and changes the direction of the reflection.

Photovoltaic solar panels are designed to reflect as little sunlight as possible, as panels are designed to absorb as much solar energy as possible. The panels would not generally create noticeable glare when compared with an existing roof or building surface. The potential impacts of glare on adjacent land uses would be minor.

The height of the solar panels is four (4) metres, with the height of all other proposed infrastructure generally consistent with the existing infrastructure on the surrounding land, as discussed in Section 4 of the EIS.

The photovoltaic cells proposed to be used on the proposal are designed to absorb as much solar energy as possible, and typically reflect two percent of the light received. To mitigate the effect of this, vegetation screening will be provided with consultation with sensitive receivers.

Therefore, visual amenity and glare impacts from the proposal are expected to be very low and vegetation screening will be provided where it is deemed necessary (see Section 6).

4.7 Project description

4.7.1 Inland Rail corridor

Submission number(s)

16

Submission

The final corridor for the Inland Rail Narromine to Narrabri (N2N) will not come the way described in the EIS.

ENGIE response

This observation is correct. Review of the *Inland Rail Narromine to Narrabri Scoping Report* (ARTC, 2018) indicates the proposal site for the N2N section of Inland Rail would cross the Namoi River floodplain west of Narrabri on a viaduct, which continues over Wee Waa Road and Kamilaroi Highway to the north-west of Narrabri. After the Kamilaroi Highway, it continues on an embankment before following the Newell Highway for 1.2 kilometres and joining the Narrabri to North Star section of Inland Rail, in relative proximity to the proposal site.

The N2N section of Inland Rail is not yet approved, with the EIS noted to still be in preparation. Therefore, it is considered unlikely there would be a cumulative impact as a result of simultaneous construction of the proposal and the N2N section of Inland Rail. However, the timing of the N2N section of Inland Rail would be monitored as construction planning for the proposal progresses, in order to determine any overlap in construction periods.

4.8 Biodiversity

Submission number(s)

17

Submission

Koalas have been seen in the location from time to time.

ENGIE response

Item 1:

The Biodiversity Assessment is contained in Appendix B of the EIS. The woodland patches of the site constitute potential Koala (*Phascolarctos cinereus*) habitat, however this habitat is unlikely to be important habitat for the species. Potential habitat at the site is poor quality, and separated from better areas of habitat by large expanses of cleared agricultural land. It is unlikely that the Koala would traverse the site. The site would not constitute core or important habitat. Local records are concentrated around the Pilliga, with none near the proposal site. Koalas may occur on rare occasions, but would be unlikely to breed at the site. No evidence of the Koala was recorded during surveys in March, September and November 2019.

5. Design refinements

Since exhibition of the EIS, the proposal site has been reduced to exclude a vegetation zone (Zone 6. PCT 397 Poplar Box – White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion) from the proposal site (see Figure 3.1).

This vegetation zone was removed from the proposal site to minimise impacts to biodiversity. As outlined above in 4.8, PCT 397 within the proposal site is not considered to conform to the nationally listed EEC, Poplar Box Grassy Woodland on Alluvial Plains. Regardless, it has always been the intention to avoid any direct impacts to the woodland form of PCT 397. Indirect impacts on this PCT would be avoided through the safeguards and mitigation measures outlined in section 6.2.3 of the EIS. The BDAR for the proposal has been updated to reflect the avoidance of this community.

These design refinements are as a result of:

- Consultation with key stakeholders during and after exhibition of the EIS (see Section 2.2)
- Issues raised in submissions by agencies during exhibition of the EIS:
 - Biodiversity Conservation Division (See section 3.10)
- Further development of the design following exhibition of the EIS

Note the Logans Lane/ Kamilaroi highway intersection is not included as no vegetation will be disturbed at this location.

The detailed design for the proposal is ongoing and will be subject to further development in consultation with relevant stakeholders, including agencies and local landholders.

6. Revised environmental management measures

The EIS for the proposal identified a range of environmental outcomes and management measures which would be required to avoid or reduce the environmental impacts.

After consideration of the issues raised in the submissions, development of the detailed design and a review of constructability issues, the environmental management measures for the proposal (Section 8 of the EIS) have been revised. Other minor changes have also been made to reflect the detailed design plans (see Section 5) and address minor omissions in the EIS.

Should the proposal be approved, the environmental management measures in Table 6.1 will guide the subsequent phases of the proposal. Additional and/or modified environmental management measures to those presented in the EIS are in *blue italics*. Deleted measures, or parts of measures, appear as ~~strike through text~~.

Table 6.1 *Revised summary of environmental management measures*

Issues	Impact	Measure	Timing
Biodiversity	Pre-construction/clearing	A Biodiversity Management Plan would be prepared prior to construction. This would detail fauna management protocols including management of tree hollows and fauna handling.	Pre-construction
		Ensure all workers are provided with an environmental induction prior to starting work on site. This would include information on the ecological values of the site and protection measures to be implemented to protect biodiversity.	Construction
	Erosion, stockpile and soil impacts on biodiversity	Use of, and regular inspection and maintenance of, erosion and sediment control measures developed in an Erosion and Sediment Control Plan (ESCP). The ESCP shall be prepared and maintained as part of the Construction Environmental Management Plan (CEMP) in accordance with relevant sections of “ <i>Managing Urban Stormwater: Soil and Construction Volume 1</i> ” (Landcom, 2004) (‘the Blue Book’).	Pre-construction Construction
		Restrict stockpiles of construction materials, fill or vegetation to existing cleared areas and not within areas of adjoining native vegetation.	Construction
		Water would be applied to stockpile areas during windy conditions.	Construction
		Reinstatement of stabilised surfaces as quickly as practicable after construction.	Construction
	Clearance of vegetation	Fence off or mark trees to be retained, to avoid additional impacts on vegetation. Fencing should protect the entire Tree Protection Zone (i.e. 10 times the diameter of the trunk at breast height).	Pre-construction
		Any hollow-bearing trees to be felled would be marked prior to clearing of vegetation. The removal of hollow bearing trees is to be undertaken in accordance with a tree hollow management protocol set out in the CEMP, and would involve the presence of a qualified ecologist or wildlife specialist experienced in the rescue of fauna.	Pre-construction Construction
		Any trees with raptor nests would be felled outside the breeding season.	Construction
		Habitat features such as hollow trunks and limbs within the proposal site would be salvaged and replaced within areas proposed for screening vegetation where practicable.	Construction
	Site rehabilitation	Planting of locally endemic tree species in areas proposed for vegetated screens.	Construction
			Post-construction

Issues	Impact	Measure	Timing
Aboriginal heritage	Aboriginal heritage items	Development of an Aboriginal Cultural Heritage Management Plan (ACHMP) which would include details of the on-going management of Silverleaf IF-1 and Silverleaf IF-2 during construction and operation and procedures for unanticipated finds.	Pre-construction
		A five-metre buffer zone with high-visibility fencing around the two sites.	Construction
		Induction for site workers detailing the location of the two sites, their cultural values and the legislative requirements for their management.	Pre-construction
		In the event that the proposal would impact upon Silverleaf IF-1 and Silverleaf IF-2, further assessment would be required in the form of an Aboriginal Cultural Heritage Assessment Report (ACHAR). Further consultation would also be required in accordance with the OEH Aboriginal community consultation requirements.	Construction
		In the event that a previously unidentified Aboriginal site is discovered within the study area at any point during the operational life of the proposal, an AHIMS site card for that site should be submitted to OEH as promptly as possible. Timing protocols for the submission of AHIMS site cards should be included in the ACHMP for the proposal.	Construction
	Identification of potential human remains	<ul style="list-style-type: none"> – In the event that potential human skeletal remains are identified within the study area at any point during the life of the proposal, the following standard procedure would be followed. – All work in the vicinity of the remains should cease immediately. – The location should be cordoned off and the NSW Police notified. – If the Police suspect the remains are Aboriginal, they will contact the Office of Environment and Heritage and arrange for a forensic anthropologist or archaeological expert to examine the site. <p>Subsequent management actions will be dependent on the findings of the inspection undertaken under Point 3.</p> <p>If the remains are identified as modern and human, the area will become a crime scene under the jurisdiction of the NSW Police.</p> <ul style="list-style-type: none"> – If the remains are identified as pre-contact or historic Aboriginal, OEH and all RAPs are to be formally notified in writing. Where impacts to exposed Aboriginal skeletal remains cannot be avoided an appropriate management mitigation strategy will be developed in consultation with OEH and RAPs. – If the remains are identified as historic non-Aboriginal, the site is to be secured and the NSW Heritage Division contacted. – If the remains are identified as non-human, work can recommence immediately. 	Construction

Issues	Impact	Measure	Timing
Landscape and visual	Visual impacts of solar farm (including glare)	<p>A landscape plan would be developed to detail the location and type of plantings that would minimise views of the proposal site from nearby properties.</p> <p>The landscape plan would be prepared in consultation with the adjacent landholders and the airstrip operators to confirm any operational requirements which would affect the location and type of landscape screening.</p> <p>The plan would detail the species to be used on site. Native vegetation communities found in the local area will be used where suitable.</p>	Pre-construction
		A review of the landscaping plan would be carried out within six months of operation commencing. This would include consultation with nearby landowners to discuss the adequacy of the provided screening.	Construction
		The materials and colour of on-site infrastructure would, where practical, be non-reflective and be of a colour that would blend with the landscape.	Construction
		Security fencing posts and wire would be non-reflective.	Construction
		Construction plant, equipment, waste and excess materials would be contained within the designated boundaries of the work site and would be removed from the site following the completion of construction.	Construction
		Work sites shall be kept tidy at all times.	Construction
Noise and vibration	Construction noise	<p>A noise management plan would be prepared and implemented as part of the Construction Environmental Management Plan (CEMP).</p> <p>The following project-specific noise mitigation measures would be implemented:</p> <ul style="list-style-type: none"> – If possible, bored piling (rather than impact piling) would be considered as an alternative to install the steel post foundations. <p>If impact piling is required, no impact piling would be undertaken within 45 metres of adjacent dwellings without prior notice being given to occupants.</p>	Pre-construction Construction
		<p>Consultation and cooperation with the nearest sensitive receivers:</p> <ul style="list-style-type: none"> – The construction contractor would establish contact with residents affected by construction noise and communicate the construction program and progress on a regular basis, particularly when noise generating activities are planned. Communication with the local community would be maintained throughout the construction period. – The construction contractor would provide a community liaison phone number and permanent site contact so that noise complaints can be received and addressed in a timely manner. <p>Upon receipt of a noise complaint, monitoring would be undertaken and reported as soon as possible. If exceedances are detected, the situation would be reviewed to identify means to attempt to reduce the impact to acceptable levels.</p>	Pre-construction Construction
		Work ethic – management of worker generated construction noise	Construction

Issues	Impact	Measure	Timing
		<p>All site workers would be briefed on the potential for noise impacts on local residents and the requirement to implement practical and reasonable measures to minimise noise impacts during the course of their activities. This would include:</p> <ul style="list-style-type: none"> – Avoiding the use of loud radios – Avoiding shouting and slamming doors – Where practical, machines would be operated at low speed or power and switched off when not being used rather than left idling for prolonged periods – Inform truck drivers of designated vehicle routes, parking locations and delivery hours – Minimising reversing – Avoiding dropping materials from height and avoiding metal to metal contact on material – Keeping engine covers closed while equipment is operating 	
		<p>The following general noise mitigation measures would be implemented to mitigate construction noise impacts:</p> <ul style="list-style-type: none"> – All engine covers would be kept closed while equipment is operating. – As far as possible, heights from which materials are dropped, into or out of trucks, would be minimised. – Machines found to produce excessive noise compared to industry best practice would be removed from the site or stood down until repairs or modifications can be made. – Once the selection of equipment has been finalised, a review would be undertaken to ensure that the noise levels do not exceed the assumed levels in this assessment. <p>To reduce the annoyance associated with reversing alarms, broadband reversing alarms (audible movement alarms) would be used for all site equipment. Satisfactory compliance with occupational health and safety requirements would need to be achieved and a safety risk assessment may need to be undertaken to determine that safety is not compromised.</p>	Construction

Issues	Impact	Measure	Timing
Land use, soils and land capability	Soil and erosion	An Erosion and Sediment Control Plan (ESCP) would be prepared prior to construction to minimise impacts on soils during construction in accordance with relevant sections of “ <i>Managing Urban Stormwater: Soil and Construction Volume 1</i> ” (Landcom, 2004) (‘the Blue Book’).	Pre-construction Construction
		Spill management and materials handling measures would be included in the ESCP to minimise the potential for fuel or chemical spills.	Pre-construction Construction
		Ground cover would be reintroduced after construction to stabilise soils during operation.	Post-construction
	Biosecurity – site workers	Limit entry points to the property.	Construction Operation
		All construction equipment and boots would be cleaned upon entering the property.	Construction Operation
		Limit worker contact with livestock, crops or plant materials as much as possible and eliminate any unnecessary contact altogether.	Construction Operation
		Keep a visitor register.	Construction Operation
	Biosecurity – vehicles	Clean machinery and equipment from the top down and dismantle it as far as possible to gain access to internal spaces.	Construction Operation
	Operation of private airstrip	Vegetation screen planting to be installed on property boundary in consultation with airstrip operator.	Prior to operation

Issues	Impact	Measure	Timing
Traffic, transport and access	Construction traffic management	<p>A traffic management plan would be prepared and implemented as part of the CEMP. The plan would be prepared in accordance with any Roads and Maritime and Narrabri Shire Council requirements. The plan would include but not be limited to:</p> <ul style="list-style-type: none"> – Details of the haulage routes for the proposal including loads, weights and lengths of haulage and construction related vehicles and number of movements of such vehicles. – <i>Avoidance of the Newell Highway access for the proposal, ensuring it remains open for general agricultural use.</i> – Measures to maintain access along roads and to properties, <i>including schedule of haulage vehicle movements to minimise convoy length or platoons.</i> – Site specific control measures (including signage) to manage and regulate traffic movements. – <i>Consultation would be undertaken with bus operators; for example, including buses operating along Kamilaroi Highway will be consulted during the construction of the new intersection.</i> – <i>The management and coordination of construction and staff vehicle movements to the site and measures to limit disruption to other motorists, including consideration of carpooling/shuttle bus arrangements to minimise the number of vehicles accessing the site each day.</i> – <i>Policies and procedures to consult and inform the community of changes to the road network and address any concerns.</i> – A response plan for any traffic incident including <i>toolbox meetings to facilitate continuous improvement initiatives and incident awareness.</i> – Mechanisms to monitor the results of the plan and any subsequent reviews and revisions. – Outline timing of deliveries and site access, including <i>construction program, construction vehicle access arrangements, estimated number of construction vehicle movements and proposed construction hours.</i> 	Pre-construction Construction
		Signage on Kamilaroi Highway to be erected to alert drivers of trucks entering and exiting Logans Lane.	Construction
		Access along Logans Lane is to be maintained.	Construction
		Upgrade the intersection of the Kamilaroi Highway and Logans Lane to a BAR type intersection.	Construction Decommissioning
		Temporarily reduce speed limits to the west of the intersection of the Kamilaroi Highway and Logans Lane from 100 km/h to 80 km/h.	Construction Decommissioning
	Road conditions	ENGIE would consult with Narrabri Shire Council during detailed design in regard to the proposed upgrades to Logans Lane. The works will be undertaken in accordance with Council requirements.	Pre-construction Construction
		Condition surveys would be undertaken prior to the construction commencing. Following construction, surveys would confirm if any damage attributed to the proposal has occurred. Should damage be identified (outside of normal wear and tear), repair works would be undertaken by ENGIE (or its contractor) in line with any relevant council requirements.	Pre-construction Construction

Issues	Impact	Measure	Timing
	Property access	Notification to affected landowners would be undertaken for any works located along Logans Lane, particularly if temporary closures would be required.	Construction
		Consultation with any properties where access would be impacted would be undertaken to determine whether additional measures are required to maintain access.	Construction
	<i>Transmission line surveyor/solicitor</i>	<i>A suitably experienced surveyor and/or solicitor would be engaged to review the physical location of the proposed high voltage transmission line relative to road and rail corridors and existing cadastral boundaries.</i>	<i>Detailed design</i>
	<i>Structures in road corridors</i>	<i>The location of above-ground structures in roads, including transmission line poles or towers, will be undertaken in accordance with Roads and Maritime's Requirements for Overhead Power Lines.</i>	<i>Detailed design, Construction</i>
Hydrology, groundwater and water quality	Water quality	An Erosion and Sediment Control Plan (ESCP) would be prepared as part of the CEMP. All erosion and sediment control measures shall be designed, implemented and maintained in accordance with relevant sections of "Managing Urban Stormwater: Soil and Construction Volume 1" (Landcom, 2004) ('the Blue Book') (particularly Section 2.2) and "Managing Urban Stormwater: Soil and Construction Volume 2A – Installation of Services" (DECC, 2008)". The ESCP shall include stockpiles, stormwater run-off, trees, site boundaries, site access and storage areas.	Pre-construction Construction
		The provision of sedimentation basins on site would be considered in the detailed design. This could involve converting existing farm dams into basins for the duration of the construction period.	Construction
		<i>Prior to the commencement of operation, ENGIE will ensure the relevant requirements of the NSW Private Water Supply Guidelines (HNEHealth 2014) are addressed with consideration to operational potable water, in consultation with HNEHealth. This would include the preparation of a Quality Assurance Program for operation of the proposal.</i>	<i>Pre-operation</i>
	Spills and leaks	A site specific emergency spill plan would be developed, and include spill management measures in accordance relevant EPA guidelines. The plan would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime TfNSW and EPA officers).	Construction
		An emergency spill kit would be kept on site at all times. All staff will be made aware of the location of the spill kit and trained in its use.	Construction
		All fuels, chemicals, and liquids will be stored at least 50 metres away from waterways and will be stored in an impervious bunded area within the compound site.	Construction
		The refuelling of plant and maintenance of machinery will be undertaken in impervious bunded areas in the compound site.	Construction
		Vehicle wash downs and/or concrete truck washouts will be carried out within a designated bunded area on an impervious surface or carried out off-site.	Construction
		Machinery would be checked daily to ensure there is no oil, fuel or other liquids leaking from the machinery. All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental spills.	Construction

Issues	Impact	Measure	Timing
	Hydrology	The Department of Primary Industries (Water) controlled activity guidelines would be considered as part of the proposal's detailed design.	Pre-construction
	Rehabilitation	Rehabilitation works are to commence as soon as practicable to stabilise the land surface after works are completed in any area.	Construction
	<i>Overland flows</i>	<i>ENGIE will ensure existing overland flows are maintained in consultation with relevant landowners during detailed design and all stages (i.e. pre-construction, construction, pre-operation and operation).</i>	<i>All stages</i>
Hazards and risk	Offsite risks	Siting of key components will minimise any current or future offsite risk. The majority of the hazards identified are considered onsite risks, and are not considered offsite risks.	Construction
	EMF	Design and selection of all electrical equipment is to minimise EMF levels and comply with the ICNIRP exposure levels.	Construction
		Monitoring of electromagnetic levels would be undertaken during the commissioning of the substation to confirm exposure levels. Should levels be above the ICNIRP exposure levels the potential need for further mitigation would be considered.	Construction
Bushfire	Bushfire management	<p><i>A bushfire management plan would be prepared in consultation with the NSW Rural Fire Service (NSW RFS) Namoi Gwydir Fire Control Centre and NSW RFS District Office. This plan would include but not limited to the following:</i></p> <ul style="list-style-type: none"> <i>– 24 hour emergency contact details, including alternative telephone contact</i> <i>– Management of fuel loads onsite and identification of hazards (physical, chemical and electrical) at risk of fire ignition with potential to impact fire-fighting operations</i> <i>– Sub-plans including:</i> <ul style="list-style-type: none"> <i>• Site infrastructure plan</i> <i>• Fire-fighting water supply plan</i> <i>• Site access and internal road plan</i> <i>– Operational procedures relating to mitigation and suppression of bush fire relevant to the operation of a solar farm, including management of identified hazards during fire-fighting operations</i> <i>– Management activities with a risk of fire ignition</i> <i>– Management of fuel loads onsite</i> <i>– The below requirements of Planning for Bush Fire Protection 2006:</i> <ul style="list-style-type: none"> <i>• Identifying, construction and maintenance of asset protection zones (APZs)</i> <i>• Providing adequate egress/access to the site</i> <i>• Emergency evacuation measures</i> <i>– Storage and maintenance of firefighting equipment including siting and provision of adequate water supplies, including provision of an appropriately sized tank within the APZ, located adjacent to the internal access road</i> 	Pre-construction Construction, Operation

Issues	Impact	Measure	Timing
Socio-economic	Community consultation	<p>A community consultation plan would be implemented to manage the concerns and impacts on stakeholders including adjacent property owners. The plan would include (but not be limited to) the following:</p> <ul style="list-style-type: none"> – Protocols to keep the community updated about the progress of the project and its benefits – Protocols to inform relevant stakeholders of potential impacts – Protocols for allow the community to identify any concerns or issues with the project, particularly during construction and decommissioning <p>The plan would be prepared in consultation with Narrabri Shire Council.</p>	Pre-construction Construction
Air quality and climate change	Air quality	<p>The CEMP would include measures to minimise impacts on air quality including:</p> <ul style="list-style-type: none"> – A map identifying locations of sensitive receivers – Identification of potential risks/impacts due to the work/activities as dust generation activities – Management measures to minimise risk including a progressive stabilisation plan – A process for monitoring dust on-site and weather conditions – A process for altering management measures as required – A process of the review of the plan prior to the decommissioning works to ensure it is update at the time of the works occurring 	Pre-construction Construction
	Dust emissions	Surveillance for visible dust generation would occur at all times.	Construction
		Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h) when this may affect receivers (visibility on roads, dust and debris near recreational areas, residences and commercial premises).	Construction
		Stockpiled materials would be covered, stabilised or stored in areas not subject to high wind.	Construction
		All trucks would be covered when transporting material to and from the site.	Construction
		Work activities would be reprogrammed if the safeguards and management measures are not adequately restricting dust generation.	Construction
		Maximum speed limits would be enforced for construction traffic within the site to limit dust generation.	Construction
		Use of a water tanker or similar to spray unpaved roads and exposed areas during construction where required.	Construction
	Exhaust emissions	Construction plant and equipment would be maintained in a good working condition in order to limit impacts on air quality.	Construction
		Construction equipment, plant and vehicles would be appropriately sized for the task.	Construction
		Equipment would be serviced frequently to ensure they are operating efficiently.	Construction
	Impacts on sensitive receivers	Local residents would be advised of hours of operation and duration of work and supplied with a contact name and number for queries or complaints regarding air quality. The CEMP will also include a procedure for handling any queries or complaints.	Pre-construction Construction

Issues	Impact	Measure	Timing
	Climate change	The use of alternative fuels and power sources for construction plant and equipment would be investigated and implemented, where appropriate.	Pre-construction Construction
		The energy efficiency and related carbon emissions would be considered in the selection of vehicle and plant equipment.	Pre-construction Construction
		Materials would be delivered as full loads and local suppliers would be used where possible.	Pre-construction Construction
Non-Aboriginal heritage	Unexpected finds	In the event that a site or artefact (as defined by the <i>Heritage Act 1977</i>) is identified during construction works, works would cease at the location.	Construction
		The find would be immediately reported to ENGIE, and the regulator (OEH Heritage Division) in accordance with legislation. No work would commence in the vicinity of the find until any required approvals have been given by the regulator.	Construction
Waste management	Construction waste	A Waste Management Plan would be developed for the proposal and would form part of the CEMP. It would include but not be limited to the following: <ul style="list-style-type: none"> – Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy and WARR Act – Quantification and classification of all waste streams – Provision for recycling management onsite – Provision of toilet facilities for onsite workers and how sullage would be disposed of (i.e., pump out to local sewage treatment plant) – Tracking of all waste leaving the site – Disposal of waste at facilities permitted to accept the waste – Requirements for hauling waste (such as covered loads) 	Pre-construction Construction
		Where possible waste would be removed on a daily basis, or as soon as reasonably practical, to maintain the site in a tidy and litter free condition.	Construction
	Wastewater	Septic tanks to be installed and operated in accordance with Narrabri Shire Council's requirements.	Construction Operation

Issues	Impact	Measure	Timing
Cumulative impacts	Cumulative traffic impacts	Consultation with ARTC and RMS TfNSW to identify if the construction phase of the proposal will overlap with ARTC Inland Rail or RMS TfNSW Newell Highway projects. Traffic management plans would be developed to address potential traffic impacts caused by concurrent projects generating construction traffic.	Pre-construction Construction
	Cumulative noise impacts	Cumulative construction noise impacts would be addressed in a Noise Management Plan. Consultation with ARTC and RMS TfNSW , and other proponents if applicable, would be completed to determine if construction activities may take place in close proximity to adjoining projects. Where possible, noise generating activities would be scheduled for different areas of the proposal site to avoid cumulative construction noise impacts. This would include periods where the nearby airstrip is in regular use.	Pre-construction Construction
	Cumulative impacts on services and accommodation	If there is potential for construction of multiple projects to occur in and around Narrabri at the same time, and large workforce numbers are required, consideration would be given to alternative accommodation options such as neighbouring towns.	Pre-construction Construction

7. Conclusion

This Response to Submissions report responds to the issues raised in submissions from the community and government agencies, following the public exhibition of the Narrabri 120MW Solar Farm EIS.

In response to the submissions, the proposal has undergone a minor amendment being that:

- The total area of the proposal site has been reduced to exclude a vegetation zone (Zone 6. PCT 397 Poplar Box – White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion) from the proposal site.

In addition mitigation measures have been amended or added in relation to the following issues:

- Traffic, transport and access
- Hydrology, groundwater and water quality
- Bushfire

This Response to Submissions report fulfils the requirements of Section 85A of the *Environmental Planning and Assessment Regulations 2000*. It meets the requirement to prepare a response to submissions as outlined in the notice provided by the Department of Planning and Environment on 3 October 2019.

In consideration of the assessment of the impacts from the proposal contained in the EIS and the proposed mitigation measures committed to, it is believed that all relevant issues and concerns have been addressed and that the proposal should now proceed for approval by the Minister.

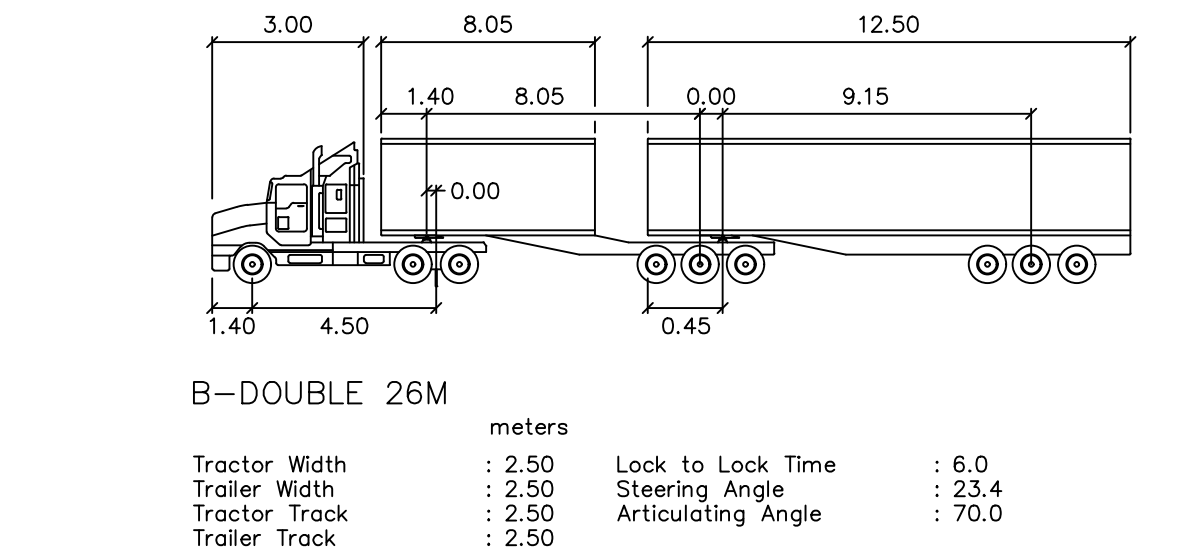
8. References

- ARTC. 2018. Inland Rail Narromine to Narrabri Scoping Report. Published 2018
- DECC. 2008. Managing Urban Stormwater: Soil and Construction Volume 2A-2E. Published in South Sydney NSW by Department of Environment and Climate Change NSW
- DECC. 2009. Interim Construction Noise Guideline. Sydney: Department of Environment and Climate Change NSW
- DEE. 2019. *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains*. Canberra: Department of the Environment and Energy
- DPIE. 2019a. Water access and licensing – Drought information. NSW Department of Planning, Industry and Environment
- DPIE 2019b Landuse Mapping for NSW V2.1 from <https://datasets.seed.nsw.gov.au/dataset/nsw-landuse-2017-v1p2-f0ed>
- DPIE 2011. Landsat woody extent and projected foliage cover (FPC) V 2.1 (25 m) 2008 from <https://datasets.seed.nsw.gov.au/dataset/landsat-woody-extent-and-foliage-projective-cover-fpc-ver-2-1-25m-20087355d>
- HNE Health. 2014. NSW Private Water Supply Guidelines
- Jones, Peter, Hillier, David, Comfort, Daphne. 2014. *Solar farm development in the United Kingdom*, Property Management, Vol. 32 Iss: 2, pp.176 – 184
- Landcom. 2004. Managing Urban Stormwater: Soil and Construction Volume 1
- NRAR. 2018. Guidelines for controlled activities on waterfront land. Published by NSW Department of Industry
- NSW Heritage Office. 2001. Assessing Heritage Significance. A NSW Heritage Manual update. Printed July 2001
- OEH. 2020. '*Spiny Peppercress – profile*' In Threatened Species, retrieved 24 February 2020, from <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10461>
- OzArk. 2019. Aboriginal and Historic Archaeological Impact Assessment – Silverleaf Solar Farm. Prepared for GHD on behalf of ENGIE Energy. April 2019
- RFS. 2006. Planning for Bushfire Protection. Prepared by NSW Rural Fire Service in cooperation with the Department of Planning
- RFS. n.d. Standards for Asset Protection Zones
- Urbis. 2016. Review of the Impact of Wind Farms on Property Values. Prepared for Office of Environment and Heritage. July 2016

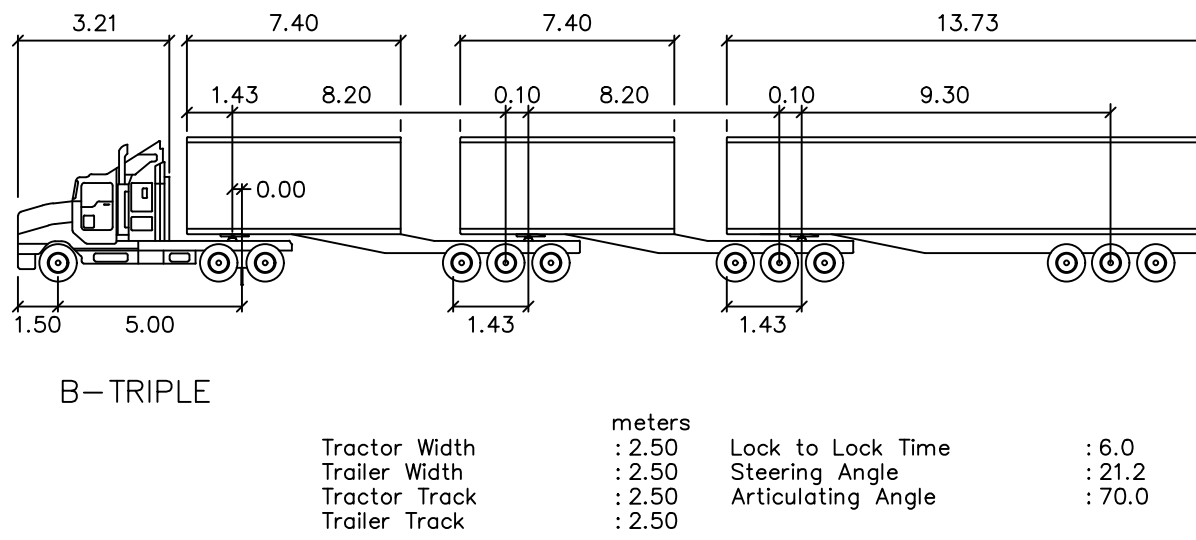
Appendices

Appendix A

**Logans Lane/ Kamilaroi Highway upgrade
concept design**



DESIGN VEHICLE PROFILE
B-DOUBLE (26.0m)



DESIGN VEHICLE PROFILE
B-TRIPLE (35.4m)

NOTES

- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
- VEHICLE TRACKING DESIGN SPEED BASED ON 15KM/H.

PLAN

SCALE 1:500

CONCEPT

B	TEXT CHANGE		AO		
A	INFORMATION ONLY		TTN		
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director
					Date



GHD Tower, Level 3
24 Honeysuckle Drive, Newcastle NSW 2300 Australia
PO Box 5403 Hunter Rgn Mail Cent. NSW 2310
T 61 2 4979 9999 F 61 2 4979 9988
E ntlmail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	T. NGUYEN	Designer	T. NGUYEN
Drafting		Design	
Check		Check	
Approved			
(Project Director)			
Date			
Scale	AS SHOWN		

Client	NSW GOVERNMENT
Project	SOLAR FARM SILVERLEAF
Title	KAMILAROI HIGHWAY / LOGANS LANE INTERSECTION UPDGRADE - BAR ONLY OPTION
Original Size	A1
Drawing No:	22-12518304-SK003
Rev:	B

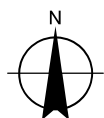
Appendix B

**Figures supporting category 1 exempt
land assessment**





Paper Size ISO A4
0 200 400
Metres



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



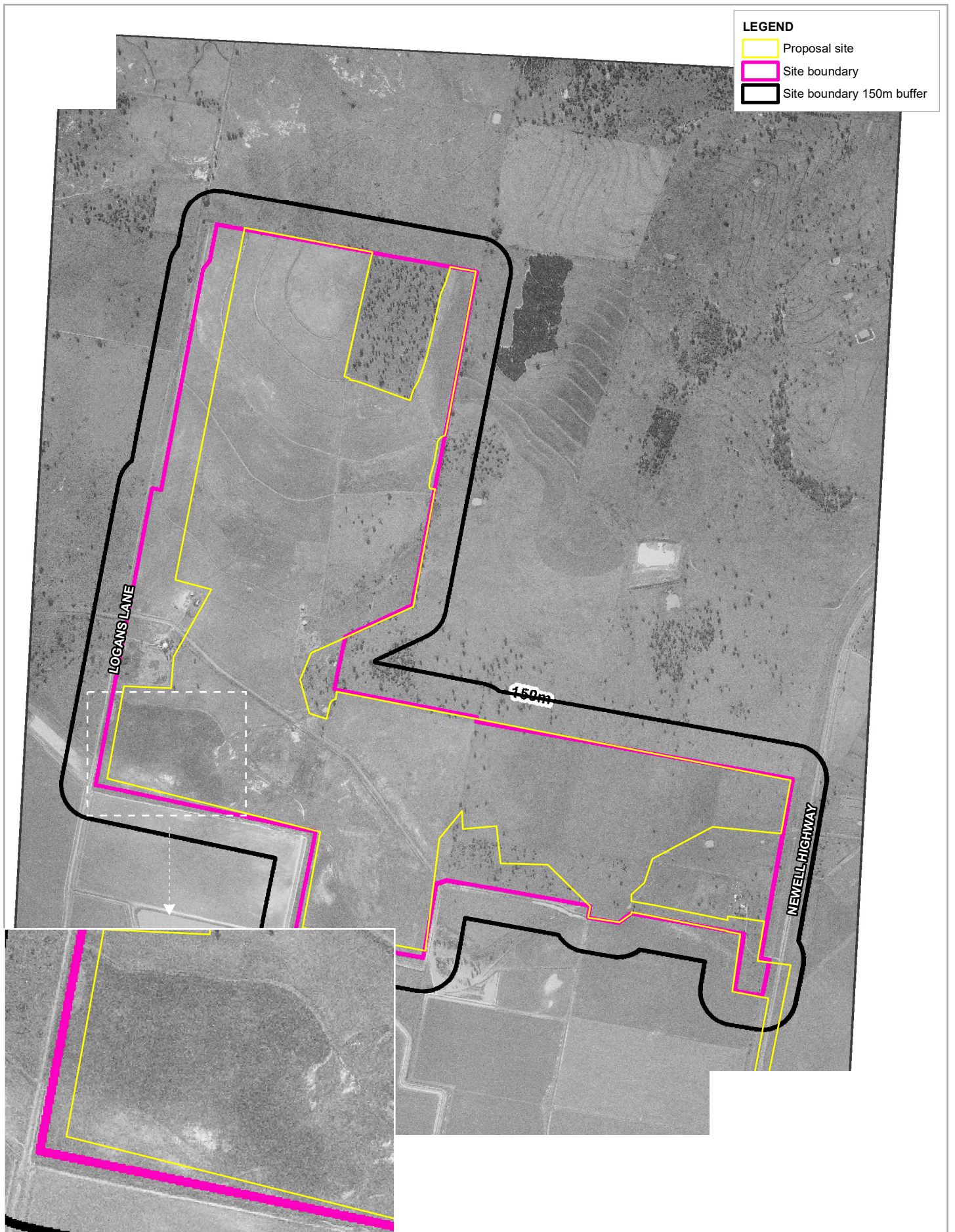
Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 31 May 2021

Historic imagery - 1972

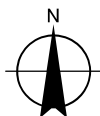
APPENDIX A
FIGURE 1b





Paper Size ISO A4
0 200 400
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

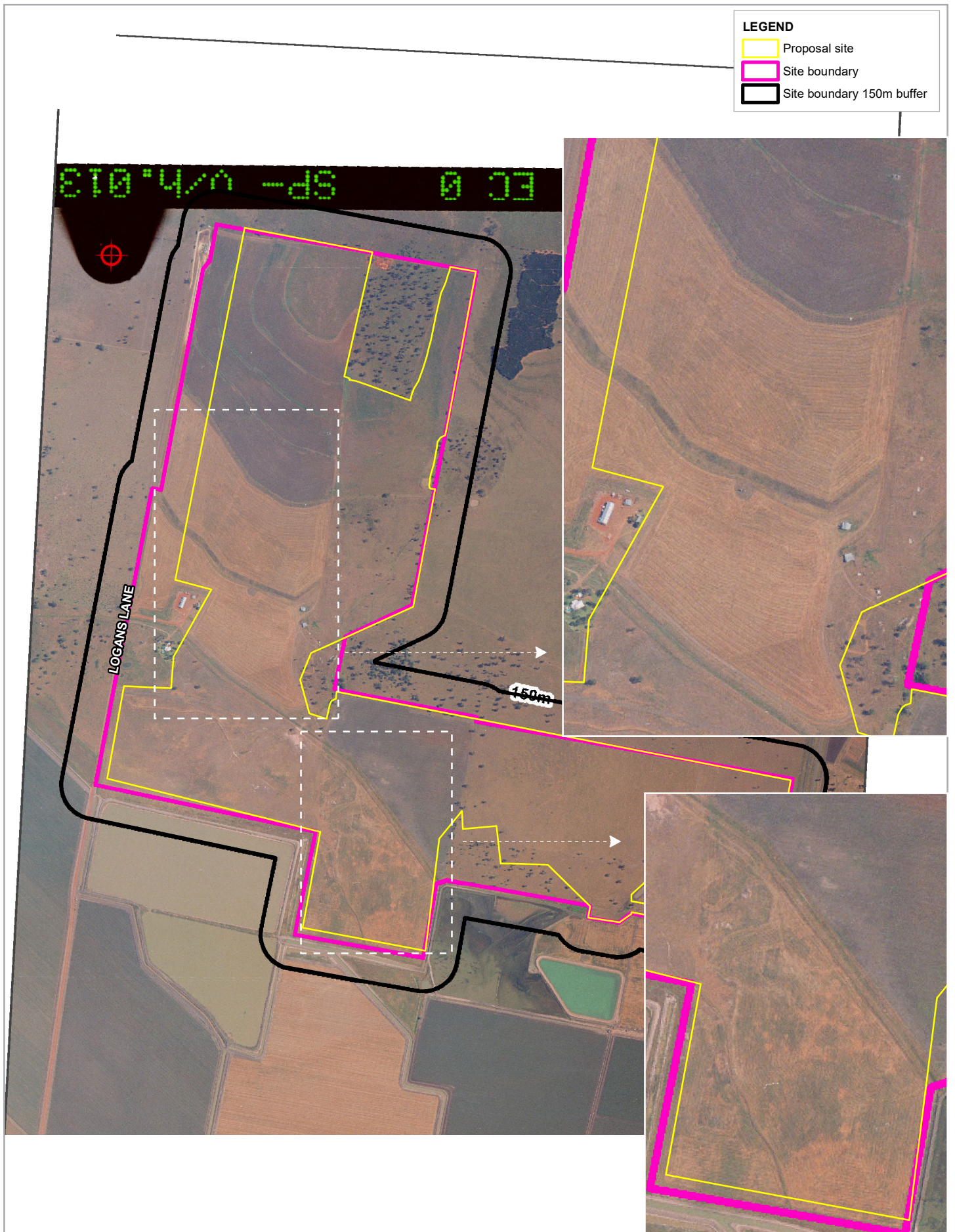


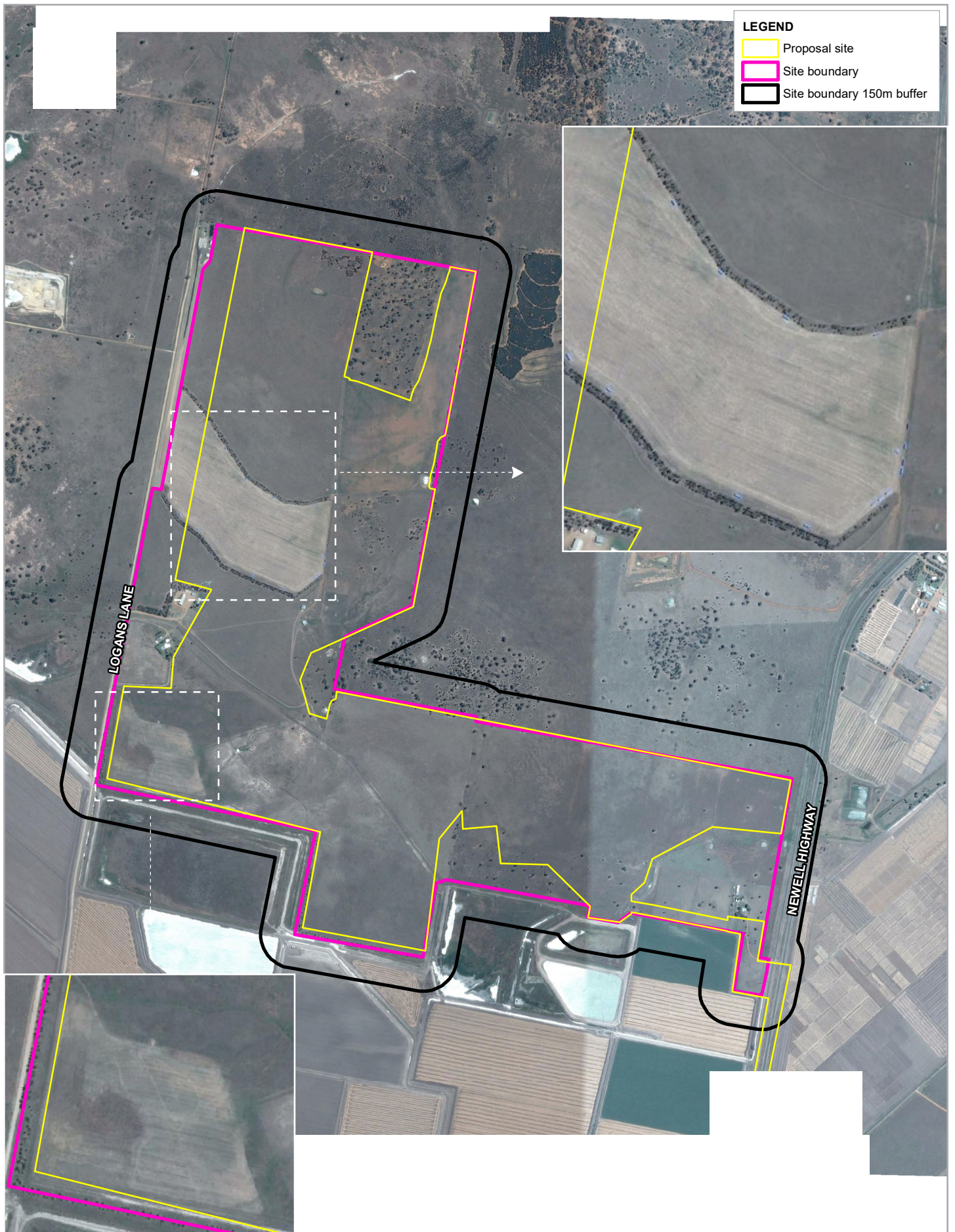
Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 31 May 2021

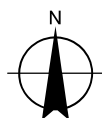
Historic imagery - 1989

APPENDIX A
FIGURE 1d





Paper Size ISO A4
0 200 400
Metres



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

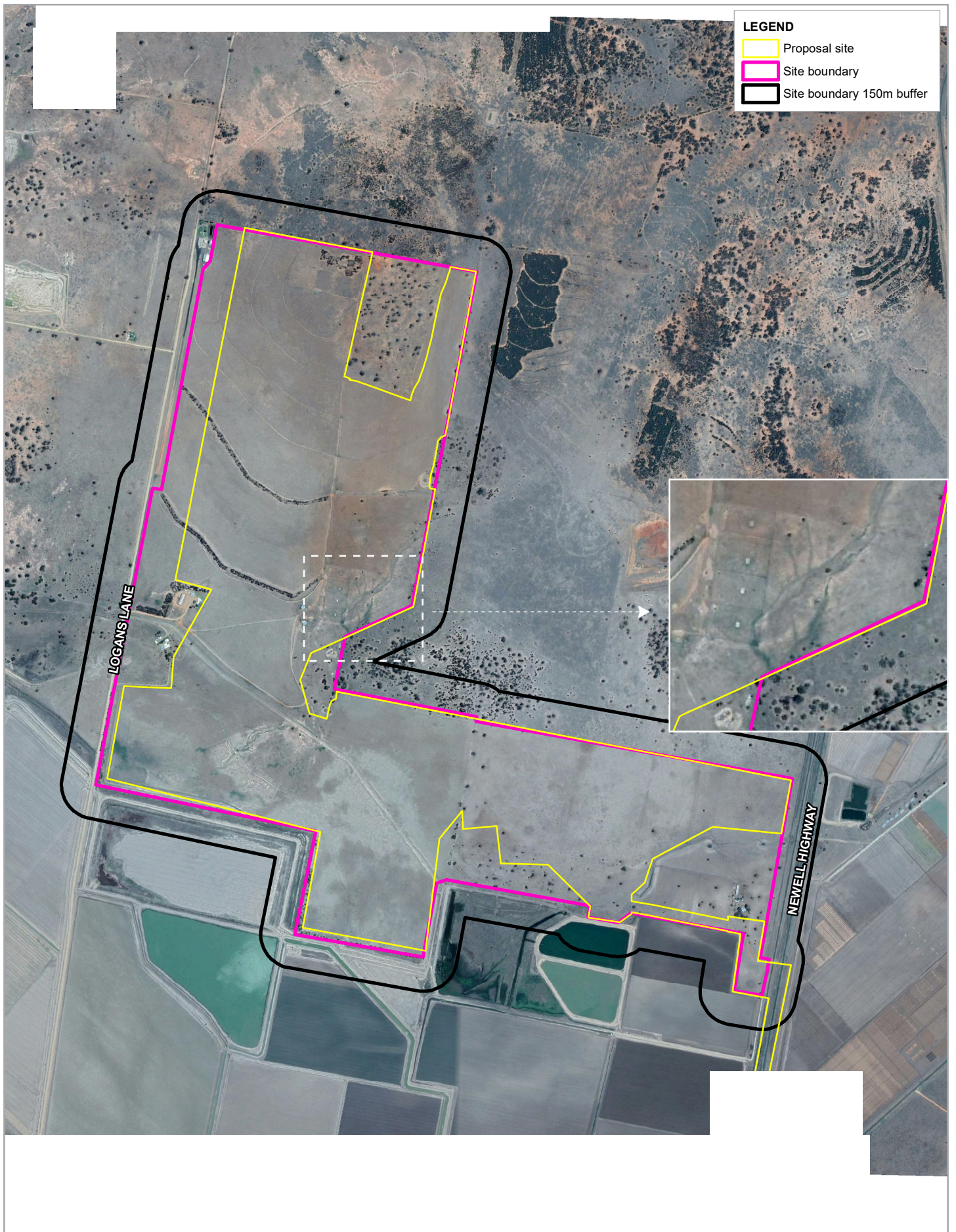


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 31 May 2021

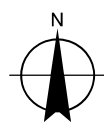
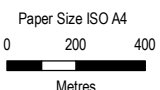
Historic imagery - 2015

APPENDIX A
FIGURE 1f



LEGEND

- Proposal site
- Site boundary
- Site boundary 150m buffer

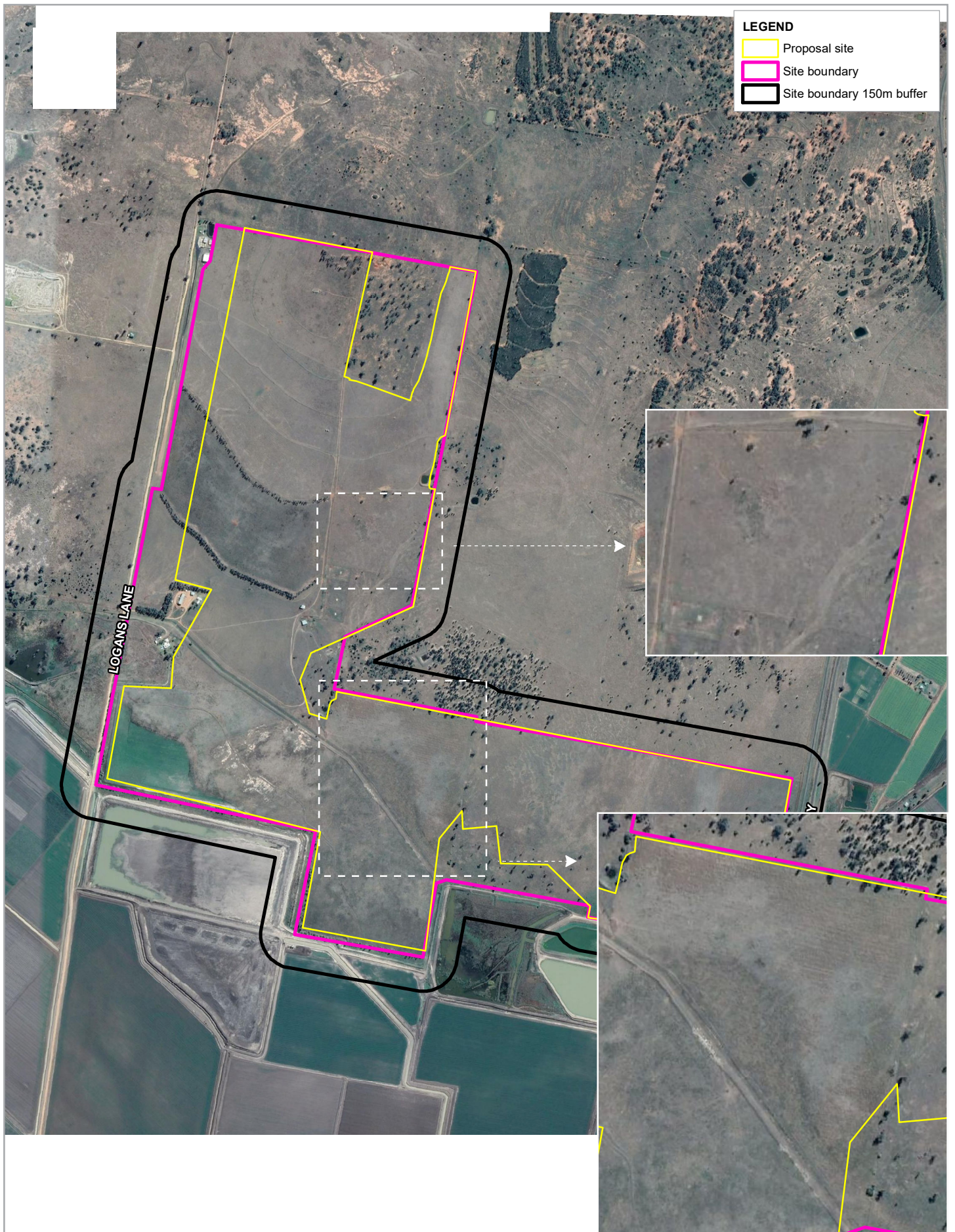


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

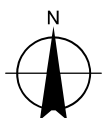
Project No. 21-26998
Revision No. -
Date 31 May 2021

APPENDIX A FIGURE 1g

Historic imagery - 2018



Paper Size ISO A4
0 200 400
Metres



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

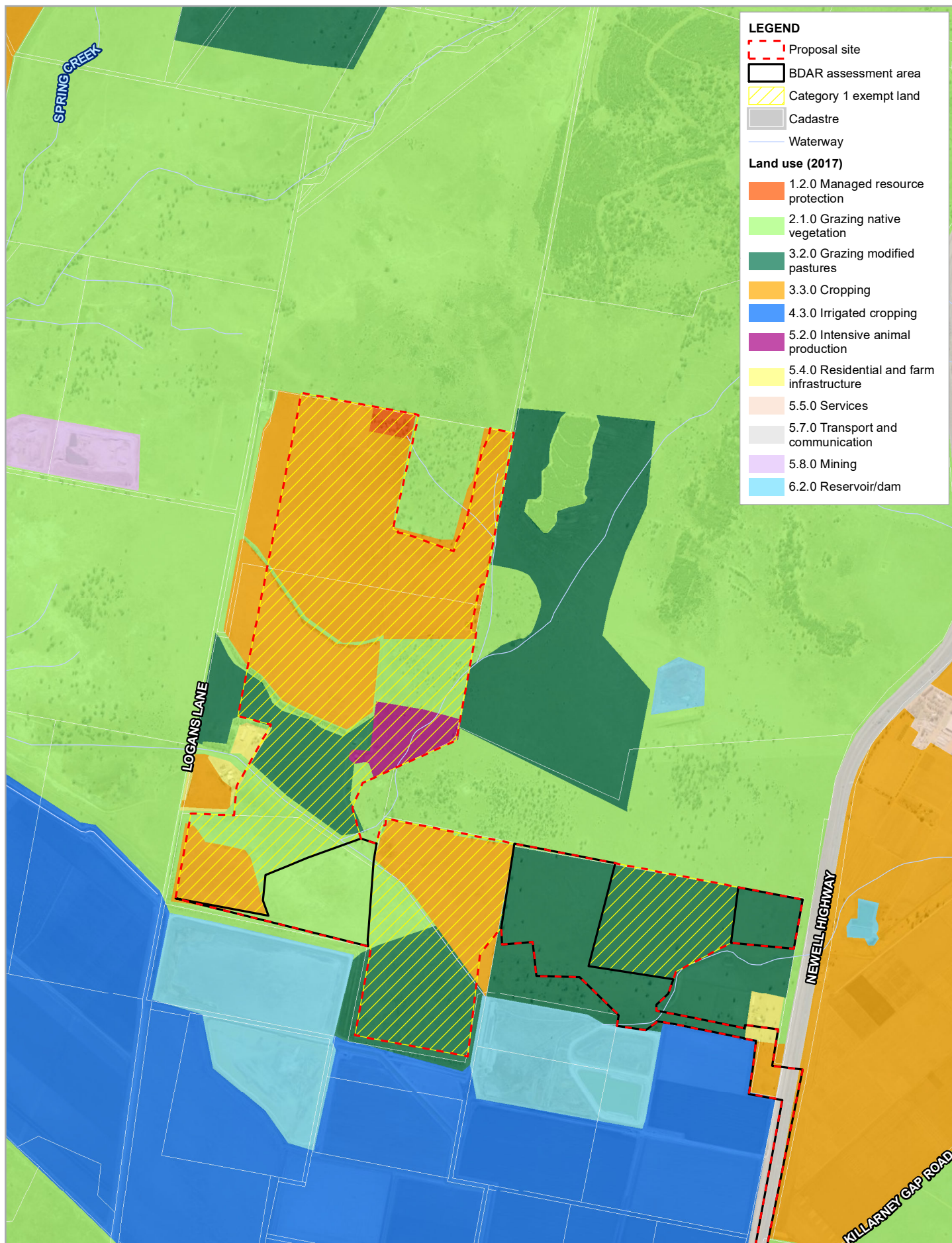


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 31 May 2021

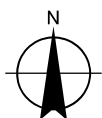
Historic imagery - 2020

APPENDIX A
FIGURE 1h



Paper Size ISO A4
0 200 400
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

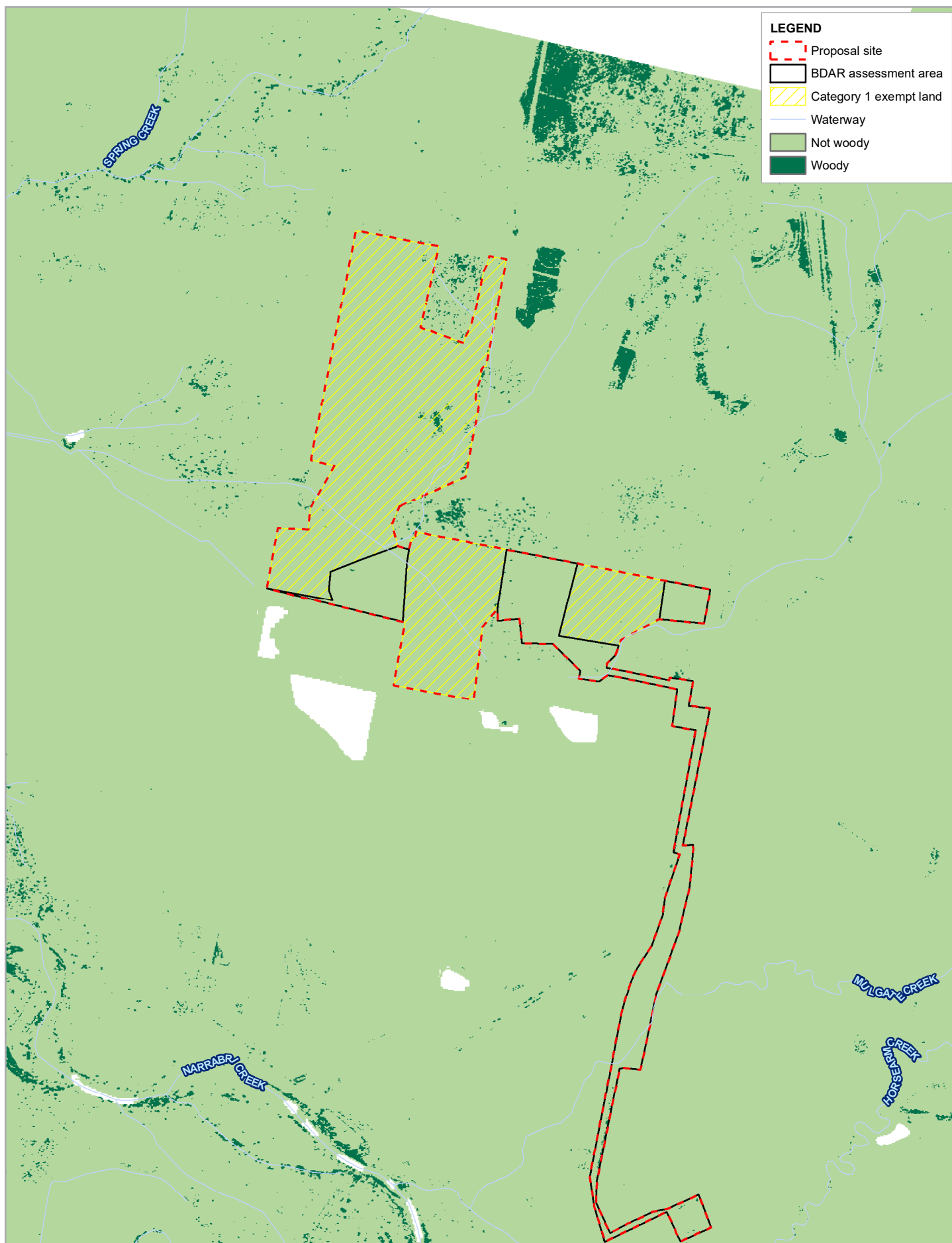


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

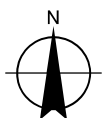
Appendix A Figure 2

Land use



Paper Size ISO A4
0 400 800
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

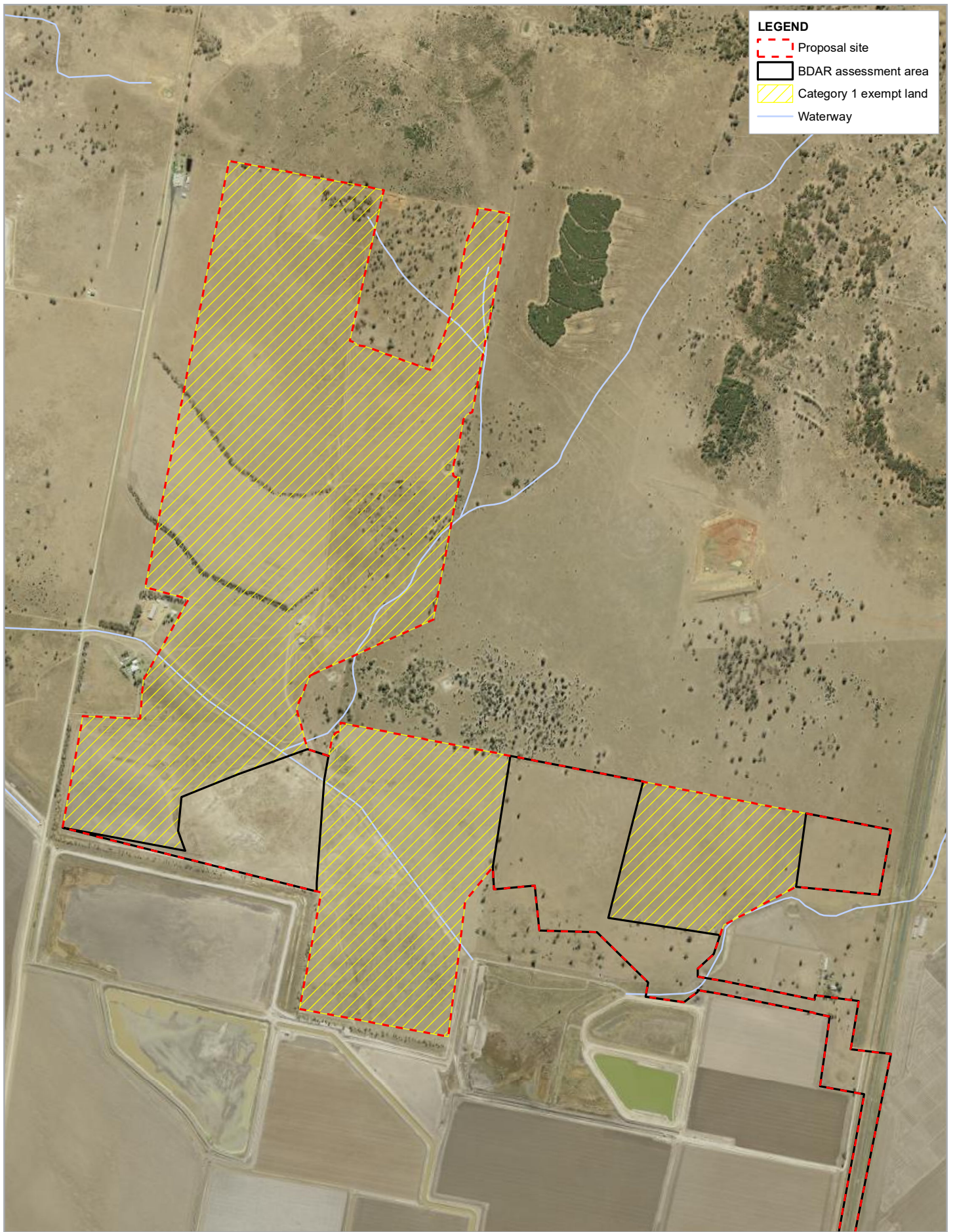


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

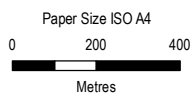
Appendix A Figure 3

Woody extent 2011

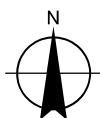


LEGEND

- Proposal site
- BDAR assessment area
- Category 1 exempt land
- Waterway



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

Category 1 exempt land

FIGURE 4

Appendix C

Landowner statutory declarations

Statutory Declaration

OATHS ACT 1900, NSW, EIGHTH SCHEDULE

I, Gregory Colyvan, do solemnly and sincerely declare that

During my ownership and control of the properties identified by Lot 2, Land Title DP586990 and as shown in the enclosed (the **Property**), I farmed crops on the Property. My period of ownership and control of the properties was between 1977 and the current date. For the purposes of this Statutory Declaration, the period between 1977 and 1990 is termed the **Pre-1990 Ownership Period**.

Farming of Crops

The farming of crops occurred at least 5 times during the Pre-1990 Ownership Period. The cropping process involved the clearing and/or tillage of land for the preparation of cropping.

The extent of cropping is shown in the areas marked in the attached map, and underwent cropping during the Pre-1990 Ownership Period, and in later years.

The only crops planted were wheat.

Herbicide Use

During the Pre-1990 Ownership Period, herbicide was not applied to the property.

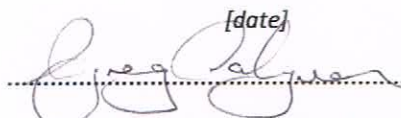
and I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the *Oaths Act 1900*.

Declared at: 12461 Newell Hwy, Narrabri, 2390.

on 29/07/2020

[place]

[date]


[signature of declarant]

in the presence of an authorised witness, who states:

I, _____, a _____,

[name of authorised witness]

[qualification of authorised witness]

certify the following matters concerning the making of this statutory declaration by the person who made it: [* please cross out any text that does not apply]

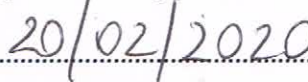
Ashleigh Isobelle Ann Rose
A Justice of the Peace in and for
the State of New South Wales
Reg. No. 226579

1. *I saw the face of the person ~~OR *I did not see the face of the person because the person was wearing a face covering, but I am satisfied that the person had a special justification¹ for not removing the covering, and~~
2. *I have known the person for at least 12 months ~~OR *I have confirmed the person's identity using an identification document and the document I relied on was~~



[signature of authorised witness]

[describe identification document relied on]

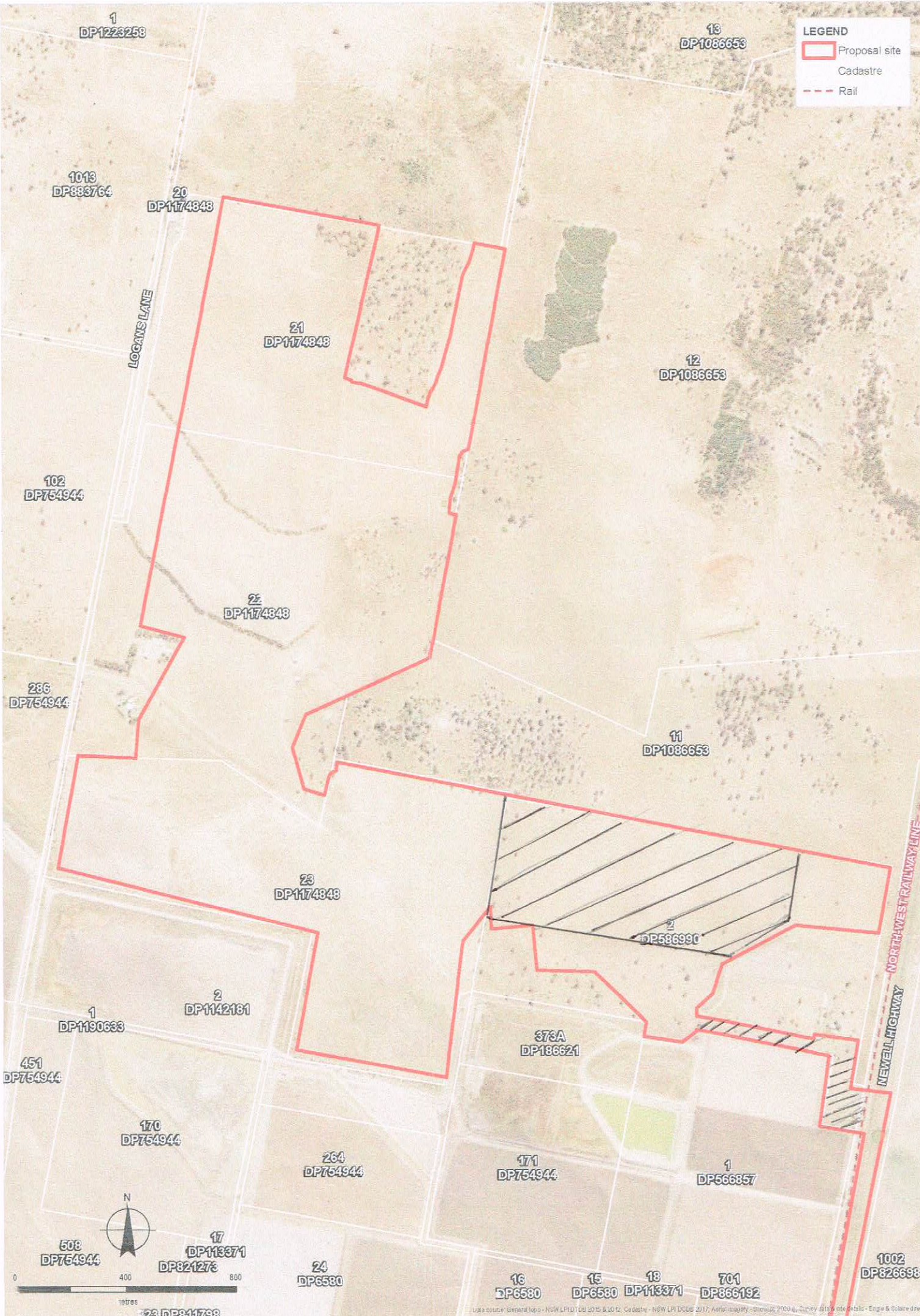


[date]

¹ The only "special justification" for not removing a face covering is a legitimate medical reason (at September 2018)

LEGEND

- Proposal site
- Cadastre
- Rail



Statutory Declaration

OATHS ACT 1900, NSW, EIGHTH SCHEDULE

I, MICHAEL JOHN LOGAN, do solemnly and sincerely declare that
[name of declarant]

during my ownership and control of the properties identified by Lots 21 – 23 DP 1174848 and as shown in the enclosed "Attachment 1 – Properties the subject of this Statutory Declaration" (the **Property**), I farmed crops on the Property. My family's period of ownership and control of the properties was between about 1955 and the current date. I assumed management of the property since 1980. For the purposes of this Statutory Declaration, the period between 1955 and 1980 is termed the **Pre-1980 Ownership Period**.

Farming of Crops

The farming of crops occurred at least 15 times during the Pre-1980 Ownership Period. The cropping process involved the clearing and/or tillage of land for the preparation of cropping.

The extent of cropping is shown in "Attachment 2 – Areas never cropped during the Pre-1980 Ownership Period". The map isolates in blue marking the areas that had not been cropped prior to 1980. Where areas unmarked on the Property in Attachment 2 underwent cropping at least 15 times during the Pre-1980 Ownership Period.

The crop(s) planted were wheat, barley, sorghum, sunflowers and lupins.

Herbicide Use

At least 15 times during the Pre-1980 Ownership Period, a herbicide was applied to the all of the property, so to destroy any existing vegetation within the herbicide application extent.

and I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the *Oaths Act 1900*.

Declared at: EDGECLIFF on 25 FEBRUARY 2020
[place] [date]
Michael Logan
[signature of declarant]

in the presence of an authorised witness, who states:

Ian Dunwoodie - Solicitor & Notary Public
Suite 404 Edgecliff Centre
203 New South Head Road, Edgecliff 2027

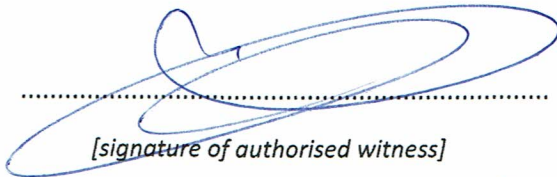
I,, a,

[name of authorised witness]

[qualification of authorised witness]

certify the following matters concerning the making of this statutory declaration by the person who made it: [* please cross out any text that does not apply]

1. *I saw the face of the person ~~OR *I did not see the face of the person because the person was wearing a face covering, but I am satisfied that the person had a special justification¹ for not removing the covering, and~~
2. *I have known the person for at least 12 months ~~OR *I have confirmed the person's identity using an identification document and the document I relied on was~~



.....

[signature of authorised witness]

[describe identification document relied on]

25 FEBRUARY 2020

.....

[date]

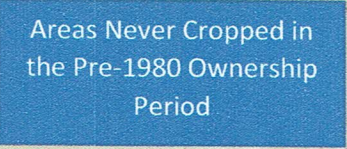
Ian Dunwoodie - Solicitor & Notary Public
Suite 404 Edgecliff Centre
203 New South Head Road, Edgecliff 2027

Attachment List:

- Attachment 1 – Properties the subject of this Statutory Declaration
- Attachment 2 – Areas never cropped during the Pre-1980 Ownership Period

¹ The only "special justification" for not removing a face covering is a legitimate medical reason (at September 2018)

Attachment 2 – Areas never cropped during the Pre-1980 Ownership Period



Areas Never Cropped in the Pre-1980 Ownership Period

Attachment
This is the Annexure marked "2"
referred to in the Statutory Declaration of
MICHAEL JOHN LOGAN
Sworn at EDGEMUFF
This 21 day of FEBRUARY 2020
Before me

Ian Dunwoodie - Solicitor & Notary Public
Suite 404 Edgecliff Centre
203 New South Head Road, Edgecliff 2027



ghd.com

→ **The Power of Commitment**

Appendix B

Biodiversity Development Assessment Report



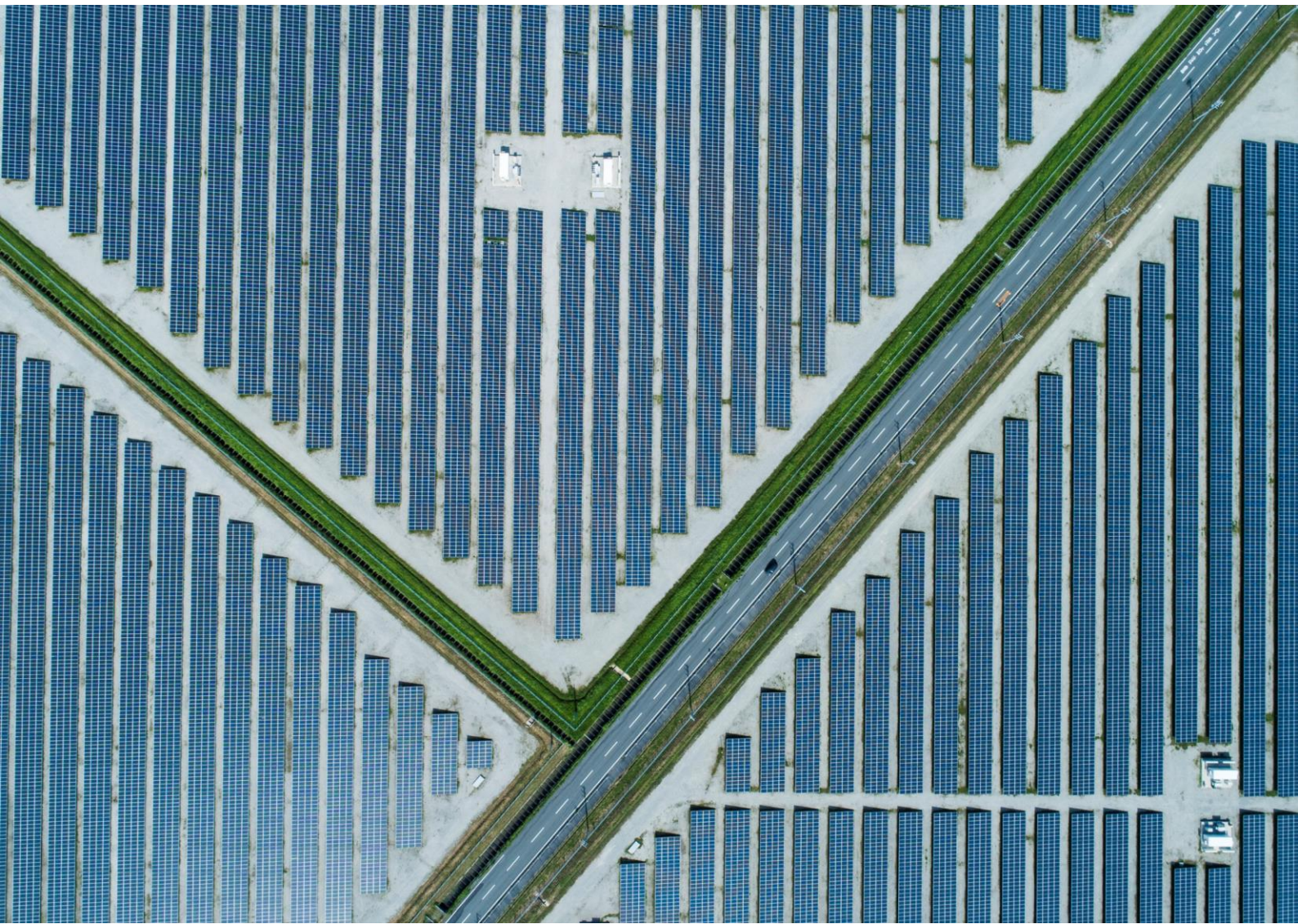
Silverleaf Solar Farm

Biodiversity Development Assessment Report

Silverleaf Solar Farm Pty Ltd

29 September 2021

→ The Power of Commitment





GHD Pty Ltd | ABN 39 008 488 373

GHD Tower, Level 3, 24 Honeysuckle Drive

Newcastle, New South Wales 2300, Australia

T +61 2 4979 9999 | **F** +61 2 9475 0725 | **E** ntlmail@ghd.com | **ghd.com**

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	K Crosby C Phu	B Harrington		D Mees		06/05/2019
S4	1	A Quin	B Harrington		D Mees		14/10/2020
S4	2	A Quin	B Harrington		D Mees		28/05/2021
S4	3	A Quin	A Quin L King		D Mees		24/08/2021
S4	4	L King	D Mees		D Mees		10/09/2021
S4	5	A Quin	D Mees		D Mees		29/09/2021

© GHD 2021

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Our ref: 12551870


29 September 2021

Narrabri Solar Farm Approvals – Certification under Section 6.15 of the Biodiversity Act 2016

Dear Sir/Madam

I, Arien Quin (BAAS 17098), certify that this Biodiversity Development Assessment Report and the accompanying finalised credit report dated 29 September 2021 has been prepared in accordance with the requirements of (and information provided under) the Biodiversity Assessment Method (2017).

Regards



Arien Quin
Senior Ecologist
+61 2 60438724
arien.quin@ghd.com

Executive summary

Background

Silverleaf Solar Farm Pty Ltd (ENGIE) proposes to construct and operate a 120 megawatt (MW) solar farm about four kilometres north-west of Narrabri between the Newell Highway in the east and Logans Lane in the west (referred to as “the proposal”).

This Biodiversity Development Assessment Report (BDAR) considers the assessment requirements of the *Biodiversity Conservation Act 2016* (BC Act), *Fisheries Management Act 1994* (FM Act) and the Australian Government’s *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as well as the relevant Secretary’s Environmental Assessment Requirements (SEARs) for the proposal.

Surveys

Staged surveys of the proposal site were conducted with reference to the Biodiversity Assessment Method (BAM) and appropriate threatened species survey guidelines for targeted species. Detailed field surveys including vegetation mapping, vegetation integrity plots, habitat assessment and targeted threatened species searches conducted in March, September and November 2018 and February 2020. The transmission line corridor was assessed by vehicular and pedestrian inspections. The ‘study area’ includes the proposal site and the transmission line corridor, together with a 1,500-metre buffer used in for assessment in accordance with the BAM.

Existing environment

The majority of the BAA has been cleared and used for agriculture and is subject to cropping and high intensity sheep and cattle grazing. The dominant vegetation is represented by native and exotic pastures. One small patch of remnant woodland is present within the BAA. This patch has been degraded and modified as a result of agricultural activities, with the understorey affected by livestock grazing. The remainder of the BAA consist of native grasslands that have been derived from clearing of woodland vegetation types. Native vegetation within the BAA corresponds to three PCTs:

- PCT 35 Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion (derived native grassland).
- PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (woodland and derived native grassland forms).
- PCT 397 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion (derived native grassland).

The proposal has been designed to avoid impacts to the majority of woodland vegetation within the study area.

Moderate condition stands of Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion (PCT 35) within the wider study area are commensurate with the endangered ecological community (EEC) listed under the BC Act as Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions, which is also identified as an entity subject to potential serious and irreversible impacts (SAIL). It is also commensurate with the EEC listed under the EPBC Act as Brigalow (*Acacia harpophylla* dominant and co-dominant). The proposal site boundary has been redesigned to avoid clearing of these patches of Brigalow woodland.

Redesign of the project footprint has also occurred to avoid impacts on a patch of PCT 397 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion that occurs in the north west of the study area.

No threatened flora species were identified within the BAA during the field survey, and none are likely to be impacted by the proposal.

No candidate species credit species were recorded and none are likely to occur. Five threatened fauna species listed under the BC Act were recorded during surveys, all of which are ecosystem credit species:

- Black Falcon (*Falco subniger*)
- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Little Pied Bat (*Chalinolobus picatus*)
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*)

Aquatic habitats are limited at the site. A number of small first order drainage lines occur that drain to dams that are used as watering points for stock. No key fish habitat or habitat for threatened species listed under the FM Act is present.

Avoidance of impacts

Various iterations of the project layout and design have occurred to avoid impacts to biodiversity values. This includes avoidance of clearing of small patches of moderate condition PCT 35 and PCT 397 which has resulted in avoidance of impacts to all threatened ecological communities (TECs) and SAIL entities that were recorded within the wider study area. Impacts to areas of better quality PCT 55 have also been largely avoided with the project only impacting on 0.7 ha of the woodland form of this community.

Potential impacts

Impacts associated with construction of the proposal would predominantly comprise impacts on areas of derived native grassland and cropped land. In total, the proposal would have impacts on approximately 60 ha of native vegetation comprising 0.7 ha of woodland and 59.3 ha of derived native grassland. Up to seven hollow-bearing trees may also be removed although a number of these may be able to be avoided during detailed design.

Offset requirements

The data from the fieldwork and mapping was entered into version 1.3.0.00 of the BAM credit calculator as a 'Development Assessment' to determine the number and type of biodiversity credits that would be required to offset impacts of the proposal.

A total of 695 ecosystem credits would be required to offset impacts of the proposal comprising:

- 16 ecosystem credits for Zone 2 – PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions_Moderate.
- 679 ecosystem credits for Zone 3 – PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions_Derived Grassland.
- As no species credit species were recorded or a likely to occur within the BAA, no species polygons were necessary, and no species credits have been calculated.
- Biodiversity offsets are not required for impacts on non-native vegetation that does not provide habitat for threatened species. No credits were calculated for 'exotic/cleared land'.
- Category 1 exempt land does not require assessment or offsetting under the BC Act (other than for prescribed impacts referred to in section 6.1 of the BC regulation). A land use assessment has determined that 285.4 ha of the BAA meets the definition of Category 1 –exempt (refer to section 9.1). This land has therefore been excluded from this assessment.
- A biodiversity offset is not required if the vegetation integrity score of the impacted vegetation zone is <17 (where the PCT is associated with threatened species habitat as represented by ecosystem credits) (Sections 10.3.1.1 and 10.3.2.1 of the BAM). In this regard, an ecosystem credit obligation of zero was calculated for the derived grassland forms of PCT 35 and PCT 397 (Zone 1 and 5).

The proposal has been redesigned to avoid impacts to the majority of woodland within the study area. Including all areas of Brigalow and Poplar box woodland. The derived native grassland form of these PCTs do not meet the condition criteria for the Brigalow (*Acacia harpophylla* dominant and co-dominant) EEC or Poplar Box Grassy Woodland on Alluvial Plains EEC.

Mitigation of impacts

A Construction Environmental Management Plan (CEMP) would be developed for the construction phase of the proposal. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, and planting of vegetated screens. Planting of vegetated screens would include locally sourced species typical of the PCTs present on site. This would improve the condition and habitat value of the retained vegetation in the long-term.

At the end of its operational life, the solar farm would be disconnected from the electrical transmission network and all solar farm infrastructure would be removed. ENGIE would also restore the surface of the solar farmland to a suitable condition for pastoral or other agricultural use.

Contents

1.	Introduction	1
1.1	Overview	1
1.2	Key features of the proposal	1
1.3	Secretary's environmental assessment requirements	2
1.4	Purpose of this report	2
1.5	Glossary of terms and acronyms	3
1.6	Scope and limitations	4
2.	Legislative context	7
2.1	Biodiversity Conservation Act 2016	7
2.1.1	Biodiversity Offset Scheme and Biodiversity Assessment Methodology	7
2.2	Fisheries Management Act 1994	8
2.3	Biosecurity Act 2015	8
2.4	Local Land Services Act 2013	8
2.5	Environment Protection and Biodiversity Conservation Act 1999	10
2.6	Assessment guidelines and information	11
3.	Methods	13
3.1	Desktop assessment	13
3.1.1	Data review	13
3.1.2	Background research	13
3.2	Site survey	14
3.2.1	Survey overview	14
3.2.2	Vegetation and flora surveys	15
3.2.3	Terrestrial fauna surveys	18
3.2.4	Aquatic habitat assessment	20
3.3	Survey conditions	20
3.4	Geographical Information System (GIS) analysis	21
3.5	BAM calculations	21
3.6	Staff qualifications	22
4.	Landscape context	24
4.1	Location	24
4.2	Existing land uses	24
4.3	Climate	24
4.4	Landscape features	24
4.4.1	Mitchell landscape	25
4.5	Determining site context	26
4.5.1	Native vegetation cover	26
4.5.2	Patch size	26
5.	Vegetation	28
5.1	Flora species	28
5.1.1	Priority and high threat species	28
5.2	Vegetation in the region	28
5.3	Vegetation at the proposal site	29
5.3.1	Native vegetation extent	29

5.3.2	Plant community types	29
5.3.3	Vegetation profiles	32
5.3.4	Groundwater dependent ecosystems	37
5.4	Fauna habitat resources	37
5.4.1	Fauna species	37
5.4.2	Fauna habitats	38
6.	Conservation significance	43
6.1	Identification of threatened species under the BAM	43
6.1.1	Predicted threatened species (ecosystem credit entities)	43
6.1.2	Candidate threatened species (Species credit entities)	46
6.2	Threatened species survey results	48
6.2.1	Threatened flora	48
6.2.2	Threatened fauna	48
6.2.3	Threatened ecological communities	49
7.	Impact assessment	51
7.1	Measures to avoid and minimise impacts	51
7.1.1	Avoidance measures	51
7.1.2	Mitigation measures	51
7.2	Residual impacts	51
7.2.1	Direct impacts	51
7.3	Fragmentation or isolation of habitat	53
7.3.1	Indirect impacts	53
7.4	Assessment of serious and irreversible impacts	54
7.5	Prescribed impacts	55
7.5.1	Areas of geological significance or rocks	55
7.5.2	Human-made structures	55
7.5.3	Non-native vegetation	55
7.5.4	Connectivity	56
7.5.5	Hydrology	56
7.5.6	Vehicle strike	56
7.6	Impacts on aquatic habitats	56
7.7	Consideration of MNES	57
8.	Recommended mitigation measures	58
8.1	Overview	58
8.2	Mitigation of impacts	58
8.3	Decommissioning of the solar farm	59
9.	Offset requirements	60
9.1	BC Act offset requirements	60
9.1.1	Impacts requiring offset	60
9.1.2	Impacts not requiring offset	62
9.1.3	Options to meet offset obligations / approach to delivering offsets	62
9.2	Offsets for impacts on MNES	63
10.	Conclusion	65
10.1	Residual impacts	65
11.	References	66

Table index

Table 1.1	Secretary’s environmental assessment requirements relevant to biodiversity	2
Table 2.1	PCT areas	10
Table 3.1	Survey techniques and timing	14
Table 3.2	Minimum plot survey requirements	16
Table 3.3	Site data collected within each plot	17
Table 3.4	Candidate flora species credit entities targeted during surveys	18
Table 3.5	Candidate fauna species credit entities targeted during surveys	19
Table 3.6	Targeted fauna survey techniques and effort	20
Table 3.7	Daily weather observations during the survey period	21
Table 3.8	GHD ecology staff and qualifications	22
Table 4.1	Landscape features	25
Table 4.2	Native vegetation cover	26
Table 4.3	Patch size	26
Table 5.1	Vegetation types in the study area and proposal site	30
Table 5.2	Vegetation zones within the proposal site	31
Table 5.3	Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion	32
Table 5.4	Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	34
Table 5.5	Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion	35
Table 5.6	Non-Native Vegetation (cropped/ predominantly exotic grassland)	36
Table 5.7	Fauna habitats: grassland with scattered trees	38
Table 5.8	Fauna habitats: woodland patches	40
Table 5.9	Fauna habitats: farm dams and waterbodies	41
Table 6.1	Confirmed predicted threatened species	43
Table 6.2	Excluded predicted threatened species	45
Table 6.3	Confirmed candidate species credit species for which surveys were conducted	46
Table 6.4	Excluded candidate threatened species	47
Table 7.1	Direct impacts on native vegetation	52
Table 7.2	Indirect impacts	54
Table 8.1	Mitigation measures	58
Table 9.1	Future integrity scores for management zones within BAA	61
Table 9.2	Ecosystem credits required to offset impacts of the proposal	62
Table 9.3	‘Like for like’ ecosystem credits required to offset impacts of the proposal	63
Table 9.4	Estimated biodiversity offset credit payment price	63

Figure index

Figure 1.1	Proposal location	5
Figure 1.2	Proposal disturbance footprint	6
Figure 2.1	Category 1 Exempt Land within proposal site	12
Figure 3.1	Survey effort	23
Figure 4.1	Landscape features	27
Figure 5.1	Vegetation	42
Figure 6.1	Threatened biota and habitat resources	50
Figure 9.1	Areas requiring offsets	64

Appendices

Appendix A	Category 1 exempt land assessment
Appendix B	Likelihood of occurrence threatened and migratory biota
Appendix C	Species lists
Appendix D	BAM calculator data
Appendix E	EPBC Act assessments of significance
Appendix F	Biodiversity credit reports

1. Introduction

1.1 Overview

Silverleaf Solar Farm Pty Ltd (ENGIE) proposes to construct and operate a 120 megawatt (MW) solar farm about four kilometres north-west of Narrabri between the Newell Highway in the east and Logans Lane in the west (referred to as the 'proposal').

The proposal requires development consent from the Minister for Planning under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Secretary's Environmental Assessment Requirements (SEARs) were provided on 22 June 2018 by the Department of Planning and Environment

This Biodiversity Development Assessment Report (BDAR) considers the assessment requirements of the NSW *Biodiversity Conservation Act 2016* (BC Act), *Fisheries Management Act 1994* (FM Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as well as the relevant SEARs.

1.2 Key features of the proposal

The proposal includes constructing, operating and eventually decommissioning or reconditioning a 120 megawatt (MW) AC solar farm to the north of Narrabri in the NSW North West Slopes.

The proposal would consist of the following components:

- Solar arrays consisting of about 440,000 solar panels four metres in height, supported by about 46,000 piles, driven or screwed into the ground in order to support the solar array's mounting system. The mounting system would be placed with rows of panels approximately six metres apart. The arrays would be single-axis tracking panels, which would consist of about 5,150 tracker units.
- Construction of a transmission corridor, supporting 132 kV power lines, connecting to TransGrid's substation located on Stoney Creek Road approximately 5 kilometres from the proposal site. The transmission lines would be installed overhead on wooden or concrete poles, between 20 and 30 metres high and spaced at intervals of around 50 metres. Stays would be required at locations where the transmission line changes direction.
- Inverter and transformer stations evenly distributed across the site, with onsite cabling and electrical connections between solar arrays and panel inverters.
- Onsite cabling and electrical connections between solar arrays and panel inverters
- A step-up substation to increase the voltage to 132 kV to allow connection to TransGrid substation (final step-up voltage to be confirmed during further consultation with TransGrid).
- Cables and trenches
- Internal access tracks to provide access throughout the site during operation
- Operational and maintenance office, including staff amenities block and parking areas
- Perimeter security fencing
- Landscaping around the perimeter of the site where required
- Upgrade of the intersection at Logans Lane and Kamilaroi Highway

Construction of the proposal would take about 12 months to complete.

The proposed solar arrays and associated components are expected to operate for about 35 years. At the end of its operational life, the proposal would be either reconditioned or decommissioned. Reconditioning would involve replacing components that were originally installed with new components that reflect technology that is available at that time. Decommissioning would remove all above ground infrastructure and rehabilitating the site to allow it to be used for purposes such as agriculture.

The proposal site and key features are mapped on Figure 1.1 and Figure 1.2.

1.3 Secretary's environmental assessment requirements

This BDAR addresses the relevant SEARs for the EIS, as outlined in Table 1.1, the requirements of the NSW Department of Planning, Industry and Environment (DPIE), and relevant guidelines and policies. The Biodiversity SEARs are detailed in Table 1.1.

Table 1.1 Secretary's environmental assessment requirements relevant to biodiversity

Item	Section	Where addressed in this report
Biodiversity	The EIS must address the following specific issues:	
	An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless OEH and DPE determine that the proposed development is not likely to have any significant impacts on biodiversity values;	This report is the BDAR prepared in accordance with the BAM
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM;	Section 7.1.1 (avoid impacts) Section 7.1.2 and 8 (mitigate impacts) Section 7.2 to 7.7 (assess direct, indirect and prescribed impacts) Section 9 (offset impacts)
	An assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts; and	Section 7.6
	A strategy to offset any residual impacts of the development in accordance with the Biodiversity Conservation Act 2016 (NSW)	Section 9

1.4 Purpose of this report

The purpose of this report is to assess the potential biodiversity impacts from the construction and operation of the proposal. The report:

- Outlines the methods used in the biodiversity assessment
- Describes the existing environment of the study area, including the results of the desktop assessment and site surveys.
- Assesses the value and conservation significance of native vegetation and habitats at the proposal site and the potential for threatened biota and matters of national environmental significance (MNES) to occur at the proposal site or be affected by the proposal.
- Provides a description of the proposal, including potential impacts on biodiversity values and measures to avoid or mitigate impacts.
- Assesses the significance of impacts on threatened biota and MNES
- Presents the data used to perform the BAM credit calculations for the proposal
- Calculates the number and type of biodiversity credits that would be required to offset impacts of the proposal in accordance with the BAM.

This report has been revised on previous versions based on feedback from the Biodiversity Conservation Division (BCD) and DPIE.

1.5 Glossary of terms and acronyms

Term	Definition
AOBV	Areas of Outstanding Biodiversity Value
BDAR Assessment Area (BAA)	This area comprises the proposal site excluding all areas of the project that have been mapped as category 1 exempt land.
BC Act	Biodiversity Conservation Act 2016
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
Biodiversity Assessment Method (BAM)	The rules for biodiversity assessment established under the BC Act that determine credits created, credits required and the circumstances that improve or maintain biodiversity values. Where referenced in this BDAR the BAM refers to the BAM 2017
Biodiversity credit	A unit of biodiversity value to measure specific development impacts or conservation gains in accordance with the BAM. Includes ecosystem credits and species credits.
Biodiversity credit report	Specifies the number and type of biodiversity credits: required to offset the impacts of a development to obtain a Biodiversity Certification Agreement; or that would be generated through conservation and management of a Stewardship site under a Biodiversity Stewardship site agreement.
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values.
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
BOS	Biodiversity Offset Scheme
CEEC	Critically endangered ecological community
CEMP	Construction Environmental Management Plan
DEE	Department of the Environment and Energy
DPI	Department of Primary Industries
Ecosystem credit	A credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
EEC	Endangered ecological community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FFMP	Flora and Fauna Management Plan
Impact area	The area assumed to be impacted by the proposal. This includes all land assessed for the BDAR within the solar farm site as well as impacts along the transmission line easement where individual power poles would be erected.
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environment Plan
LGA	Local Government Area
Locality	The area within a 10 km radius of the .
Migratory species	Species listed under listed under international agreements (i.e Ramsar, JAMBA, CAMBA and ROKAMBA conventions) to which Australia is a party
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage
PCT	Plant community type
Proposal site	The area that would be directly impacted by construction and operation of the proposal. Encompasses the solar farm site and the transmission line corridor (noting that not all of the transmission line easement will be impacted).

Term	Definition
SAIL	Serious and irreversible impact
SAIL entity	Species and ecological communities that have the potential to be the subject of serious and irreversible impacts (SAILS)
SEPP	State Environment Planning Policy
Species credit	A credit that relates to an individual threatened species that cannot be reliably predicted based on habitat surrogates. Threatened species that require species credits are identified in the Threatened Biodiversity Data Collection
Study area	The area that was subject to a site survey and assessed for direct or indirect impacts arising from construction and operation of the proposal. This included the properties on which the solar farm will be constructed, as well as publicly accessible sections of two transmission line options. Also the 'subject land' as referenced in the BAM. A buffer of 1,500 metres has been used in desktop assessments in accordance with the BAM (2017).
TEC	Threatened ecological community
Threatened biota	Threatened species, populations or ecological communities listed under the BC Act, FM Act and/or the EPBC Act.

1.6 Scope and limitations

This BDAR has been prepared by GHD for ENGIE and may only be used and relied on by ENGIE and its related bodies corporate for the purpose agreed between GHD and ENGIE as set out in sections 1.3 and 1.4 of this report.

GHD otherwise disclaims responsibility to any person other than ENGIE arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

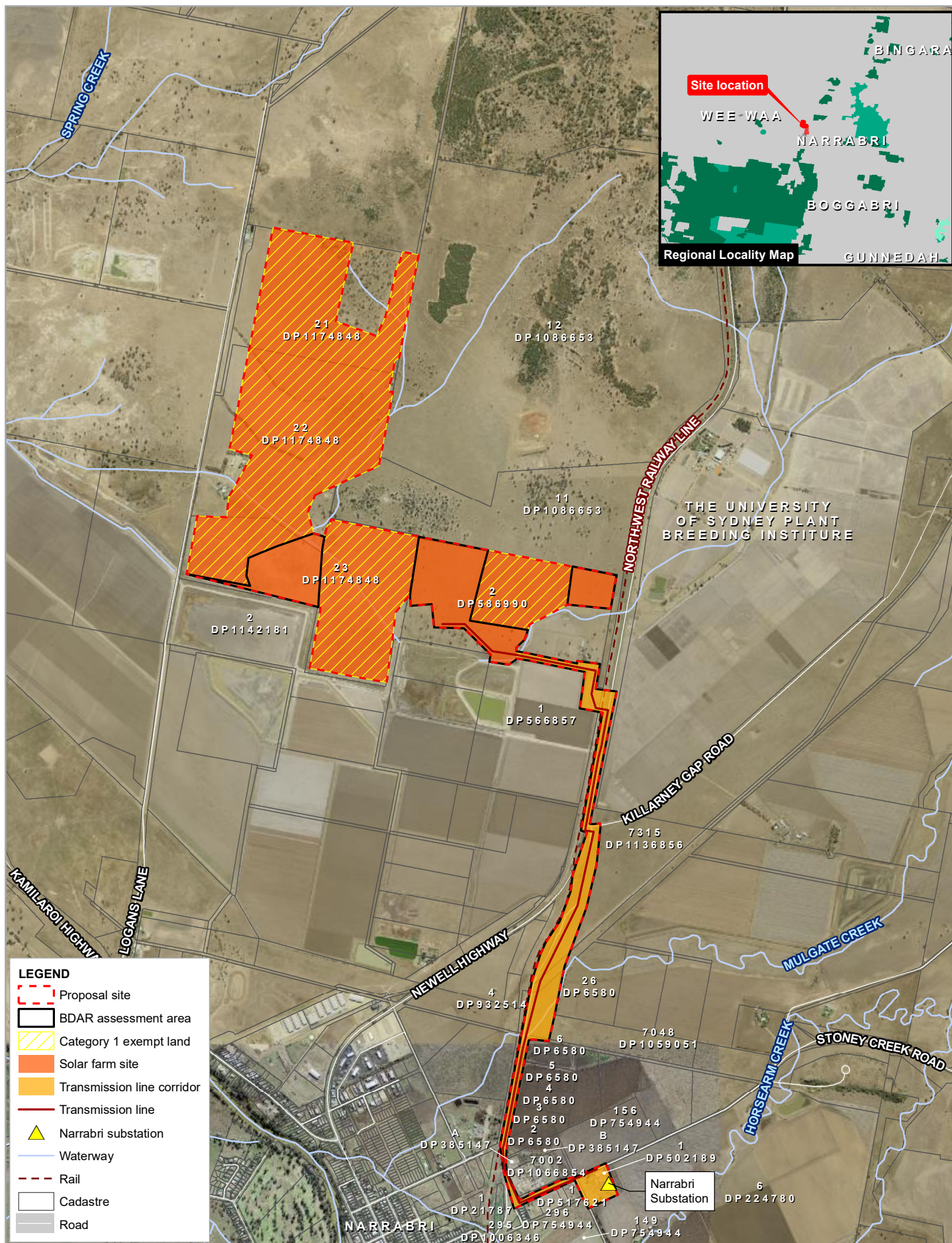
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described throughout this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this BDAR based on information provided by ENGIE and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were

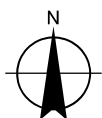
The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, particular climatic conditions leading up to field surveys. As a result, not all relevant site features and conditions may have been identified in this report. Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.



Paper Size ISO A4
0 400 800
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

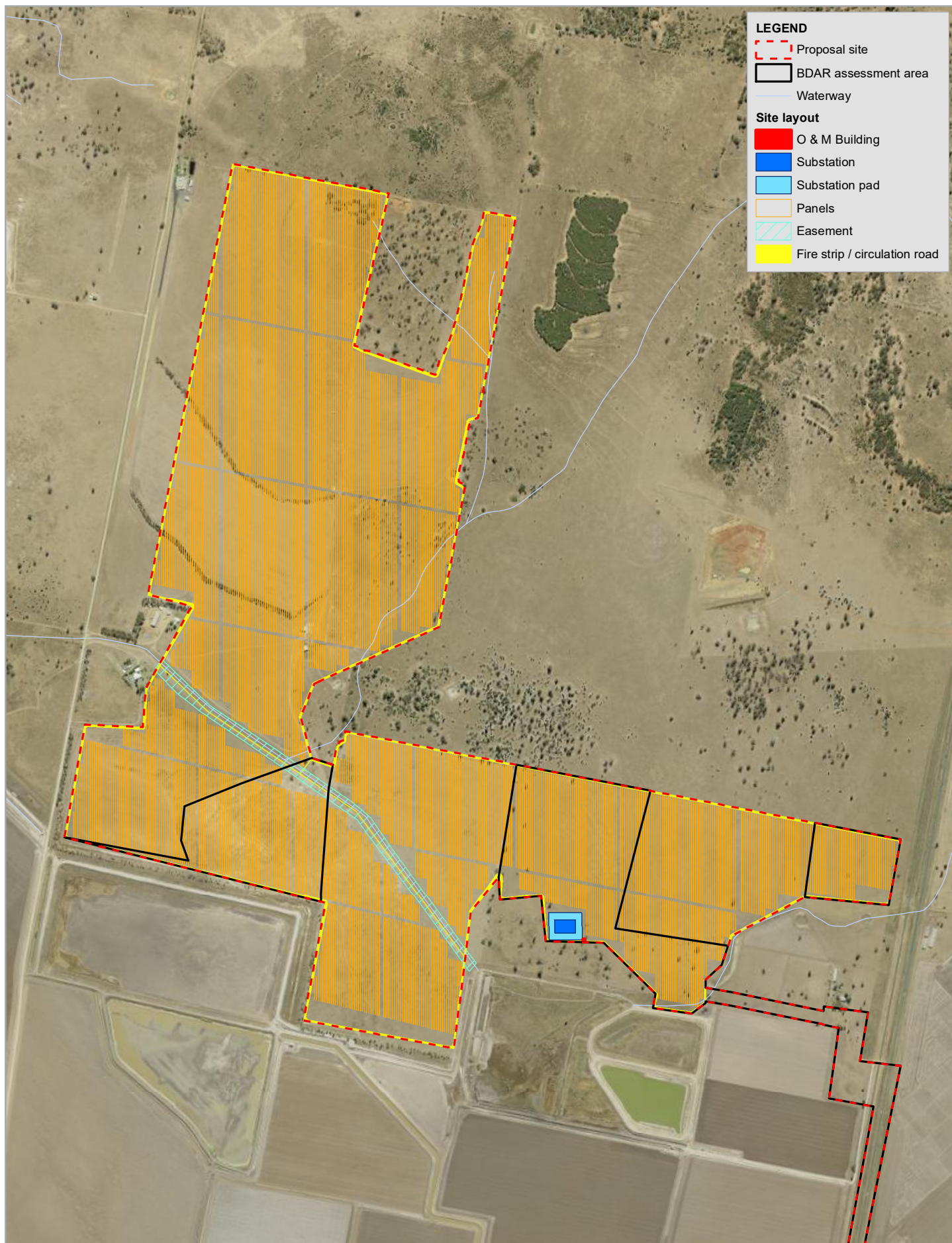


Engie
Silverleaf Narrabri Solar Farm
Biodiversity Assessment

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

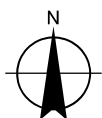
The proposal

FIGURE 1-1



Paper Size ISO A4
0 200 400
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Engie
Silverleaf Narrabri Solar Farm
Biodiversity Assessment

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

Project disturbance footprint

FIGURE 1-2

2. Legislative context

2.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) provides legal status for biota of conservation significance in NSW. The BC Act aims to, amongst other things, 'maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development'. It provides for the listing of threatened species and communities, establishes a framework to avoid, minimise and offset the impacts of proposed development (the Biodiversity Offsets Scheme), and establishes a scientific method for assessing the likely impacts on biodiversity values and calculating measures to offset those impacts (the Biodiversity Assessment Method, BAM). These are discussed further below.

2.1.1 Biodiversity Offset Scheme and Biodiversity Assessment Methodology

The BC Act, together with the *Biodiversity Conservation Regulations 2017*, provides a mechanism to address impacts on biodiversity from land clearing associated with development. Under this legislation, there are provisions for a Biodiversity Offsets Scheme (BOS), which includes a framework to avoid, minimise and offset impacts of development on biodiversity.

The aim of the BOS is to provide a transparent, consistent and scientifically based approach to biodiversity assessment and offsetting. It also allows for the establishment of biodiversity stewardship agreements, which are in-perpetuity agreements entered into by landholders, to secure offset sites and generate biodiversity credits, which can be used to offset impacts of development. The aim of the BOS is to ensure that the impacts of development, clearing or biodiversity certification will result in no net loss of biodiversity.

The Biodiversity Assessment Method (BAM) was established by OEH as a standard method to implement the aims of the BOS and to address the loss of biodiversity and threatened species. The scheme creates a market framework for the conservation of biodiversity values and the offsetting of development impacts. It also provides the mechanisms to offset impacts of development, clearing or biodiversity certification such that there is no loss of biodiversity values.

The BAM sets out how biodiversity values will be assessed, prescribes requirements to avoid and minimise impacts, establishes rules for calculating the number and class of credits required for unavoidable impacts, and determines the trading rules that will apply. The methodology includes a software package known as the Biodiversity Assessment Method Calculator (the BAM calculator) which processes site survey and assessment data. The BAM calculator specifies the type and extent of surveys required for a biodiversity assessment and then processes survey data to calculate the number and type of biodiversity credits that are either required at a development site or will be generated at a stewardship site. The BAM must be applied by a person accredited under the BC Act.

The Biodiversity Conservation Trust Fund (BCTF) ensures that landowners have the funds needed to carry out the management actions required each year and provides a financial incentive to landowners to carry out those actions. The scheme is administered by OEH and ensures accountability and compliance through legislation, regular reporting requirements and financial measures. Under certain circumstances a developer may make a payment directly into the BCTF to offset the impacts of a proposed development in lieu of purchasing and retiring biodiversity credits. The BCT must then use funds in the BCTF to purchase and retire appropriate biodiversity credits.

The BOS and BAM have been addressed in accordance with the project SEARs through the preparation of this BDAR by accredited assessors.

2.2 Fisheries Management Act 1994

The objects of the *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. It provides for the listing of threatened species, populations and ecological communities, listing of 'Key Threatening Processes', and the requirements or otherwise for the preparation of a Species Impact Statement (SIS).

One of the objectives of the FM Act is to 'conserve key fish habitats ' which includes aquatic habitats that are important to the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. To assist in the protection of key fish habitats, DPI has produced the Policy and guidelines for fish habitat conservation and management (DPI, 2013). This policy applies to the following developments, works or activities, each of which can impact on key fish habitat:

- Dredging or reclamation
- Impeding fish passage
- Damaging marine vegetation
- De-snagging

The FM Act has been considered in this assessment through:

- Desktop review to determine the threatened biota that are predicted to occur within the locality of the proposal and hence could occur, subject to the habitats present.
- Aquatic habitat assessment
- Assessment of potential impacts on threatened biota and key fish habitat
- Identification of suitable impact mitigation and environmental management measures for aquatic habitats, where required.

2.3 Biosecurity Act 2015

The *Biosecurity Act 2015* provides for risk-based management of biosecurity in NSW. It provides a statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds.

The primary object of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

One priority weed for the North West region was recorded in the proposal site. Legal requirements to minimise the potential for the introduction and/or spread of weeds as a result of the proposal are discussed in Section 5.1.

2.4 Local Land Services Act 2013

The *Local Land Services Act 2013* (LLS Act) regulates the clearing of native vegetation on rural lands in NSW. Under the LLS Act land has been categorised and mapped on the Native Vegetation Regulatory Map. Mapped land classes include:

- Rural land where clearing of native vegetation can occur without approval (Category 1 – Exempt land).
- Rural land where clearing requires approval from Local Land Service (Category 2 - Regulated land).
- Rural land where clearing of native vegetation may not be permitted under the Land Management (Native Vegetation) Code 2018, and a limited suite of allowable activities apply (Category 2 – Vulnerable regulated land).
- Rural land where clearing is not permitted (Category 2 – Sensitive regulated land).

Clearing of native vegetation on land that meets the definition of Category 1 - Exempt Land under the LSS Act does not require assessment or offsetting under the BAM (refer to s.6.8 (3) of the BC Act and s.2.3.1.1 of the BAM). A development on Category 1 land may involve other biodiversity impacts which will require assessment in a BDAR if they constitute a 'prescribed impact' (as listed in clause 6.1 of the *Biodiversity Conservation Regulation 2017* (BC Reg), however no biodiversity credit obligation is generated.

The circumstances under which land is to be designated as Category 1 – Exempt and Category 2– Regulated are set out in s.60H-60J of the LLS Act and cl.109-114 of the *Local Land Services Regulation 2014*.

With regards to Category 1 –exempt land mapping S.60 H of the LLS Act states that:

- Land is to be designated as category 1-exempt land if the Environment Agency Head reasonably believes that:
 - The land was cleared of native vegetation as at 1 January 1990, or
 - The land was lawfully cleared of native vegetation between 1 January 1990 and the commencement of this Part.
- Land is to be designated as category 1-exempt land if the Environment Agency Head reasonably believes that:
 - The land contains low conservation value grasslands, or
 - The land contains native vegetation that was identified as regrowth in a property vegetation plan referred to in section 9 (2) (b) of the *Native Vegetation Act 2003*, or
 - The land is of a kind prescribed by the regulations as category 1-exempt land.
- Land is to be designated as category 1-exempt land if the land is biodiversity certified under Part 8 of the *Biodiversity Conservation Act 2016* or under any Act repealed by that Act.”
- With regards to matters relating to the determination of mapped category of land S 60 J of the LLS Act states that: Native vegetation that comprises grasslands or other non-woody vegetation is taken to have been cleared if the native vegetation was significantly disturbed or modified. The regulations may make provision for the purposes of determining whether native vegetation has been significantly disturbed or modified for the purposes of this Division.
- Determinations may be made by the Environment Agency Head that land was unlawfully cleared of native vegetation only if compliance or enforcement action of a kind prescribed by regulations was taken in relation to the clearing.
- Determinations may be made by the Environment Agency Head that land was cleared of native vegetation as of 1 January 1990 or between that date and the commencement of this Part only on the basis of the best available aerial photographs or satellite imagery before and after the relevant date, and any evidence provided by the landholder under section 60K (8).
- Determinations made (or taken on appeal to have been made) by the Environment Agency Head as to whether land was or was not unlawfully cleared of native vegetation does not affect any decision made with respect to compliance or enforcement action taken under this or any other Act in relation to the clearing.

The majority of the proposal site has been cleared of native vegetation and used for intensive agricultural practices including grazing and cropping. A review of historic aerial imagery, publicly available datasets (including land use mapping (DPIE 2019) and Landsat woody extent mapping 2008 (DPIE 2011)) and landowner testimonies indicates that a large proportion of the site meets the definition of Category 1 exempt land as it was cleared of native vegetation prior to 1990 and or/ legally cleared and cropped between 1990 and 2021. Historic aerial imagery provided in Figures 3 to 9 of Appendix A indicates approximately 285.4 ha of the site has been previously cleared and cropped prior to 1990 and or legally cleared for cropping between 1990 and 2021. This evidence is also supported by land use mapping that shows portions of the site are mapped as cropped as well as woody extent mapping which indicates that the majority of the site consist of non woody vegetation (refer to Figure 1 and 2 in Appendix A). Statutory declarations from land-owners that attest to historical cropping practices across the site are provided in Appendix A. These testimonies support the historic aerial imagery and land use mapping which all indicate that large areas within the development site were cleared prior to 1990.

Table 2.1 PCT areas

PCT	Area within proposal site (ha)	Area of category 1 exempt land (ha)	Area within BAA (ha)
PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	0.69	0	0.69
PCT 35 Derived Native Grasslands	26.81	26.04	0.77
PCT 55 Derived Native Grasslands	121.96	68.07	53.89
PCT 397 Derived Native Grasslands	32.69	21.98	10.71
Planted vegetation	7.88	7.88	0
Cropped/predominantly exotic grassland	198.20	159.79	38.41
Cleared	8.11	1.42	6.69
TOTAL	396.34	285.18	111.16

Areas within the proposal site that meet the definition of Category 1 exempt land provided in the LLS Act are shown on Figure 2.1. These areas have been excluded from this BDAR as they do not require assessment or offsetting under the BC Act (other than for prescribed impacts referred to in section 6.1 of the BC regulation). The residual areas assessed within this BDAR are referred to herein as the BDAR assessment area (BAA). Table 2.1 provides a breakdown of the area of each PCT within the proposal site, area of Category 1 exempt land and area within the BAA.

There are no prescribed impacts arising from the proposal that require biodiversity offsets (refer to section 7.5).

2.5 Environment Protection and Biodiversity Conservation Act 1999

The purpose of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is to ensure that actions likely to cause a significant impact on 'matters of national environmental significance' undergo an assessment and approval process. Under the EPBC Act, an action includes a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. An action that 'has, will have or is likely to have a significant impact on a matter of national environmental significance (MNES)' is deemed to be a 'controlled action' and may not be undertaken without prior approval from the Australian Minister for the Environment. MNES relevant to this report include threatened species and ecological communities and migratory species.

The EPBC Act has been considered in this assessment through:

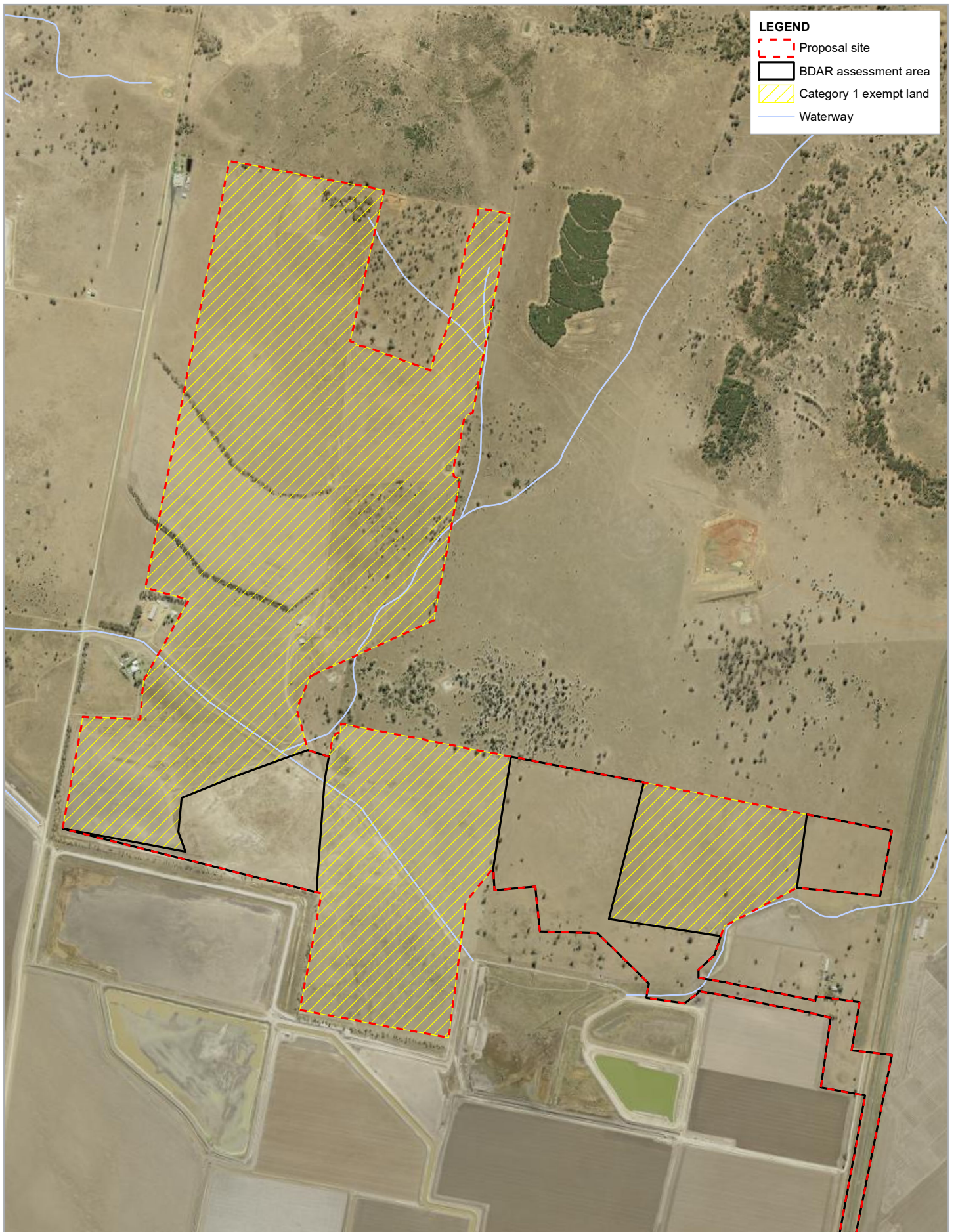
- Desktop review to determine the listed biodiversity matters that are predicted to occur within the locality of the proposal and hence could occur, subject to the habitats present.
- Targeted field surveys for listed threatened biota and migratory species.
- Assessment of potential impacts on threatened and migratory biota, including assessments of significance in accordance with the EPBC Act Significant Impact Guidelines 3.1 (DotE, 2013).
- Identification of suitable impact mitigation and environmental management measures for threatened and migratory biota, where required.

2.6 Assessment guidelines and information

This report has been prepared in accordance with the Biodiversity Assessment Method (OEH 2017a) and with reference to the following guidelines:

- *NSW Guide to Surveying Threatened Plants* (OEH, 2016c)

'Species credit' threatened bats and their habitats. NSW survey guide for the Biodiversity Assessment Method (OEH, 2018c).

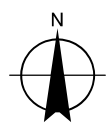


LEGEND

- Proposal site
- BDAR assessment area
- Category 1 exempt land
- Waterway

Paper Size ISO A4
 0 200 400
 Metres

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



Engie
 Silverleaf Narrabri Solar Farm
 Biodiversity Assessment

Project No. 21-26998
 Revision No. -
 Date 09 Aug 2021

Category 1 exempt land

FIGURE 2-1

3. Methods

3.1 Desktop assessment

3.1.1 Data review

A desktop database review was undertaken to identify threatened flora and fauna species, populations and ecological communities (threatened biota) listed under the BC Act and EPBC Act, that could be expected to occur in the locality, based on previous records, known distribution ranges, and habitats present. These were also used to obtain the necessary site data to perform BAM calculations.

A 10 km search radius from the proposal site was used to identify threatened species that were previously recorded in the locality. For flora species, the BioNet Atlas database (OEH, 2018a) yielded very few records and only one species within the standard 10 km search radius. This could reflect low or diffuse sampling efforts in the locality, rather than a low occurrence of threatened species. For this reason, the search radius for threatened flora was expanded to 20 km and included all valid records since 1980.

The threatened biota and migratory species identified in the desktop assessment are presented in Appendix A. Following collation of database records and threatened species and community profiles, a 'likelihood of occurrence' assessment was prepared for threatened biota and migratory species with reference to the broad vegetation types and habitats contained within the study area. This was further refined following field surveys and verification of vegetation types and identification and assessment of habitat present within the BAA. A likelihood of occurrence ranking was attributed to these biota based on this information.

Information sources used in the preparation of this report include:

- Office of Environment and Heritage (OEH) NSW BioNet Atlas database for records of threatened species listed under the BC Act (OEH, 2018a)
- OEH Threatened biodiversity profile search online database for threatened ecological communities listed under the BC Act (OEH, 2018d)
- Department of the Environment and Energy (DEE) Protected Matters Online Search Tool for MNES listed under the EPBC Act and predicted to occur in the locality (DEE, 2018a)
- DEE online Species profiles and threats database (SPRAT) (DEE, 2018b)
- NSW BioNet Vegetation Classification (OEH, 2018b) to identify matching plant community types (PCTs) in the study area
- The list of species credit-type species and predicted species identified by the BAM calculator (OEH, 2019)

3.1.2 Background research

Background research was conducted to identify:

- Landscape-scale features of the study area in accordance with Section 4.2 of the BAM (OEH, 2017a)
- Site context of the study area that includes assessing vegetation cover and patch size as required under Subsections 4.3.2 and 5.3.2 of the BAM (OEH, 2017a)
- The likely distribution of native vegetation and threatened ecological communities, based on previous mapping and aerial photograph interpretation, for targeted field verification as required under Section 5 of the BAM (OEH, 2017a).
- A list of predicted and candidate threatened species and populations of flora and fauna to assess the habitat suitability and threatened biodiversity data collection as required under Section 6 of the BAM (OEH, 2017a).
- Evaluate baseline information to determine whether additional surveys, mapping and reporting is required to support project approval.

The background research included analysis of the following information sources:

- Aerial photographic imagery
- NSW Mitchell Landscapes mapping and landscape descriptions (DECC, 2008a, DECC 2008b)
- Interim Biogeographic Regionalisation of Australia (IBRA version 7.0)
- Initial BAM credit calculations
- Namoi CMA vegetation extant map, 2013 VIS-ID 4028, mapping and report prepared by EcoLogical for the Namoi Catchment Management Authority (EcoLogical, 2013).
- Mapping of the EPBC-listed “Natural Grasslands on the basalt and fine textured alluvial plains of northern NSW and southern Queensland” in the Namoi Catchment. VIS ID 3852 (EcoLogical, 2010).
- Namoi CMA Pre-European Vegetation Mapping, Namoi Catchment Management Authority (EcoLogical, 2009).
- Atlas of Groundwater Dependent Ecosystems (GDE) (BOM, 2018a)
- Directory of Important Wetlands of Australia (DIWA) (DEWHA, 2008)
- Aerial photographs and satellite imagery of the BAA and buffer area

3.2 Site survey

3.2.1 Survey overview

Staged surveys of the study area were conducted in accordance with the BAM (2017) and with reference to appropriate threatened species survey guidelines for targeted species. Site surveys included:

- Initial site stratification and vegetation mapping
- Sampling of vegetation integrity plot/transects
- Habitat assessments
- Targeted surveys for threatened flora
- Targeted surveys for threatened fauna

Survey effort was formally stratified across the proposal site in accordance with the BAM (2017). Survey effort that has directly contributed to this BDAR is summarised in Table 3.1, mapped on Figure 3.1 and is described in detail below.

Table 3.1 *Survey techniques and timing*

Stage	Date	Survey Technique
BAM assessment survey	14-16 March 2018	Vegetation mapping Vegetation integrity plots Targeted flora searches Fauna survey Habitat assessment Spotlighting Call playback Anabats
Candidate species credit flora survey and additional plots	19-21 September 2018	Vegetation integrity plots Targeted flora searches Opportunistic fauna survey Raptor nest assessment

Stage	Date	Survey Technique
Candidate species credit flora survey and additional plots	13 November 2018	Vegetation integrity plots Targeted flora searches Opportunistic fauna survey
Candidate species credit flora survey	26-28 February 2020	Targeted flora searches

Publicly accessible portions of the transmission line alignment were assessed through driven and walked transects, and where the transmission line crossed private properties, these were viewed from the nearest road. Vegetation along the transmission line was mapped based on the visual inspections and from aerial photography interpretation.

3.2.2 Vegetation and flora surveys

Vegetation mapping

Vegetation was assessed with reference to the BAM (OEH, 2017a). Regional vegetation mapping was ground-truthed in the field via driven and walked transects across the study area to verify community type and boundaries, floristic and structural homogeneity within patches and to update mapping as required. The proposed transmission alignment was inspected via vehicular traverses along roadsides and tracks.

Native vegetation communities in the study area were assigned to the closest equivalent Plant Community Type (PCT) held in the BioNet Vegetation Classification database (OEH, 2018b). The closest equivalent PCT for each vegetation community was determined through a comparison of the floristic descriptions of PCTs in the database with the plot / transect data collected from the site. In addition to floristic and structural similarity, the landscape position, soil type and other diagnostic features of the vegetation communities on the sites were also compared to the descriptions in the database in order to determine the most suitable PCT. Threatened ecological communities (TECs) as defined in NSW and Commonwealth legislation were also identified.

The native vegetation in the study area was then stratified into vegetation zones in accordance with Section 5.3.1 of the BAM (OEH, 2017a). A vegetation zone is defined in the BAM as a relatively homogenous area that is of the same vegetation type and broad condition. Each vegetation zone was assigned a patch size in accordance with Section 5.3.2 of the BAM (OEH, 2017a).

Vegetation integrity survey plots (assessing site condition)

Following the stratification of the study area into vegetation zones, plot surveys were conducted in accordance with Section 5.3.3 and Section 5.3.4 the BAM (OEH, 2017a) to obtain vegetation integrity data for the calculation of biodiversity credits. The field data sheets are provided in Appendix D.

Plots were located to comply with the minimum number of plots required by Table 4 in the BAM (OEH, 2017a). Due to refinements of the proposal site boundary during detailed design as part of efforts to reduce impacts on native vegetation, some plots used in the BAM calculations are located outside the BAA. In total, 25 plots were sampled within the proposal site, with 15 plots located within the BAA and 10 plots outside of the BAA. The location of survey plots is shown on Figure 3.1 and the minimum plot survey requirements are summarised in Table 3.2.

Table 3.2 *Minimum plot survey requirements*

PCT	Condition	Area in BAA (ha)	Minimum number of plots required	Number of plots sampled	Comments
PCT 35 Brigalow - Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion (derived native grasslands)	Derived grassland	0.77	1	4	Three plots located outside the final proposal site due to revisions in the proposal site boundary and or land excluded due to classification as category 1 exempt land.
PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (woodland)	Moderate	0.69	1	3	All plots located outside the final proposal site due to revisions in the proposal site boundary
PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (derived native grasslands)	Derived grassland	53.89	5	6	Four plots located within land excluded due to classification as category 1 exempt land.
PCT 397 Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion (derived native grasslands)	Derived grassland	10.71	3	4	Three plots located within land excluded due to classification as category 1 exempt land.
Total		66.06	10	17	

Plots were located randomly within each of the vegetation zones by walking a random distance into the vegetation zone and then locating the plot on a randomly generated compass bearing, this was then repeated for subsequent plots within the vegetation zone. Plots were purposely not located near ecotones, tracks and their edges or other locally disturbed areas.

The site value was determined by assessing ten attributes used to assess function, composition and structure of vegetation within a 50 metre x 20 metre plot. These attributes were then assessed against benchmark values. Benchmarks are quantitative measures of the range of variability in condition in vegetation with relatively little evidence of alteration, disturbance or modification by humans since European settlement (DECC, 2009).

Attributes assessed within each plot are listed in Table 3.3. All flora species within a 20 metre by 20 metre quadrat nestled within the 50 m by 20 m plot were identified according to the nomenclature of the Royal Botanic Gardens and Domain Trust (RBGT, 2018). Each species identified was allocated a growth form group¹ and designated as either native, exotic or high threat exotic in accordance to the lists provided in the BAM calculator.

The overall condition of vegetation was assessed through general observation and comparison against the PCT condition benchmark data as well as using parameters such as species diversity, history of disturbance, weed invasion and canopy health.

Table 3.3 Site data collected within each plot

Attribute	Area assessed
Native plant species richness	20 X 20 metre plot
Percentage foliage cover for each species	20 X 20 metre plot
Estimated number of individuals for each species	20 X 20 metre plot
Number of large trees	50 X 20 metre plot
Tree regeneration (presence/absence)	50 X 20 metre plot
Tree stem size class	50 X 20 metre plot
Total length of fallen logs	50 X 20 metre plot
Litter cover	5 times 1 X 1 metre plot
High threat exotic vegetation cover	50 X 20 metre plot
Hollow bearing trees	50 X 20 metre plot

Targeted threatened flora surveys

Potential candidate species credit entities for the proposal site were identified and assessed in accordance with Section 6.3 and steps 1 to 4 of Section 6.4 of the BAM (OEH, 2017a). All threatened plants are classified under the BAM as species credit entities as their occurrence cannot be reliably predicted based on vegetation type.

The suite of threatened plants with potential to occur in the proposal site was identified based on the desktop assessment results and the species credit entities identified by preliminary BAM Credit Calculations (see Appendix D). Habitat for these species was identified and assessed based on OEH threatened species profiles and the experience and judgement of GHD ecologists. The majority of the proposal site is highly modified and is dominated by exotic species, grazed, and can be readily discounted as supporting occurrences of threatened plant species.

A limited number of threatened species associated with alluvial clays or basaltic soils were considered to have marginal potential habitat within the Belah woodland (PCT 55) types and associated derived native grassland areas of the proposal site. These were mainly woodland groundcover species, and include *Digitaria porrecta* (Finger Panic Grass), *Homopholis belsonii* (Belson's Panic) and *Swainsona murrayana* (Slender Darling Pea).

¹ TG – tree, SG – shrub, GG – grass/grasslike, FG – forb, EG – fern, OG – other (Table 3 of the BAM, OEH 2017a)

Threatened flora surveys were completed in March, September and November 2018. Noting that the above habitats at the time of survey were heavily grazed and relatively bare of ground vegetation, and considering the large areas of marginal potential habitat, searches were undertaken with due consideration of threatened species survey guidelines (DEC, 2004; OEH, 2016c), by utilising meandering traverses in marginal potential habitat within the proposal site, focussing on margins of woodland patches and along fence lines where grazing may be comparatively less intense.

Additional targeted surveys for threatened flora were completed over a three-day period from 26-28 February 2020. These surveys were undertaken following a period of significant summer rains. These surveys consisted of two ecologists walking transects located 10 metres apart within portions of the site containing suitable habitat for candidate flora species (refer to Table 3.4).

Table 3.4 Candidate flora species credit entities targeted during surveys

Common name	Scientific name	Appropriate survey period	Survey Method/Timing
Creeping Tick-trefoil	<i>Desmodium campylocaulon</i>	Dec-April	Parallel transect and meander surveys completed in March 2018 and February 2020.
Bluegrass	<i>Dichanthium setosum</i>	Nov- May	Parallel transect and meander surveys completed in March 2018 and February 2020.
Finger Panic Grass	<i>Digitaria porrecta</i>	Jan-Feb	Parallel transect and meander surveys completed in February 2020.
Spiny Peppergrass	<i>Lepidium aschersonii</i>	Nov-April	Parallel transect and meander surveys completed in March 2018, September 2018 November 2018 and February 2020.
Slender Darling Pea	<i>Swainsona murrayana</i>	Sep	Parallel transect and meander surveys completed September 2018

3.2.3 Terrestrial fauna surveys

Fauna habitat assessment

Fauna habitat assessments were undertaken throughout the proposal site during all survey periods, including observation of potential shelter, basking, roosting, nesting and/or foraging sites. Specific habitat features and resources such as water bodies, food trees, the density of understorey vegetation, the composition of ground cover, the soil type, presence of hollow-bearing trees, leaf litter and ground debris were noted.

Indicative habitat criteria for targeted threatened species (i.e. those determined as having the potential to occur within the proposal site following the desktop review) were identified prior to fieldwork. Habitat criteria were based on information provided in OEH and DEE threatened species profiles, field guides, and the knowledge and experience of GHD field ecologists.

Habitat assessments included searches for resources of potential value to threatened fauna including:

- Trees with bird nests or other potential fauna roosts
- Rock outcrops or overhangs providing potential shelter sites for fauna
- Burrows, dens and warrens
- Distinctive scats or latrine sites, owl whitewash and regurgitated pellets under roost sites
- Tracks or animal remains
- Evidence of activity such as feeding scars, scratches and diggings
- Specific food trees and evidence of foraging (chewed *Allocasuarina* cones)

The locations and quantitative descriptions of significant habitat features were captured with a handheld GPS unit and photographed where appropriate. The field survey effort included dawn and dusk observations of hollows for evidence of occupancy.

Opportunistic and incidental observations of fauna species were recorded at all times during field surveys. This included a conscious focus on suitable areas of habitat during flora surveys, for instance fallen timber was scanned and/or turned for reptiles and mature trees and stags were scanned for roosting birds.

Targeted fauna surveys

Under the BAM, targeted surveys are not required for threatened fauna species that can be reliably predicted to occur at the proposal site based on habitat surrogates (predicted / ecosystem credit species). These species are assumed to be present within certain PCTs, given a certain patch size and condition. Nonetheless these species and their habitats were recorded along with fauna that are not listed as threatened, as a general guide to the condition and biodiversity value of the proposal site.

Targeted, seasonal surveys are required for candidate threatened species entities i.e. species credit species and specific habitat resources such as nesting or roosting habitat for dual credit species. Candidate species credit entities that have a moderate potential to occur at the proposal site (refer to Appendix A) were targeted during these surveys are listed in Table 3.5.

Targeted threatened fauna surveys were undertaken between 14-16 March 2018, with supplementary surveys in September and November 2018. Further detail regarding candidate fauna species targeted during surveys is provided in Section 6.1. No harp netting was conducted as there were no flyways, and candidate bat species would have breeding habitat such as caves (dual credit species) or suitable habitat (species credit only species) at the site.

Targeted fauna survey techniques and effort conducted in the proposal site are summarised in Table 3.6. Survey effort was stratified across the entire proposal site, noting that fauna species are mobile and may rely upon habitat resources in the proposal site even if not directly observed at the proposal site. All fauna observations were recorded on pro forma field data sheets.

Table 3.5 Candidate fauna species credit entities targeted during surveys

Common name	Scientific name	Appropriate survey period	Survey Method/Timing
Australian Bustard	<i>Ardeotis australis</i>	All year	Diurnal bird surveys (Mar, Sep, Nov)
Bush Stone-curlew	<i>Burhinus grallarius</i>	All year	Diurnal bird surveys, Spotlighting, call playback (Mar, Sep, Nov)
Black-breasted Buzzard (breeding)	<i>Hamirostra melanosternum</i>	Sep-Nov	Habitat assessment – no breeding habitat present Diurnal bird surveys (March, Sep, Nov)
Koala	<i>Phascolarctos cinereus</i>	All year	Scat searches Opportunistic surveys Call playback (Mar, Sep, Nov)
Little Eagle (breeding)	<i>Hieraaetus morphnoides</i>	Aug-Sept	Diurnal bird surveys Survey of potential nest trees during breeding season (Sept)
Square tailed Kite (breeding)	<i>Lophoictinia isura</i>	Sept-Jan	Diurnal bird surveys Survey of potential nest trees during breeding season (Sept)

Table 3.6 Targeted fauna survey techniques and effort

Survey technique	Survey effort
Daytime traverses Active reptile/ amphibian searches Active searches for scats and signs	Targeted searches of habitat for 12 person hours Included dedicated searches for any signs of fauna occupation. Included searching for evidence of feeding, foraging and signs of bird presence (such as pellets, whitewash, nests etc.) and other biota (scats, scratchings, diggings, nests etc.). Active searches of woody debris, under rocks and other ground litter were conducted throughout the proposal site targeting frogs and reptiles.
Spotlighting	Two consecutive nights of walked spotlighting transects on 14 and 15 March (3 x person hours each night) were conducted between the hours of 8 – 10 PM. Total effort = 6 person hours.
Call Playback	Two consecutive nights of call playback on 14 and 15 March targeting Koala, Barking Owl and Masked Owl.
Ultrasonic call recording	2 x Anabats positioned in different locations over two nights (12 hours each/per night from 14-16 March 2018). Total effort = 48 hours.
Diurnal bird surveys	4 person hours x 3 days. Total effort = 12 person hours.
Opportunistic fauna surveys	Fauna surveys in conjunction with plot/transects and flora searches on three days in September and one afternoon in November. 2 person hours x 4 days Total effort = 8 person hours.

3.2.4 Aquatic habitat assessment

A rapid aquatic habitat assessment was undertaken along the drainage line in the proposal site. The character and condition of the drainage line was noted.

An assessment of potential habitat for threatened aquatic species was based on the habitat assessments undertaken during the field survey and published habitat preferences of threatened biota. Key fish habitat maps for the area (DPI, 2007) were reviewed and key fish habitat was identified according to the following classifications as detailed in (DPI, 2013):

- Type 1 – highly sensitive fish habitat (includes freshwater habitats that contain in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or three metres in length, or native aquatic plants; known or expected protected or threatened fish habitat; and areas of critical habitat).
- Type 2 – moderately sensitive key fish habitat (freshwater habitats other than those defined in Type 1)
- Type 3 – minimally sensitive key fish habitat (ephemeral aquatic habitat not supporting native aquatic or wetland vegetation)
- Not key fish habitat (includes first and second order streams on gaining streams)

3.3 Survey conditions

The field surveys were undertaken between March and November in 2018 and 26-28 February 2020. Bureau of Meteorology (BOM) records for survey dates are outlined in Table 3.7. These records were taken at Narrabri Airport weather station (054038) located approximately 3 kilometres from the proposal site (BOM, 2018b).

Surveys completed in September and November 2018 were undertaken during drought conditions, with much of the state experiencing drought impacts such as low soil moisture levels. The proposal site was very dry at the time of these survey, as indicated by the absence of water from natural drainage lines, heavily grazed vegetation, bare sections of earth from vegetation dieback, and relatively low grassland flora species diversity.

Targeted flora surveys completed between 26-28 February 2020 were undertaken following heavy rainfall in the Narrabri region. Rainfall recorded for the period between 5–19 February totalled 172 mm. As a result of this significant rainfall event conditions were ideal during the survey period between 26-28 February 2020 for detecting the majority of candidate threatened flora identified as having potential to occur within the proposal site if they were present. At the time of the targeted survey there was prolific growth of native plants and both flowering and fruiting material were observed.

Table 3.7 *Daily weather observations during the survey period*

Date	Minimum temp (Deg Celsius)	Max temp (Deg Celsius)	Rainfall (mm)
14 March 2018	17.4	32.5	0
15 March 2018	15.8	29.6	0
16 March 2018	18.6	35.7	0
19 September 2018	17.4	28.9	0
20 September 2018	8.2	21.3	0
21 September 2018	5.1	24.0	0
13 November 2018	14.2	32.6	0
26 February 2020	20.9	29.9	0
27 February 2020	18.8	31.2	4.8
28 February 2020	12.1	30.8	0

3.4 Geographical Information System (GIS) analysis

GIS was used to:

- Plot the proposal site on a high resolution aerial photo base and to map vegetation zones, survey effort, habitat resources and biodiversity values across the site.
- Calculate the extent of native vegetation to be impacted
- Identify patch sizes relevant to the proposal site
- Confirm the relevant IBRA bioregion, IBRA subregion and Mitchell Landscape for the site.

Additional GIS analysis was used to plot a 1,500 m buffer area surrounding the site in which site context components were calculated. Native vegetation cover, extent and connectivity were assessed using aerial photography. Air photo interpretation was used to identify and record distinct vegetation patches, determine the broad condition state of vegetation types and the location and extent of vegetated habitat corridors. Aerial photography was examined at scales between 1:2000 and 1:4000.

The buffer area and GIS area calculations were used to enter information about landscape value and to determine the change in Landscape Value score by assessing the impact of the proposal on native vegetation cover and connectivity as well as the patch size.

3.5 BAM calculations

The proposal was assessed according to the methodology presented in the BAM (OEH, 2017a), and the *Biodiversity Assessment Methods Calculator Users Guide* (OEH, 2017b). The BAM credit calculator is a software application that is used to apply the BAM. Data is entered into the BAM credit calculator based on information collected in the desktop assessment, site surveys and from using GIS mapping software.

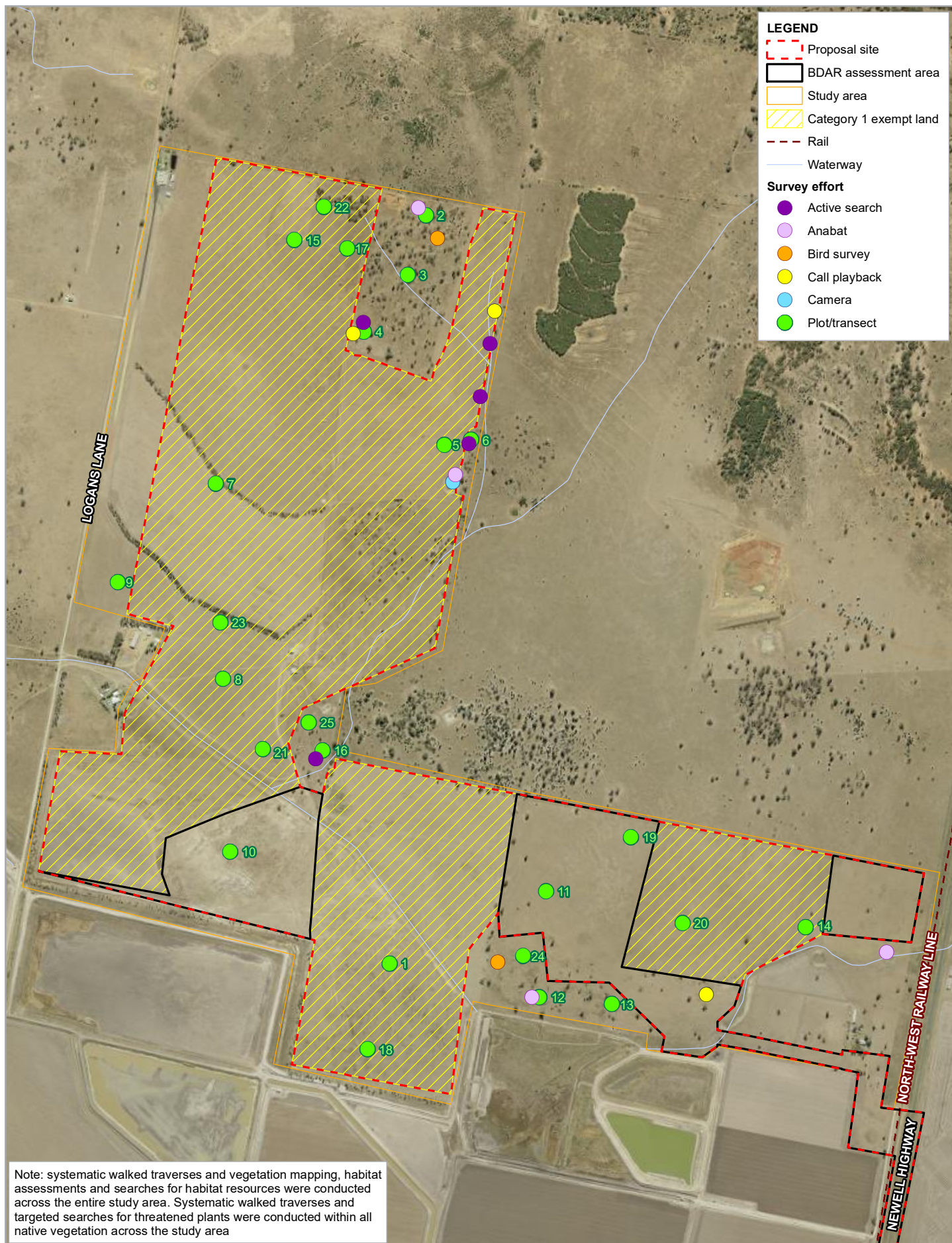
The original BAM credit calculations were performed by Cecilia Phu using credit calculator version 1.2.6.00 (OEH, 2019) These calculations were revised by Arien Quin (using credit calculator version 1.2.7.2) following BCD submissions on the project EIS and subsequent changes to the project boundary. Data entered into the BAM calculator is provided in Appendix D. The biodiversity credit report is included in Appendix F.

3.6 Staff qualifications

This BDAR was prepared by Kirsten Crosby (accredited assessor number BAAS17011), Cecilia Phu (accredited assessor number BAAS17058) and Arien Quin (BAAS 17098) in accordance with the BAM. A technical review of the report and credit calculations was undertaken by Ben Harrington (accredited assessor number BAAS17023). Qualifications of ecologists who assisted with this assessment are presented in Table 3.8.

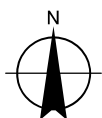
Table 3.8 GHD ecology staff and qualifications

Name	Position / Project Role	Qualifications	Relevant Experience
Kirsten Crosby	Senior Ecologist (fauna) Desktop assessment, site surveys, reporting	BSc (Zoology), PhD Accredited BAM Assessor	15+ years
Cecilia Phu	Senior Ecologist (flora) Site surveys, BAM calculations, targeted flora surveys, reporting	BSc (Honours) Accredited BAM Assessor	13+ years
Arien Quin	Senior Ecologist (flora) Site surveys, BAM calculations, reporting	BA, BSc Accredited BAM Assessor	13+ years
Philippa Fagan	Ecologist Site surveys	BBiod&Cons, MEnv&Bus Mgt Accredited BAM Assessor	4+ years
Alejandro Baretto	Senior Ecologist (flora) Targeted flora surveys	BSc Biotechnology Accredited BAM Assessor	6+ years
Bridie Halse	Ecologist Site surveys	BEnvs	2+ years
Ben Harrington	Technical Director – Technical review	BSc, MSc Accredited BAM Assessor	17+ years



Paper Size ISO A4
0 200 400
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Engie
Silverleaf Narrabri Solar Farm
Biodiversity Assessment

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

Survey effort

FIGURE 3-1

4. Landscape context

The BAM requires the assessment of landscape features to help describe the biodiversity values of the proposal site and assess the impacts of the proposal. Landscape features relevant to the BAM calculations are shown on Figure 4.1, discussed below and summarised in Table 4.1.

4.1 Location

The proposal site is located about four kilometres north-west of Narrabri, within the Narrabri Shire Council local government area. The proposal site consists of two rural properties located between Newell Highway in the east and Logans Lane in the west. The proposal site is predominantly located within the following lots:

- 330 Logans Lane – Lots 21 to 23 of DP 1174848 (referred to as the Logans Lane property in the EIS).
- 12461 Newell Highway – Lot 2 DP 586990 (referred to as the Newell Highway property in the EIS).

The proposal site also includes the corridor for a transmission line between the eastern side of the solar farm site and the substation located about 3.7 kilometres to the south on Stoney Creek Road.

4.2 Existing land uses

The study area for this assessment has an area of approximately 396 hectares and is currently used for agricultural purposes, with the primary use being grazing with some cropping. The study area contains three residential dwellings with two located on the Logan's Lane property and one on the Newell Highway property. Existing property access points are available adjacent to each of the dwellings from either Logans Lane or the Newell Highway. The Logans Lane property also has a number of sheds, some are positioned around the dwellings and some located east of the dwellings.

A low voltage transmission line runs through the southern part of the Logans Lane property and provides power to the dwellings on this property and also to the private airstrip (as discussed below). The alignment of this transmission line is shown in Figure 1.1.

A small private airstrip is located adjacent to the north-west corner of the solar farm site and is used by small crop dusting aircraft. This air strip is located on a separate property and does not form part of the properties on which the proposal is to be constructed.

4.3 Climate

In Narrabri, the climate is warm and temperate. About 658 mm of precipitation falls annually, with lowest rainfall in September and highest in January. January is also the warmest month with an average of 26.4 °C and maximum of 33.8 °C, while July is the coldest month of the year with an average of 10.6 °C and minimum of 3.8 °C.

4.4 Landscape features

The study area is in the Brigalow Belt South IBRA bioregion and occurs within the Liverpool Plains IBRA subregion (IBRA version 7.0). Landscape features within the study area as prescribed in Section 4 of the BAM are summarised in Table 4.1 and shown in Figure 4.1.

Table 4.1 *Landscape features*

Landscape feature	Study area
IBRA bioregions and subregions	Brigalow Belt South Bioregion / Liverpool Plains subregion
NSW landscape regions (Mitchell landscapes)	Kaputar Slopes and Liverpool Alluvial Plains (see section 4.4.1 below).
Local Government Area (LGA)	Narrabri
Rivers and streams	A predominantly 2 nd order stream runs across the site. This channel runs through the site from Logans Lane to the property to the south where gates are located to control water flow. This drainage line is not mapped as key fish habitat (DPI, 2007).
Important and local wetlands	No important wetlands occur at the proposal site, on adjacent lands or downstream. To local wetlands are mapped as occurring adjacent to the proposal site (refer to Figure 1-1). Neither of these wetlands would be impacted by the proposal.
Connectivity features	Vegetation at the site provides limited connectivity with areas outside the site.
Areas of geological significance and soil hazard features	There are no karst, caves, crevices, cliffs or other areas of geological significance located within the proposal site or buffer area surrounding the site.
Areas of outstanding biodiversity value	No declared areas of outstanding biodiversity value occur in or near the proposal site
Landscape features listed in the SEARs	No additional landscape features are listed in the SEARs

4.4.1 Mitchell landscape

The proposal site is located within two Mitchell soil landscapes: (1) Kaputar Slopes, and (2) Liverpool Alluvial Plains. The descriptions for these soil landscapes are reproduced below from DECC (2008a):

Kaputar Slopes: *Lower slopes of the Kaputar volcanic complex with radiating finger-like ridges capped by basalt over lower Permian and Triassic quartz sandstone, lithic sandstone, silty sandstone, conglomerate and thin coal measures. General elevation 300 to 500m, local relief 80m. Shallow stony red-brown loam and clay loam in uniform profiles on basalt, yellow and yellow-brown texture-contrast profile on sandstone, deep black earths in lowest valleys. Kurrajong (Brachychiton populneus), yellow box (Eucalyptus melliodora), white box (Eucalyptus albens), rough-barked apple (Angophora floribunda) and Blakely's red gum (Eucalyptus blakelyi) on lower slopes and valleys.*

Liverpool Alluvial Plains: *Quaternary alluvial plains and outwash fans derived from Tertiary basalts. Permian and Triassic quartz sandstones with minor basalt caps. Undulating hills and sloping plains with alluvial channels and floodplains. General elevation 300 to 350m, local relief <10m. Extensive black earths on low angle slopes. Deep black and brown cracking clays, alluvial soils and red or brown texture-contrast soils on slopes below sandstone. Open grasslands of plains grass (Austrostipa aristiglumis), Panicum sp., windmill grass (Chloris truncata) and blue grass (Dichanthium sericeum) on black earths with occasional myall (Acacia pendula), white box (Eucalyptus albens), yellow box (Eucalyptus melliodora), bimbale box (Eucalyptus populnea) and wilga (Geijera parviflora). River red gum (Eucalyptus camaldulensis) along streams.*

The soils, vegetation and landform across the majority of the proposal site is well-matched to the Liverpool Alluvial Plains soil landscape. It is characterised by alluvial and basalt derived soils on a relatively flat landscape and supports vegetation containing *Eucalyptus populnea* (Poplar Box, also referred to as Bimbale Box), *Geijera parviflora* (Wilga) and *Casuarina cristata* (Belah), which are all species typical of heavier, dark soils such as alluvial clays and basalts.

4.5 Determining site context

To determine site context as required under Section 4.3 of the BAM, an assessment of native vegetation cover and patch size has been undertaken and is outlined below.

4.5.1 Native vegetation cover

Native vegetation cover (woody and non-woody) was assessed on the proposal site and within a 1,500 metre (3189.3 ha) buffer area surrounding the outside edge of the boundary of the proposal site. Aerial photography was examined at scales between 1:2000 and 1:4000. The percent native vegetation cover within the 1,500 metre buffer area was calculated as 28 % and includes:

- Native vegetation
- Regrowth native vegetation
- Derived or modified native grasslands

Areas that were excluded include:

- Cleared areas
- Non-native cropping land
- Dams, ponds and other waterbodies
- Buildings

The identification of native vegetation (including derived native grasslands) in the 1,500 m buffer area was based on review of the Namoi CMA vegetation extant map, 2013 VIS-ID 4028 (EcoLogical, 2013), in combination with aerial photograph interpretation and ground-truthing during field surveys.

Table 4.2 Native vegetation cover

Native vegetation cover	Values
Total assessment area (1,500 m buffer area)	3189 (nearest whole hectare)
Area of native vegetation cover (woody and non-woody)	884 (nearest whole hectare)
% native vegetation cover	28% (nearest percentile)
Cover class	>0-30%

4.5.2 Patch size

Patch size is defined under the BAM (OEH, 2017a) as an area of intact native vegetation that:

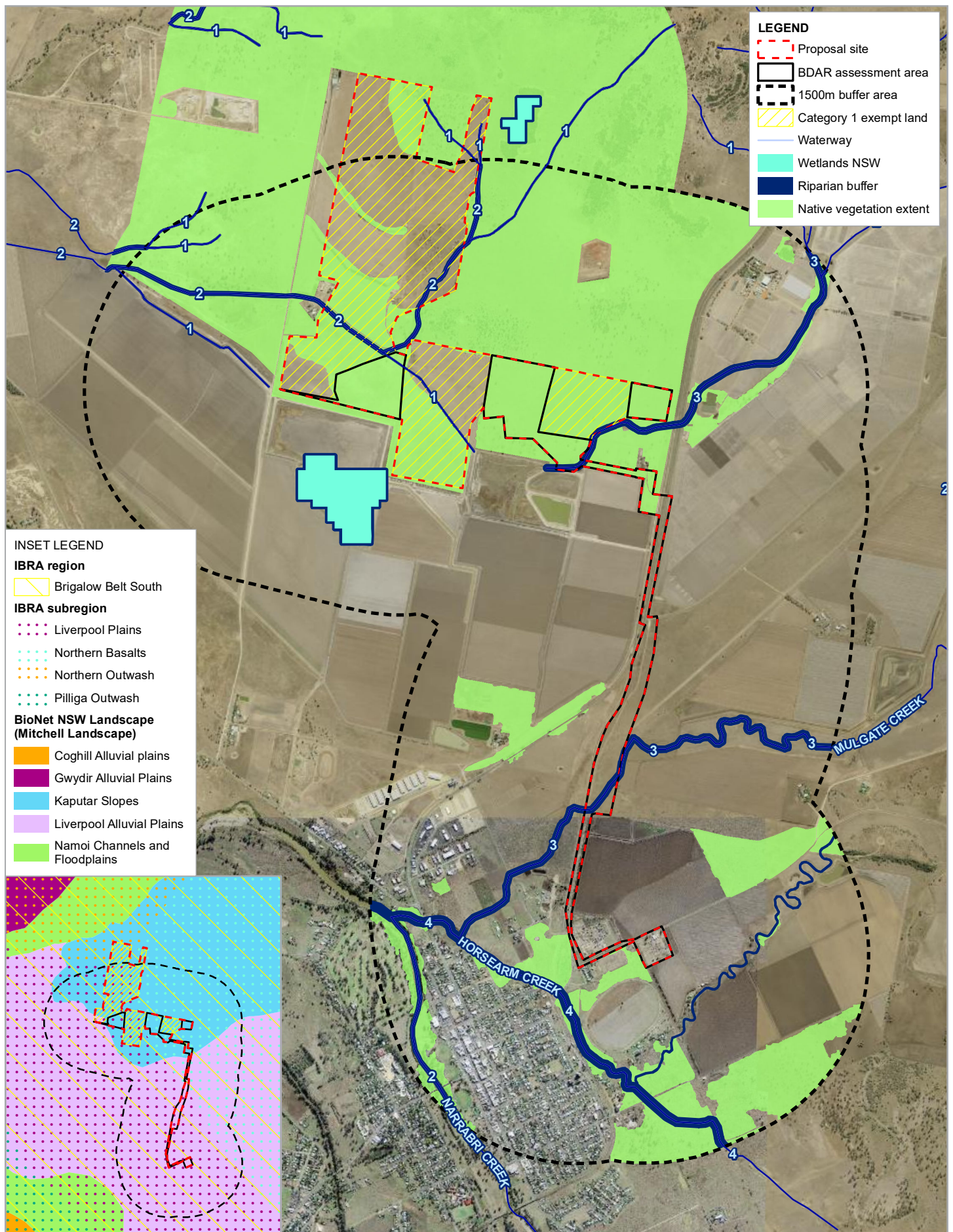
- Occurs on the development site (i.e. proposal site)
- Includes native vegetation that has a gap of less than 100 m from the next area of moderate to good native vegetation (or ≤ 30 m for non-woody ecosystems)

Patch size may extend onto adjoining land that is not part of a development site or a stewardship site. Patch size area is assigned to each vegetation zone as a class, being < 5ha, 5-24 ha, 25-100 ha or ≥ 100 ha. For the purposes of the calculations in the BAM and for this assessment, the total patch size has not been calculated outside of the 1,500 m buffer area, given the highest class was already reached within the buffer area.

Patch size includes areas of derived native grassland therefore all vegetation zones a patch size of 101 ha was entered into the credit calculator.

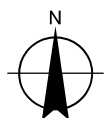
Table 4.3 Patch size

Veg zone	Patch size class
1	>100 ha
2	>100 ha
3	>100 ha
4	>100 ha



Paper Size ISO A4
0 400 800
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Engie
Silverleaf Narrabri Solar Farm
Biodiversity Assessment

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

Landscape features

FIGURE 4-1

5. Vegetation

5.1 Flora species

A total of 143 species from 36 families were identified within the proposal site during the field survey, including 104 native species and 39 exotic species (Appendix C). The most species diverse families recorded were Poaceae (42 species, 30 native and 12 exotic), Asteraceae (14 species, eight native and six exotic), Chenopodiaceae (13 species all native) and Malvaceae (10 species, eight native and two exotic).

No threatened flora species were identified within the proposal during the field survey. The proposed transmission easement was inspected during vehicular and pedestrian traverses along roadsides. This inspection indicated that this land contains cleared cultivated lands and exotic grassland. No native vegetation would be impacted by the construction of the transmission line.

5.1.1 Priority and high threat species

One priority weed, *Lycium ferocissimum* (African Boxthorn) listed in the North West region (which includes the Narrabri local council area) was recorded within the proposal site during the field survey. The state and regional objective for this priority weed under the *Biosecurity Act 2015* is to protect priority assets. As such, the applicable mandatory measure for this species under Division 8, Clause 33 of the *Biosecurity Regulation 2017* is the restriction of sale or import of the species into the state (i.e. 'prohibition on dealings'). *Opuntia stricta* (Prickly Pear) is not a priority weed for the North West region but does carry a state objective of asset protection and so the same mandatory measure (i.e. prohibition on dealings) also applies to this species.

In addition, the general biosecurity duty also applies to all weed species, including African Boxthorn and Prickly Pear. The recommended measures to demonstrate compliance with the general biosecurity duty are (NWLLS, 2017):

- Land managers should mitigate the risk of new weeds being introduced to their land
- Land managers should prevent seed and propagules spreading from their land
- Land managers reduce the impacts of the plant on priority assets.

Lycium ferocissimum (African Boxthorn) and *Opuntia stricta* (Prickly Pear) are also Weeds of National Significance declared under the National Weed Strategy, which recommends that their spread should be minimised to protect priority assets.

The following exotic species recorded in the proposal site are classified as high threat weeds for the purposes of the BAM:

- *Carthamus lanatus* (Saffron Thistle)
- *Vachellia farnesiana* (Mimosa Bush)
- *Chloris gayana* (Rhodes Grass)
- *Paspalum dilatatum* (Paspalum)
- *Paspalum urvillei* (Vasey Grass)
- *Lycium ferocissimum* (African Boxthorn)

5.2 Vegetation in the region

The Narrabri region is located on the Liverpool Plains, a broad Quaternary alluvial plain bounded by volcanic ranges (Nandewar Ranges and Mt Kaputar to the east and the Warrumbungles to the west). Located at the confluence of several subregions within the Brigalow Belt South (including Liverpool Plains, Northern Outwash, and Northern Basalt sub-bioregions), the geology of the region features Tertiary and Quaternary alluvial fans and basalt outwashes. Soils are characterised by brown clays, red loams, and red or brown texture contrast soils on slopes below sandstone (OEH, 2015). Low angle slopes feature rich black earths (OEH, 2015).

The region supports a variety of vegetation types, from semi-arid woodlands to grassy woodlands and grasslands, to dry open forests (OEH, 2016a). Typical species on the fertile basalt and alluvial flats include *Eucalyptus populnea* (Poplar Box), *E. pilligaensis* (Pilliga Box), *E. moluccana* (Grey Box), *Casuarina luehmannii* (Bulloak), *C. cristata* (Belah), *Acacia harpophylla* (Brigalow), and *Callitris glaucophylla* (White Cypress Pine), with *Eucalyptus camaldulensis* (River Red Gum) along creeks and streams (OEH, 2016a). Shrub species commonly found on the heavier alluvial clays and basalts include *Geijera parviflora* (Wilga), *Eremophila mitchellii* (Budda), *Alectryon oleifolius* (Rosewood) and *Atalaya hemiglauca* (Whitewood) (OEH, 2016a). Native grasslands are commonly dominated by *Austrostipa aristiglumis* (Plains Grass), *Panicum* species, *Chloris* species and *Dichanthium* species on black earths (OEH, 2016a). Sandy soils (such as sandy outwash areas to the south of Narrabri) and skeletal sandy ridgetops support ironbark and *Callitris* open forests (OEH, 2016a).

Narrabri is broadly situated on the floodplains of the Namoi River and has a long agricultural history, with agricultural settlement of the broader Liverpool Plains taking place in the late 1820s (OEH, 2016b). From pastoral farming to crop farming, Narrabri is a recognised agricultural centre supporting industries such as cotton, wheat, beef and lamb (Lawrence Consulting, 2012). As such, much of the original vegetation in the region has been cleared to support agriculture, with remaining intact or remnant woodland vegetation on the flats occurring as scattered, diffuse patches within a predominantly grassland landscape. Larger areas of intact remnant vegetation remain in less fertile areas, namely thin and sandy soils in the outwash and sandstone ridgetop landscapes.

5.3 Vegetation at the proposal site

5.3.1 Native vegetation extent

The majority of the proposal site has been cleared and used for agriculture (sheep and cattle grazing). The dominant vegetation within the proposal site is native grasslands derived from PCT 55 (Belah Woodland on alluvial plains). A smaller proportion of the site includes native grasslands derived from PCT 397 (Poplar Box-White Cypress Pine shrub grass tall woodland). There is a very small patch (0.7 ha) of the woodland form of PCT 55 along the southern edge of the proposal site.

The extent of native vegetation mapped within the proposal site is approximately 66.1 ha, comprised of 65.4 ha derived native grassland and 0.7 ha of Belah Woodland (see Table 5.1). There is approximately 45.1 ha of cleared or non-native vegetation in the proposal site comprising, exotic pastures or exotic grassland

5.3.2 Plant community types

There is one small (0.7 ha) patch of remnant woodland present in the proposal site; this patch has been highly modified as a result of agricultural activities, with much of the understorey affected by grazing activities. This remnant woodland has been mapped and described in the proposal site in accordance with the BAM. The remnant woodland patch corresponds to PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.

The surrounding derived native grasslands that occur at the proposal site are continuous with the understoreys of the remnant woodland patches and are considered to be derived from the clearing of the original woodland PCT. For this reason, different areas of derived native grassland have been assigned to the woodland PCTs that would have originally occurred. In determining the original woodland PCT that would have occurred at a location, consideration was given to nearby woodland patches (within and outside of the proposal site) and any scattered paddock trees present.

One of the PCTs identified within the study area (PCT 35 Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion) comprises a local occurrence of the endangered ecological community (EEC) listed under the BC Act as Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions. It is also commensurate with the EEC listed under the EPBC Act as Brigalow (*Acacia harpophylla*) dominant and co-dominant (see Figure 6.1). The proposal site has been redesigned to avoid the areas of this community.

The vegetation types (including PCTs, derived grassland and non-native or non-indigenous vegetation) mapped within the study area are summarised in Table 5.1. Within the study area, the vegetation zones identified within the proposal site are detailed in Table 5.2 and shown on Figure 5.1.

Table 5.1 *Vegetation types in the study area and proposal site*

Vegetation type	BC Act status	EPBC Act status	Extent in study area (ha)	Extent in proposal site (ha)
PCT 35 Brigalow- Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions – EEC	Brigalow (Acacia harpophylla dominant and co-dominant) - EEC	3.9	0
PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Not listed	Not listed	6.8	0.69
PCT 397 Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion	Not listed	Does not meet the key diagnostic characteristics in the listing advice for Poplar Box Woodland EEC.	18.5	0
PCT 35 Derived Native Grasslands	Does not conform to the Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions - EEC final determination	Does not meet the key diagnostic characteristics in the listing advice for Brigalow (Acacia harpophylla dominant and co-dominant) – EEC	36.1	0.77
PCT 55 Derived Native Grasslands	Not listed	Not listed	159.8	53.89
PCT 397 Derived Native Grasslands	Not listed	Not listed	37.0	10.71
Planted vegetation	Not listed	Not listed	10.95	0
Cropped/predominantly exotic grassland	Not listed	Not listed	226.13	38.41
Cleared	Not listed	Not listed	8.1	6.69
TOTAL			507.28	111.16

Table 5.2 *Vegetation zones within the proposal site*

Vegetation zone	Plant community type (OEH, 2018c)	PCT ID	Condition	Area (ha)	Patch size (ha)	BC Act Status	EPBC Act Status	Notes
n/a	Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion	35	Moderate	0	101	EEC/SAII	EEC	Proposal site boundary was revised to avoid this zone and hence potential impacts on this EEC and SAI entity
n/a	Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion	35	Moderate	0	101	EEC/SAII	EEC	Proposal site boundary was revised to avoid this zone and hence potential impacts on EEC and SAI entity
1	Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion	35	Derived grassland	0.77	101	Does not meet EEC condition criteria	Does not meet EEC condition criteria	-
2	Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	55	Moderate	0.69	101	Not listed	Not listed	-
3	Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	55	Derived grassland	53.89	101	Not listed	Not listed	-
n/a	Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion	397	Moderate	0	101	Not listed	Does not meet the key diagnostic characteristics to comprise Poplar Box woodland on Alluvial Plains (see section 6)	The proposal site boundary was revised to avoid impacts to this zone
4	Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion	397	Derived grassland	10.71	101	Not listed	Not listed	-
Total				66.06				

5.3.3 Vegetation profiles


Description profiles of the PCTs present in the study area are provided in Table 5.3, Table 5.4 and Table 5.5. Non-native and planted vegetation is described in Table 5.6 and Table 5.7.

Table 5.3 *Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion*

Attribute	Description
Vegetation Formation	Semi-arid Woodlands (grassy sub-formation)
Vegetation Class	Brigalow Clay Plain Woodlands
PCT ID	35
PCT % Cleared	90%
Plots sampled	6, 16, 25 (woodland form, vegetation zone 1 and 2) 8, 9, 21, 23 (derived native grassland form, vegetation zone 3)
Floristic description	<p><u>Woodland Form</u></p> <p>This community is a low open woodland dominated by <i>Acacia harpophylla</i> (Brigalow) with a sparse understorey characterised by low abundances of saltbush species and native grasses.</p> <p>The canopy layer includes occasional occurrences of <i>Eucalyptus populnea</i> (Poplar Box) and <i>E. pilligaensis</i> (Pilliga Box).</p> <p>The low shrub layer is characterised by <i>Enchylaena tomentosa</i> (Ruby Saltbush), <i>Sclerolaena birchii</i> (Galvanised Burr), <i>S. muricata</i> (Black Rolypoly), <i>Dysphania pumilio</i> (Small Crumbweed), <i>Rhagodia spinescens</i> (Thorny Saltbush), <i>Einadia</i> spp. and <i>Portulaca oleracea</i> (Pigweed).</p> <p>The ground layer was very sparse at the time of survey but the dominant species included <i>Enteropogon acicularis</i> (Curly Windmill Grass), <i>Urochloa panicoides</i>* (Urochloa Grass), <i>Tribulus terrestris</i>* (Caltrop) and <i>Boerhavia dominii</i> (Tarvine).</p> <p><u>Derived native grassland form</u></p> <p>Areas mapped as containing derived native grassland from PCT 35 have had their canopy and shrub layer removed. The groundlayer in these areas has been degraded through grazing and other agricultural activities. Native species present within these areas include a variety of resilient native grass and herb species including <i>Aristida leptopoda</i> (White Speargrass), <i>Austrostipa aristiglumis</i> (Plains Grass), <i>Chloris truncata</i> (Windmill Grass), <i>Enteropogon acicularis</i> (Curly Windmill Grass), <i>Solanum esurale</i> (Quena), <i>Sida cunninghami</i> (Ridge Sida), <i>Chrysocephalum apiculatum</i> (Common Everlasting), <i>Bothriochloa ewertiana</i> (Desert Bluegrass), <i>Einadia nutans</i> (Climbing Saltbush) and <i>Vittadenia</i> spp.</p>
Justification for PCT selection	Although the occurrence of this PCT within the study area is highly degraded and exhibits low native species diversity, it is generally consistent with the attributes described for this PCT in the BioNet Vegetation Classification database (landform position, dominant canopy, soil types, location).
Conservation significance	<p>Woodland occurrences of this community within the study area are consistent with the final determination for the EEC <i>Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains</i> (BC Act).</p> <p>The woodland occurrences are also consistent with the EEC <i>Brigalow</i> (<i>Acacia harpophylla</i> dominant and co-dominant) (EPBC Act).</p> <p>The derived native grassland occurrences of this PCT are not consistent with the EECs listed under the BC Act and EPBC Act.</p>

Attribute	Description
Photograph	<div>  </div> <p>Photograph 1 Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion (remnant woodland)</p> <div>  </div> <p>Photograph 2 Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion (derived native grassland)</p>

Table 5.4 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions

Attribute	Description
Vegetation Formation	Semi-arid Woodlands (grassy sub-formation)
Vegetation Class	North-west Floodplain Woodlands
PCT ID	55
PCT % Cleared	83%
Plots sampled	12, 13, 24 (woodland form, vegetation zone 4) 1, 10, 11, 14, 18, 20 (derived native grassland form, vegetation zone 5)
Floristic description	<p><u>Woodland form</u></p> <p>This community is a tall woodland dominated by <i>Casuarina cristata</i> (Belah) and <i>Eucalyptus pilligaensis</i> (Pilliga Box) with a sparse understorey characterised by low abundances of saltbush species and native grasses. Although it is similar to PCT 35, it differs from PCT 35 in that it does not support any occurrences (regrowth or otherwise) of <i>Acacia harpophylla</i> (Brigalow).</p> <p>The low shrub layer is characterised by <i>Sclerolaena muricata</i> (Black Rolypoly), <i>Solanum esuriale</i> (Quena), <i>Sclerolaena birchii</i> (Galvanised Burr), <i>Sclerolaena divaricata</i> (Tangled Copperburr), <i>Salsola australis</i> and <i>Alectryon diversifolius</i> (Scrub Boonaree).</p> <p>The groundcover is very sparse and is characterised by low covers of native and exotic grasses and forbs, including <i>Enteropogon acicularis</i> (Curly Windmill Grass), <i>Chloris truncata</i> (Windmill Grass), <i>Hordeum leporinum</i>* (Barley Grass), <i>Rapistrum rugosum</i>* (Turnip Weed), <i>Medicago minima</i>* (Woolly Burr Medic), <i>Urochloa panicoides</i> (Urochloa Grass), <i>Austrostipa aristiglumis</i> (Plains Grass), <i>Panicum effusum</i> (Hairy Panic) and <i>Sporobolus caroli</i> (Fairy Grass).</p> <p><u>Derived native grassland form</u></p> <p>Areas mapped as containing derived native grassland from PCT 55 have had their canopy and shrub layer removed. The groundlayer in these areas has been degraded through grazing and other agricultural activities and is characterised by low covers of native and exotic grasses and forbs, including <i>Aristida leptopoda</i> (White Speargrass), <i>Austrostipa aristiglumis</i> (Plains Grass), <i>Enteropogon acicularis</i> (Curly Windmill Grass), <i>Chloris truncata</i> (Windmill Grass), <i>Bothriochloa ewertiana</i> (Desert Bluegrass), <i>Einadia nutans</i> (Climbing Saltbush), <i>Portulaca oleraceae</i> (Pigweed), <i>Leptochloa divaricatissima</i>, <i>Hordeum leporinum</i>* (Barley Grass), <i>Rapistrum rugosum</i>* (Turnip Weed), <i>Medicago minima</i>* (Woolly Burr Medic), <i>Urochloa panicoides</i> (Urochloa Grass), <i>Chrysocephalum apiculatum</i> (Common Everlasting), <i>Panicum effusum</i> (Hairy Panic) and <i>Sporobolus caroli</i> (Fairy Grass).</p>
Justification for PCT selection	Although the occurrence of this PCT within the proposal site is highly degraded and exhibits low native species diversity, it is generally consistent with the attributes described for this PCT in the BioNet Vegetation Classification database (landform position, dominant canopy, soil types, location).
Conservation significance	Not listed as a threatened ecological community under BC Act and EPBC Act.
Photograph	 <p>Photograph 3 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (remnant woodland)</p>


Attribute	Description
	 <p>Photograph 4 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (derived native grassland)</p>

Table 5.5 *Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion*

Attribute	Description
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Pilliga Outwash Dry Sclerophyll Forests
PCT ID	397
PCT % Cleared	45%
Plots sampled	15, 17, 19, 22 (derived native grassland form, vegetation zone 7)
Floristic description	<p><u>Derived native grassland form</u></p> <p>Areas mapped as containing derived native grassland from PCT 397 have had their canopy and shrub layer removed. The groundlayer in these areas has been degraded through grazing and other agricultural activities and is characterised by low covers of native and exotic grasses and forbs, including <i>Aristida ramosa</i> (Purple speargrass), <i>Enteropogon acicularis</i> (Curly Windmill Grass), <i>Chloris truncata</i> (Windmill Grass), <i>Bothriochloa ewertiana</i> (Desert Bluegrass), <i>Einadia nutans</i> (Climbing Saltbush), <i>Portulaca oleraceae</i> (Pigweed), <i>Leptochloa divaricatissima</i>, <i>Hordeum leporinum</i>* (Barley Grass), <i>Rapistrum rugosum</i>* (Turnip Weed), <i>Medicago minima</i>* (Woolly Burr Medic), <i>Urochloa panicoides</i> (Urochloa Grass), <i>Chrysocephalum apiculatum</i> (Common Everlasting), <i>Panicum effusum</i> (Hairy Panic) and <i>Sporobolus caroli</i> (Fairy Grass). This vegetation zone also includes a very sparse cover of resilient sub shrubs including <i>Scleroleana</i> and <i>Maireana</i> spp.</p>
Justification for PCT selection	The occurrence of this PCT within the proposal site has been modified through grazing and past clearing of the canopy layer and midstorey. However, it contains a relatively high native species diversity, with the floristic composition and associated landform position, dominant canopy, soil types, location etc generally consistent with the attributes described for this PCT in the BioNet Vegetation Classification database.
Conservation significance	This community does not meet the key diagnostic criteria to comprise an occurrence of the TEC listed under the EPBC Act as Poplar Box Grassy Woodland on Alluvial Plains as it does not have a canopy layer dominated by <i>Eucalyptus populnea</i> (rather it is dominated by <i>Eucalyptus melanophloia</i>) .


Attribute	Description
Photograph	 <p>Photograph 5 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion (derived native grassland)</p>

Table 5.6 *Non-Native Vegetation (cropped/ predominantly exotic grassland)*

Attribute	Description
Vegetation Formation	n/a
Vegetation Class	n/a
PCT ID	n/a
PCT % Cleared	n/a
Plots sampled	5, 7
Floristic description	<p>Non-native vegetation in the study area is dominated by exotic grasslands comprising pastures or cropping for pasture, and roadside or trackside grassy swales. The dominant grass species recorded within exotic grassland was <i>Urochloa panicoides</i> (Urochloa Grass). Along roadsides, other common exotic species include <i>Paspalum dilatatum</i> (Paspalum), <i>Plantago lanceolata</i> (Lamb's Tongue) and <i>Modiola caroliniana</i> (Red-flowered Mallow).</p> <p>Other frequently recorded species within exotic grassland also comprised exotic plants and included <i>Polygonum aviculare</i> (Wireweed), <i>Conyza bonariensis</i> (Flaxleaf Fleabane), <i>Sida rhombifolia</i> (Paddy's Lucerne), <i>Centaurea solstitialis</i> (St Barnaby's Thistle) and <i>Tribulus terrestris</i> (Cat-head).</p>
Justification for PCT selection	n/a
Conservation significance	Non-native vegetation. Does not comprise an occurrence of a threatened ecological community.

Attribute	Description
Photograph	 <p>Photograph 6 Non-native vegetation (cropped/ predominantly exotic grassland)</p>

5.3.4 Groundwater dependent ecosystems

The *NSW State Groundwater Dependent Ecosystems Policy* defines groundwater dependent ecosystems (GDEs) as ecosystems which have their species composition, and their natural ecological processes determined by groundwater (DLWC, 2002). Ecosystems vary dramatically in the degree of dependency of groundwater, from having no apparent dependence through to being entirely dependent on it (DLWC, 2002).

Dependence (or interaction) of the vegetation communities identified within the proposal site on groundwater was determined by searching the Atlas of GDEs (BOM, 2018a). This Atlas predicts the occurrence of groundwater dependent ecosystems and ecosystems that potentially use groundwater. It shows ecosystems that interact with the subsurface expression of groundwater (including vegetation ecosystems) or the surface expression of groundwater (such as rivers and wetlands. The Atlas also shows the likelihood that landscapes are accessing water in addition to rainfall, such as soil water, surface water or groundwater.

Native vegetation within the proposal site is mapped as having a low potential for being reliant on the subsurface presence of groundwater (BOM, 2018a). No aquatic GDEs are present.

5.4 Fauna habitat resources

5.4.1 Fauna species

A total of 50 species of fauna were recorded during the field survey. These included 30 bird species (including three introduced species), 15 mammal species (including three introduced species and 11 microbat species), three reptile species and two frog species (see Appendix C).

5.4.2 Fauna habitats

Fauna habitats comprise small patches of highly modified woodland and large areas of derived grassland or cropped land. There are no caves or culverts, cliff lines, substantial rock outcrops, wetlands or waterbodies in the proposal site. Fauna habitats present at the site are detailed in Table 5.7 to Table 5.9.

Table 5.7 Fauna habitats: grassland with scattered trees

Grassland with scattered paddock trees	
Description	Dominated by exotic crop species (e.g. Oats) or derived native grassland. Occasional isolated paddock trees or small groups of paddock trees are present (see Photograph 7). Paddock tree species comprise Narrow-leaved Grey Box (<i>Eucalyptus pilligaensis</i>) and occasional White Cypress Pine (<i>Callitris glaucophylla</i>). Many of the Narrow-leaved Grey Box were hollow-bearing.
Fauna recorded	<p>A number of bird species typically associated with open grazing country were recorded. Galahs (<i>Eolophus rosiecapillus</i>), Red-rumped Parrot (<i>Psephotus haematonotus</i>) and Eastern Rosella (<i>Platycercus eximius</i>) were recorded, often near hollows. The introduced Common Myna (<i>Sturnus tristis</i>) and Common Starling (<i>Sturnus vulgaris</i>) are likely to compete with native bird species for hollows. Small flocks of the Noisy Miner (<i>Manorina melanocephala</i>) were observed. Occasional ravens (<i>Corvus</i> spp.) and Pied Butcherbirds (<i>Cracticus nigrogularis</i>) were seen perching on fences and powerlines. Flocks of Welcome Swallows (<i>Hirundo neoxena</i>) were seen foraging above and in the pasture and grassland. Whistling Kites (<i>Haliastur sphenurus</i>) were observed at a nest in a paddock tree.</p> <p>The introduced Brown Hare (<i>Lepus capensis</i>) and Fox (<i>Vulpes vulpes</i>), and Eastern Grey Kangaroo (<i>Macropus giganteus</i>) were observed in open paddocks. A range of microbats were recorded and would forage over the proposal site. Potential roosting habitat is present in hollow trees.</p> <p>South-eastern Morethia Skinks (<i>Morethia boulengeri</i>) and Ragged Snake-eyed Skinks (<i>Cryptoblepharus pannosus</i>) were seen basking on fallen timber, and Tree Dtellas (<i>Gehyra variegata</i>) were observed on paddock trees while spotlighting.</p>
Threatened species	A Black Falcon (<i>Falco subniger</i>) was observed roosting in a leafy paddock tree.

Grassland with scattered paddock trees



Photograph 7 Predominantly cleared paddock with occasional paddock trees and fallen timber

Table 5.8 Fauna habitats: woodland patches




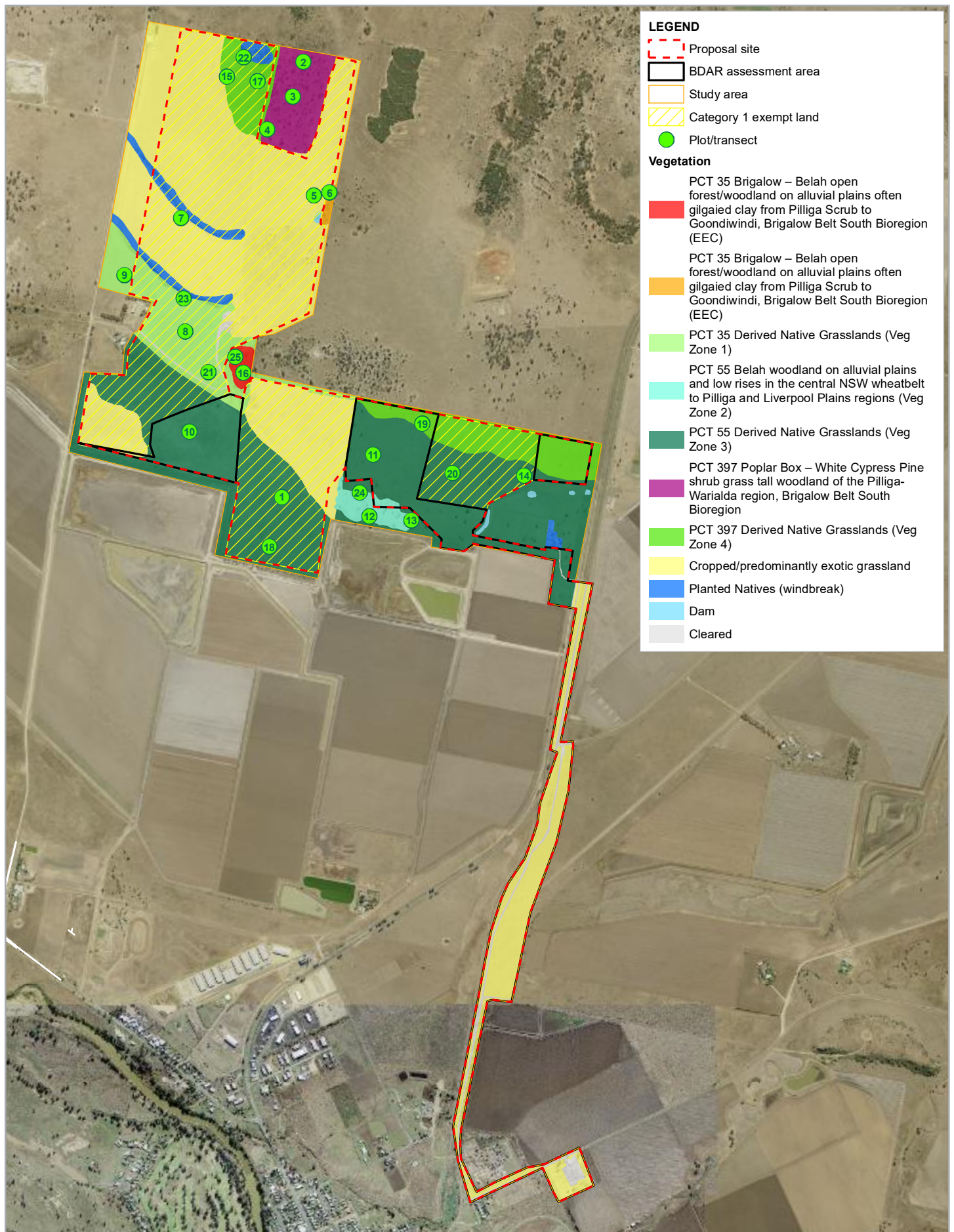
Woodland patches	
Description	Woodland vegetation is present in small patches within the study area. This vegetation comprises a canopy of eucalypts and Cypress Pine, with a sparse understory and grassy ground layer. A higher density of leaf litter and fallen timber is present in these areas. Hollow-bearing trees are also present. These are not considered breeding habitat for large owls and cockatoos as they are not located along riparian corridors. There is some connectivity to larger patches of vegetation in adjacent properties, however vegetation is generally fragmented.
Fauna recorded	Several woodland bird species were recorded in these areas but not in adjacent paddocks. These included the Apostlebird (<i>Struthidea cinerea</i>), Pied Butcherbird (<i>Cracticus torquatus</i>) and White-winged Chough (<i>Corcorax melanorhamphos</i>). A Barn Owl (<i>Tyto javanica</i>) was observed flying into woodland. Many of the bird species recorded in the cleared agricultural land were also observed in the woodland patches.
Threatened species	<p>The Grey-crowned Babbler was recorded in the patch of Poplar Box – White Cypress Pine woodland in the northern portion of the site. A number of nests were also recorded in this area.</p> <p>The Little Pied Bat (<i>Chalinolobus picatus</i>) and Yellow-bellied Sheath-tail Bat (<i>Saccolaimus flaviventris</i>) were recorded in small woodland patches using Anabat analysis. These species could roost and breed in hollow-bearing trees at the site.</p> <p>The woodland patches constitute potential Koala (<i>Phascolarctos cinereus</i>) habitat, however this habitat is unlikely to be important habitat for the species. Local records are concentrated around the Pilliga, with none near the proposal site. Koalas may occur on rare occasions but would be unlikely to breed at the site. No evidence of the Koala was recorded during surveys.</p>
	
	Photograph 8 Native woodland

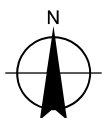
Table 5.9 Fauna habitats: farm dams and waterbodies

Farm dams	
Description	Two farm dams are present in the proposal site. These had limited emergent vegetation and are used as watering points by sheep (see Photograph 9 and Photograph 10). Small, undefined drainage lines are also present, leading to and from these dams. These tended to be depressions in the grassland, with occasional sedges present. No defined channel, standing water or pools are present. No woody debris or snags are present. Several tanks with pumps are also present.
Fauna recorded	Common frogs such as the Spotted Grass Frog (<i>Limnodynastes tasmaniensis</i>) and Broad-palmed Frog (<i>Litoria latopalmata</i>) were observed at the dams. Tadpoles were observed in puddles adjacent to the tank. Apostlebirds and Magpie-larks were recorded at the dams. The dams and tanks would provide a source of water for other birds, microbats and macropods. Microbats are also likely to forage for insects above the dams, and a variety of microbats were recorded at these locations.
Threatened species	The Eastern Freetail Bat (<i>Mormopterus norfolkensis</i>), Little Pied Bat (<i>Chalinolobus picatus</i>) and Yellow-bellied Sheathtail Bat (<i>Saccolaimus flaviventris</i>) were recorded at dams in paddocks using Anabat call analysis. These species could roost and breed in paddock trees at the site.
	
	Photograph 9 Farm dam
	
	Photograph 10 Tank



Paper Size ISO A4
0 400 800
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Engie
Silverleaf Narrabri Solar Farm
Biodiversity Assessment

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

Vegetation

FIGURE 5-1

6. Conservation significance

6.1 Identification of threatened species under the BAM

6.1.1 Predicted threatened species (ecosystem credit entities)

Based on the bioregional context for the assessment and the PCTs, patch size, vegetation cover and habitat resources present at the proposal site, the BAM calculator generates a list of threatened fauna species that are predicted to utilise the proposal site (i.e. potential 'predicted threatened species', or potential 'ecosystem credit entities'). The potential for these predicted threatened species to occur within the site were further refined based on the desktop assessment, habitat resources observed during field surveys and the knowledge and experience of the assessor.

The suite of 'confirmed' predicted threatened species associated with ecosystem credits required for the proposal site, and with relevant habitat resources present on the site, are listed in Table 6.1. For each confirmed predicted threatened species, the vegetation zone association is provided. Targeted surveys are not required under the BAM for these species as they are assumed to be present. It is noted that a number of these species were recorded in the study area during surveys.

It should be noted that several of these species would only occur in the woodland form of the PCTs present at the proposal site and are only associated with ecosystem credits generated for impacts to woodland vegetation zones. Notably many threatened species of woodland birds would only occur in vegetation with canopy vegetation, as part of relatively extensive patch and/or with habitat resources such as abundant fallen woody debris (see Appendix A for further detail and justification).

Table 6.1 Confirmed predicted threatened species

Common name	Scientific name	Vegetation zone association
Dusty Woodswallow	<i>Artamus cyanopterus</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 - Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 - Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 - Poplar Box - White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Brown Treecreeper	<i>Climacteris picummus victoriae</i>	397 - Poplar Box - White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Pied Honeyeater	<i>Certhionyx variegatus</i>	55 - Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Little Pied Bat	<i>Chalinolobus picatus</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Speckled Warbler	<i>Chthonicola sagittata</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Spotted Harrier	<i>Circus assimilis</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 - Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 - Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 - Poplar Box - White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Varied Sitella	<i>Capoenositta chrysoptera</i>	55 - Belah woodland on alluvial plains and low rises_moderate (veg zone 2)

Common name	Scientific name	Vegetation zone association
Grey Falcon	<i>Falco hypoleucos</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Black Falcon	<i>Falco subniger</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Little Eagle (foraging)	<i>Hieraetus morphnoides</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Square Tailed Kite (foraging)	<i>Lophoicinia isura</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Blacked-striped Wallaby	<i>Macropus dorsalis</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Hooded Robin	<i>Melanodryas cucullata</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Turquoise Parrot	<i>Neophema pulchella</i>	397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Barking Owl (foraging)	<i>Ninox connivens</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Corben's Long-eared Bat	<i>Nycophilus corbeni</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)

Common name	Scientific name	Vegetation zone association
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)
Superb Parrot	<i>Polytelis swainsonii</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Scarlet Robin	<i>Petroica boodang</i>	55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3)
Koala (foraging)	<i>Phascolarctos cinereus</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Stripe-tailed Dunnart	<i>Sminthopsis macroura</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3)
Diamond Firetail	<i>Stagonopleura guttata</i>	55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2)
Masked Owl (Foraging)	<i>Tyto novaehollandiae</i>	35 Brigalow-Belah open forest / woodland _derived grassland (veg zone 1) 55 – Belah woodland on alluvial plains and low rises_moderate (veg zone 2) 55 – Belah woodland on alluvial plains and low rises_derived grassland (veg zone 3) 397 – Poplar Box – White Cypress Pine shrub grass tall woodland – derived grassland (veg zone 4)

Species indicated by **bold text** were recorded within the study area

The potential predicted threatened species listed in Table 6.2 were assessed as unlikely to occur and were excluded from the list of confirmed predicted threatened species.

Table 6.2 Excluded predicted threatened species

Common name	Scientific name	Justification
Glossy Black-Cockatoo (foraging)	<i>Calyptrorhynchus lathami</i>	Due to land clearing, there are very few canopy trees remaining in remnant patches characterised by <i>Allocasuarina</i> and <i>Casuarina</i> species. Very few foraging resources despite the presence of associated PCTs in the study area.
Speckled Warbler	<i>Chthonicola sagittata</i>	Habitat degraded. Minimal treed habitat with shelter and foraging substrate. This species requires large relatively undisturbed woodland or forest remnants to persist in an area.
Pilliga Mouse	<i>Pseudomys pilligaensis</i>	Mainly confined to low-nutrient deep sands of the Pilliga region. No suitable forested habitat present for this species within the site.
White-bellied Sea-Eagle (foraging)	<i>Haliaeetus leucogaster</i>	Habitat constraint for this species includes foraging habitats within 1km of rivers, lakes, large dams or creeks, wetlands and coastlines. No foraging habitat for this species is present at the site.

Common name	Scientific name	Justification
Little Lorikeet	<i>Glossopsitta pusilla</i>	No foraging or breeding resources present within the associated PCT identified within the site.
Painted Honeyeater	<i>Grantiella picta</i>	Habitat constraints for this species includes mistletoes present at a density of greater than five mistletoes per hectare. No suitable foraging habitat present for this species within the site
Swift Parrot (foraging)	<i>Lathamus discolor</i>	No habitat constraint listed in the Threatened Biodiversity Data Collection. However, this species has a high energy requirement and its foraging patterns strongly influenced by presence of a high abundance of flowering resources. Due to land clearing, the foraging resource is very low, even though associated PCTs are present in the study area. No important foraging habitat is likely to occur at the site.

6.1.2 Candidate threatened species (Species credit entities)

Threatened species that cannot reliably be predicted to occur on a development site based on PCT, distribution and habitat criteria are identified by the Threatened Biodiversity Data Collection as 'species credit' entities. In some circumstances, the particular habitat components of species assessed for ecosystem credit species, such as the breeding habitat of a cave roosting bat or forest owls, are also assessed for species credits. The credit calculator references geographic, vegetation and habitat data for the proposal site to generate a list of the species credit entities that are predicted to occur (i.e. the 'potential candidate threatened species').

Searches of threatened species databases were also completed to identify any additional potential candidate threatened species (to those generated by the credit calculator) that are known or predicted to occur in the locality (refer to likelihood of occurrence table in Appendix B). The likelihood of occurrence of these additional potential candidate threatened species were reviewed, giving consideration to the habitats available in the study area.

Potential candidate threatened species that could occur in the study area based on the habitat resources observed during field surveys were confirmed as candidate threatened species. 'Confirmed' candidate threatened species require targeted survey in accordance with Section 6.4.1.17 of the BAM (OEH, 2017a). The list of confirmed candidate threatened species is presented in Table 6.3; these species were subjected to targeted survey. Surveys were conducted in the appropriate season for all confirmed candidate threatened species and so the targeted survey results can be considered a reliable indicator of their presence or absence at the proposal site (see Table 6.3).

Table 6.3 Confirmed candidate species credit species for which surveys were conducted

Common name	Scientific name	BioNet records in locality	Survey months	Presence	Justification
FAUNA					
Australian Bustard	<i>Ardeotis australis</i>	N	All year	No - surveyed	No evidence of the species was recorded in the study area in surveys in March, September and November. There are no local records.
Bush Stone-curlew	<i>Burhinus grallarius</i>	Y	All year	N	No evidence of the species was recorded in the study area in surveys in September. Marginal habitat present (No large patches of woodland present. Limited fallen timber present)
Koala (breeding)	<i>Phascolarctos cinereus</i>	Y	All year	No - surveyed	No evidence of the species was recorded in the study area in surveys in March, September and November. Local records are associated with large expanses of intact native vegetation.

Common name	Scientific name	BioNet records in locality	Survey months	Presence	Justification
Little Eagle (breeding habitat)	<i>Hieraaetus morphnoides</i>	Y	Aug-Oct	No-surveyed	No large raptor nests observed other than an active Whistling Kite and possible falcon nest.
Square-tailed Kite (breeding habitat)	<i>Lophoictinia isura</i>	Y	Sept-Jan	No-surveyed	No large raptor nests observed other than an active Whistling Kite and possible falcon nest.
FLORA					
Creeping Tick-trefoil	<i>Desmodium campylocaulon</i>	N	Dec-April	No-surveyed	No evidence of the species was recorded at the site in surveys in March. 2019 or February 2020
Bluegrass	<i>Dichanthium setosum</i>	N	Dec - May	No - surveyed	No evidence of the species was recorded at the site in surveys in March .2019 or February 2020
Finger Panic Grass	<i>Digitaria porrecta</i>	Y	Dec - May	No – surveyed	No evidence of the species was recorded at the site in surveys in March .2019 or February 2020
Spiny Peppergrass	<i>Lepidium aschersonii</i>	Y	Sep - May	No - surveyed	No evidence of the species was recorded at the site in surveys in March 2019, September 2018 November 2018 or February 2020.
Slender Darling Pea	<i>Swainsona murrayana</i>	N	Sep – Feb	No – surveyed	No evidence of the species was recorded at the site in surveys in September and November 2018.

Several species could be reliably discounted as occurring within the study area based on the habitat types present and/or the known distribution of the species. A number of dual credit fauna species have foraging habitat present but either no potential breeding habitat was identified during the field surveys, or the species does not breed in the area. These species are **not** 'confirmed candidate threatened species' for the purposes of this assessment and do not require further assessment. Detailed justification for the conclusion is provided in Table 6.4 and/or the 'habitat/constraints' fields in the credit calculator.

Table 6.4 Excluded candidate threatened species

Common name	Scientific name	Justification
FAUNA		
Glossy Black-cockatoo (breeding habitat)	<i>Calyptorhynchus lathami</i>	No suitable breeding habitat
Eastern Pygmy-possum	<i>Cerartetus nanus</i>	No suitable habitat is present. No suitable woodlands or heath containing suitable feed species (i.e banksia, eucalyptus or bottlebrushes) present within the site.
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Site does not contain cliffs and is not within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops or crevices or within two kilometres of old mines or tunnels
White-bellied Sea-Eagle (breeding habitat)	<i>Haliaeetus leucogaster</i>	No suitable breeding habitat
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	No suitable breeding habitat, land not within 40 m of riparian woodland on inland watercourses or waterholes containing dead or dying eucalypts
Pale headed Snake	<i>Hoplocephalus bitorquatus</i>	Habitat degraded

Common name	Scientific name	Justification
Swift Parrot (breeding habitat)	<i>Lathamus discolor</i>	Does not breed on mainland Australia. No important foraging habitat present.
Squirrel Glider	<i>Petaurus norfolcensis</i>	No suitable habitat
Superb Parrot (breeding habitat)	<i>Polytelis swainsonii</i>	No suitable breeding habitat (does not breed in Narrabri area)
Border Thick-tailed Gecko	<i>Uvidicolus sphyrurus</i>	No suitable habitat
FLORA		
	<i>Cyperus conicus</i>	No suitable habitat is present. The habitats within the study area are not associated with sandy soils. Suitable habitat would be associated with sandy gullies in sandstone outwash areas. Waterbodies in the form of farm dams are present but does not provide suitable habitat and there are no wetlands and wet run-on areas.
Native Milkwort	<i>Polygala linariifolia</i>	No suitable habitat is present. No dry sclerophyll forests and woodlands on sandy soils. The habitats that this species is associated with is typical of vegetation found in the Pilliga Outwash sub-region to the south of Narrabri.
Scant Pomaderris	<i>Pomaderris queenslandica</i>	No suitable habitat is present. Habitats in the study area lack sheltered, shrubby understories.
-	<i>Tylophora linearis</i>	No suitable habitat is present. The woodlands within the study area are associated with alluvials and basalt outwashes. Dry woodland habitat on sedimentary flats and low rises do not occur in the study area.

6.2 Threatened species survey results

6.2.1 Threatened flora

No threatened flora species were recorded in the proposal site during field surveys conducted in March, September or November 2018 or February 2020.

All potential threatened plant habitat associated with native vegetation in the solar farm site was traversed on foot, with no notable barriers to human movement or visibility encountered during the field survey. Field staff were able to traverse all areas of potential threatened flora habitat on foot, in a manner that reflected threatened species survey guidelines (OEH, 2016; Cropper, 1993). The candidate threatened flora species can be excluded from occurring at the proposal site, given they were not located by an experienced botanist familiar with each of the species.

6.2.2 Threatened fauna

Five threatened fauna species listed under the BC Act were recorded during surveys, all of which are ecosystem credit species (see Figure 6.1):

- Black Falcon (*Falco subniger*)
- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*)
- Eastern Coastal Freetail Bat (*Miniopterus norfolkensis*)
- Little Pied Bat (*Chalinolobus picatus*)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)

There is broadly suitable habitat for the candidate threatened fauna species listed in Table 6.3. Targeted field surveys were undertaken at a suitable time of year to detect the Australasian Bustard and Bush Stone-Curlew if present at the proposal site; however there were no observations and also there are no local records of the Australasian Bustard. The Australasian Bustard and Bush Stone-Curlew can be reliably discounted as occurring at the proposal site based on the survey effort employed. Similarly, there was no evidence of the Koala during surveys in March, September and November. Potential habitat at the site is poor quality and separated from better areas of habitat by large expanses of cleared agricultural land. It is unlikely that the Koala would traverse the site. This habitat would not be critical breeding habitat for the species.

No nests or breeding habitat for any of the other dual credit fauna species was recorded at the site, and thus no species credit habitat is considered present for these species.

The small, undefined drainage lines on the proposal site are ephemeral streams that do not provide habitat for any threatened species listed under the FM Act.

6.2.3 Threatened ecological communities

Moderate condition stands of Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion (PCT 35) within the study area are commensurate with the EEC listed under the BC Act as Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions, which is also identified as an SAI entity. This community also commensurate with the EEC listed under the EPBC Act as Brigalow (*Acacia harpophylla* dominant and co-dominant). The proposal site boundary has been redesigned to avoid clearing of these small patches (see Figure 6.1). The respective EECs listed under the BC Act and EPBC Act are hereafter collectively referred to as the 'Brigalow Woodland EEC'.

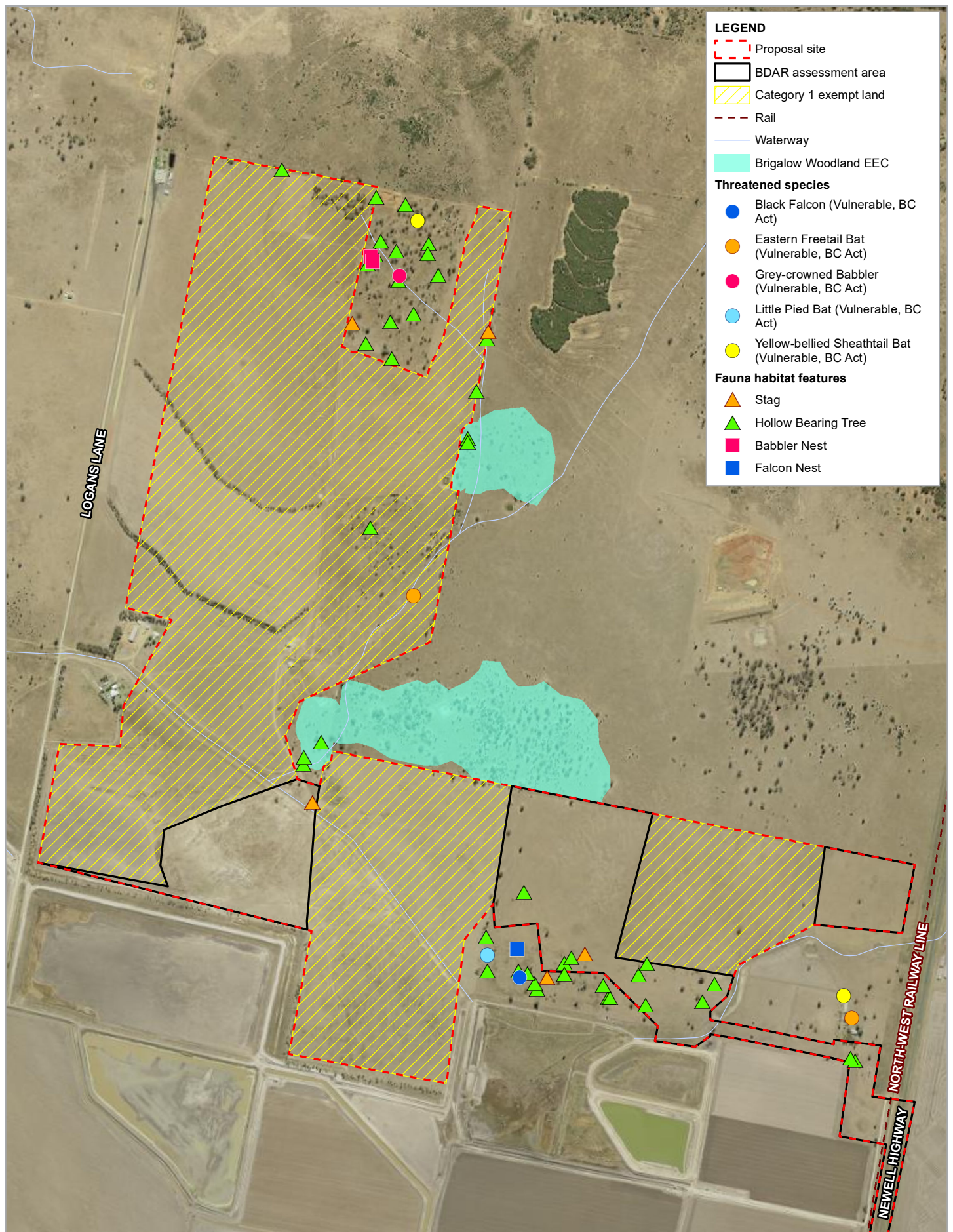
Based on the NSW Scientific Committee determination for the community, the derived grassland form of PCT 35 does not meet the condition criteria to comprise an occurrence of Brigalow Woodland EEC, and impacts on this area would not constitute impacts on an SAI entity. Similarly, based on the Commonwealth listing advice for the community, the derived grassland form of PCT 35 does not meet the condition criteria for the EEC.

The small patch of Poplar-Box-White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South (PCT 397) within the study area was assessed against the approved conservation advice for the EEC listed under the EPBC Act as Poplar Box Grassy woodland on Alluvial Plains. This assessment determined that the woodland form of PCT 397 within the study area does not conform with the EEC listing as although *Eucalyptus populnea* (Poplar Box) occurs occasionally in the canopy layer it is not the dominant species (i.e. does not form 50% or more of the total canopy cover within the community).

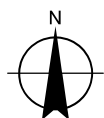
Similarly, areas mapped as the derived native grasslands form of PCT 397 are not considered to form part of this nationally listed EEC as patches lacking the canopy cover are not considered part of this ecological community (DEE 2019).

Regardless, the proposal layout has been redesigned to avoid any direct impacts to the woodland form of PCT 397. Indirect impacts on this PCT would be avoided through the safeguards and mitigation measures outlined in section 7.1.2.

The aquatic ecological community of the lowland Darling River is listed as an EEC under the FM Act. Farm dams are excluded from this listing. The small, undefined drainage channels in the proposal site do not contain any aquatic species or habitats and do not comprise an occurrence of the community.



Paper Size ISO A4
0 200 400
Metres



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Engie
Silverleaf Narrabri Solar Farm
Biodiversity Assessment

Threatened biota
and habitat resources

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

FIGURE 6-1

7. Impact assessment

7.1 Measures to avoid and minimise impacts

7.1.1 Avoidance measures

During the development of the proposal, a number of alternate site layouts were investigated. These layouts were developed in response to ongoing environmental investigations and consultation with landowners (both on the subject properties or adjacent to the proposal site). The proposal was purposefully modified to avoid impacts to biodiversity values and especially threatened biota as follows:

- Avoidance of areas of threatened ecological communities, with a focus on high value vegetation, in particular areas of moderate condition Brigalow Woodland EEC and Poplar Box Woodland.
- Avoidance of most other patches of woodland vegetation, to minimise impacts on fauna habitats and to retain better condition native vegetation (all woodland avoided other than a small (0.7 ha) patch of PCT 55).
- Retention of the existing drainage channel running through the southern part of the Logans Lane property.
- All laydown and stockpile sites to be located in areas of exotic vegetation/cropped land.

The following additional changes to the proposal site layout were made to reduce social or other environmental impacts of the proposal and further reduced impacts to biodiversity values:

- Inclusion of a buffer around the existing airstrip located adjacent to the north-west corner of the proposal site to ensure that the operations of this business is not affected.
- Inclusions of buffer zones around residential dwellings to be left on site following consultation with landowners.
- Inclusion of buffers around the edge of the site to allow for potential planting of vegetation to provide visual screening.

7.1.2 Mitigation measures

A Construction Environmental Management Plan (CEMP) (or equivalent) would be required for the construction phase of the proposal and would be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, and planting of vegetated screens (see Section 8).

Planting of vegetated screens would occur along the boundary of the proposal site. These would include locally sourced species typical of the PCTs present on site. This would improve the condition of the retained vegetation in the long-term.

At the end of life, the solar farm will be disconnected from the electrical transmission network and all solar farm infrastructure would be removed (except for any cables which are underground to a depth of greater than 500 mm and solar farm access roads which need not be removed). ENGIE must also restore the surface of the solar farmland to a suitable condition for pastoral or other agricultural use (see Section 8.3).

7.2 Residual impacts

7.2.1 Direct impacts

Removal or modification of vegetation

The construction of the solar farm would predominantly comprise impacts on areas of derived native grassland, exotic grassland and cropped land. In total, the proposal would remove or modify about 66.03 ha of native vegetation.

Solar panels and other infrastructure would be constructed within 65.4 hectares of derived native grassland. All paddock trees would be removed in these areas and there would short term impacts across the entire area during the construction period associated with the movement of vehicles and equipment and installation of infrastructure. The proposal would have a minimal impact on the native woodland vegetation within the study area and locality with only 0.7 ha of woodland being impacted by the proposal (refer to Table 7.1).

Small areas of understorey vegetation would be removed and soil excavated within the immediate footprints of infrastructure such as solar panels and transmission line poles. There will be direct impacts associated with the construction of the substation, perimeter road/firebreak and installation of piles which would be driven or screwed into the ground.

Some temporary disturbance to the groundcover is also likely to occur due to machinery driving through the area during construction and as a result of laying of cables. These impacts are likely to be temporary in nature and groundcover will be left to regenerate following construction. Groundcover vegetation at the proposal site has been subject to grazing and other agricultural activities over several decades and would be resilient to these short-term impacts. Regardless of the temporary nature of these impacts due to the current lack of scientific literature pertaining to the long-term impacts of temporary disturbance native ground storey species at solar farms in the Narrabri area it has been assume that there would be complete removal of vegetation across the site.

Impacts associated with the construction and operation of the transmission line would be restricted to the installation of poles spaced approximately 50 metres apart. For each pole an impact area of five square metres has been assumed. There would be approximately 18 poles constructed within areas of native vegetation. This would result in impacts to around 0.009 ha of the 6.04 ha of derived grassland form of PCT 55 (vegetation zone 3) that occurs within the transmission line easement (accounting for the reduced area of impact when compared to the total proposal area)

Table 7.1 *Direct impacts on native vegetation*

Plant community type (PCT)	Condition	Threatened ecological community	Area within BAA (ha)	Area impacted (ha)
Zone 1 – PCT 35 Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion_	Poor _Derived Grassland	Does not meet EEC condition criteria	0.77	0.77
Zone 2 – PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Moderate_Woodland	Not listed	0.69	0.69
Zone 3 – PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Poor _Derived Grassland	Not listed	53.89	47.86 ¹
Zone 4 – PCT 397 Poplar Box-White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion	Poor _Derived Grassland	Does not meet EEC condition criteria	10.71	10.71
Total native vegetation			66.06	60.
Total woodland			0.69	0.69
Total derived native grasslands			65.37	59.34
Non-native vegetation (cropped land and exotic grassland, cleared land and dams)			45.11	45.11
Total proposal site			111.16	105.14

¹ Note that the entire transmission line easement would not be cleared and impacts would be limited to the disturbance associated with installation of power poles (refer to section X)

Removal of habitat and habitat resources

The vegetation that would be removed or modified provides habitat resources for native fauna species, including threatened species of fauna. The survey effort to date has been sufficient to exclude impacts on all candidate species credit species.

The clearing of approximately 0.7 ha of woodland and scattered paddock trees within 60.0 ha of derived native grassland would include the removal of a small number of mature trees including up to seven hollow-bearing trees. Mature trees have value for fauna populations as sources of foraging resources such as leaves, nectar, sap or seed and substrate for invertebrate prey. In the context of the areas of remaining native woodland and forest vegetation surrounding the BAA, the proposal would remove a small proportion of available foraging resources for local populations of native fauna.

Fauna injury and mortality

As described above, the BAA provides a variety of habitat resources for native fauna species, including foraging, roosting and shelter resources for threatened species as well as common native fauna. Groundcover vegetation, leaf litter and woody debris would provide shelter and foraging substrate for reptiles, frogs and invertebrates. Construction is likely to result in the injury or mortality of some individuals of these less mobile fauna species and other small terrestrial fauna that may be sheltering in vegetation within the BAA during clearing activities. There is a potential risk of injury or mortality to any species which may be using hollows, such as microbats, arboreal mammals or hollow-nesting birds. The potential for impacts on fauna utilising hollows would be reduced through pre-clearance surveys of habitat trees and protocols for less-impact felling of habitat trees (see Table 8.1). More mobile native fauna such as native birds, bats, terrestrial and arboreal mammals that may be sheltering in vegetation in the BAA are likely to evade injury during construction activities.

The proposal would involve the removal of a small number of hollow-bearing trees or stags. Hollows are a limiting resource, relied on by many native fauna for shelter and breeding. Galahs, Eastern Rosellas and Red-rumped Parrots were observed during surveys at these hollows. The removal of these hollows would reduce the extent of potential breeding habitat for native species in the area, and could potentially remove breeding habitat for threatened species such as the Yellow-bellied Shearwater, Little Pied Bat and Eastern Freetail-bat, which were recorded during surveys.

Recommendations have been made in Section 7.1.2 above to minimise the risk of vegetation clearing activities resulting in the injury or mortality of resident fauna.

7.3 Fragmentation or isolation of habitat

The BAA is located in already cleared land. The majority of the BAA is derived grassland and would already comprise a gap in habitat for less mobile or shelter dependent native fauna. No patches of intact native vegetation would be completely removed or isolated by the proposal and no connecting links would be severed. The proposal would remove small areas of woodland at the edge of patches resulting in a minor increase in the degree of fragmentation of habitat in the locality. The proposal would also remove clumps of paddock trees which may provide 'stepping stones' of connectivity between roadside vegetation to the east and west for mobile species such as Galahs and other birds.

7.3.1 Indirect impacts

Indirect impacts that may occur as a result of the proposal are described in Table 7.2. Mitigation measures proposed to minimise the risk of these impacts are detailed in Section 7.1.2 and Section 8.

Table 7.2 *Indirect impacts*

Impact	Description
Reflected light and heat generated by solar panels	Reflected heat and light from the solar panel would increase the temperature of the microclimate around the infrastructure. This may alter the species composition and richness. It may also affect growth of plants. These impacts may then affect habitat for small fauna such as lizards that may occur in these areas.
Shading caused by panel array	The solar panel structures would result in shading of groundcover vegetation. This may result in some minor changes to the composition and abundance of native species growing beneath the panels.
Weed invasion and edge effects	<p>'Edge effects' refer to increased noise and light or erosion and sedimentation at the interface of intact vegetation and cleared areas. Edge effects may result in impacts such as changes to vegetation type and structure, increased growth of exotic plants, increased predation of native fauna or avoidance of habitat by native fauna. Altered environmental conditions along new edges can allow invasion by pest animals specialising in edge habitats and/or change the behaviour of resident animals. Edge effects would result from construction activities and then continue to affect vegetation and habitats adjoining the BAA.</p> <p>The BAA and adjoining land has been extensively cleared for agricultural purposes. Small patches of woodland vegetation occur at scattered locations. Various weeds and exotic pasture species are present throughout the site. Construction of the proposal would result in new edges along already fragmented woodland patches and has the potential to introduce or spread weeds. Given the existing degree of vegetation clearing in the study area this would comprise a very minor increase in the degree of edge effects.</p>
Pests and pathogens	Construction activities, in general, have the potential to introduce or spread pathogens such as Phytophthora (<i>Phytophthora cinnamomi</i>), Myrtle Rust (<i>Uredo rangeli</i>) and Chytrid fungus (<i>Batrachochytrium dendrobatidis</i>) into native vegetation. The potential for impacts associated with these pathogens is low, given the disturbed nature of much of the study area, lack of permanent flowing water on site, and the environmental safeguards that would be implemented during the construction process.
Noise, light and vibration	<p>Construction of the proposal would require the use of additional vehicles and plant in the site. Fauna that occupy habitats within the BAA and adjacent areas are likely to be accustomed to some existing noise and vibration originating from vehicles, agricultural machinery and light aircraft. There is limited light spill currently at the site.</p> <p>Noise and vibration disturbance during construction could disturb resident fauna. While there would be localised increases in noise, vibration and light that would temporarily create substantial disturbance, increases above existing background levels during construction are unlikely to result in a significant impact on fauna that occur in the study area.</p>
Sedimentation and erosion	Construction of the proposal has the potential to result in sedimentation and erosion within the BAA and adjoining native vegetation and aquatic habitats, through soil disturbance and construction activities. Sediment laden runoff to waterways can alter water quality and adversely affect aquatic life. Given the modified nature of drainage lines in adjacent areas and limited native vegetation, the potential for impacts is negligible.
Aquatic disturbance and pollution	Construction of the proposal has the potential to result in the mobilisation of contaminated sediments into waterways, or chemical spills from vehicles or plant. The introduction of pollutants from the proposal into the surrounding environment, if uncontrolled, could potentially impact on water quality further downstream. Given the modified nature of drainage lines in adjacent areas and limited native vegetation, the potential for impacts is negligible.

7.4 Assessment of serious and irreversible impacts

Under the BC Act, a determination of whether an impact is serious and irreversible must be made in accordance with the principles set up in Section 6.7 of the BC Regulation.

The principles are aimed at capturing impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales. These include impacts that will:

- Cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
- Further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size.

- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution.
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

The decision-maker must determine whether or not an impact on biodiversity values is likely to be a serious and irreversible impact (SAIL). The framework allows for decision-makers to take into account the scale of an impact and the potential for avoidance and mitigation. These factors are weighed against the status and vulnerabilities of the potential SAIL entity to ultimately determine if a proposal will indeed have a serious and irreversible impact (OEH, 2017c). If there is a serious and irreversible impact for a Part 4 development, the development must be refused.

Woodland form patches of PCT 35 within the study area are commensurate with the EEC listed under the BC Act as Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions, which is an identified SAIL entity. Currently there is no threshold of impact for Brigalow EEC/SAIL (OEH, 2017c) and so the default threshold of any direct impact would comprise a potential SAIL.

The proposal site boundary has been redesigned to avoid remnant woodland patches of the EEC and therefore the proposal avoids impacts on SAIL entities. No detailed assessment of this SAIL entity is therefore considered necessary.

7.5 Prescribed impacts

Prescribed impacts relevant to the proposal are described below. Given the scale and context of the proposal there are unlikely to be any substantial impacts on threatened species and their habitats beyond those associated with the removal of vegetation and habitat in the proposal site.

7.5.1 Areas of geological significance or rocks

No areas of geological significance are present. No caves for breeding of bats are present.

7.5.2 Human-made structures

No buildings, culverts, bridges or similar human-made structures of particular relevance to fauna would be removed for the proposal. The removal of dams and water points is discussed below.

7.5.3 Non-native vegetation

The proposal would remove or modify up to 45.1 ha of non-native vegetation associated with cropped land and exotic grassland, cleared land, and dams.

Non-native vegetation provides minimal habitat for most threatened species. Raptors may hunt over non-native grassland on occasion. Similarly, microchiropteran bats would forage above the non-native grassland. Small bird species that forage in woodland areas may also forage in the adjacent non-native grassland on occasion. No fauna species would rely on these areas for their survival in the locality but may use these areas on occasion as part of a much larger home range.

As described above for areas of derived native vegetation, minimal areas of exotic vegetation would be removed and soil excavated within the immediate footprints of infrastructure. The majority of the non-native vegetation in the proposal site would be retained in a similar condition to its current state throughout the operational phase of the proposal. These areas would be modified through shading by solar panels and periodic operational activities. This would comprise a substantially lower impact on biodiversity values than complete or permanent vegetation removal.

7.5.4 Connectivity

Habitat fragmentation through the clearing of vegetation can increase the isolation of remnant vegetation and create barriers to the movements of small and sedentary fauna such as ground dwelling mammals, reptiles and amphibians. Furthermore, habitat fragmentation can create barriers to the movement of pollinator vectors, such as insects, or seed vectors, such as birds, and consequently affect the life cycle of both common and threatened flora.

The proposal site provides limited connectivity for fauna given the predominantly cleared native of the proposal site. Clearing of most woodland areas will be avoided for the proposal. Vegetation and scattered hollow-bearing trees in the proposal site comprises scattered fragments that together with woodland patches in adjacent areas provide 'stepping stones' of habitat between larger areas of vegetation for mobile species such as bats and birds. Removal of these patches and trees would reduce the availability of these stepping stones to a small degree. Species that require larger tracts of connected vegetation would not occur in these small, fragmented patches. Poles and wires associated with the transmission corridor would not impact movement of any fauna species.

Connectivity for small ground-dwelling fauna such as lizards and kangaroos would be retained in the proposal site, as these species can move under and between the solar panels.

7.5.5 Hydrology

Two farm dams may be removed for the proposal. This would reduce the number of watering points in the wider area by a small degree. Threatened species that may use these (such as the Grey-crowned Babbler and microchiropteran bats) would likely use a number of similar farm dams throughout their home range.

There would be limited direct impacts on the small, undefined drainage lines that occur on the proposal site. Given their ephemeral nature, these drainage lines provide negligible habitat for threatened species.

There would be minor if any impacts on aquatic habitat downstream of the proposal site and there is no evidence that aquatic habitat in the vicinity of the proposal site would be occupied by any threatened biota (see Section 7.6).

7.5.6 Vehicle strike

The proposal site currently has low levels of vehicle activity typically associated with farming. Occasional movements of cars, utility vehicles, trucks and farming equipment would occur throughout the proposal site. The movements of vehicles and machinery would increase during construction. During operation of the project movement of vehicles and machinery would be limited to occasional maintenance visits.

The potential risk of vehicle strike is most relevant to common species such as kangaroos, and few threatened species are likely to be at risk. Birds such as the Grey-crowned Babbler would move away from vehicles and the risk of injury and mortality is low.

7.6 Impacts on aquatic habitats

Two farm dams may be removed for the proposal. There would be limited direct impacts on the small, undefined drainage lines that occur on the proposal site. The proposal would not remove these drainage lines. Any upgrades to tracks would include pipes or culverts to ensure drainage is not blocked. Given the low stream order this is in line with (DPI, 2013) fish crossing requirements.

None of the aquatic habitats in the proposal site or study area are classified as Key Fish Habitat and would not provide potential habitat for threatened fish (see Appendix A). Aquatic habitats may provide limited breeding and shelter resources for common frog and reptile species. Any tracks that may be constructed would include appropriate pipes or culverts to allow flow during rain events.

No habitat for threatened biota listed under the FM Act would be directly impacted. Indirect impacts could include sedimentation and erosion during construction. Given the generally dry nature of these drainage lines, the risk of indirect impacts is low. There would be no blockage of fish passage or removal of snags as a result of the proposal.

7.7 Consideration of MNES

The proposal has been designed to avoid direct impacts on Brigalow (*Acacia harpophylla* dominant and co-dominant) EEC listed under the EPBC Act. Given the close proximity of stands of this EEC to the proposal, an assessment of significance has been prepared in accordance with the '*Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*' (DotE, 2013). This assessment is provided in Appendix E.

Given the avoidance of direct impacts, and limited potential for indirect impacts, the proposal is unlikely to constitute a significant impact, and no further assessment or approval of the proposal under the EPBC Act is likely to be required.

8. Recommended mitigation measures

8.1 Overview

The mitigation of adverse effects arising from the proposal has been presented according to the hierarchy of avoidance, mitigation and offsetting of impacts. The proposal has been located and designed to avoid impacts on biodiversity values as far as possible as discussed in Section 7.1.1. The proposal would result in minimal direct impacts on native biota and their habitats within the BAA. There is limited potential for impacts on habitat in the study area during the longer-term operational phase of the proposal. Specific mitigation measures are recommended in section 8.2 to minimise impacts on the natural environment and biodiversity values.

8.2 Mitigation of impacts

In order to address the potential impacts of the proposal on biodiversity, the mitigation measures outlined in Table 8.1 should be incorporated into the Construction Environment Management Plan (CEMP).

Table 8.1 Mitigation measures

Timing	Mitigation measures	Responsible party
Pre-construction/ clearing	A fauna management plan should be prepared prior to construction. This would detail fauna management protocols including management of tree hollows and fauna handling.	Site ecologist
	Ensure all workers are provided with an environmental induction prior to starting work on site. This would include information on the ecological values of the site and protection measures to be implemented to protect biodiversity.	Construction contractor/ Site ecologist
	Use of and regular inspection and maintenance of erosion and sediment control measures.	Construction contractor
	Fence off or mark trees and areas of native vegetation to be retained, to avoid additional impacts on vegetation. Fencing should protect the entire Tree Protection Zone (i.e. 10 times the diameter of the trunk at breast height).	Construction contractor/ Site ecologist
	Appropriate buffers would be established around trees that are to be retained. Work would avoid damage to the structural root zones (SRZ) of the trees	Construction contractor/ Site ecologist
Construction/ clearing	Restrict stockpiles of construction materials, fill or vegetation to existing cleared areas and not within areas of adjoining native vegetation	Construction contractor
	Water should be applied to stockpile areas during windy conditions	Construction contractor
	Any hollow-bearing trees to be felled should be marked prior to clearing of vegetation. The removal of hollow bearing trees is to be undertaken in accordance with a tree hollow management protocol set out in the CEMP, and would involve the presence of a qualified ecologist or wildlife specialist experienced in the rescue of fauna.	Site ecologist
	Any trees with raptor nests should be felled outside the breeding season	Site ecologist
	Habitat features such as hollow trunks and limbs within the BAA should be salvaged and replaced within areas proposed for screening vegetation as far as is practicable.	Site ecologist

Timing	Mitigation measures	Responsible party
Post construction/ clearing	Reinstatement of stabilised surfaces as quickly as practicable after construction including infilling of any cable trenches	Construction contractor
	Planting of locally endemic tree species and groundcover in areas proposed for vegetated screens. Species would be drawn from the list of species typical in the PCTs present on site.	Site ecologist
	Supplementary seeding of appropriate native groundcover species to aid in regeneration of temporarily disturbed surfaces.	Site ecologist

8.3 Decommissioning of the solar farm

At the end of life, the solar farm will be disconnected from the electrical transmission network. This entails disconnecting and removing solar panels for recycling, recycling the steel associated with the single-axis tracking system, removing the containerised inverter and transformer systems, and associated cabling and any conduit. Under the proposed lease agreements with landowners, ENGIE must remove the solar farm infrastructure except for any cables which are underground to a depth of greater than 500 mm and solar farm access roads which need not be removed. ENGIE must also restore the surface of the solar farm land to a suitable condition for pastoral or other agricultural use and leave the land electrically safe and otherwise in a safe condition.

9. Offset requirements

9.1 BC Act offset requirements

9.1.1 Impacts requiring offset

Impacts associated with the proposal that require calculation of biodiversity offsets include the removal of 60.01 ha of native vegetation, and associated habitat for threatened biota. Impacts within the BAA that require biodiversity offsets are shown on Figure 9.1.

Ecosystem credits

The data from the fieldwork and mapping was entered into version 1.3.0.0 of the BAM credit calculator as a 'Development Assessment' to determine the number and type of biodiversity credits that would be required to offset impacts of the proposal. The proposal was assessed as BAM calculator case 00011577//18/00011578/ Revision 11. The Biodiversity credit report is included in Appendix F and summarised below.

There are 60.03 ha of native vegetation (0.69 ha of remnant woodland and 59.34 ha of derived grassland) at the BAA that would be impacted by construction of the solar farm. Of the 59.34 hectares of derived grassland that occur within the site 47.85 ha requires offsetting. The remaining 11.48 hectares has a vegetation integrity score of less than 17 and therefore does not require offsetting (refer to section 9.1.2).

For all management zones within the BAA the 'future vegetation integrity score' was entered as 0.

The area of each management zone entered into the BAM calculator and the current and future integrity scores are shown in Table 9.1. The approach to VI scores is summarised in Appendix D.

Table 9.1 *Future integrity scores for management zones within BAA*

Vegetation zone	Management zone	Area (ha)	Current VI score	Future VI score	Change in VI score
Zone 1 – PCT 35 Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay _Derived Grassland	1	0.77	12	0	-12
Zone 2 – PCT 55 Belah woodland on alluvial plains and low rises _Moderate	2	0.69	45.3	0	-45.3
Zone 3 – PCT 55 Belah woodland on alluvial plains and low rises _Derived Grassland	3	47.85	28.4	0	-28.4
Zone 4 – PCT 397 Poplar Box- White Cypress Pine shrub grass tall woodland _Derived Grassland	4	10.71	15.1	0	-15.1

Ecosystem credits that would be required to offset the impacts of the proposal are shown in Table 9.2.

Table 9.2 Ecosystem credits required to offset impacts of the proposal

Vegetation zone / PCT	Area (ha)	Change in VI score	BC Act status	Ecosystem credits required
Zone 1 – PCT 35 Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion_Derived Grassland	0.77	-12	Does not meet EEC condition criteria	0*
Zone 2 – PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions_Moderate	0.69	-45.3	Not listed	15
Zone 3 – PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions_Derived Grassland	47.85	-28.4	Not listed	679
Zone 5 – PCT 397 Poplar Box- White Cypress Pine shrub grass tall woodland of the Pilliga-Warialda region, Brigalow Belt South Bioregion_Derived Grassland	10.71	-15.1	Not listed	0*
Total	60.02			695

Note: * no offset is required because the current vegetation integrity score is less than 17.

9.1.2 Impacts not requiring offset

A biodiversity offset is not required if the vegetation integrity score of the impacted vegetation zone that comprises threatened species habitat is <17 (Sections 10.3.1.1 and 10.3.2.1 of the BAM). In this regard, no ecosystem credits are required for the derived grassland forms of PCT 35 and PCT 397 (Zone 1 and 4).

Offsets are not required for impacts on non-native vegetation. No credits were calculated for 'exotic/cleared land'.

The proposal includes an upgrade to the intersection of the Kamilaroi Highway and Logans Lane, as well as sealing of some sections of Logans lane. These works would be confined to areas comprised of disturbed road verge and existing areas of hardstand. No vegetation would be impacted as a result of the intersection upgrade and therefore offsets are not required.

Species credits

No species credit species were recorded. No species credit habitat for dual credit species (i.e. breeding habitat) was recorded. No polygons have been prepared and no species credits have been calculated.

The Black Falcon, Grey-crowned Babbler, Eastern Coastal Freetail Bat, Little Pied Bat and Yellow-bellied Sheathtail Bat were recorded within the BAA during field surveys and are confirmed predicted threatened species for this assessment. The ecosystem credits listed above would offset the removal of foraging and breeding habitat for these species. None of these threatened fauna species are dual credit species.

9.1.3 Options to meet offset obligations / approach to delivering offsets

In accordance with the offset rules established by the *Biodiversity Conservation Regulation 2017* there are various means by which offset obligations described in Section 9.1 can be met. These include:

- Retiring the appropriate credits from an established stewardship site
- Monetary payment directly into the Biodiversity Conservation Trust Fund
- Funding an approved biodiversity action. Funding a biodiversity action may be available as a last resort, subject to consultation with approval authorities, if all other options are determined to be unsuitable.

Existing biodiversity credits

The preferred approach to offset the residual impacts of the proposal is to secure and retire appropriate credits from stewardship site/s that fit within the trading rules of the BOS in accordance with the 'like for like' report generated by the credit calculator. The like for like trading rules for the ecosystem credits required for the proposal are summarised in Table 9.3. PCT 55 is the only PCT that may be traded in this class. As of 27 May 2021 no suitable like for like credits PCT 55 credits are available for purchase. If such credits are still unavailable following project approval, credits would be sourced either through the establishment of a Biodiversity Stewardship Site and/or sourced from the open market in accordance with the rules outlined in the 'variation report' generated by the BAM calculator.

Table 9.3 'Like for like' ecosystem credits required to offset impacts of the proposal

Credit Class	Any PCT in the below class	And in any of below trading groups	Containing hollow-bearing trees	In the below IBRA subregions
Credit classes for PCT 55	North-west Floodplain Woodlands (including PCT 55)	North-west Floodplain Woodlands - $\geq 70\%$ - $<90\%$ cleared group (including Tier 4 or higher).	Yes	Liverpool Plains, Castlereagh-Barwon, Kaputar, Liverpool Range, Northern Basalts, Northern Outwash, Peel, Pilliga and Pilliga Outwash. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.

Payment into the Biodiversity Conservation Fund

A payment to the Biodiversity Conservation Trust (BCT) could be considered if a suitable number and type of biodiversity credits could not be secured from third parties.

It should be noted that payment for offsets are subject to change and that credit payment prices are reviewed by the BCT quarterly. The payment amounts presented within this report were calculated and summarised from the Payment report included in Appendix F and are valid as of 27 May 2021.

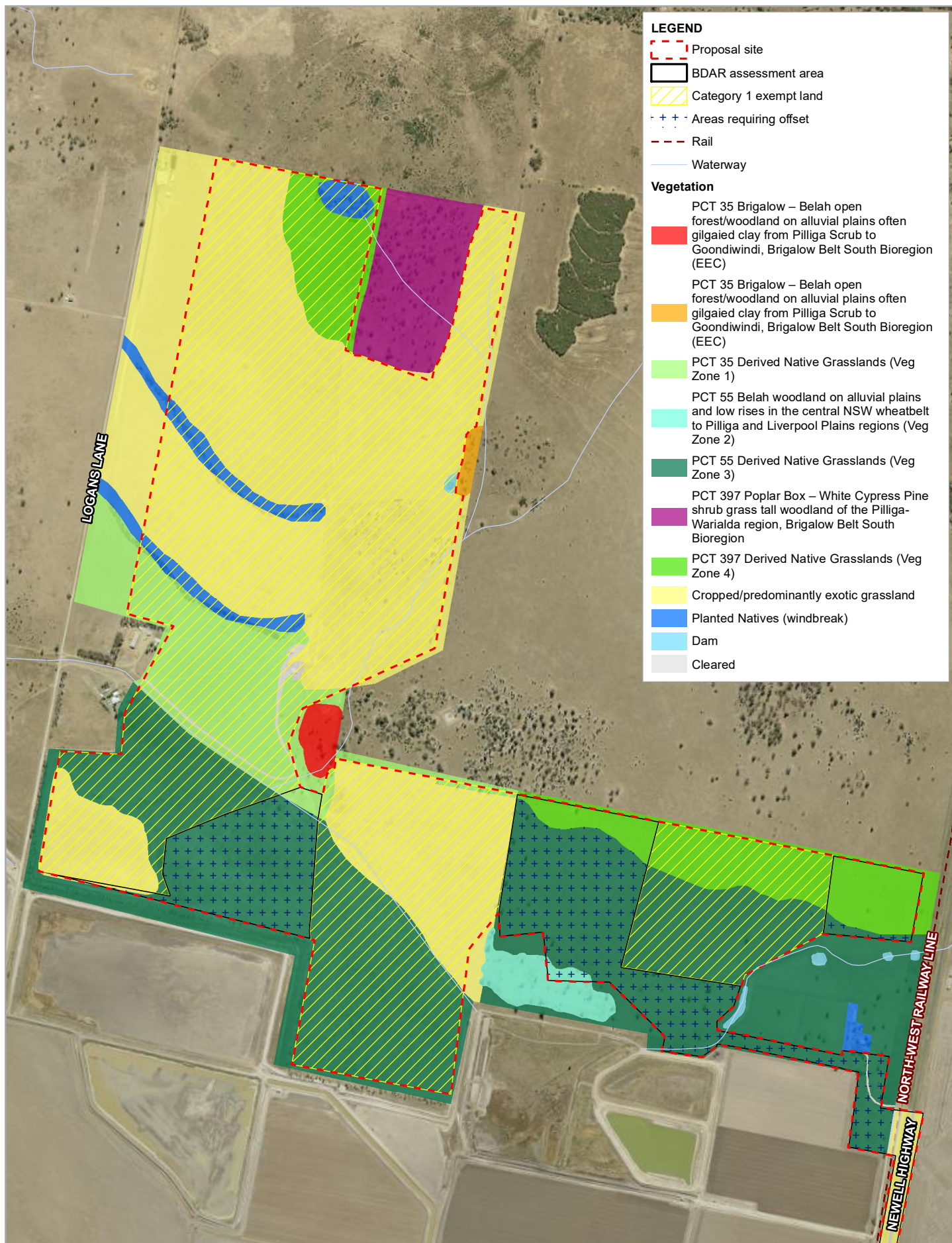
Table 9.4 Estimated biodiversity offset credit payment price

Credit class	Price per credit	Number of credits required	Final credit price
55 - Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	\$5,831.98	695	\$4,053,226.85
Subtotal (excl. GST)			\$4,053,226.85
GST			\$405,322.68
Total			\$4,458,549.54

9.2 Offsets for impacts on MNES

Offsets are required for any significant residual impacts on MNES, according to the requirements of the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy October 2012* (EPBC Act Offsets Policy) (DSEWPaC, 2012).

The proposal has been redesigned to avoid moderate condition Brigalow near the boundary of the proposal site. The derived native grassland form of this PCT does not meet the condition criteria for the Brigalow (*Acacia harpophylla* dominant and co-dominant) EEC. The assessments of significance prepared for this EEC indicated that the proposal is unlikely to have a significant impact on this MNES, and thus the proposal would not be a controlled action and no offsets would be required under the EPBC Act.



Areas requiring offsets

FIGURE 9-1

10. Conclusion

ENGIE proposes to construct and operate a 120 megawatt (MW) solar farm about four kilometres north-west of Narrabri between the Newell Highway in the east and Logans Lane in the west.

The majority of the study area has been cleared and used for agriculture (sheep and cattle grazing). The dominant vegetation is represented by native and exotic pasture. One small patch of remnant woodland is present within the BAA. This patch has been highly modified as a result of agricultural activities, with much of the understorey affected by grazing activities. The southern portion of the study area has been cleared but supports derived native grassland.

PCT 35 Brigalow-Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion in the study area comprises a local occurrence of the endangered ecological community (EEC) listed under the BC Act as *Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions*. Moderate condition forms of this community are an SAI entity and are commensurate with the EEC listed under the EPBC Act as *Brigalow (Acacia harpophylla) dominant and co-dominant*. The proposal site has been redesigned to avoid the areas of this EEC. There would be no direct impacts on the SAI entity.

Five threatened fauna species listed under the BC Act were recorded during surveys, all of which are ecosystem credit species. No threatened flora or other species credit -entities were recorded.

The proposal was purposefully modified to avoid impacts to biodiversity values and especially threatened biota. Areas of high value vegetation commensurate with Brigalow Woodland EEC were avoided, and most other patches of woodland vegetation were also avoided to minimise impacts on fauna habitats and to retain better condition native vegetation. The existing drainage channel would also be retained through the southern part of the Logans Lane property. A range of mitigation measures are also proposed, including planting of vegetated screens, fauna habitat management and rescue protocols, and protection of vegetation to be retained.

10.1 Residual impacts

Credits that would be required to offset the residual impacts of the proposal comprise:

- 15 ecosystem credits for Zone 2 – PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions_Moderate associated with 0.69 ha of remnant woodland.
- 679 ecosystem credits for Zone 3 – PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions_Derived Grassland associated with 59.33ha of derived grassland.

No species credits are required for the proposal.

A biodiversity offset is not required if the vegetation integrity score of the impacted vegetation zone is <17 (Sections 10.3.1.1 and 10.3.2.1 of the BAM). In this regard, an ecosystem credit obligation of zero was found for the derived grassland forms of PCT 35 and PCT 397.

No credits were calculated for 'exotic/cleared land' as offsets are not required for impacts on non-native vegetation that does not provide habitat for threatened species.

There would be no direct impacts on *Brigalow (Acacia harpophylla) dominant and co-dominant* EEC listed under the EPBC Act. No further assessment, approval or provision of biodiversity offsets is required under the EPBC Act.

Aquatic habitat is limited to small, ephemeral first order drainage lines. These do not constitute key fish habitat, and do not contain any aquatic habitat within the Darling River EEC listed under the FM Act. There would be no impacts on habitat for threatened fish. Any construction of tracks would include suitable pipes or culverts to allow water flow during rain events.

A CEMP (or equivalent) would be required for the construction phase of the proposal and would be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, and planting of vegetated screens around the boundary of the solar farm.

11. References

- BOM (2018a). "Atlas of Groundwater Dependant Ecosystems." from <http://www.bom.gov.au/water/groundwater/gde/map.shtml>.
- BOM (2018b). "Climate Data Online." from http://www.bom.gov.au/climate/averages/tables/cw_067084.shtml.
- DEC (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)*. New South Wales Department of Environment and Conservation, Hurstville, NSW.
- DECC (2008a). *Descriptions for NSW (Mitchell) Landscapes Version 2*. Based on descriptions compiled by Dr. Peter Mitchell. NSW Department of Environment and Climate Change,.
- DECC (2008b). *NSW (Mitchell) Landscapes Version 3*. NSW Department of Environment and Climate Change.
- DECC (2009). *The BioBanking Assessment Methodology*. NSW Department of Environment and Climate Change.
- DEE (2018a). "Protected Matters Online Search Tool." from <http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst.jsf>.
- DEE (2018b). "Species profiles and threats database (SPRAT)." from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.
- DEWHA (2008). *Directory of Important Wetlands Spatial Database including Wetlands Type and Criteria*. Australian Government Department of the Environment Water Heritage and the Arts.
- DLWC (2002). *The NSW State Groundwater Dependent Ecosystem policy: A component policy of the NSW State Groundwater Policy Framework Document*. New South Wales Department for Land and Water Conservation.
- DotE (2013). *Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*. Australian Government Department of the Environment, Canberra.
- DPI (2007). "Key Fish Habitat maps." from <https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/key-fish-habitat-maps>.
- DPI (2013). *Policy and guidelines for fish habitat conservation and management. Update 2013*. NSW Department of Primary Industries.
- DPIE (2019) Landuse Mapping for NSW V2.1 2017 from <https://datasets.seed.nsw.gov.au/dataset/nsw-landuse-2017-v1p2-f0ed>
- DPIE (2011) Landsat woody extent and projected foilage cover (FPC) V 2.1 (25 m) 2008 from <https://datasets.seed.nsw.gov.au/dataset/landsat-woody-extent-and-foilage-projective-cover-fpc-ver-2-1-25m-20087355d>
- DSEWPaC (2012). *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy. October 2012*. Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra.
- EcoLogical (2009). *Namoi CMA Pre-European Vegetation Map. VIS ID 3853*. NSW Office of Environment and Heritage.
- EcoLogical (2010). *EPBC-listed natural grasslands on the basalt and fine textured alluvial plains of the Namoi Catchment (2010). VIS ID 3852*. NSW Office of Environment and Heritage.
- EcoLogical (2013). *Namoi CMA vegetation extant map, 2013. VIS_ID 4028*. NSW Office of Environment and Heritage, from <https://datasets.seed.nsw.gov.au/dataset/55a9513c-36fd-4c04-970d-3fd63492e899>.
- GHD (2020) Biodiversity Monitoring Report for Beryl Solar Farm (unpublished report prepared for FS NSW Project No 1 AT Pty Ltd as Trustee for FS NSW Project No 1 Asset Trust).
- Lawrence Consulting (2012). *Narrabri Shire Economic Profile*. Prepared for Narrabri Shire Council, http://www.narrabri.nsw.gov.au/files/uploaded/file/Economic%20Development/Narrabri_Shire_Economic_Profile.pdf.

NWLLS (2017). *North West Regional Strategic Weed Management Plan 2017 – 2022*. North West Local Land Services.

OEH (2015). "Brigalow Belt South - subregions." *Brigalow Belt South Bioregion*, from <https://www.environment.nsw.gov.au/bioregions/BrigalowBeltSouth-Subregions.htm>.

OEH (2016a). "Brigalow Belt South - biodiversity." *Brigalow Belt South Bioregion*, from <https://www.environment.nsw.gov.au/bioregions/BrigalowBeltSouth-Biodiversity.htm>.

OEH (2016b). "Brigalow Belt South - regional history." *Brigalow Belt South Bioregion*, from <https://www.environment.nsw.gov.au/bioregions/BrigalowBeltSouth-RegionalHistory.htm>.

OEH (2016c). *NSW Guide to Surveying Threatened Plants*. NSW Office of Environment and Heritage.

OEH (2017a). *Biodiversity Assessment Method*. NSW Office of Environment and Heritage.

OEH (2017b). *Biodiversity Assessment Method Calculator Users Guide*. NSW Office of Environment and Heritage.

OEH (2017c). *Guidance to assist a decision-maker to determine a serious and irreversible impact*. NSW Office of Environment and Heritage.

OEH (2018a). "NSW BioNet Atlas." from <http://www.bionet.nsw.gov.au/>.

OEH (2018b). "NSW BioNet Vegetation Classification." from <http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>.

OEH (2018c). *'Species credit' threatened bats and their habitats*. NSW survey guide for the Biodiversity Assessment Method. NSW Office of Environment and Heritage.

OEH (2018d). "Threatened biodiversity profile search." from <http://www.environment.nsw.gov.au/threatenedspecies/>.

OEH (2019). "Biodiversity Assessment Method Calculator Version 1.2.6.00." from <https://customer.lmbc.nsw.gov.au/assessment/s/userlogin?startURL=%2Fassessment%2Fs%2F>.

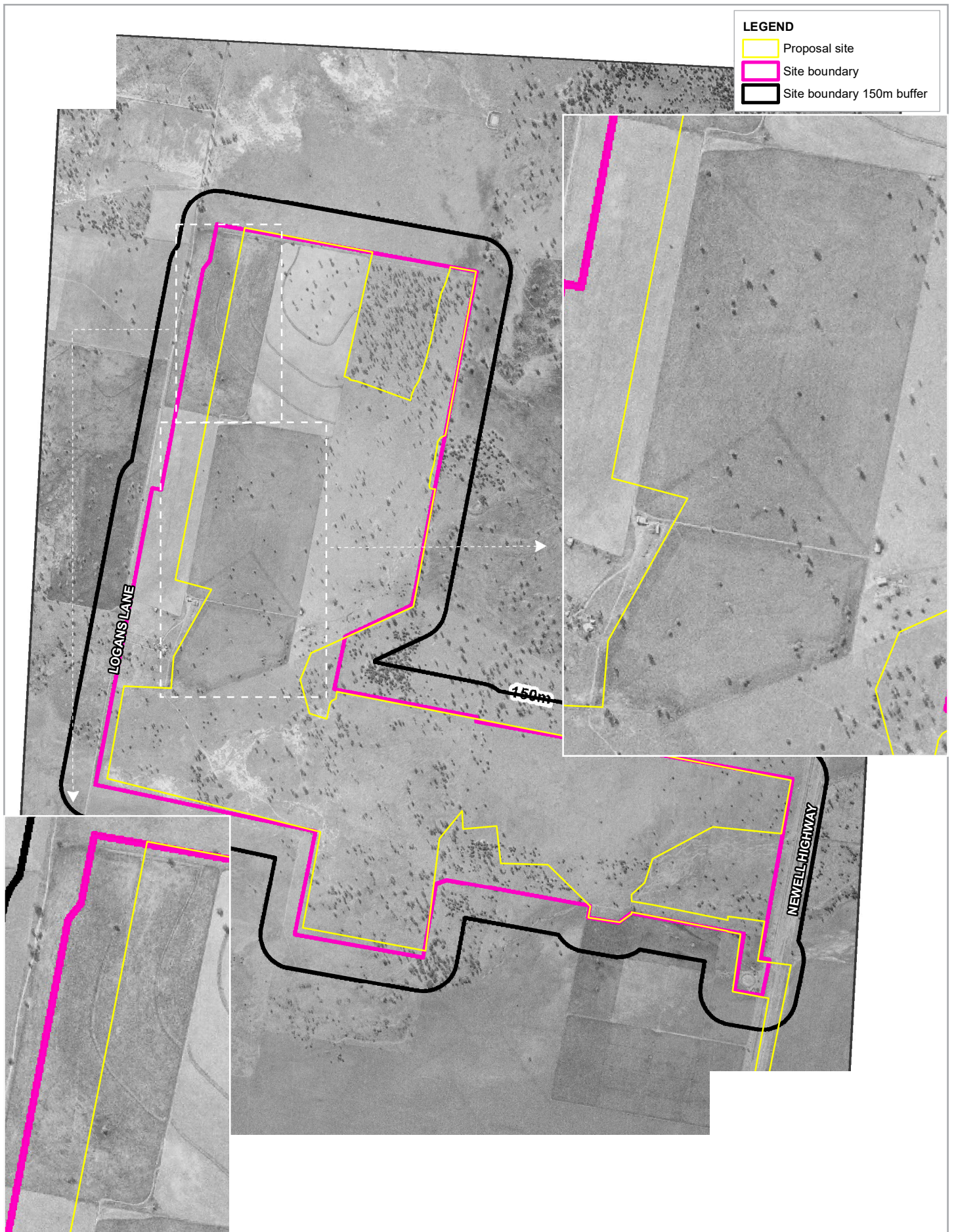
RBGT (2018). "PlantNET - The Plant Information Network System of The Royal Botanic Gardens and Domain Trust, Sydney, Australia." from <http://plantnet.rbgsyd.nsw.gov.au>.

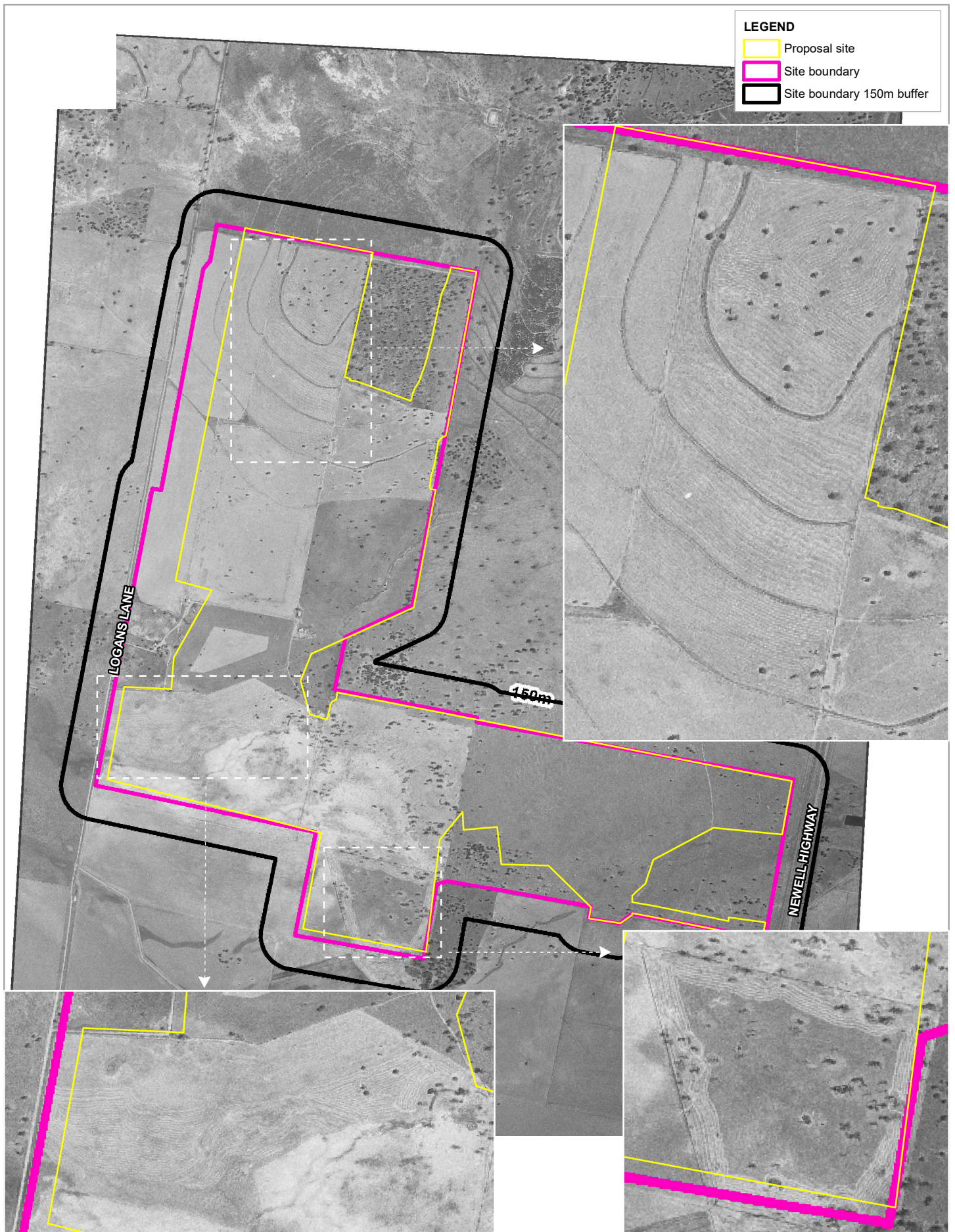
Weselek, A, Ehmenn A, Zikeli, S , Lewandowski, I, Schindele, S , Petra Hoky (2019), Agrophotovoltaic systems: applications, challenges and opportunities, A Review. *Agronomy for Sustainable Development* 39:35

Appendices

Appendix A

Category 1 exempt land assessment

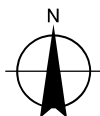








Paper Size ISO A4
0 200 400
Metres



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

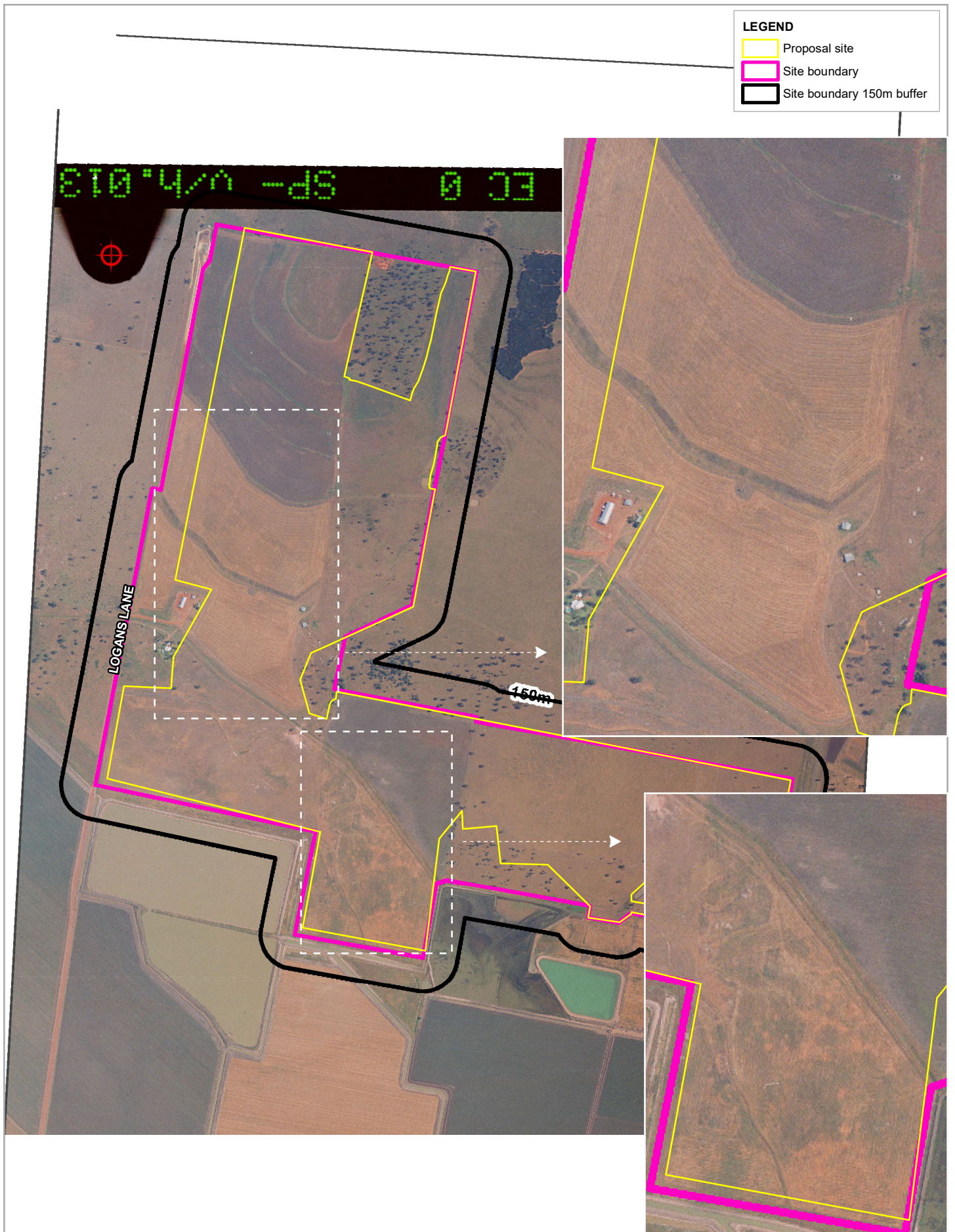


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

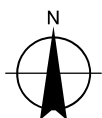
Project No. 21-26998
Revision No. -
Date 31 May 2021

Historic imagery - 1989

APPENDIX A
FIGURE 1d



Paper Size ISO A4
0 200 400
Metres



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

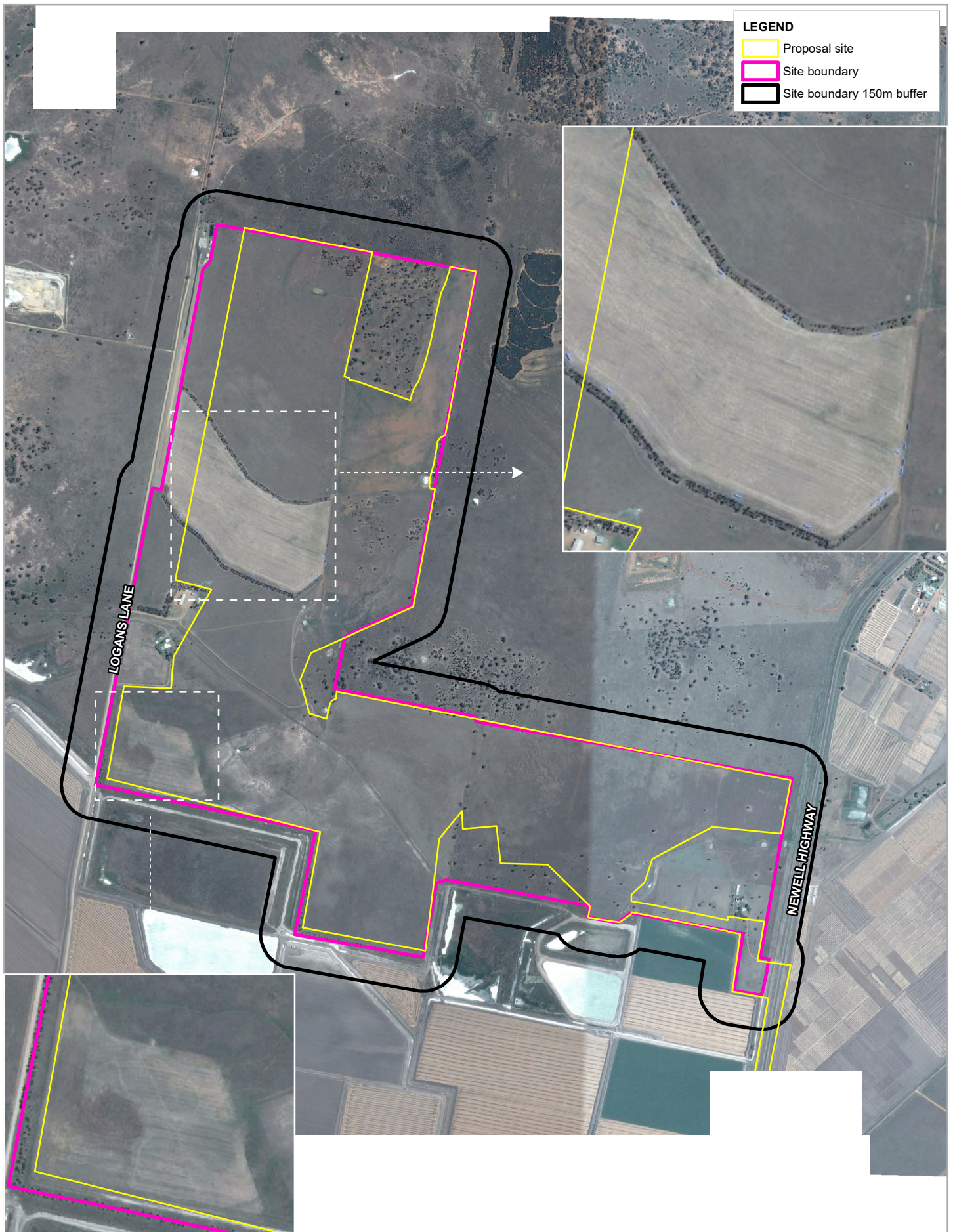


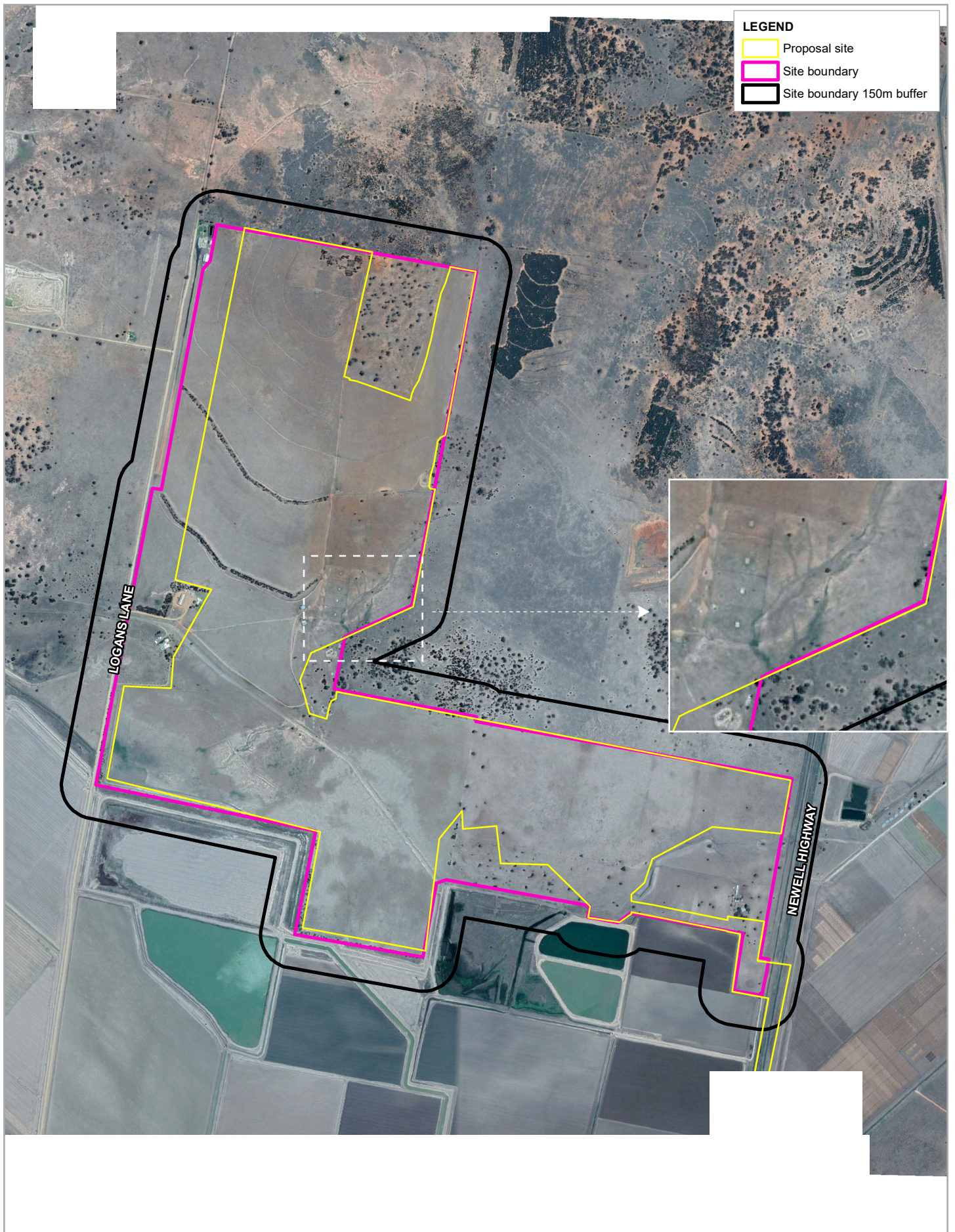
Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 31 May 2021

Historic imagery - 1998

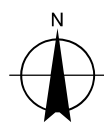
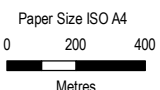
APPENDIX A
FIGURE 1e





LEGEND

- Proposal site
- Site boundary
- Site boundary 150m buffer

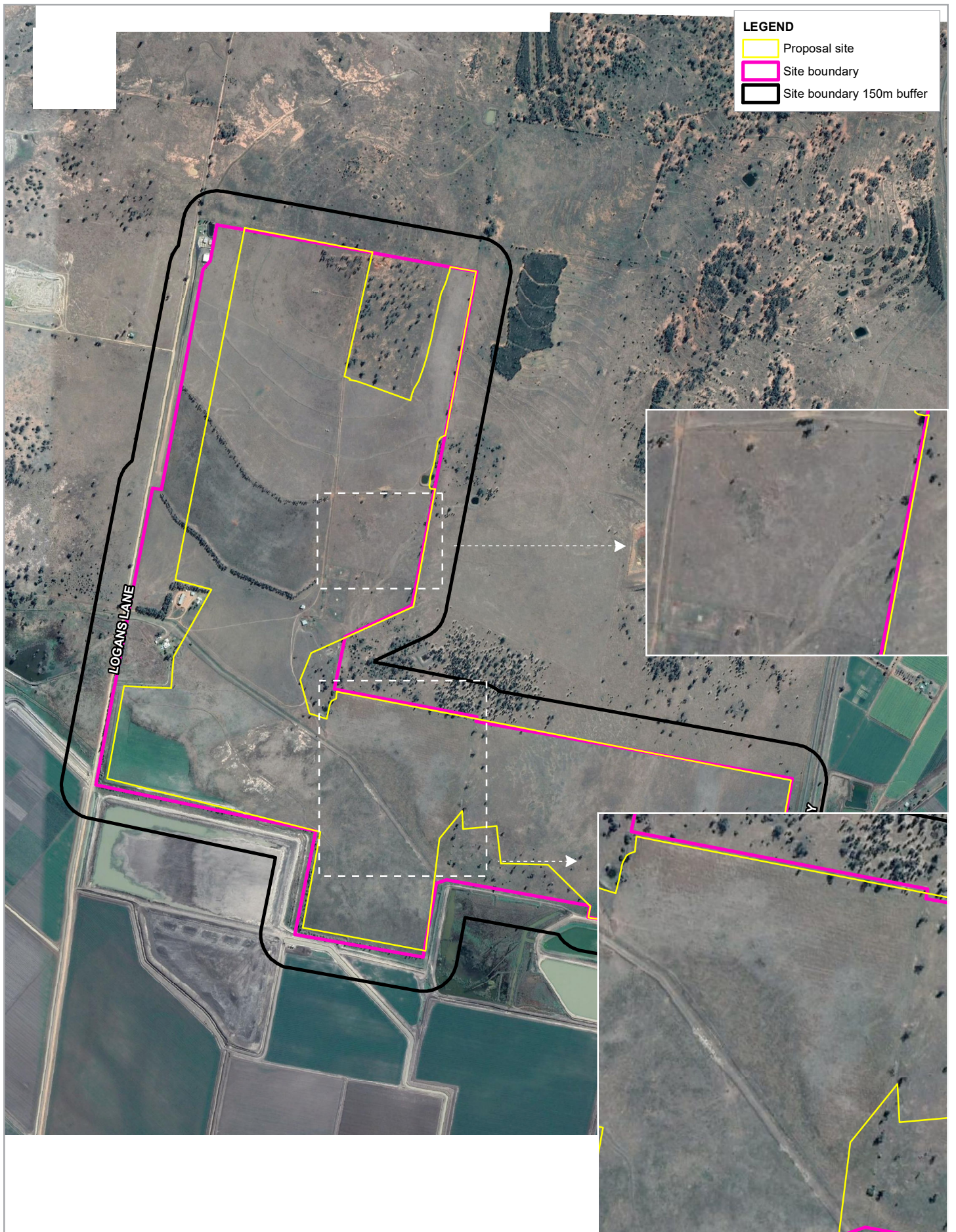


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

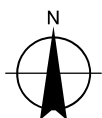
Project No. 21-26998
Revision No. -
Date 31 May 2021

APPENDIX A FIGURE 1g

Historic imagery - 2018



Paper Size ISO A4
0 200 400
Metres



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

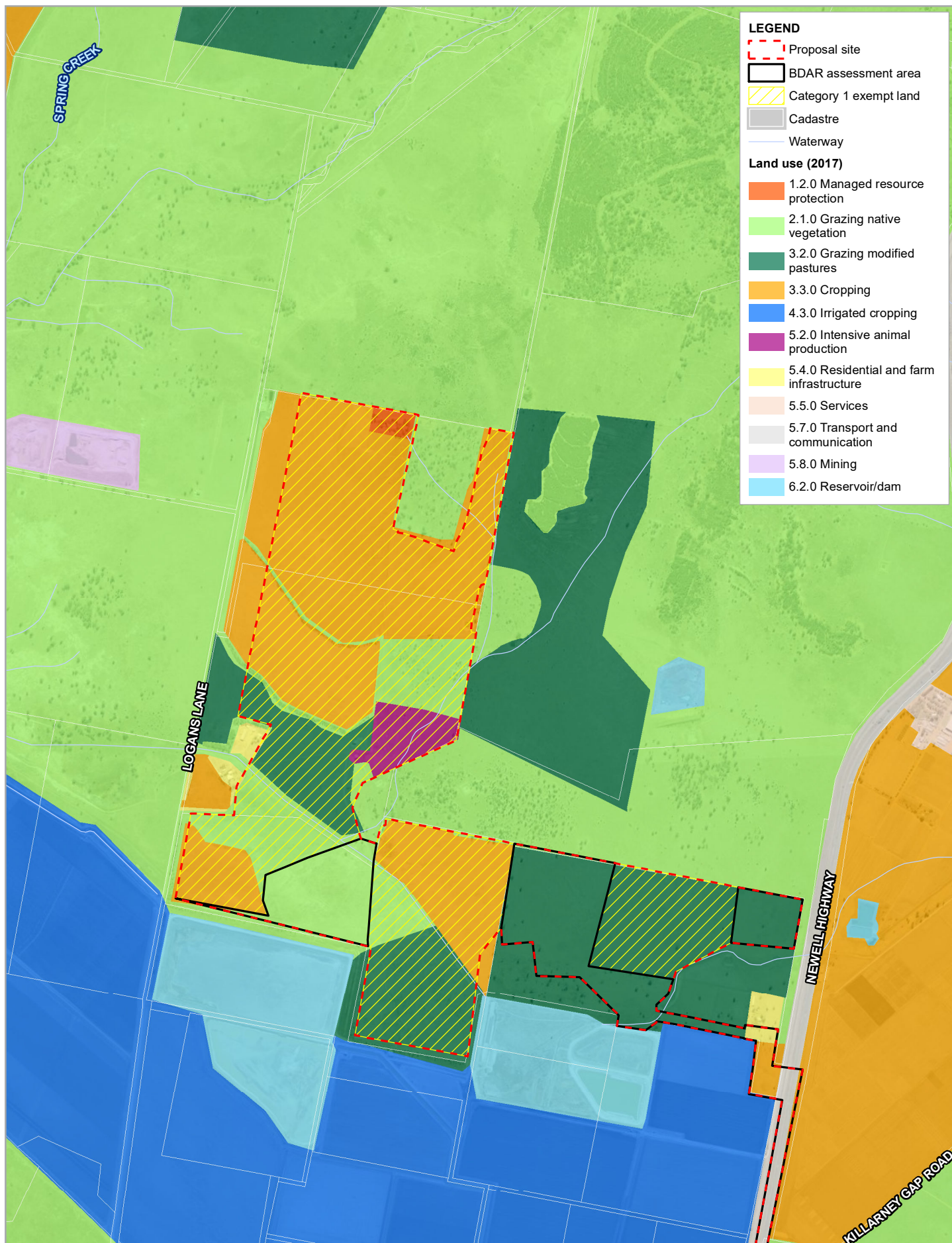


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 31 May 2021

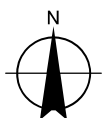
Historic imagery - 2020

APPENDIX A
FIGURE 1h



Paper Size ISO A4
0 200 400
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

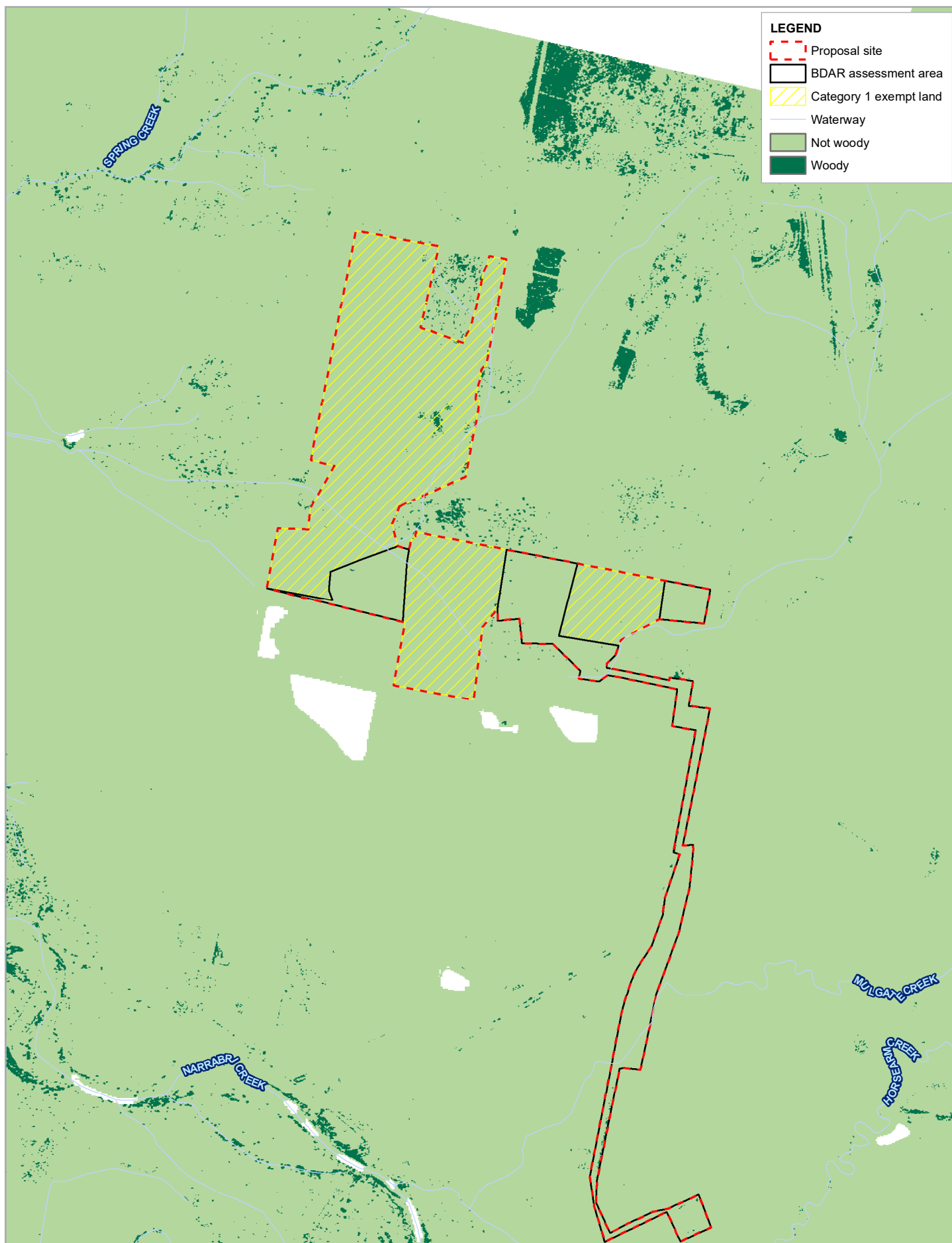


Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

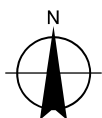
Appendix A Figure 2

Land use



Paper Size ISO A4
0 400 800
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Engie
Silverleaf Narrabri Solar Farm
Category 1 Exempt Land Application

Project No. 21-26998
Revision No. -
Date 09 Aug 2021

Appendix A
Figure 3

Woody extent 2011

Statutory Declaration

OATHS ACT 1900, NSW, EIGHTH SCHEDULE

I, Gregory Colyvan, do solemnly and sincerely declare that

During my ownership and control of the properties identified by Lot 2, Land Title DP586990 and as shown in the enclosed (the **Property**), I farmed crops on the Property. My period of ownership and control of the properties was between 1977 and the current date. For the purposes of this Statutory Declaration, the period between 1977 and 1990 is termed the **Pre-1990 Ownership Period**.

Farming of Crops

The farming of crops occurred at least 5 times during the Pre-1990 Ownership Period. The cropping process involved the clearing and/or tillage of land for the preparation of cropping.

The extent of cropping is shown in the areas marked in the attached map, and underwent cropping during the Pre-1990 Ownership Period, and in later years.

The only crops planted were wheat.

Herbicide Use

During the Pre-1990 Ownership Period, herbicide was not applied to the property.

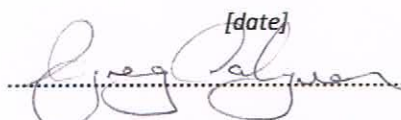
and I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the *Oaths Act 1900*.

Declared at: 12461 Newell Hwy, Narrabri, 2390.

on 29/07/2020

[place]

[date]


[signature of declarant]

in the presence of an authorised witness, who states:

I, _____, a _____,

[name of authorised witness]

[qualification of authorised witness]

certify the following matters concerning the making of this statutory declaration by the person who made it: [* please cross out any text that does not apply]

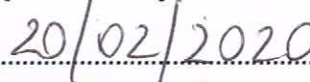
Ashleigh Isobelle Ann Rose
A Justice of the Peace in and for
the State of New South Wales
Reg. No. 226579

1. *I saw the face of the person ~~OR *I did not see the face of the person because the person was wearing a face covering, but I am satisfied that the person had a special justification¹ for not removing the covering, and~~
2. *I have known the person for at least 12 months ~~OR *I have confirmed the person's identity using an identification document and the document I relied on was~~



[signature of authorised witness]

[describe identification document relied on]

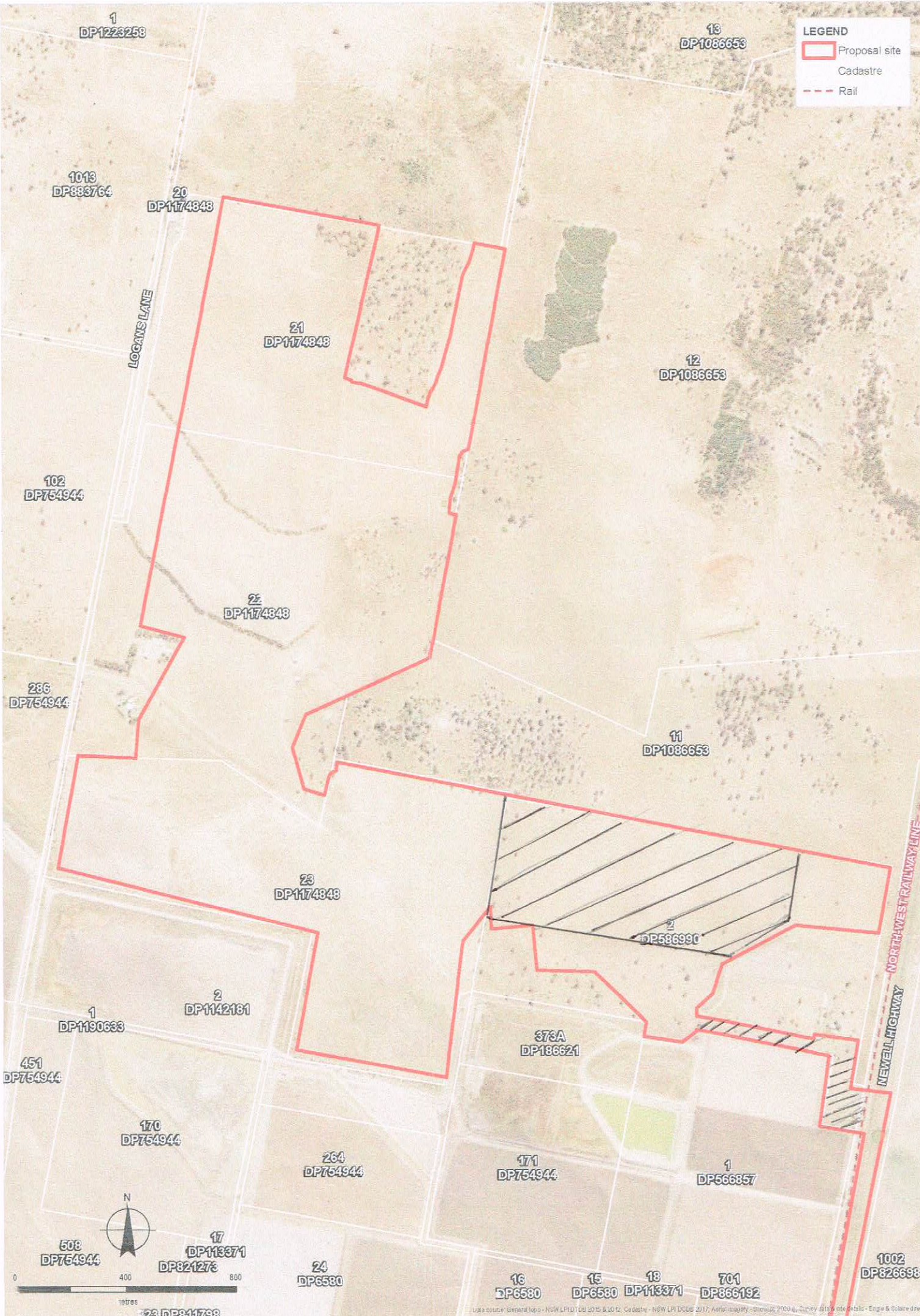


[date]

¹ The only "special justification" for not removing a face covering is a legitimate medical reason (at September 2018)

LEGEND

- Proposal site
- Cadastre
- Rail



Statutory Declaration

OATHS ACT 1900, NSW, EIGHTH SCHEDULE

I, MICHAEL JOHN LOGAN, do solemnly and sincerely declare that
[name of declarant]

during my ownership and control of the properties identified by Lots 21 – 23 DP 1174848 and as shown in the enclosed “Attachment 1 – Properties the subject of this Statutory Declaration” (the **Property**), I farmed crops on the Property. My family’s period of ownership and control of the properties was between about 1955 and the current date. I assumed management of the property since 1980. For the purposes of this Statutory Declaration, the period between 1955 and 1980 is termed the **Pre-1980 Ownership Period**.

Farming of Crops

The farming of crops occurred at least 15 times during the Pre-1980 Ownership Period. The cropping process involved the clearing and/or tillage of land for the preparation of cropping.

The extent of cropping is shown in “Attachment 2 – Areas never cropped during the Pre-1980 Ownership Period”. The map isolates in blue marking the areas that had not been cropped prior to 1980. Where areas unmarked on the Property in Attachment 2 underwent cropping at least 15 times during the Pre-1980 Ownership Period.

The crop(s) planted were wheat, barley, sorghum, sunflowers and lupins.

Herbicide Use

At least 15 times during the Pre-1980 Ownership Period, a herbicide was applied to the all of the property, so to destroy any existing vegetation within the herbicide application extent.

and I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the *Oaths Act 1900*.

Declared at: EDGECLIFF on 25 FEBRUARY 2020
[place] [date]
Michael Logan
[signature of declarant]

in the presence of an authorised witness, who states:

Ian Dunwoodie - Solicitor & Notary Public
Suite 404 Edgecliff Centre
203 New South Head Road, Edgecliff 2027

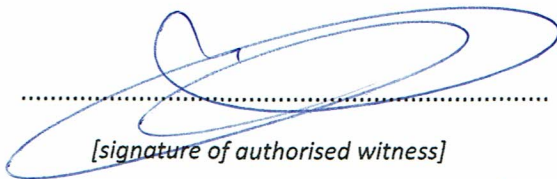
I,, a,

[name of authorised witness]

[qualification of authorised witness]

certify the following matters concerning the making of this statutory declaration by the person who made it: [* please cross out any text that does not apply]

1. *I saw the face of the person ~~OR *I did not see the face of the person because the person was wearing a face covering, but I am satisfied that the person had a special justification¹ for not removing the covering, and~~
2. *I have known the person for at least 12 months ~~OR *I have confirmed the person's identity using an identification document and the document I relied on was~~



[signature of authorised witness]

[describe identification document relied on]

25 FEBRUARY 2020

[date]

Ian Dunwoodie - Solicitor & Notary Public
Suite 404 Edgecliff Centre
203 New South Head Road, Edgecliff 2027




Attachment List:

- Attachment 1 – Properties the subject of this Statutory Declaration
- Attachment 2 – Areas never cropped during the Pre-1980 Ownership Period

¹ The only "special justification" for not removing a face covering is a legitimate medical reason (at September 2018)

ATTACHMENT 1

LEGEND

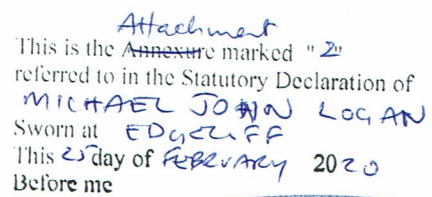
-  Proposal site
-  Cadastre
-  Rail



Attachment
This is the Annexure marked "1"
referred to in the Statutory Declaration of
MICHAEL LOGAN JOHN LOGAN
Sworn at *Edinburgh*
This 25 day of *February* 2020.
Before me

Ian Dunwoodie - Solicitor & Notary Public
Suite 404 Edgecliff Centre
203 New South Head Road, Edgecliff 2027

Attachment 2 – Areas never cropped during the Pre-1980 Ownership Period



Ian Dunwoodie - Solicitor & Notary Public
Suite 404 Edgecliff Centre
203 New South Head Road, Edgecliff 2027

Appendix B

**Likelihood of occurrence threatened and
migratory biota**

Likelihood of occurrence of threatened flora species at the site

Family	Scientific name	Common name	BC Status	EPBC Status	Number of records within 20km	Most recent record	Bionet atlas records (20km)	Protected Matters search report (10km)	Predicted by BAM Calculator	Species Habitat	SAIL entity?	SAIL threshold	Likelihood of Occurrence	Justification	Confirmed Candidate Species requiring further assessment (i.e. targeted survey)	Recommended survey times (from BAMC)	Survey undertaken	To be assessed as SAIL entity?
Euphorbiaceae	<i>Bertya opposens</i>	Coolabah Bertya	V	V	84	2018	Recorded within 20km since 1980	-	No	Known from three scattered sites in NSW: near Coolabah in western NSW, and two locations south of Narrabri. A fourth population near Cobar is considered possibly extinct. Most recent records found 20km south of Narrabri in Jacks Creek SF; there are no records within 10km of the site. Occurs in a range of habitats including stony/gravelly mallee ridges and cypress pine forest on red soils, or sandy gullies. Associated species at Jacks Creek SF (largest population) include Dirty Gum, White Cypress Pine and Red Ironbark.	No	n/a	Unlikely	No suitable habitat is present. The PCTs in the study area are not associated with stony or gravelly mallee ridges or sandy gully habitats; these latter habitats are typically associated with sandy outwash areas such as those found in the Pilliga Outwash sub-region to the south of Narrabri (where Jacks SF is located).	No	n/a	n/a	n/a
Surianaceae	<i>Cadellia pentastylis</i>	Ooline, Scrub Myrtle	V	V	22	2008	Recorded within 20km since 1980	Species or species habitat likely to occur within area	No	Relic rainforest species. Occurs from north of Gunnedah to west of Tenterfield. Forms a closed or open canopy mixing with eucalypt and cypress pine species. Presence appears to be strongly correlated with low-medium nutrient soils of sandy clay or clay consistency. All records within 20km are from intact forest approximately 20km to the east of the site, near the Deriah Community Conservation Area (Zone 2) Aboriginal Area.	No	n/a	Unlikely	No suitable habitat is present. The habitat in the study area is associated with higher fertility soils associated with the Namoi River floodplains. Also the remnant woodland vegetation does not provide suitable sheltered microhabitats that would be found in larger and more intact remnant vegetation.	No	n/a	n/a	n/a
Malvaceae	<i>Commersonia procumbens</i> (syn. <i>Androcalva procumbens</i>)	-	V	V	0	n/a	-	Species or species habitat likely to occur within area	No	Mainly confined to the Dubbo-Mendooran-Gilgandra region, but also in the Pilliga and Nymagee areas and recent collections from the Upper Hunter. Grows on sandy soils, often on roadsides. Has been recorded in Tumbledown Red Gum and Mugga Ironbark communities, Broombush scrub, under mallee eucalypts with a Common Fringe-myrtle understorey, and in a recently burnt Ironbark and Callitris area. Also in <i>Eucalyptus fibrosa subsp. nubila</i> , Tumbledown Red Gum, White Box and White Cypress Pine woodlands north of Dubbo.	No	n/a	Unlikely	No suitable habitat is present. The habitats within the study area are not associated with sandy soils.	No	n/a	n/a	n/a
Cyperaceae	<i>Cyperus conicus</i>	-	E	Not listed	1	2006	Recorded within 20km since 1980	-	Yes	Occurs rarely in the Pilliga area of NSW. Grows in open woodland in sandy soil. Recorded from Callitris forest in the Pilliga area, growing in sandy soil with Slender Flat-sedge, Bearded Flat-sedge and Sticky Sedge. Usually occurs with other sedge species and in sandy or silty and damp to wet soils. One record approximately 15km to the NE of Narrabri was recorded in deep sandy soil over sandstone, in a moist area near a shallow drainage line. The vegetation type was Dirty Gum-Black Cypress Pine forest.	No	n/a	Unlikely	No suitable habitat is present. The habitats within the study area are not associated with sandy soils. Suitable habitat would be associated with sandy gullies in sandstone outwash areas. Waterbodies in the form of farm dams are present but does not provide suitable habitat and there are no wetlands and wet run-on areas.	No	n/a	n/a	n/a
Poaceae	<i>Dichanthium setosum</i>	Bluegrass	V	V	0	n/a	-	Species or species habitat likely to occur within area	Yes	Occurs on the New England Tablelands, North-west Slopes and Plains and the Central-west Slopes. Associated with heavy basaltic black soils and red-brown loams with clay subsoil. Often found in moderately disturbed areas cleared woodland, grassy roadside remnants and highly disturbed pasture. Appears to have wide environmental tolerances. Associated species include White Box, Yellow Box, Silver-leaved Ironbark, Ribbon Gum, Winter Apple, Purple Wiregrass, Kangaroo Grass, Snowgrass, Redleg Grass.	No	n/a	Low - Moderate	Marginal habitat present in areas of native woodland and derived native grasslands; grazing and drought conditions has reduced the suitability of habitat.	Yes	December - May	March, September, November	n/a
Poaceae	<i>Digitaria porrecta</i>	Finger Panic Grass	E	Not listed	10	2017	Recorded within 20km since 1980	-	Yes	In NSW found on the North West Slopes and Plains, from near Moree south to Tambar Springs and from Tamworth to Coonabarabran. Inhabits native grasslands, woodland and open forests with grassy understorey on richer soils. Often found along roadsides and travelling stock routes where there is light grazing and occasional fire, and the understorey retains a reasonable level of species diversity. Associated species include White Box, Weeping Myall, Plains Grass, <i>Enteropogon acicularis</i> , Downs Nutgrass, Flower-of-an-Hour and Native Sensitive Plant.	No	n/a	Low - Moderate	Marginal habitat present in areas of native woodland and derived native grasslands; grazing and drought conditions has reduced the suitability of habitat.	Yes	December - May	March, September, November	n/a
Poaceae	<i>Homopholis belsonii</i>	Belson's Panic	E	V	5	2017	Recorded within 20km since 1980	Species or species habitat may occur within area	Yes	Occurs on northwest slopes and plains, north of Warialdia between Wee Waa, Goondiwindi and Glen Innes. Grows in dry woodland (e.g. Belah), often on poor soils though also found in basalt-enriched sites and alluvial clay soils. Habitat and ecology poorly known. Grows under shrubs and trees and can be easily overlooked. Tends to prefer slightly modified environments.	No	n/a	Low - Moderate	Marginal habitat present in areas of native woodland. The woodland areas are highly modified and the understorey sparse due to previous clearing and ongoing grazing. This has reduced the suitability of habitat.	Yes	December - April	March, September, November	n/a
Brassicaceae	<i>Lepidium aschersonii</i>	Spiny Peppercress	V	V	3	2007	Recorded within 20km since 1980	-	Yes	Found on ridges of gilgai clays dominated by Brigalow, Belah, Bulloak and Grey Box. Often the understorey is dominated by introduced plants. The species grows as a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter.	No	n/a	Low - Moderate	No suitable gilgai habitat present although small areas of highly modified Belah woodland is present as very marginal habitat; grazing impacts and drought conditions has reduced the suitability of habitat.	Yes	September - May	March, September, November	n/a
Rutaceae	<i>Philothea ericifolia</i>	-	Not listed	V	0	n/a	-	Species or species habitat likely to occur within area	No	This species occurs in drainage areas in dry sclerophyll open forest or woodland on sandstone and in heath on damp sandy flats and gullies. Specific microclimates include damp sandy flats, alluvial deposits of coarse gravel in dry creek beds and along a spur receiving soakage from high ground. Associated species include Narrow-leaved Ironbark, Pinkwood and <i>Philothea australis</i> .	No	n/a	Unlikely	No suitable habitat is present. No dry sclerophyll forests or woodlands on sandstone. No heathy understories in sandy flats and gullies. Lack of suitable microclimates across the study area.	No	n/a	n/a	n/a
Polygalaceae	<i>Polygala linariifolia</i>	Native Milkwort	E	Not listed	2	2006	Recorded within 20km since 1980	-	Yes	In NSW known from three locations: an isolated population west of Hungerford; north from Warialdia and Copeton Dam; and on the north coast near Casino and Kyogle. Grows in sandy soils in dry eucalypt forest and woodland with a sparse understorey. In the Pilliga area has been recorded in Fuzzy Box woodland, White Cypress Pine - Bulloke - Ironbark woodland, Rough-barked Apple riparian forb-grass open forest, and Ironbark - Brown Bloodwood shrubby woodland	No	n/a	Unlikely	No suitable habitat is present. No dry sclerophyll forests and woodlands on sandy soils. The habitats that this species is associated with is typical of vegetation found in the Pilliga Outwash sub-region to the south of Narrabri.	No	n/a	n/a	n/a
Rutaceae	<i>Pomaderris queenslandica</i>	Scant Pomaderris	E	Not listed	0	n/a	-	-	Yes	Widespread but uncommon in northeast NSW and in Queensland. Known only from a few locations on the New England Tablelands and northwest slopes, including near Torrington and Coolatal, and from the NSW north coast. Inhabits moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks.	No	n/a	Unlikely	No suitable habitat is present. Habitats in the study area lack sheltered, shrubby understories.	No	n/a	n/a	n/a
Orchidaceae	<i>Pterostylis cobarensis</i>	Greenhood Orchid, Cobar Rustyhood	V	Not listed	3	2011	Recorded within 20km since 1980	-	No	Recorded from Bourke, Nyngan, Cobar, Nymagee, Warren, Gilgandra, Narrabri and Coonabarabran districts. Grows in eucalypt woodlands, open mallee shrubland or Callitris shrublands on low stony ridges in skeletal sandy loam soils. Associated species include Grey Mallee, Green Mallee, Gum Coolibah, <i>Eucalyptus vicina</i> , White Cypress Pine, Wilga, Belah, Currawang, <i>Senna</i> spp. and <i>Eremophila</i> spp.	No	n/a	Unlikely	No suitable habitat is present. No shrublands on stony ridges are present in the study area, and soils are not shallow sandy loams.	No	n/a	n/a	n/a
Fabaceae - Faboideae	<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	0	n/a	-	-	Yes	Appears to prefer clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams, and appears in association with bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with <i>Maireana</i> species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated. The species may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated	No	n/a	Low - Moderate	Marginal habitat present in areas of native woodland and derived native grasslands; grazing impacts and drought conditions has reduced the suitability of habitat.	Yes	September - February	March, September, November	n/a
Apocynaceae	<i>Tylophora linearis</i>	-	V	E	0	n/a	-	Species or species habitat likely to occur within area	Yes	Found in the Barraba, Mendooran, Temora and West Wyalong districts in the northern and central western slopes of NSW. Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of Red Ironbark, Mugga Ironbark, White Box, Black Cypress Pine, White Cypress Pine and Bulloak.	No	n/a	Unlikely	No suitable habitat is present. The woodlands within the study area are associated with alluvials and basalt outwashes. Dry woodland habitat on sedimentary flats and low rises do not occur in the study area.	No	n/a	n/a	n/a

Key:
V - vulnerable
E - endangered

Likelihood of occurrence of threatened fauna species at the site

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
<p>Australian Brush-turkey population in the Nandewar and Brigalow Belt South Bioregions</p> <p><i>Alectura lathamii</i></p>	E		S	35 records (OEH 2018a)	Endangered population occurs in the Nandewar and Brigalow Belt South bioregions from north-east of Wyallda to Narrabri. Majority of records are from Mount Kaputar National Park and Deriah State Forest, with some records from Severn State Forest. Preferred inland habitat is a dry rainforest community within the Semi-evergreen Vine Thicket EEC. Birds build nesting mounds in dense vegetation, while tall trees such as Eucalypts are used for nocturnal and diurnal roosting.	Nil. No suitable habitat present.
<p>Australian Bustard</p> <p><i>Ardeotis australis</i></p>	E		Species	Credit calculator	Occurs in inland Australia. In NSW mainly found in the north-west corner, less often in the lower western and central west plains regions, with occasional vagrants east to the western slopes and riverine plain. Breeding confined to the north-west region. Mainly inhabits tussock and hummock grasslands, also occurs in low shrublands and low open grassy woodlands. Breeds on bare ground on low sandy ridges or stony rises in ecotones between grassland and shrubland cover. Travels long distances, presumably in response to habitat and climatic conditions.	Possible. Not observed during surveys.
<p>Australian Painted Snipe</p> <p><i>Rostratula australis</i></p>	E	E	Ecosystem	2 records, last recorded 2007 (OEH 2018a); Species or species' habitat likely to occur within 10km (DotE 2018a)	Normally found in permanent or ephemeral shallow inland wetlands, either freshwater or brackish. Nests on the ground amongst tall reed-like vegetation near water. Feeds on mudflats and the water's edge taking insects, worm and seeds. Prefers fringes of swamps, dams and nearby marshy areas with cover of grasses, lignum, low scrub or open timber.	Nil. No suitable wetland habitat present. Very small farm dams unlikely to provide suitable habitat for this species.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
<p>Barking Owl</p> <p><i>Ninox connivens</i></p>	V		Species (breeding)	74 records (OEH 2018a)	Occurs from coast to inland slopes and plains, though is rare in dense, wet forests east of the Great Dividing Range and sparse in higher parts of the tablelands and in the arid zone. Inhabits eucalypt woodlands, open forest, swamp woodlands, and, especially in inland areas, timber along watercourses. Roosts along creek lines in dense, tall understorey foliage (e.g. in Acacia and Casuarina), or dense eucalypt canopy. Nests in hollows of large, old eucalypts including <i>Eucalyptus camaldulensis</i> , <i>Eucalyptus albens</i> , <i>Eucalyptus polyanthemos</i> and <i>Eucalyptus blakelyi</i> . Birds and mammals important prey during breeding. Territories range from 30 to 200 hectares.	Possible. Could forage on site. Breeding unlikely as no timbered watercourse present.
<p>Black Falcon</p> <p><i>Falco subniger</i></p>	V		Ecosystem	2 records (OEH 2018a)	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Occurs in plains, grasslands, foothills, timbered watercourses, wetland environs, crops, and occasionally over towns and cities. Breeding occurs along timbered waterways in inland areas.	Present. Recorded roosting in dense canopy of a paddock tree.
<p>Black-breasted Buzzard</p> <p><i>Hamirostra melanosternon</i></p>	V		Ecosystem / Species	Credit calculator	Sparsely distributed in areas of less than 500mm rainfall, north from north-western NSW. Inhabits a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparsely timbered woodlands. Breeds from August to October near water in a tall tree.	Unlikely. Could forage on occasion at the site. No suitable waterways with very large raptor nests present.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Black-chinned Honeyeater (eastern subspecies) <i>Melithreptus gularis gularis</i>	V		Ecosystem	5 records (OEH 2018a)	Widespread in NSW, but rarely recorded east of Great Dividing Range except in Richmond and Clarence River areas and scattered sites in the Hunter, Central Coast and Illawarra regions. Mostly in upper levels of drier open forests /woodlands dominated by box and ironbark eucalypts, or less commonly smooth-barked gums, stringybarks and tea-treas. Forage over home range of >5 ha. Tend to occur within largest woodland patches in the landscape. They forage for insects, nectar and honeydew. The nest is hidden by foliage high in the crown of a tree.	Unlikely. Poor quality woodland habitat unlikely to support foraging of this species.
Brolga <i>Grus rubicunda</i>	V		Ecosystem	1 record, last recorded 2003 (OEH 2018a)	In NSW occurs west of the Great Dividing Range and on the north coast. Dependent on wetlands, especially shallow swamps. Often feed in dry grassland, ploughed paddocks or desert claypans.	Unlikely. No wetland habitat present. Could forage in paddocks on rare occasions.
Brown Treecreeper (eastern subspecies) <i>Climacteris picumnus victoriae</i>	V		Ecosystem	136 records (OEH 2018a)	Occurs from Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell to the east coast, in areas such as the Snowy River Valley, Cumberland Plain, Hunter Valley and parts of the Richmond and Clarence Valleys. Most common on the inland slopes and plains. Inhabits eucalypt woodlands and dry open forest, usually dominated by stringybarks or rough-barked species with open grassy understorey. Fallen timber is important foraging habitat. Nests in hollows in standing trees or stumps.	Unlikely. No large patches of woodland present. Limited fallen timber present.
Bush Stone-curlew <i>Burhinus grallarius</i>	E		Species	4 records (OEH 2018a)	Scattered distribution across NSW. Inhabits lowland grassy woodland and open forest and, in coastal areas, Casuarina and Melaleuca woodlands, saltmarsh and mangroves. Requires a low, sparse groundcover, some fallen timber and leaf litter, and a general lack of a shrubby understory (DEC 2006).	Unlikely. No large patches of woodland present. Limited fallen timber present.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Diamond Firetail <i>Stagonopleura guttata</i>	V		Ecosystem	34 records (OEH 2018a)	Typically found west of the Great Dividing Range, but populations also occur in drier coastal areas including W Sydney, Hunter, Clarence and Snowy River valleys. Occurs in grassy eucalypt woodlands including Box Gum and Snow Gum communities, as well as open forest, mallee and natural and derived grasslands. Often found in riparian areas and occasionally in lightly wooded farmland. Nests in shrubby understorey or higher up under nests of other species.	Possible. Could forage and breed at the site.
Dusky Woodswallow <i>Artamus cyanopterus</i>	V		Ecosystem	52 records (OEH 2018a)	The Dusky Woodswallow is widespread from the coast to inland, including the western slopes of the Great Dividing Range and farther west. It is often recorded in woodlands and dry open sclerophyll forests, and has also been recorded in shrublands, heathlands regenerating forests and very occasionally in moist forests or rainforests. The understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, often with coarse woody debris. It is also recorded in farmland, usually at the edges of forest or woodland or in roadside remnants or wind breaks with dead timber. The nest is an open shallow untidy cup frequently built in an open hollow, crevice or stump. Although Dusky Woodswallows have large home ranges, individuals may spend most of their time in about a 2 ha range and defend an area about 50 m around the nest. Dusky Woodswallows prefer larger remnants over smaller remnants. Competitive exclusion by Noisy Miners (<i>Manorina melanoccephala</i>) is a significant threat to this species.	Unlikely. Poor quality fragmented woodland habitat unlikely to support foraging of this species.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Flame Robin <i>Petroica phoenicea</i>	V		Ecosystem	1 record (OEH 2018a)	Breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. Migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains. Forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris. Fallen logs and coarse woody debris are important habitat components. Open cup nest of plant fibres and cobweb is often built near the ground in a sheltered niche, ledge or shallow cavity in a tree, stump or bank.	Likely. Could forage on occasion at the site. No breeding habitat present.
Freckled Duck <i>Stictonetta naevosa</i>	V		Ecosystem	3 records (OEH 2018a)	Breeds in large, ephemeral swamps in the Murray-Darling, particularly along the Paroo and Lachlan Rivers and other Riverina rivers. In drier times moves to more permanent waters. Disperses during extensive inland droughts and may be found in coastal areas during such times. Prefers freshwater swamps/ccreeks with dense Cumbungi, Lignum or tea-tree. Nests in dense vegetation at or near water level.	Nil. No wetland habitat present.
Glossy Black-Cockatoo <i>Calyptrorhynchus lathamii</i>	V		Ecosystem/ Species	98 records (OEH 2018a)	Widespread but uncommon from coast to southern tablelands and central western plains. Feeds almost exclusively on the seeds of Allocasuarina species. Prefers woodland and open forests, rarely away from Allocasuarina. Roost in leafy canopy trees, preferably eucalypts, usually <1km from feeding site. Nests in large (approx. 20cm) hollows in trees, stumps or limbs, usually in Eucalypts.	Unlikely. No suitable foraging habitat. Lack of water and limited leafy eucalypts present.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
<p>Grey Falcon</p> <p><i>Falco hypoleucos</i></p>	E		Ecosystem	Credit calculator	Inhabits shrubland, grassland and wooded watercourses of arid and semi-arid regions, and occasionally open woodlands throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Breeding only occurs within arid areas of the Great Dividing Range. Its diet consists of other birds, especially parrots and pigeons, reptiles and small mammals. Nesting occurs in disused nests of other birds of prey and ravens, high in a living eucalypt near water or a watercourse. Breeding occurs in late winter and early spring.	Possible. Could forage on occasion at the site. Unlikely to breed in the area.
<p>Grey-crowned Babbler (eastern subspecies)</p> <p><i>Pomatostomus temporalis temporalis</i></p>	V		Ecosystem	398 records (OEH 2018a)	Occurs on western slopes and plains , as well as in the Hunter Valley and several locations on the north coast. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Family groups have territories between 1-50 (generally around 10) hectares. Nests typically built in shrubs or sapling eucalypts.	Present. Foraging and nests observed on site.
<p>Hooded Robin (south-eastern form)</p> <p><i>Melanodryas cucullata cucullata</i></p>	V		Ecosystem	32 records (OEH 2018a)	Considered a sedentary species, but local seasonal movements are possible. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Occurrence is positively associated with patch size, and with components of habitat complexity including canopy cover, shrub cover, ground cover, logs, fallen branches and litter. Nests on low, live or dead forks or branches of trees or stumps, or occasionally on fallen trees or limbs.	Unlikely. Poor quality fragmented woodland habitat unlikely to support foraging of this species.
<p>Little Eagle</p> <p><i>Hieraaetus morphnoides</i></p>	V		Ecosystem/ Species	19 records (OEH 2018a)	Occurs throughout NSW except most densely forested parts of the Dividing Range escarpment. Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring.	Possible. Could forage at the site. No large raptor nests observed other than an active Whistling Kite and possible falcon nest.
<p>Little Lorikeet</p>	V		Ecosystem	76 records (OEH 2018a)	Occurs from coast to western slopes of the Great Dividing Range. Inhabits dry, open	Likely. Could forage on occasion at the

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
<i>Glossopsitta pusilla</i>					eucalypt forests and woodlands. Occurrence is positively associated with patch size, and with components of habitat complexity including canopy cover, shrub cover, ground cover, logs, fallen branches and litter. Feed primarily on profusely-flowering eucalypts and a variety of other species including melaleucas and mistletoes. On the western slopes and tablelands <i>Eucalyptus albens</i> and <i>E. melliodora</i> are particularly important food sources for pollen and nectar respectively. Mostly nests in small (opening approx. 3cm) hollows in living, smooth-barked eucalypts, especially <i>Eucalyptus viminalis</i> , <i>E. blakelyi</i> and <i>E. dealbata</i> . Most breeding records are from the western slopes.	site. Potential breeding habitat present.
Magpie Goose <i>Anseranas semipalmata</i>	V		Ecosystem	4 records (OEH 2018a)	Occurs in the tropics, increasing numbers in central and northern NSW and vagrants to south-east NSW. Inhabits shallow wetlands containing dense rushes or sedges, and nearby dry land used for grazing. It feeds on grasses, bulbs and rhizomes and roosts in tall vegetation within wetland areas. Breeding is occurs predominately in monsoonal areas and is unlikely in SE NSW. Nests are formed in trees over deep water.	Nil. No suitable wetland habitat present.
Malleefowl <i>Leipoa ocellata</i>	E	V	Ecosystem	1 record, last recorded 1999 (OEH 2018a); Species or species' habitat likely to occur within 10km (DotE 2018a)	Occurs in semi-arid to arid mallee country in the south-west of NSW. Occasional records exist from the Pilliga. Inhabits predominately mallee communities, apparently preferring areas of sandy soil, abundant leaf litter, dense canopy and an abundance of food shrubs and herbs (especially legumes). Less frequently found in other eucalypt woodlands such as <i>Eucalyptus microcarpa</i> , Ironbark and <i>E. populnea</i> woodlands with thick understorey, and Mulga and native Cypress Pine communities.	Nil. No suitable habitat present.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Masked Owl <i>Tyto novaehollandiae</i>	V		Ecosystem/ Species	8 records (OEH 2018a)	Occurs across NSW except NW corner. Most common on the coast. Inhabits dry eucalypt woodlands from sea level to 1100 m. Roosts and breeds in large (>40cm) hollows and sometime caves in moist eucalypt forested gullies. Hunts along the edges of forests and roadsides. Home range between 500 ha and 1000 ha. Prey mostly terrestrial mammals but arboreal species may also be taken.	Possible. May forage on occasion at the site. No breeding habitat present.
Painted Honeyeater <i>Grantiella picta</i>	V	V	Ecosystem	23 records (OEH 2018a); Species or species' habitat known to occur within 10km (DotE 2018a)	Nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Inhabits Boree, Brigalow and Box Gum woodlands and Box-Ironbark forests. Specialist forager on the fruits of mistletoes, preferably of the Amyema genus. Nests in outer tree canopy.	Unlikely. Poor quality fragmented woodland habitat unlikely to support foraging of this species. Few mistletoes observed.
Regent Honeyeater <i>Anthochaera phrygia</i>	CE	CE	Ecosystem/ Species	4 records (OEH 2018a); Foraging, feeding or related behaviour may occur within 10km (DotE 2018a)	In NSW confined to two known breeding areas: the Capertee Valley and Bundarra-Barraba region. Non-breeding flocks occasionally seen in coastal areas foraging in flowering Spotted Gum and Swamp Mahogany forests, presumably in response to drought. Inhabits dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak, with an abundance of mature trees, high canopy cover and abundance of mistletoes. The species is a dual credit species, with the species credit component mapped as an important area. These mapped areas do NOT require survey as it is presumed that the species is present. Any impact from development could potentially be serious and irreversible. Ecosystem credit areas are unlikely to have potential serious and irreversible impacts.	Unlikely. Poor quality woodland habitat unlikely to support foraging of this species. No important foraging habitat present. Does not breed in the area.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Scarlet Robin <i>Petroica boodang</i>	V		Ecosystem	9 records (OEH 2018a)	In NSW occurs from coast to inland slopes. Breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within open understorey of shrubs and grasses and sometimes in open areas. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. Abundant logs and coarse woody debris are important habitat components.	Unlikely. Poor quality woodland habitat unlikely to support foraging of this species.
Speckled Warbler <i>Chthonicola sagittata</i>	V		Ecosystem	255 records (OEH 2018a)	Within NSW most frequently reported from the hills and tablelands of the Great Dividing Range, rarely from the coast. Inhabits a wide range of Eucalyptus-dominated communities with a grassy understorey, a sparse shrub layer, often on rocky ridges or in gullies. Sedentary and requires large, relatively undisturbed remnants to persist in an area. Forages on the ground for seeds and insects, and nests in a slight hollow in the ground or at the base of a low dense plant.	Unlikely. Poor quality woodland habitat unlikely to support foraging of this species.
Spotted Harrier <i>Circus assimilis</i>	V		Ecosystem	14 records (OEH 2018a)	Occurs throughout Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Inhabits grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe (e.g. chenopods). Most commonly in native grassland, but also in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn).	Possible. Could forage at the site. No large raptor nests observed other than an active Whistling Kite and possible falcon nest.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Square-tailed Kite <i>Lophoictinia isura</i>	V		Ecosystem/ Species	5 records (OEH 2018a)	Occurs across NSW, resident in North, northeast and along west-flowing rivers. Summer breeding migrant to southeast of state. Inhabits a variety of habitats including woodlands and open forests, with preference for timbered watercourses. Favours productive forests on the coastal plain, box-ironbark-gum woodlands on the inland slopes, and Coolibah/River Red Gum on the inland plains. In Sydney area nests in mature living trees within 100m of ephemeral/permanent watercourse. Large home range > 100 km ² .	Possible. Could forage at the site however no timbered watercourses present. No large raptor nests observed other than Whistling Kite and possible falcon nest.
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Ecosystem/ Species	18 records (OEH 2018a); Species or species' habitat may occur within 10km (DotE 2018a)	Occurs as a single population in the South-west Slopes and Riverina bioregions. Two core breeding areas: between Cowra and Yass – Grenfell, Cootamundra and Coolac in the SW Slopes, and along the Murray, Edward and Murrumbidgee Rivers in the Riverina. Birds breeding in the SW slopes migrate north to the Namoi/Gwydir Rivers for winter. Inhabits Box Gum, Box – Cypress Pine and Boree woodlands and River Red Gum Forest. Nest in hollow trees, in tall riparian River Red Gum communities (Riverina area) or open Box Gum woodland or isolated paddock trees (SW Slopes). Mainly forages in grassy box woodlands, up to 10km from breeding sites.	Unlikely. Could forage on occasion at the site. Breeding does not occur in the Narrabri area.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Swift Parrot <i>Lathamus discolor</i>	E	CE	Ecosystem/ Species	Credit calculator	<p>Migratory, travelling to the mainland from March to October. Breeds in Tasmania from September to January. On the mainland, it mostly occurs in the southeast foraging on winter flowering eucalypts and lerps, with records of the species between Adelaide and Brisbane. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains.</p> <p>The species is a dual credit species, with the species credit component mapped as an important area. These mapped areas do NOT require survey as it is presumed that the species is present. Any impact from development could potentially be serious and irreversible. Ecosystem credit areas are unlikely to have potential serious and irreversible impacts.</p>	Unlikely. Poor quality woodland habitat unlikely to support foraging of this species.
Turquoise Parrot <i>Neophema pulchella</i>	V		Ecosystem	140 records (OEH 2018a)	Occurs from coast to inland slopes. In coastal area, most common between Hunter and Northern Rivers, and further south in S Coast. Inhabits open eucalypt woodlands and forests, typically with a grassy understorey. Favours edges of woodlands adjoining grasslands or timbered creek lines and ridges. Feeds on the seeds of native and introduced grasses and other herbs. Grasslands and open areas provide important foraging habitat for this species while woodlands provide important roosting and breeding habitat. Nests in tree hollows, logs or posts from August to December.	Likely. Could forage on occasion at the site. Potential breeding habitat present.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
<p>Varied Sittella</p> <p><i>Daphoenositta chrysoptera</i></p>	V		Ecosystem	64 records (OEH 2018a)	<p>Sedentary, occurs across NSW from the coast to the far west. Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Sensitive to habitat isolation and loss of structural complexity, and adversely affected by dominance of Noisy Miners. Cleared agricultural land is potentially a barrier to movement. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.</p>	<p>Possible. Could forage on occasion at the site.</p>
<p>White-bellied Sea-Eagle</p> <p><i>Haliaeetus leucogaster</i></p>	V	C	Ecosystem/ Species	4 records (OEH 2018a)	<p>Primarily coastal but may extend inland over major river systems. Breeds close to water, mainly in tall open forest/woodland but also in dense forest, rainforest, closed scrub or remnant trees. Usually forages over large expanses of open water, but also over open terrestrial habitats (e.g. grasslands).</p>	<p>Nil. No suitable foraging habitat present. No large raptor nests observed other than Whistling Kite and possible falcon nest.</p>
<p>Curlew Sandpiper</p> <p><i>Calidris ferruginea</i></p>	E	M (C,J,K)	Ecosystem/ Species	Species or species' habitat may occur within 10km (DotE 2018a)	<p>Breeds in northern hemisphere. In Australia generally occupies littoral and estuarine habitats. In NSW mainly found in intertidal mudflats on sheltered coasts. Roosts on beaches, spits or islands on the coast/in wetlands, or in saltmarsh on rocky shores.</p>	<p>Nil. No wetland habitat present. Very small farm dams present unlikely to provide suitable foraging habitat.</p>
<p>Black-striped Wallaby</p> <p><i>Macropus dorsalis</i></p>	E		Ecosystem	623 records (OEH 2018a)	<p>Occurs on the far north coast and western slopes of NSW. On the north-west slopes occurs in Brigalow remnants to south of Narrabri. Preferred habitats characterised by dense low (up to 3m) woody or shrubby vegetation, near open grassy foraging areas. On the north-west slopes associated with dense vegetation including brigalow, ooline and vine-thickets. On the north-coast closely associated with dry rainforest but also recorded from moist eucalypt forest with dense understorey.</p>	<p>Nil. No suitable shrubby vegetation present.</p>

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Brush-tailed Rock-wallaby <i>Petrogale penicillata</i>	E	V	Species	9 records (OEH 2018a)	Occurs from the Shoalhaven north to the Queensland border. Now mostly extinct west of the Great Dividing Range, except in the Warrumbungles and Mt Kaputar. Occurs on rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Diet consists of vegetation in adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Nil. No suitable rocky habitat present. No targeted surveys conducted.
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	V	V	Ecosystem	49 records (OEH 2018a); Species or species' habitat likely to occur within 10km (DotE 2018a)	Little known about the biology or social structure of these bats - rarely recorded and scattered distribution. Limited distribution that is restricted to the Murray-Darling Basin and western slopes in south-eastern Australia. Occur in a wide range of habitats including River Red Gum, Black Box, Allocasuarina, Belah, Mallee, open woodlands and savannahs, but are most common in box, ironbark and cypress open forests and buloke woodlands of inland northern NSW (Churchill 2008). In SA known to roost in tree hollows less than 3m above the ground with multiple small entrances, elsewhere they roost in fissures in branches and under exfoliating bark. Tree hollows used as maternity sites.	Possible. Could forage and breed at the site.
Eastern Bentwing-bat <i>Miniopterus schreibersii oceanensis</i>	V		Ecosystem/ Species	15 records (OEH 2018a)	Generally occurs east of the Great Dividing Range along NSW coast. Inhabits various habitats from open grasslands to woodlands, wet and dry sclerophyll forests and rainforest. Essentially a cave bat but may also roost in road culverts, stormwater tunnels and other man-made structures. Only 4 known maternity caves in NSW, near Wee Jasper, Bungonia, Kempsey and Texas. Females may travel hundreds of kilometres to the nearest maternal colony.	Likely. Could forage on occasion at the site. No breeding habitat present.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Eastern Cave Bat <i>Vespadelus troughtoni</i>	V		Species	28 records (OEH 2018a)	Occurs in NE NSW south to Kempsey and west to the Warrumbungles. Inhabits rainforest margins, wet and dry sclerophyll forests through to drier forests and woodlands in semi-arid environments. All records are within close proximity to sandstone or volcanic escarpments. Roosts in overhangs and caves, mines, boulder piles, abandoned Fairy Martin nests and occasionally in buildings, and regularly switches between alternate roost colonies. Forages over a small area, but are capable of flying 500m over clear paddocks.	Unlikely. Not recorded during anabat surveys. No volcanic escarpments in close proximity. Records in the region are centred around the Pilliga and forests of the Boggabri area.
Eastern Freetail-bat <i>Mormopterus norfolkensis</i>	V		Ecosystem	2 records (OEH 2018a)	Occurs in dry sclerophyll forest and woodland east of the Great Dividing Range. Forages in natural and artificial openings in vegetation, typically within a few kilometres of its roost. Roosts primarily in tree hollows but also recorded from man-made structures or under bark.	Present (probable record based on Anabat analysis). May forage, roost and breed at the site.
Eastern Pygmy-possum <i>Cercartetus nanus</i>	V		Species	7 records (OEH 2018a)	Occurs along the east coast of NSW, and inland to the Pilliga, Dubbo, Parkes and Wagga Wagga. Inhabits range of habitats from coastal heath and woodland through open and closed forests, subalpine heath and rainforest. Inhabits rainforest, sclerophyll forests and heath. Banksia spp. and myrtaceous shrubs and trees are favoured food sources and nesting proposal sites in drier habitats. Diet mostly pollen and nectar from Banksia, Eucalyptus, and Callistemon species, and insects. Nests in hollows in trees, under the bark of Eucalypts, forks of tea-trees, abandoned bird nests and <i>Xanthorrhoea</i> bases.	Nil. No suitable forested habitat present.
Greater Glider <i>Petauroides volans</i>		V	Species	27 records (OEH 2018a); Species or species' habitat may occur within 10km (DotE 2018a)	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, from sea level to 1200 m above sea level. It prefers taller montane, moist eucalypt forest with relatively old trees and abundant hollows.	Nil. No suitable moist forest habitat present. Nearest records are from Mt Kaputar National Park. No records from the Pilliga.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	V	V	Ecosystem/ Species	Foraging, feeding or related behaviour may occur within 10km (DotE 2018a)	Roosts in camps within 20 km of a regular food source, typically in gullies, close to water and in vegetation with a dense canopy. Forages in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, swamps and street trees, particularly in eucalypts, melaleucas and banksias. Highly mobile with movements largely determined by food availability. Will also forage in urban gardens and cultivated fruit crops.	Unlikely. No local records. No breeding camp present.
Koala <i>Phascolarctos cinereus</i>	V	V	Ecosystem/ Species	107 records (OEH 2018a); Species or species' habitat known to occur within 10km (DotE 2018a)	Occurs from coast to inland slopes and plains. Restricted to areas of preferred feed trees in eucalypt woodlands and forests. Home range varies depending on habitat quality, from < 2 to several hundred hectares. Important' habitat (species credit habitat) is defined by the density of koalas and quality of habitat determined by on-site survey.	Unlikely. Limited connectivity with better quality patches of vegetation. Site would not constitute core or important habitat. No evidence during surveys.
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	V	V	Species	39 records (OEH 2018a); Species or species' habitat likely to occur within 10km (DotE 2018a)	Occurs from the coast to the western slopes of the divide. Largest numbers of records from sandstone escarpment country in the Sydney Basin and Hunter Valley. Roosts in caves and mines and most commonly recorded from dry sclerophyll forests and woodlands. An insectivorous species that flies over the canopy or along creek.	Unlikely. Limited connectivity with better quality patches of vegetation. No vegetated creek lines or rocky outcrops present. Records in the region are from Mt Kaputar National Park and the Pilliga.
Little Pied Bat <i>Chalinolobus picatus</i>	V		Ecosystem	24 records (OEH 2018a)	Found in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings in dry open forest and woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, and Bimble box communities. They feed on moths and other flying invertebrates.	Present (probable record based on Anabat analysis). May forage, roost and breed at the site.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Pilliga Mouse <i>Pseudomys pilligaensis</i>	V	V	Ecosystem	67 records (OEH 2018a); Species or species' habitat may occur within 10km (DotE 2018a)	Mainly confined to low-nutrient deep sands of the Pilliga region, though an individual was also recorded from the Warrumbungles following major fires in 2013. Appears to prefer areas with sparse groundcover. Occur in highest numbers in: recently burnt moist gullies; areas dominated by Broombush; and areas with Bloodwood overstorey and <i>Acacia burrowii</i> understorey.	Nil. No suitable forested habitat present.
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Ecosystem	2 records (OEH 2018a)	Inhabits a range of environments including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Den sites are in hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces. Females occupy home ranges of up to 750 ha and males up to 3,500 ha, usually traversed along densely vegetated creek lines.	Unlikely. Limited connectivity with better quality patches of vegetation. No vegetated creek lines present.
Squirrel Glider <i>Petaurus norfolcensis</i>	V		Species	28 records (OEH 2018a)	Occurs along the drier inland slopes as well as coastal habitats. Inhabits woodland and open forest with a Eucalyptus, Corymbia or Angophora overstorey and a shrubby understorey of Acacia or Banksia. Key habitat components include reliable winter and early-spring flowering Eucalypts, Banksia or other nectar sources, and hollow-bearing trees for roost and nest sites, with social groups moving between multiple hollows.	Unlikely. Suitable woodland habitat with flowering understory species not present.
Stripe-faced Dunnart <i>Sminthopsis macroura</i>	V		Species	No local records	Occurs throughout much of inland central and northern Australia, extending into central and northern NSW. Prefers relatively ungrazed habitats with greater diversity and healthier understorey vegetation. Occurs in native dry grasslands and low dry shrublands, often along drainage lines where food and shelter resources tend to be better.	Unlikely. Site is highly grazed and has no drainage lines with suitable habitat. No local records.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Yellow-bellied Sheath-tail-bat <i>Saccolaimus flaviventris</i>	V		Ecosystem	193 records (OEH 2018a)	Migrates from tropics to SE Aus in summer. Forages across a range of habitats including those with and without trees, from wet and dry sclerophyll forest, open woodland, Acacia shrubland, mallee, grasslands and desert. Roosts communally in large tree hollows and buildings (Churchill 2008).	Present (definite record based on Anabat analysis). May forage, roost and breed at the site.
Pink-tailed Worm-lizard <i>Aprasia parapulchella</i>	V	V	Ecosystem	Species or species' habitat may occur within 10km (DotE 2018a)	Populations occur in the Queanbeyan/Canberra district, Cooma, Yass, Bathurst, Albury and West Wyalong areas. Inhabits grassland and open woodland with substantial embedded rock cover in sunny situations. Recorded in both native and non-native grasslands. Usually recorded under small rocks (150 - 600 mm basal area) shallowly embedded in the soil (2 - 5 cm, and use ant burrows under these rocks.	Nil. No suitable rocky habitat present. No targeted surveys conducted.
Border Thick-tailed Gecko <i>Uvidicolus sphyrrurus</i>	V	V	Species	1 record, last recorded 2000 (OEH 2018a)	The Border Thick-tailed Gecko occurs in the New England Tableland, Nandewar and Brigalow Belt South Bioregions in northern NSW and in south-east Queensland. It is a nocturnal species that shelters by day and is most commonly found in undisturbed habitat remnants on rocky outcrops and stony hills within eucalypt and cypress-pine open forest or woodland between 500-1100 m elevation.	Nil. No suitable rocky habitat in undisturbed remnants present.
Five-clawed Worm-skink <i>Anomalopus mackayi</i>	E	V	Ecosystem	3 records (OEH 2018a); Species or species' habitat may occur within 10km (DotE 2018a)	Patchily distributed on the north-west slopes and plains of NSW between Ashford, Mungindi and Walgett and north into Queensland. Inhabits deep burrows and soil cracks in grassy White Box woodland on moist black soils and River Red Gum - Coolibah - Bimble Box woodland on cracking clays. Has also been recorded in grassland areas and open paddocks with scattered trees.	Possible. Could occur in better quality woodland patches as well as grazed paddocks.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
<p>Pale-headed Snake</p> <p><i>Hoplocephalus bitorquatus</i></p>	V		Species	28 records (OEH 2018a)	Occurs north from Tuggerah along the coast and to the western side of the Great Divide, historically recorded as far west as Mungindi and Quambone. Inhabits dry eucalypt forests and woodlands, cypress woodland and occasionally in rainforest or moist eucalypt forest. West of the Great Dividing Range in NSW the species, has been recently recorded in sites dominated by Narrow-leaved Ironbark, Black Box and Silver-leaf Ironbark woodland and Coolabah. Favours streamside areas, particularly in drier habitats. Shelter during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees.	Unlikely. No suitable woodland along streams present at the site.
<p>Eel Trailed Catfish</p> <p><i>Tandanus tandanus</i></p>	E (FM Act)		NA	(DPI 2018a)	In NSW is currently only regularly observed in the Macquarie catchment upstream of Warren, the Castlereagh catchment upstream of Mendooran, the Namoi catchment upstream of Wee Waa, the Gwydir catchment upstream of Moree and the Border Rivers catchment upstream of Goondiwindi. Present in a range of riverine and lake habitats, preferring sluggish or still waters. Found in both clear and turbid waters, in areas ranging from mud to gravel to rock substrates. Now rare in riverine habitats in inland NSW and Queensland but can be found in farm dams.	Nil. No riverine habitat present.
<p>Murray Cod</p> <p><i>Maccullochella peelii</i></p>		V	NA	Species or species' habitat may occur within 10km (DotE 2018a)	Occurs throughout the Murray-Darling Basin. Can live in a wide range of habitats, from clear, rocky streams in the upper western slopes regions of New South Wales to the slow flowing, turbid rivers and billabongs of the western plains. Generally, they are found in waters up to 5m deep and in sheltered areas with cover from rocks, timber or overhanging banks. The presence of wood debris has been shown to be the primary factor determining Murray cod presence.	Nil. No riverine habitat present.

Name	BC Status	EPBC Status	Credit type	Source	Habitat Association	Likelihood of Occurrence
Purple Spotted Gudgeon <i>Mogurnda adspersa</i>	E (FM Act)		NA	(DPI 2018a)	Occured in inland drainages of the Murray-Darling basin as well as coastal drainages of northern NSW and Queensland. Now extremely rare in inland NSW, having been recorded from this area only once since 1983. Found in slow-moving or still waters of rivers, creeks and billabongs, often amongst weeds, rocks or large woody debris (snags).	Nil. No suitable creek or billabong habitat present.

Key: CE – critically endangered, E – endangered, EP – endangered population, V – vulnerable.

Appendix C

Species lists

Flora species recorded

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Acanthaceae	<i>Brunoniella australis</i>	Blue Trumpet	-	-	-
Aizoaceae	<i>Tetragonia moorei</i>	-	-	-	-
Aizoaceae	<i>Tetragonia tetragonioides</i>	New Zealand Spinach	-	-	-
Amaranthaceae	<i>Alternanthera nodiflora</i>	Common Joyweed	-	-	-
Amaranthaceae	<i>Gomphrena celosioides</i>	Gomphrena Weed	*	-	-
Asteraceae	<i>Arctotheca calendula</i>	Capeweed	*	-	-
Asteraceae	<i>Calotis cuneifolia</i>	Purple Burr-Daisy	-	-	-
Asteraceae	<i>Calotis lappulacea</i>	Yellow Burr-daisy	-	-	-
Asteraceae	<i>Calotis</i> spp.	A Burr-daisy	-	-	-
Asteraceae	<i>Carthamus lanatus</i>	Saffron Thistle	*	-	-
Asteraceae	<i>Centaurea solstitialis</i>	St Barnabys Thistle	*	-	-
Asteraceae	<i>Chrysocephalum apiculatum</i>	Common Everlasting	-	-	-
Asteraceae	<i>Chrysocephalum semipapposum</i>	Clustered Everlasting	-	-	-
Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	*	-	-
Asteraceae	<i>Helianthus annuus</i>	Common Sunflower	*	-	-
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	*	-	-
Asteraceae	<i>Vittadinia cuneata</i>	A Fuzzweed	-	-	-
Asteraceae	<i>Vittadinia</i> spp.	Fuzzweed	-	-	-
Asteraceae	<i>Xerochrysum bracteatum</i>	Golden Everlasting	-	-	-
Boraginaceae	<i>Cynoglossum australe</i>	-	-	-	-
Boraginaceae	<i>Echium plantagineum</i>	Paterson's Curse	*	-	-
Brassicaceae	<i>Lepidium africanum</i>	Common Peppercress	*	-	-
Brassicaceae	<i>Lepidium bonariense</i>	Argentine Peppercress	*	-	-
Brassicaceae	<i>Lepidium pseudohyssopifolium</i>	Peppercress	-	-	-
Brassicaceae	<i>Lepidium</i> spp.	A Peppercress	*	-	-
Brassicaceae	<i>Rapistrum rugosum</i>	Turnip Weed	*	-	-
Cactaceae	<i>Opuntia stricta</i>	Common Prickly Pear	*	-	-
Campanulaceae	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	-	-	-
Campanulaceae	<i>Wahlenbergia stricta</i>	Australian Bluebell	-	-	-
Caryophyllaceae	<i>Cerastium glomeratum</i>	Mouse-ear Chickweed	*	-	-
Casuarinaceae	<i>Casuarina cristata</i>	Belah	-	-	-
Chenopodiaceae	<i>Atriplex leptocarpa</i>	Slender-fruit Saltbush	-	-	-
Chenopodiaceae	<i>Chenopodium desertorum</i>	Desert Goosefoot	-	-	-
Chenopodiaceae	<i>Dysphania pumilio</i>	Small Crumbweed	-	-	-
Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush	-	-	-
Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush	-	-	-
Chenopodiaceae	<i>Enchylaena tomentosa</i>	Ruby Saltbush	-	-	-

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Chenopodiaceae	<i>Maireana microphylla</i>	Small-leaf Bluebush	-	-	-
Chenopodiaceae	<i>Rhagodia spinescens</i>	Spiny Saltbush	-	-	-
Chenopodiaceae	<i>Salsola australis</i>	-	-	-	-
Chenopodiaceae	<i>Sclerolaena birchii</i>	Galvanized Burr	-	-	-
Chenopodiaceae	<i>Sclerolaena divaricata</i>	Tangled Copperburr	-	-	-
Chenopodiaceae	<i>Sclerolaena muricata</i>	Black Rolypoly	-	-	-
Chenopodiaceae	<i>Sclerolaena tetracladus</i>	Brigalow Burr	-	-	-
Convolvulaceae	<i>Convolvulus angustissimus</i>	-	-	-	-
Convolvulaceae	<i>Convolvulus erubescens</i>	Blushing Bindweed	-	-	-
Convolvulaceae	<i>Evolvulus alsinoides</i>	Bindweed	-	-	-
Cucurbitaceae	<i>Cucumis myriocarpus subsp. leptodermis</i>	Paddy Melon	*	-	-
Cyperaceae	<i>Carex inversa</i>	Knob Sedge	-	-	-
Euphorbiaceae	<i>Euphorbia drummondii</i>	Caustic Weed	-	-	-
Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining glycine	-	-	-
Fabaceae (Faboideae)	<i>Glycine microphylla</i>	Small-leaf Glycine	-	-	-
Fabaceae (Faboideae)	<i>Medicago polymorpha</i>	Burr Medic	*	-	-
Fabaceae (Mimosoideae)	<i>Acacia harpophylla</i>	Brigalow	-	-	-
Fabaceae (Mimosoideae)	<i>Acacia stenophylla</i>	River Cooba	-	-	-
Fabaceae (Mimosoideae)	<i>Neptunia gracilis f. gracilis</i>	Sensitive Plant	-	-	-
Fabaceae (Mimosoideae)	<i>Vachellia farnesiana</i>	Mimosa Bush	-	-	-
Haloragaceae	<i>Haloragis aspera</i>	Rough Raspwort	-	-	-
Lamiaceae	<i>Lamium amplexicaule</i>	Henbit	*	-	-
Malvaceae	<i>Abutilon cryptopetalum</i>	-	-	-	-
Malvaceae	<i>Abutilon leucopetalum</i>	-	-	-	-
Malvaceae	<i>Abutilon macrum</i>	-	-	-	-
Malvaceae	<i>Abutilon oxycarpum</i>	Straggly Lantern-bush	-	-	-
Malvaceae	<i>Sida ammodendron</i>	Sand Sida	-	-	-
Malvaceae	<i>Sida corrugata</i>	Corrugated Sida	-	-	-
Malvaceae	<i>Sida cunninghamii</i>	Ridged Sida	-	-	-
Malvaceae	<i>Sida fibulifera</i>	Pin Sida	-	-	-
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	*	-	-
Malvaceae	<i>Sida spp.</i>	-	*	-	-
Myoporaceae	<i>Eremophila debilis</i>	Winter Apple	-	-	-
Myoporaceae	<i>Eremophila mitchellii</i>	Budda	-	-	-
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum	-	-	-
Myrtaceae	<i>Corymbia tessellaris</i>	Carbeen	-	-	-

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Myrtaceae	<i>Eucalyptus chloroclada</i>	Dirty Gum	-	-	-
Myrtaceae	<i>Eucalyptus conica</i>	Fuzzy Box	-	-	-
Myrtaceae	<i>Eucalyptus dealbata</i>	Tumbledown Red Gum	-	-	-
Myrtaceae	<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark	-	-	-
Myrtaceae	<i>Eucalyptus pilligaensis</i>	Narrow-leaved Grey Box	-	-	-
Myrtaceae	<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>	Bimble Box	-	-	-
Nyctaginaceae	<i>Boerhavia dominii</i>	Tarvine	-	-	-
Oxalidaceae	<i>Oxalis corniculata</i>	-	*	-	-
Oxalidaceae	<i>Oxalis perennans</i>	-	-	-	-
Oxalidaceae	<i>Oxalis</i> spp.	-	-	-	-
Pittosporaceae	<i>Rhytidosporum</i> spp.	-	-	-	-
Plantaginaceae	<i>Plantago gaudichaudii</i>	Narrow Plantain	-	-	-
Poaceae	<i>Aristida leptopoda</i>	White Speargrass	-	-	-
Poaceae	<i>Aristida ramosa</i>	Purple Wiregrass	-	-	-
Poaceae	<i>Aristida</i> spp.	A Wiregrass	-	-	-
Poaceae	<i>Austrostipa aristiglumis</i>	Plains Grass	-	-	-
Poaceae	<i>Austrostipa nodosa</i>	-	-	-	-
Poaceae	<i>Austrostipa ramosissima</i>	Stout Bamboo Grass	-	-	-
Poaceae	<i>Austrostipa verticillata</i>	Slender Bamboo Grass	-	-	-
Poaceae	<i>Bothriochloa decipiens</i> var. <i>decipiens</i>	Pitted Bluegrass	-	-	-
Poaceae	<i>Bothriochloa erianthoides</i>	Satintop Grass	-	-	-
Poaceae	<i>Bothriochloa ewartiana</i>	Desert Bluegrass	-	-	-
Poaceae	<i>Bothriochloa macra</i>	Red Grass	-	-	-
Poaceae	<i>Cenchrus setaceus</i>	Fountain Grass	*	-	-
Poaceae	<i>Chloris gayana</i>	Rhodes Grass	*	-	-
Poaceae	<i>Chloris truncata</i>	Windmill Grass	-	-	-
Poaceae	<i>Chloris ventricosa</i>	Plump Windmill Grass	-	-	-
Poaceae	<i>Cynodon dactylon</i>	Couch	-	-	-
Poaceae	<i>Dactylis glomerata</i>	Cocksfoot	*	-	-
Poaceae	<i>Dactyloctenium radulans</i>	Button Grass	-	-	-
Poaceae	<i>Digitaria diffusa</i>	Open Summer-grass	-	-	-
Poaceae	<i>Digitaria divaricatissima</i>	Umbrella Grass	-	-	-
Poaceae	<i>Echinochloa colona</i>	Awnless Barnyard Grass	-	-	-
Poaceae	<i>Ehrharta longiflora</i>	Annual Veldtgrass	*	-	-
Poaceae	<i>Enteropogon acicularis</i>	Curly Windmill Grass	-	-	-
Poaceae	<i>Enteropogon</i> spp.	Windmill Grass	-	-	-
Poaceae	<i>Eragrostis leptostachya</i>	Paddock Lovegrass	-	-	-
Poaceae	<i>Eragrostis trachycarpa</i>	-	-	-	-
Poaceae	<i>Hordeum leporinum</i>	Barley Grass	*	-	-

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Poaceae	<i>Lachnagrostis filiformis</i>	-	-	-	-
Poaceae	<i>Leptochloa divaricatissima</i>	-	-	-	-
Poaceae	<i>Lolium perenne</i>	Perennial Ryegrass	*	-	-
Poaceae	<i>Lolium spp.</i>	A Ryegrass	*	-	-
Poaceae	<i>Megathyrsus maximus</i> var. <i>maximus</i>	-	*	-	-
Poaceae	<i>Panicum effusum</i>	Hairy Panic	-	-	-
Poaceae	<i>Paspalidium constrictum</i>	Knottybutt Grass	-	-	-
Poaceae	<i>Paspalidium jubiflorum</i>	Warrego Grass	-	-	-
Poaceae	<i>Paspalum dilatatum</i>	Paspalum	*	-	-
Poaceae	<i>Paspalum urvillei</i>	Vasey Grass	*	-	-
Poaceae	<i>Rytidosperma</i> spp.	-	-	-	-
Poaceae	<i>Sorghum bicolor</i>	Cultivated Sorghums	*	-	-
Poaceae	<i>Sporobolus caroli</i>	Fairy Grass	-	-	-
Poaceae	<i>Thyridolepis mitchelliana</i>	Mulga Mitchell Grass	-	-	-
Poaceae	<i>Urochloa panicoides</i>	Urochloa Grass	*	-	-
Polygonaceae	<i>Persicaria decipiens</i>	Slender Knotweed	-	-	-
Polygonaceae	<i>Polygonum aviculare</i>	Wireweed	*	-	-
Polygonaceae	<i>Rumex brownii</i>	Swamp Dock	-	-	-
Polygonaceae	<i>Rumex crispus</i>	Curled Dock	*	-	-
Polygonaceae	<i>Rumex</i> spp.	-	*	-	-
Portulacaceae	<i>Portulaca oleracea</i>	Pigweed	-	-	-
Pteridaceae	<i>Cheilanthes sieberi</i>	Rock Fern	-	-	-
Rutaceae	<i>Geijera parviflora</i>	Wilga	-	-	-
Sapindaceae	<i>Alectryon diversifolius</i>	Scrub Boonaree	-	-	-
Scrophulariaceae	<i>Myoporum acuminatum</i>	Boobialla	-	-	-
Solanaceae	<i>Lycium ferocissimum</i>	African Boxthorn	*	-	-
Solanaceae	<i>Nicotiana megalosiphon</i> subsp. <i>megalosiphon</i>	-	-	-	-
Solanaceae	<i>Solanum esuriale</i>	Quena	-	-	-
Verbenaceae	<i>Glandularia aristigera</i>	Mayne's Pest	*	-	-
Verbenaceae	<i>Verbena officinalis</i>	Common Verbena	*	-	-
Zygophyllaceae	<i>Tribulus terrestris</i>	Caltrop	*	-	-

Fauna species recorded during surveys

Common Name	Scientific Name	Exotic	NSW Status	EPBC Status	Observation Type
BIRDS					
Apostlebird	<i>Struthidea cinerea</i>				O
Australian Magpie	<i>Cracticus tibicen</i>				O
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>				W
Australian Raven	<i>Corvus coronoides</i>				O
Australian Ringneck	<i>Barnardius zonarius</i>				O
Black Falcon	<i>Falco subniger</i>		V		O
Black Kite	<i>Milvus migrans</i>				O
Black-shouldered Kite	<i>Elanus axillaris</i>				O
Brown Falcon	<i>Falco berigora</i>				O
Cockatiel	<i>Nymphicus hollandicus</i>				O
Common Myna	<i>Sturnus tristis</i>	*			O
Common Starling	<i>Sturnus vulgaris</i>	*			O
Crested Pigeon	<i>Ocyphaps lophotes</i>				O
Eastern Barn Owl	<i>Tyto javanica</i>				O
Eastern Rosella	<i>Platycercus eximius</i>				O
Galah	<i>Eolophus roseicapillus</i>				O
Grey Butcherbird	<i>Cracticus torquatus</i>				O
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>		V		O
Magpie-lark	<i>Grallina cyanoleuca</i>				O
Nankeen Kestrel	<i>Falco cenchroides</i>				O
Noisy Miner	<i>Manorina melanocephala</i>				O
Pied Butcherbird	<i>Cracticus nigrogularis</i>				O
Red-rumped Parrot	<i>Psephotus haematonotus</i>				O
Rock Dove	<i>Columba livia</i>	*			O
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>				O
Tawny Frogmouth	<i>Podargus strigoides</i>				O
Whistling Kite	<i>Haliastur sphenurus</i>				O
White-winged Chough	<i>Corcorax melanorhamphos</i>				O
Willie Wagtail	<i>Rhipidura leucophrys</i>				O
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>				W
MAMMALS					
Brown Hare	<i>Lepus capensis</i>	*			O
Eastern Grey Kangaroo	<i>Macropus giganteus</i>				O
Fox	<i>Vulpes vulpes</i>	*			O
House Mouse	<i>Mus musculus</i>	*			K
Chocolate Wattled Bat	<i>Chalinolobus morio</i>				D
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>		V		Pr

Common Name	Scientific Name	Exotic	NSW Status	EPBC Status	Observation Type
Ride's Freetail-bat	<i>Mormopterus ozimops ridei</i>				D
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>				D
Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>				Pr
Little Broad-nosed Bat	<i>Scotorepens greyii</i>				D
Little Forest Bat	<i>Vespadelus vulturnus</i>				D
Little Pied Bat	<i>Chalinolobus picatus</i>		V		Pr
long-eared bat	<i>Nyctophilus sp.</i>				D
White-striped Freetail-bat	<i>Tadarida australis</i>				D
Yellow-bellied Sheath-tail-Bat	<i>Saccolaimus flaviventris</i>		V		D
REPTILES					
Ragged Snake-eyed Skink	<i>Cryptoblepharus pannosus</i>				O
South-eastern Morethia Skink	<i>Morethia boulengeri</i>				O
Tree Dtella	<i>Gehyra variegata</i>				O
FROGS					
Broad-palmed Frog	<i>Litoria latopalmata</i>				O
Spotted Grass Frog	<i>Limnodynastes tasmaniensis</i>				O

Key: * - exotic, V – vulnerable, D – definite record (Anabat analysis), K – dead, O – observed,

Pr - probable record (Anabat analysis), W – heard.

Appendix D

BAM calculator data

BAM calculator input data

VegZone	Location relative to footprint	plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to10	funTreeStem10to20	funTreeStem20to30	funTreeStem30to50	funTreeStem50to80	funTreeRegen	funHighThreatExotic	
		Text[Maximum 10 characters]	Number	Number with 2 decimal point	Number	Text[Letters, numbers, underscores and hyphans] Please fill condition-class name in all plots	[54 or 55 or 56]			Range in [0-359]	Number	Number	Number	Number	Number	Number	Number with 1 decimal point	Number with 1 decimal point	Number with 1 decimal point	Number with 1 decimal point	Number with 1 decimal point	Number with 1 decimal point	Number	Number	Number with 1 decimal point	Number with 1 decimal point	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	Number	Number with 1 decimal point	
1	in	8	35	26.81	0	Derived_grassland	55	766757	6647688	165	0	1	2	5	0	0	0.0	0.1	55.0	0.5	0.0	0.0	0	0	17.0	0.0	0	0	0	0	0	0	0.0	
1	out	9	35	26.81	0	Derived_grassland	55	766400	6648017	350	0	0	4	3	0	0	0.0	0.0	57.0	0.3	0.0	0.0	0	0	15.0	0.0	0	0	0	0	0	0	0.0	
1	in	21	35	26.81	0	Derived_grassland	55	766892	6647450	45	0	1	6	2	0	0	0	0.1	13.1	0.2	0.0	0.0	0	0	16.0	0	0	0	0	0	0	0	0.0	
1	in	23	35	26.81	0	Derived_grassland	55	766748	6647880	275	0	1	4	3	0	0	0	0.1	1.7	0.3	0.0	0.0	0	0	12.0	0	0	0	0	0	0	0	0.1	
2	out	12	55	0.69	7	Moderate	55	767831	6646608	75	2	3	11	7	0	0	15	9	54.3	3	0	0	3	3	41.0	12.0	0	0	0	0	0	1	0	2.0
2	out	13	55	0.69	7	Moderate	55	768077	6646584	98	1	3	5	3	0	0	20.0	21.0	33.0	0.3	0.0	0.0	1	2	22.0	3.0	0	0	0	1	0	0	1.0	
2	out	24	55	0.69	7	Moderate	55	767776	6646747	181	1	3	2	5	0	0	0.5	15.2	35.1	0.5	0.0	0.0	0	0	8.2	1	0	0	0	0	0	0	0.1	
3	in	1	55	121.96	0	Derived_grassland	55	767322	6646721	135	0	2	5	6	0	0	0.0	1.1	40.5	0.6	0.0	0.0	0	0	23.0	0.0	0	0	0	0	0	0	0	0.1
3	in	10	55	121.96	0	Derived_grassland	55	766782	6647102	135	0	3	8	5	0	0	0.0	1.3	46.5	1.1	0.0	0.0	0	0	22.0	0.0	0	0	0	0	0	0	0	0.1
3	in	11	55	121.96	0	Derived_grassland	55	767853	6646967	221	0	2	4	8	0	0	0.0	0.3	58.0	2.1	0.0	0.0	0	0	21.0	0.0	0	0	0	0	0	0	0	0.0
3	in	14	55	121.96	0	Derived_grassland	55	768735	6646845	282	0	2	3	7	0	0	0.0	5.1	11.1	1.5	0.0	0.0	0	0	7.0	0.0	0	0	0	0	0	0	0	0.0
3	in	18	55	121.96	0	Derived_grassland	55	767247	6646430	90	0	0	2	1	0	0	0	0.0	10.1	0.1	0.0	0.0	0	0	45.0	0	0	0	0	0	0	0	0	0.0
3	in	20	55	121.96	0	Derived_grassland	55	768317	6646860	30	0	2	5	6	0	0	0	0.4	10.5	0.6	0.0	0.0	0	0	24.0	0	0	0	0	0	0	0	0	0.0
4	out	2	397	1.15	119	Moderate	55	767446	6649262	154	1	8	11	14	1	3	10.0	1.3	29.2	9.4	0.1	10.2	4	1	10.0	0.0	0	0	0	0	1	0	0.1	
4	out	3	397	1.15	119	Moderate	55	767385	6649060	105	1	8	8	16	0	1	15.0	2.6	30.3	14.5	0.0	0.1	4	4	19.0	4.0	0	0	1	1	1	0	2.1	
4	out	4	397	1.15	119	Moderate	55	767235	6648868	90	1	8	12	16	0	1	15	1.2	43.5	7.2	0.0	0.1	3	1	27.0	5	0	0	0	1	1	0	5.0	
5	in	15	397	32.69	0	Derived_grassland	55	766999	6649178	210	0	3	5	6	0	1	0.0	0.5	38.0	0.6	0.0	0.1	0	0	10.0	0.0	0	0	0	0	0	0	0	0.2
5	in	17	397	32.69	0	Derived_grassland	55	767178	6649150	195	0	0	3	1	1	1	0	0.0	25.2	0.1	0.1	0.1	0	0	29.0	0	0	0	0	0	0	0	0	0.1
5	in	19	397	32.69	0	Derived_grassland	55	768142	6647150	165	0	1	3	2	0	0	0	0.1	0.3	0.2	0.0	0.0	0	0	27.0	0	0	0	0	0	0	0	0	0.0
5	in	22	397	32.69	0	Derived_grassland	55	767099	6649290	180	0	2	7	9	0	0	0	0.3	7.7	1.0	0.0	0.0	0	0	13.0	0	0	0	0	0	0	0	0	0.2
0	in	5				Non-native	55	767508	6648483	250	0	0	3	3	0	0	0.0	0.0	1.4	0.3	0.0	0.0	0	0	11.0	0.0	0	0	0	0	0	0	0	0.1
0	in	7				Non-native	55	766733	6648351	263	0	1	1	2	0	0	0.0	0.3	1.0	0.2	0.0	0.0	0	0	12.0	0.0	0	0	0	0	0	0	0	0.0
0	out	16	35	0.08	9	Moderate	55	767095	6647446	165	2	2	3	5	0	0	40.0	3.1	17.5	0.5	0.0	0.0	1	1	20.0	0.0	1	1	1	0	0	0	0.2	
0	out	25	35	0.08	9	Moderate	55	767048	6647541	153	1	5	6	5	0	1	0.2	1.4	1.5	0.5	0.0	0.1	4	0	14.4	49	0	0	0	1	1	0	0.0	
0	out	6	35	0.63	31	Moderate	55	767599	6648500	177	2	4	4	5	0	0	25.0	11.6	45.0	2.3	0.0	0.0	0	3	60.0	52.0	1	1	1	1	0	0	0.1	

Site attribute values used to calculate the future vegetation integrity score for each vegetation zone

Attribute component	Site attribute	Future value	Justification
Composition	Tree (TG)	0	Assumes that there will be a total removal of canopy layers
	Shrub (SG)	0	Assumes that there will be a total removal of shrub layers
	Grass/Grasslike (GG)	-10% from observed means for each respective vegetation zone	A 10% reduction in the species richness value from the observed mean was used due to predicted shading effects of the solar panels. Most groundcover species recorded during survey are considered to be relatively resilient species, withstanding grazing and drought conditions.
	Forb (FG)	-10% from observed means for each respective vegetation zone	
	Fern (EG)	-10% from observed means for each respective vegetation zone	
	Other (OG)	-10% from observed means for each respective vegetation zone	
Structure	Tree (TG)	0	Assumes that there will be a total removal of canopy layers
	Shrub (SG)	0	Assumes that there will be a total removal of shrub layers
	Grass/Grasslike (GG)	-50% from observed means for each respective vegetation zone	A 50% reduction in the percentage cover from the observed mean was used due to predicted shading effects of the solar panels. Most groundcover species recorded during survey are considered to be relatively resilient species, withstanding grazing and drought conditions.
	Forb (FG)	-50% from observed means for each respective vegetation zone	
	Fern (EG)	-50% from observed means for each respective vegetation zone	
	Other (OG)	-50% from observed means for each respective vegetation zone	
Function	No. large trees	0	Assumes that there will be a total removal of canopy and shrub layers
	Litter	No change from observed means	Due to the paucity of groundcover vegetation at the time of survey, most vegetation zones recorded relatively low functional litter cover. The functional litter cover is predicted to remain relatively unchanged by shading effects of the solar panels.
	Fallen logs	0	Assumes that there will be a removal of all woody debris
	Stem size class	absent	Assumes that there will be a total removal of canopy and shrub layers
	Regen	absent	
	High threat weeds (HT)	No change from observed means	The majority of high threat weeds are represented by exotic grasses and thistles, which are predicted to remain relatively unchanged by shading effects of the solar panels. <i>Lycium ferocissimum</i> (African Boxthorn) is the only high threat weed that is also a priority weed for the North West region. The regional and state objectives for this priority weed is asset protection, which carries a mandatory requirement to minimise the spread of the weed offsite (rather than to eradicate). African Boxthorn occurs in the proposal site in very low numbers and is unlikely to affect the high threat attribute for future vegetation integrity scores even if it were to be physically removed to accommodate the solar panels or as part of control activities. Note that Prickly Pear is not a high threat weed, even though it is a state priority weed

Appendix E

EPBC Act assessments of significance

Introduction

This assessment of significance has been prepared to assess the significance of potential impacts on the 'Brigalow (*Acacia harpophylla* dominant and co-dominant' which is listed as an endangered ecological community (EEC) under the EPBC Act (hereafter referred to as 'Brigalow Woodland EEC').

This community occurs in the study area as two remnant patches on the eastern boundary of the Logans Lane property (i.e. the northern lot). The remnant patches extend outside of the study area (i.e. outside of the Logans Lane property).

The occurrence of Brigalow Woodland EEC within the study area has been affected by previous and ongoing agricultural use of the land, such as land clearing, grazing and livestock trampling. As such, the condition of the community is highly modified from its likely pre-European condition. Many extant examples of this community typically have a sparse ground layer. The occurrences of this community within the study area still meet the key diagnostic characteristics and condition thresholds to be included as part of the EEC, namely:

- The canopy is dominated by *Acacia harpophylla* (Brigalow) trees (including regrowth)
- The overall patch size is greater than 0.5 ha
- Exotic perennial plants comprise less than 50% of the total vegetation cover of the patch

Therefore, the occurrences of this community within the study area are in sufficiently good condition to be assessed as the EEC.

Regional and local extent

The Brigalow Woodland EEC occurs over a substantial geographic area in semi-arid eastern Australia, in QLD and NSW. The distribution of Brigalow woodlands extends from Townsville in Qld to Narrabri in NSW, in a broad band east of Blackall (Qld), Cunnamulla (Qld) and Bourke (NSW).

The original extent of the Brigalow Woodland EEC is not known but potential habitat in NSW is estimated to be approximately 115,300 hectares, based on mapping of "Brigalow soils" in the early 1960s. Recent vegetation mapping of the northern wheatbelt has found that only 13,500 hectares remains of this community and that it is severely fragmented. In NSW, remnants of the listed ecological community mostly occur north of Bourke, west of Narrabri and north of Moree.

Surviving remnants of Brigalow Woodland EEC are often small linear patches along roadsides and the edges of paddocks where threats include ongoing logging for fence posts; road widening and invasion by weeds.

Key threats

The key threat to the Brigalow Woodland EEC is land clearing. Other important threats and risks include inappropriate fire regimes, weeds, feral animals and inappropriate grazing. Climate change is also a threat that needs consideration in management.

Nature of impact

The proposal site has been redesigned to avoid direct impacts on this community. Therefore, the following assessment evaluates the potential indirect impacts of the proposal on the community, with reference to the significance impact criteria for critically endangered and endangered ecological communities (DotE, 2013).

Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community

The proposal will not directly reduce the extent of the ecological community. The proposal site boundary has been redesigned to avoid (i.e. exclude from the direct impact area) the ecological community.

- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.

The proposal will not fragment or increase fragmentation of the ecological community. The proposal site has been purposefully designed to avoid the ecological community. The entirety of the two patches now are located outside the proposal site boundary.

- Adversely affect habitat critical to the survival of an ecological community

The listing advice for the Brigalow Woodland EEC states that areas considered critical to the survival of the ecological community include all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community, as well as buffer zones around these patches, particularly where the buffer zones include native vegetation. The purpose of the buffer zones is to minimise risk of damage to extant patches by limiting activities, or exercising care when undertaking activities around patches, such as cropping, ploughing, grazing or spraying.

The proposal will not include agricultural activities such as cropping, ploughing, grazing or spraying and is unlikely to indirectly impact the ecological community during its operational life. However, inadvertent damage may be caused during the construction and decommission of the proposal.

As part of the proposal, planting of vegetated screens would occur along the boundary of the proposal site. These would include locally sourced species typical of the vegetation communities present on site, including the Brigalow Woodland EEC. This would improve the condition of the retained vegetation in the long-term and protect the extant patches of the ecological community within the study area during construction and decommission of the proposal.

In addition to the above, prior to the construction of the proposal, trees and native vegetation patches that will be retained would be delineated to avoid additional impacts on vegetation including the Brigalow ecological community, through fencing or other means of demarcation. Fencing would be established at a distance from the trees and/or vegetation patches to protect the entire Tree Protection Zone (i.e. 10 times the diameter of the trunk at breast height).

With the implementation of these measures, the proposal would be unlikely to adversely affect habitat critical to the survival of this ecological community.

- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

The ecological community is mapped as having a low potential for being reliant on the subsurface presence of groundwater (BOM 2019a). Regardless, the proposal is unlikely to affect groundwater levels or substantially alter surface water drainage patterns. No works affecting soil nutrients is associated with the proposal. In addition, a Construction Environmental Management Plan (CEMP) (or equivalent) would be required for the construction phase of the proposal, and would be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants. No pollutants would be generated during the operational phase of the proposal.

- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to:

- Assisting invasive species, that are harmful to the listed ecological community, to become established, or
- A CEMP (or equivalent) would be required for the construction phase of the proposal, and would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants. An operation management plan would also include measures to minimise invasive species.
- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

The proposal is not associated with the regular use of fertilisers, herbicides or other chemicals and would be unlikely to cause the mobilisation of such chemicals and pollutants into the ecological community.

- Interfere with the recovery of an ecological community.

The proposal avoids clearance of, and would protect remnant areas of the ecological community in the study area. The proposal would establish buffer zones through perimeter planting and demarcation measures during construction. The proposal would include responsible management of weeds under the CEMP and in consideration of the responsibilities of the general biosecurity duty under the *Biosecurity Act 2015*. As such the proposal is unlikely to interfere with the recovery of the ecological community.

Conclusion

Considering the above, the proposal is considered unlikely to have a significant impact on the Brigalow Woodland EEC. No further assessment, approval or provision of biodiversity offsets is required under the EPBC Act and associated policy.

Appendix F

Biodiversity credit reports

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00011577/BAAS17098/18/00011578	Silverleaf Solar Farm Narrabri	10/06/2021
Assessor Name	Assessor Number	BAM Data version *
Arien Quin	BAAS17098	45
Proponent Names	Report Created	BAM Case Status
	29/09/2021	Finalised
Assessment Revision	Assessment Type	Date Finalised
11	Major Projects	29/09/2021

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Endangered Ecological Community	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
Species		
Nil		

BAM Biodiversity Credit Report (Like for like)

Additional Information for Approval

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami / Glossy Black-Cockatoo
Climacteris picumnus victoriae / Brown Treecreeper (eastern subspecies)
Lathamus discolor / Swift Parrot
Pseudomys pilligaensis / Pilliga Mouse
Chthonicola sagittata / Speckled Warbler
Glossopsitta pusilla / Little Lorikeet
Haliaeetus leucogaster / White-bellied Sea-Eagle
Grantiella picta / Painted Honeyeater

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	Not a TEC	48.5	16	679	695
397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion	Not a TEC	10.7	0	0	0

55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
North-west Floodplain Woodlands This includes PCT's: 55	North-west Floodplain Woodlands >=70% and <90%	55_Moderate	Yes	16	Liverpool Plains, Castlereagh-Barwon, Kaputar, Liverpool Range, Northern Basalts, Northern Outwash, Peel, Pilliga and Pilliga Outwash. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

	North-west Floodplain Woodlands This includes PCT's: 55	North-west Floodplain Woodlands >=70% and <90%	55_Derived_grassland	No	679	Liverpool Plains, Castlereagh-Barwon, Kaputar, Liverpool Range, Northern Basalts, Northern Outwash, Peel, Pilliga and Pilliga Outwash. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Pilliga Outwash Dry Sclerophyll Forests This includes PCT's: 88, 141, 148, 397, 411, 702, 1090, 1384	Pilliga Outwash Dry Sclerophyll Forests <50%	397_Derived_grassland	No	0	Liverpool Plains, Castlereagh-Barwon, Kaputar, Liverpool Range, Northern Basalts, Northern Outwash, Peel, Pilliga and Pilliga Outwash. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



BAM Biodiversity Credit Report (Like for like)

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00011577/BAAS17098/18/00011578	Silverleaf Solar Farm Narrabri	10/06/2021
Assessor Name	Assessor Number	BAM Data version *
Arien Quin	BAAS17098	45
Proponent Name(s)	Report Created	BAM Case Status
	29/09/2021	Finalised
Assessment Revision	Assessment Type	Date Finalised
11	Major Projects	29/09/2021

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Endangered Ecological Community	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
Species		
Nil		

Additional Information for Approval

PCTs With Customized Benchmarks

PCT
No Changes

BAM Biodiversity Credit Report (Variations)

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami / Glossy Black-Cockatoo
Climacteris picumnus victoriae / Brown Treecreeper (eastern subspecies)
Lathamus discolor / Swift Parrot
Pseudomys pilligaensis / Pilliga Mouse
Chthonicola sagittata / Speckled Warbler
Glossopsitta pusilla / Little Lorikeet
Haliaeetus leucogaster / White-bellied Sea-Eagle
Grantiella picta / Painted Honeyeater

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	Not a TEC	48.5	16	679	695.00
397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion	Not a TEC	10.7	0	0	0.00

55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Variations)

	North-west Floodplain Woodlands This includes PCT's: 55	North-west Floodplain Woodlands >=70% and <90%	55_Moderate	Yes	16	Liverpool Plains,Castlereagh-Barwon, Kaputar, Liverpool Range, Northern Basalts, Northern Outwash, Peel, Pilliga and Pilliga Outwash. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	North-west Floodplain Woodlands This includes PCT's: 55	North-west Floodplain Woodlands >=70% and <90%	55_Derived_grassland	No	679	Liverpool Plains,Castlereagh-Barwon, Kaputar, Liverpool Range, Northern Basalts, Northern Outwash, Peel, Pilliga and Pilliga Outwash. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Semi-arid Woodlands (Grassy sub-formation)	Tier 2 or higher threat status	55_Moderate	Yes (including artificial)	16	IBRA Region: Brigalow Belt South, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Semi-arid Woodlands (Grassy sub-formation)	Tier 2 or higher threat status	55_Derived_grassland	No	679	IBRA Region: Brigalow Belt South, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Pilliga Outwash Dry Sclerophyll Forests This includes PCT's: 88, 141, 148, 397, 411, 702, 1090, 1384	Pilliga Outwash Dry Sclerophyll Forests <50%	397_Derived_grassland	No	0	Liverpool Plains, Castlereagh-Barwon, Kaputar, Liverpool Range, Northern Basalts, Northern Outwash, Peel, Pilliga and Pilliga Outwash. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 4 or higher threat status	397_Derived_grassland	No	0	IBRA Region: Brigalow Belt South, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options Like-for-like options

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00011577/BAAS17098/18/00011578	Silverleaf Solar Farm Narrabri	10/06/2021
Assessor Name	Report Created	BAM Data version *
Arien Quin	29/09/2021	45
Assessor Number	Assessment Type	BAM Case Status
BAAS17098	Major Projects	Finalised
Assessment Revision	Date Finalised	
11	29/09/2021	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
<i>Ardeotis australis</i> Australian Bustard	No (surveyed)	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input type="checkbox"/> Survey month outside the specified months? </div>
<i>Desmodium campylocaulon</i> Creeping Tick-trefoil	No (surveyed)	<div> <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec </div> <div> <input type="checkbox"/> Survey month outside the specified months? </div>
<i>Dichanthium setosum</i> Bluegrass	No (surveyed)	<div> <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input type="checkbox"/> Survey month outside the specified months? </div>

BAM Candidate Species Report

<i>Digitaria porrecta</i> Finger Panic Grass	No (surveyed)	<input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Hieraaetus morphnoides</i> Little Eagle	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Lepidium aschersonii</i> Spiny Peppergrass	No (surveyed)	<input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Lophoictinia isura</i> Square-tailed Kite	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Swainsona murrayana</i> Slender Darling Pea	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Black-breasted Buzzard	Hamirostra melanosternon	Species is vagrant Habitat constraints

BAM Candidate Species Report

Border Thick-tailed Gecko	<i>Uvidicolus sphyrurus</i>	Habitat degraded
Bush Stone-curlew	<i>Burhinus grallarius</i>	Habitat degraded Habitat constraints
<i>Cyperus conicus</i>	<i>Cyperus conicus</i>	Habitat degraded
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	Habitat constraints
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	Habitat degraded
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	Refer to BAR
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	Habitat constraints
Koala	<i>Phascolarctos cinereus</i>	Habitat constraints
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Habitat constraints
Masked Owl	<i>Tyto novaehollandiae</i>	Habitat constraints
Native Milkwort	<i>Polygala linariifolia</i>	Habitat degraded
Pale-headed Snake	<i>Hoplocephalus bitorquatus</i>	Habitat degraded
Scant Pomaderris	<i>Pomaderris queenslandica</i>	Habitat degraded
Squirrel Glider	<i>Petaurus norfolcensis</i>	Habitat degraded
Superb Parrot	<i>Polytelis swainsonii</i>	Species is vagrant Habitat constraints
Swift Parrot	<i>Lathamus discolor</i>	Habitat constraints
<i>Tylophora linearis</i>	<i>Tylophora linearis</i>	Habitat degraded
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	Habitat constraints

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00011577/BAAS17098/18/00011578	Silverleaf Solar Farm Narrabri	10/06/2021
Assessor Name	Report Created	BAM Data version *
Arien Quin	29/09/2021	45
Assessor Number	Assessment Type	BAM Case Status
BAAS17098	Major Projects	Finalised
Assessment Revision		Date Finalised
11		29/09/2021

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Black Falcon	Falco subniger	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Black-breasted Buzzard	Hamirostra melanosternon	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Black-striped Wallaby	Macropus dorsalis	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion

BAM Predicted Species Report

Black-striped Wallaby	<i>Macropus dorsalis</i>	397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Corben's Long-eared Bat	<i>Nyctophilus corbeni</i>	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Diamond Firetail	<i>Stagonopleura guttata</i>	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Dusky Woodswallow	<i>Artamus cyanopterus cyanopterus</i>	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Grey Falcon	<i>Falco hypoleucos</i>	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Koala	<i>Phascolarctos cinereus</i>	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Little Eagle	<i>Hieraaetus morphnoides</i>	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion

BAM Predicted Species Report

Little Eagle	Hieraaetus morphnoides	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Little Pied Bat	Chalinolobus picatus	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Masked Owl	Tyto novaehollandiae	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Pied Honeyeater	Certhionyx variegatus	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Scarlet Robin	Petroica boodang	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
Spotted Harrier	Circus assimilis	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Square-tailed Kite	Lophoictinia isura	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Stripe-faced Dunnart	Sminthopsis macroura	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Superb Parrot	Polytelis swainsonii	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Turquoise Parrot	Neophema pulchella	397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion

BAM Predicted Species Report

Varied Sittella	Daphoenositta chrysoptera	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
White-throated Needletail	Hirundapus caudacutus	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Yellow-bellied Sheath-tail-bat	Saccolaimus flaviventris	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Black-breasted Buzzard	Hamirostra melanosternon	397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Diamond Firetail	Stagonopleura guttata	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Glossy Black-Cockatoo	Calyptorhynchus lathami	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. 397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Grey Falcon	Falco hypoleucos	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion

BAM Predicted Species Report

Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Koala	Phascolarctos cinereus	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Little Lorikeet	Glossopsitta pusilla	397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Little Pied Bat	Chalinolobus picatus	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Painted Honeyeater	Grantiella picta	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Pied Honeyeater	Certhionyx variegatus	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
Pilliga Mouse	Pseudomys pilligaensis	397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion

BAM Predicted Species Report

Speckled Warbler	Chthonicola sagittata	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Square-tailed Kite	Lophoictinia isura	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Superb Parrot	Polytelis swainsonii	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Swift Parrot	Lathamus discolor	397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
Varied Sittella	Daphoenositta chrysoptera	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	35-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
		397-Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

BAM Predicted Species Report

Common Name	Scientific Name	Justification in the BAM-C
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	Refer to BAR
Glossy Black-Cockatoo	<i>Calyptrorhynchus lathamii</i>	Habitat constraints
Little Lorikeet	<i>Glossopsitta pusilla</i>	Refer to BAR
Painted Honeyeater	<i>Grantiella picta</i>	Habitat constraints
Pilliga Mouse	<i>Pseudomys pilligaensis</i>	Refer to BAR
Speckled Warbler	<i>Chthonicola sagittata</i>	Refer to BAR
Swift Parrot	<i>Lathamus discolor</i>	Refer to BAR
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	Refer to BAR

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00011577/BAAS17098/18/00011578		11	29/09/2021
Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Arien Quin	BAAS17098	Silverleaf Solar Farm Narrabri	Finalised
Assessment Type	Date Finalised		
Major Projects	29/09/2021		

PCT list

Price calculated	PCT common name	Credits
Yes	35 - Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	0
Yes	55 - Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	695
Yes	397 - Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion	0

Species list

Price calculated	Species	Credits
------------------	---------	---------

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Liverpool Plains	35 - Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	No	Brigalow Clay Plain Woodlands >90%	18.87%	\$295.80	1.5164	\$9,086.12	0	\$0.00
Liverpool Plains	55 - Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	No	North-west Floodplain Woodlands >=70% and <90%	18.87%	\$189.86	1.1760	\$5,831.98	695	\$4,053,226.85
Liverpool Plains	397 - Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Wialda region, Brigalow Belt South Bioregion	No	Pilliga Outwash Dry Sclerophyll Forests <50%	19.12%	\$80.00	2.1074	\$1,612.40	0	\$0.00
Subtotal (excl. GST)									\$4,053,226.85
GST									\$405,322.68
Total ecosystem credits (incl. GST)									\$4,458,549.54

Species credits for threatened species



Biodiversity payment summary report

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
--------------------	---------	---------------	------------------	--------------	---------------------	------------------------	---------------------

No species available

Grand total	\$4,458,549.54
-------------	----------------



ghd.com

→ **The Power of Commitment**

Appendix C

Updated statutory compliance table

Legislation	Applicability	Reference
Commonwealth		
<i>Environmental Protection and Biodiversity Conservation Act 1999</i>	The proposal will not significantly impact upon any MNES or Commonwealth land. No referral to the Commonwealth Minister for Environment is required.	Section 5.4.1 (EIS) Section 3.10 (RtS)
State		
<i>Environmental Planning and Assessment Act 1979</i>	The proposal requires development consent from the Minister for Planning and Public Spaces under Part 4, Division 4.7 of the Act.	Section 5.1.1 (EIS) Section 4 (Amendment Report)
<i>Roads Act 1993</i>	Section 138 states road works on or over a public road require consent from the roads authority. An approval from TfNSW is required for works on the Kamilaroi Highway and Logans Lane.	Section 5.3 (EIS)
	The proposed amendment for the transmission line intersecting with Newell Highway will require notification and approval from TfNSW.	Section 3.13.1 (RtS) Section 4 (Amendment Report)
<i>Protection of the Environment Operations Act 1997</i>	Schedule 1 outlines the activities which require an environment protection licence. Clause 17 of Schedule 1 lists electricity generating works, but does not include the generation of electricity through solar and/or wind power. As such, the proposal does not require a licence under the Act.	Section 5.3.1 (EIS)
<i>Biodiversity Conservation Act 2016</i>	A calculation of biodiversity credits for the proposal was undertaken. The BDAR undertaken for the EIS and proposed amendments outline the biodiversity credits required for the proposal.	Section 5.3.3 (EIS) Section 2.1 (BDAR) Section 3.10 (RtS) Section 4 (Amendment Report)
<i>Crown Land Management Act 2016</i>	The transmission line traverses a number of Crown Land areas. Approval to construct the transmission line infrastructure on Crown Land is required from DPIE-Crown Lands.	Section 5.3.3 (EIS) Section 3.14 (RtS) Section 4 (Amendment Report)
Environmental planning instruments		
State Environmental Planning Policy (State and Regional Development) 2011	The proposal has been deemed as SSD due to it meeting the description of the listing under Schedule 1 (20).	Section 5.2 (EIS) Section 4 (Amendment Report)
State Environmental Planning Policy (Infrastructure) 2007	The proposal is permissible with consent under clause 34(1) as it is electricity generating works on land zoned as RU1 - Primary Production.	Section 5.2.1 (EIS)
State Environmental Planning Policy (Koala Habitat Protection) 2021	SEPP 44 assessed in the EIS has since been repealed by the Koala SEPP 2010 and 2021. Land zoned as RU1 – Primary Production is exempt from the development control provisions of the Koala SEPP 2021. Considerations to Koala habitat were are considered within the BDAR.	Section 5.2.1 (EIS) Section 4.8 (RtS) Section 4 (Amendment Report)

Legislation	Applicability	Reference
State Environmental Planning Policy No. 33 Hazardous and Offensive Development	SEPP 33 applies to any proposals which fall under the policy's definition of 'potentially hazardous industry'. A SEPP 33 risk screening process was undertaken for the proposal.	Section 5.2.1 and Section 6.9 (EIS)
State Environmental Planning Policy No. 55 Remediation of Land	SEPP 55 aims to ensure that changes of land use do not increase the risk to health or the environment, inappropriate restrictions on land use are avoided, and information used to support decision making is provided to the community.	Section 5.21, Section 3.6 and Section 6.6 (EIS)
Regional environmental plans		
<i>New England North West Regional Plan 2036</i>	The proposal assists in achieving the goals outlined in the plan related to a strong and dynamic economy and strong infrastructure and transport networks.	Section 5.2.2 (EIS)
Local environmental plans		
<i>Narrabri Local Environmental Plan 2012</i>	Electricity generating works are prohibited with or without consent within the RU1 Primary Production zone, however the requirements of the Infrastructure SEPP override the provisions of the Narrabri Local Environmental Plan.	Section 5.2.3 (EIS)

Appendix D

Updated mitigation measures

Issues	Impact	Measure	Timing
Biodiversity	Pre-construction/clearing	A Biodiversity Management Plan would be prepared prior to construction. This would detail fauna management protocols including management of tree hollows and fauna handling.	Pre-construction
		Ensure all workers are provided with an environmental induction prior to starting work on site. This would include information on the ecological values of the site and protection measures to be implemented to protect biodiversity.	Construction
	Erosion, stockpile and soil impacts on biodiversity	Use of, and regular inspection and maintenance of, erosion and sediment control measures developed in an Erosion and Sediment Control Plan (ESCP). The ESCP shall be prepared and maintained as part of the Construction Environmental Management Plan (CEMP) in accordance with relevant sections of <i>"Managing Urban Stormwater: Soil and Construction Volume 1"</i> (Landcom, 2004) ('the Blue Book').	Pre-construction Construction
		Restrict stockpiles of construction materials, fill or vegetation to existing cleared areas and not within areas of adjoining native vegetation.	Construction
		Water would be applied to stockpile areas during windy conditions.	Construction
		Reinstatement of stabilised surfaces as quickly as practicable after construction.	Construction
	Clearance of vegetation	Fence off or mark trees to be retained, to avoid additional impacts on vegetation. Fencing should protect the entire Tree Protection Zone (i.e. 10 times the diameter of the trunk at breast height).	Pre-construction
		Any hollow-bearing trees to be felled would be marked prior to clearing of vegetation. The removal of hollow bearing trees is to be undertaken in accordance with a tree hollow management protocol set out in the CEMP, and would involve the presence of a qualified ecologist or wildlife specialist experienced in the rescue of fauna.	Pre-construction Construction
		Any trees with raptor nests would be felled outside the breeding season.	Construction
		Habitat features such as hollow trunks and limbs within the proposal site would be salvaged and replaced within areas proposed for screening vegetation where practicable.	Construction
	Site rehabilitation	Planting of locally endemic tree species in areas proposed for vegetated screens.	Construction Post-construction
Aboriginal heritage	Aboriginal heritage items	Development of an Aboriginal Cultural Heritage Management Plan (ACHMP) which would include details of the on-going management of Silverleaf IF-1 and Silverleaf IF-2 during construction and operation and procedures for unanticipated finds.	Pre-construction
		A five-metre buffer zone with high-visibility fencing around the two sites.	Construction
		Induction for site workers detailing the location of the two sites, their cultural values and the legislative requirements for their management.	Pre-construction
		In the event that the proposal would impact upon Silverleaf IF-1 and Silverleaf IF-2, further assessment would be required in the form of an Aboriginal Cultural Heritage Assessment Report (ACHAR). Further consultation would also be required in accordance with the OEH Aboriginal community consultation requirements.	Construction

Issues	Impact	Measure	Timing
		In the event that a previously unidentified Aboriginal site is discovered within the study area at any point during the operational life of the proposal, an AHIMS site card for that site should be submitted to OEH as promptly as possible. Timing protocols for the submission of AHIMS site cards should be included in the ACHMP for the proposal.	Construction
	Identification of potential human remains	<p>In the event that potential human skeletal remains are identified within the study area at any point during the life of the proposal, the following standard procedure would be followed.</p> <p>All work in the vicinity of the remains should cease immediately.</p> <p>The location should be cordoned off and the NSW Police notified.</p> <p>If the Police suspect the remains are Aboriginal, they will contact the Office of Environment and Heritage and arrange for a forensic anthropologist or archaeological expert to examine the site.</p> <p>Subsequent management actions will be dependent on the findings of the inspection undertaken under Point 3.</p> <p>If the remains are identified as modern and human, the area will become a crime scene under the jurisdiction of the NSW Police.</p> <p>If the remains are identified as pre-contact or historic Aboriginal, OEH and all RAPs are to be formally notified in writing. Where impacts to exposed Aboriginal skeletal remains cannot be avoided an appropriate management mitigation strategy will be developed in consultation with OEH and RAPs.</p> <p>If the remains are identified as historic non-Aboriginal, the site is to be secured and the NSW Heritage Division contacted.</p> <p>If the remains are identified as non-human, work can recommence immediately.</p>	Construction
Landscape and visual	Visual impacts of solar farm (including glare)	<p>A landscape plan would be developed to detail the location and type of plantings that would minimise views of the proposal site from nearby properties.</p> <p>The landscape plan would be prepared in consultation with the adjacent landholders and the airstrip operators to confirm any operational requirements which would affect the location and type of landscape screening.</p> <p>The plan would detail the species to be used on site. Native vegetation communities found in the local area will be used where suitable.</p>	Pre-construction
		A review of the landscaping plan would be carried out within six months of operation commencing. This would include consultation with nearby landowners to discuss the adequacy of the provided screening.	Construction
		The materials and colour of on-site infrastructure would, where practical, be non-reflective and be of a colour that would blend with the landscape.	Construction
		Security fencing posts and wire would be non-reflective.	Construction
		Construction plant, equipment, waste and excess materials would be contained within the designated boundaries of the work site and would be removed from the site following the completion of construction.	Construction
		Work sites shall be kept tidy at all times.	Construction

Issues	Impact	Measure	Timing
Noise and vibration	Construction noise	<p>A noise management plan would be prepared and implemented as part of the Construction Environmental Management Plan (CEMP).</p> <p>The following project-specific noise mitigation measures would be implemented:</p> <p>If possible, bored piling (rather than impact piling) would be considered as an alternative to install the steel post foundations.</p> <p>If impact piling is required, no impact piling would be undertaken within 45 metres of adjacent dwellings without prior notice being given to occupants.</p>	Pre-construction Construction
		<p>Consultation and cooperation with the nearest sensitive receivers:</p> <p>The construction contractor would establish contact with residents affected by construction noise and communicate the construction program and progress on a regular basis, particularly when noise generating activities are planned. Communication with the local community would be maintained throughout the construction period.</p> <p>The construction contractor would provide a community liaison phone number and permanent site contact so that noise complaints can be received and addressed in a timely manner.</p> <p>Upon receipt of a noise complaint, monitoring would be undertaken and reported as soon as possible. If exceedances are detected, the situation would be reviewed to identify means to attempt to reduce the impact to acceptable levels.</p>	Pre-construction Construction
		<p>Work ethic – management of worker generated construction noise</p> <p>All site workers would be briefed on the potential for noise impacts on local residents and the requirement to implement practical and reasonable measures to minimise noise impacts during the course of their activities. This would include:</p> <p>Avoiding the use of loud radios</p> <p>Avoiding shouting and slamming doors</p> <p>Where practical, machines would be operated at low speed or power and switched off when not being used rather than left idling for prolonged periods</p> <p>Inform truck drivers of designated vehicle routes, parking locations and delivery hours</p> <p>Minimising reversing</p> <p>Avoiding dropping materials from height and avoiding metal to metal contact on material</p> <p>Keeping engine covers closed while equipment is operating</p>	Construction

Issues	Impact	Measure	Timing
		<p>The following general noise mitigation measures would be implemented to mitigate construction noise impacts:</p> <p>All engine covers would be kept closed while equipment is operating.</p> <p>As far as possible, heights from which materials are dropped, into or out of trucks, would be minimised.</p> <p>Machines found to produce excessive noise compared to industry best practice would be removed from the site or stood down until repairs or modifications can be made.</p> <p>Once the selection of equipment has been finalised, a review would be undertaken to ensure that the noise levels do not exceed the assumed levels in this assessment.</p> <p>To reduce the annoyance associated with reversing alarms, broadband reversing alarms (audible movement alarms) would be used for all site equipment. Satisfactory compliance with occupational health and safety requirements would need to be achieved and a safety risk assessment may need to be undertaken to determine that safety is not compromised.</p>	Construction
Land use, soils and land capability	Soil and erosion	An Erosion and Sediment Control Plan (ESCP) would be prepared prior to construction to minimise impacts on soils during construction in accordance with relevant sections of <i>"Managing Urban Stormwater: Soil and Construction Volume 1"</i> (Landcom, 2004) ('the Blue Book').	Pre-construction Construction
		Spill management and materials handling measures would be included in the ESCP to minimise the potential for fuel or chemical spills.	Pre-construction Construction
		Ground cover would be reintroduced after construction to stabilise soils during operation.	Post-construction
	Biosecurity – site workers	Limit entry points to the property.	Construction Operation
		All construction equipment and boots would be cleaned upon entering the property.	Construction Operation
		Limit worker contact with livestock, crops or plant materials as much as possible and eliminate any unnecessary contact altogether.	Construction Operation
		Keep a visitor register.	Construction Operation
	Biosecurity – vehicles	Clean machinery and equipment from the top down and dismantle it as far as possible to gain access to internal spaces.	Construction Operation
	Operation of private airstrip	Vegetation screen planting to be installed on property boundary in consultation with airstrip operator.	Prior to operation

Issues	Impact	Measure	Timing
Traffic, transport and access	Construction traffic management	<p>A traffic management plan would be prepared and implemented as part of the CEMP. The plan would be prepared in accordance with any Roads and Maritime and Narrabri Shire Council requirements. The plan would include but not be limited to:</p> <p>Details of the haulage routes for the proposal including loads, weights and lengths of haulage and construction related vehicles and number of movements of such vehicles.</p> <p><i>Avoidance of the Newell Highway access for the proposal, ensuring it remains open for general agricultural use.</i></p> <p>Measures to maintain access along roads and to properties, <i>including schedule of haulage vehicle movements to minimise convoy length or platoons.</i></p> <p>Site specific control measures (including signage) to manage and regulate traffic movements.</p> <p><i>Consultation would be undertaken with bus operators; for example, including buses operating along Kamilaroi Highway will be consulted during the construction of the new intersection.</i></p> <p><i>The management and coordination of construction and staff vehicle movements to the site and measures to limit disruption to other motorists, including consideration of carpooling/shuttle bus arrangements to minimise the number of vehicles accessing the site each day.</i></p> <p><i>Policies and procedures to consult and inform the community of changes to the road network and address any concerns.</i></p> <p>A response plan for any traffic incident including <i>toolbox meetings to facilitate continuous improvement initiatives and incident awareness.</i></p> <p>Mechanisms to monitor the results of the plan and any subsequent reviews and revisions.</p> <p>Outline timing of deliveries and site access, <i>including construction program, construction vehicle access arrangements, estimated number of construction vehicle movements and proposed construction hours.</i></p>	Pre-construction Construction
		Signage on Kamilaroi Highway to be erected to alert drivers of trucks entering and exiting Logans Lane.	Construction
		Access along Logans Lane is to be maintained.	Construction
		Upgrade the intersection of the Kamilaroi Highway and Logans Lane to a BAR type intersection.	Construction Decommissioning
		Temporarily reduce speed limits to the west of the intersection of the Kamilaroi Highway and Logans Lane from 100 km/h to 80 km/h.	Construction Decommissioning
	Road conditions	ENGIE would consult with Narrabri Shire Council during detailed design in regard to the proposed upgrades to Logans Lane. The works will be undertaken in accordance with Council requirements.	Pre-construction Construction
		Condition surveys would be undertaken prior to the construction commencing. Following construction, surveys would confirm if any damage attributed to the proposal has occurred. Should damage be identified (outside of normal wear and tear), repair works would be undertaken by ENGIE (or its contractor) in line with any relevant council requirements.	Pre-construction Construction

Issues	Impact	Measure	Timing
	Property access	Notification to affected landowners would be undertaken for any works located along Logans Lane, particularly if temporary closures would be required.	Construction
		Consultation with any properties where access would be impacted would be undertaken to determine whether additional measures are required to maintain access.	Construction
	<i>Transmission line surveyor/solicitor</i>	<i>A suitably experienced surveyor and/or solicitor would be engaged to review the physical location of the proposed high voltage transmission line relative to road and rail corridors and existing cadastral boundaries.</i>	<i>Detailed design</i>
	<i>Structures in road corridors</i>	<i>The location of above-ground structures in roads, including transmission line poles or towers, will be undertaken in accordance with Roads and Maritime's Requirements for Overhead Power Lines.</i>	<i>Detailed design, Construction</i>
Hydrology, groundwater and water quality	Water quality	An Erosion and Sediment Control Plan (ESCP) would be prepared as part of the CEMP. All erosion and sediment control measures shall be designed, implemented and maintained in accordance with relevant sections of "Managing Urban Stormwater: Soil and Construction Volume 1" (Landcom, 2004) ('the Blue Book') (particularly Section 2.2) and "Managing Urban Stormwater: Soil and Construction Volume 2A – Installation of Services" (DECC, 2008)". The ESCP shall include stockpiles, stormwater run-off, trees, site boundaries, site access and storage areas.	Pre-construction Construction
		The provision of sedimentation basins on site would be considered in the detailed design. This could involve converting existing farm dams into basins for the duration of the construction period.	Construction
		<i>Prior to the commencement of operation, ENGIE will ensure the relevant requirements of the NSW Private Water Supply Guidelines (HNEHealth 2014) are addressed with consideration to operational potable water, in consultation with HNEHealth. This would include the preparation of a Quality Assurance Program for operation of the proposal.</i>	<i>Pre-operation</i>
	Spills and leaks	A site specific emergency spill plan would be developed, and include spill management measures in accordance relevant EPA guidelines. The plan would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime TNSW and EPA officers).	Construction
		An emergency spill kit would be kept on site at all times. All staff will be made aware of the location of the spill kit and trained in its use.	Construction
		All fuels, chemicals, and liquids will be stored at least 50 metres away from waterways and will be stored in an impervious bunded area within the compound site.	Construction
		The refuelling of plant and maintenance of machinery will be undertaken in impervious bunded areas in the compound site.	Construction
		Vehicle wash downs and/or concrete truck washouts will be carried out within a designated bunded area on an impervious surface or carried out off-site.	Construction
		Machinery would be checked daily to ensure there is no oil, fuel or other liquids leaking from the machinery. All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental spills.	Construction
	Hydrology	The Department of Primary Industries (Water) controlled activity guidelines would be considered as part of the proposal's detailed design.	Pre-construction

Issues	Impact	Measure	Timing
	Rehabilitation	Rehabilitation works are to commence as soon as practicable to stabilise the land surface after works are completed in any area.	Construction
	<i>Overland flows</i>	<i>ENGIE will ensure existing overland flows are maintained in consultation with relevant landowners during detailed design and all stages (i.e. pre-construction, construction, pre-operation and operation).</i>	<i>All stages</i>
Hazards and risk	Offsite risks	Siting of key components will minimise any current or future offsite risk. The majority of the hazards identified are considered onsite risks, and are not considered offsite risks.	Construction
	EMF	Design and selection of all electrical equipment is to minimise EMF levels and comply with the ICNIRP exposure levels.	Construction
		Monitoring of electromagnetic levels would be undertaken during the commissioning of the substation to confirm exposure levels. Should levels be above the ICNIRP exposure levels the potential need for further mitigation would be considered.	Construction
Bushfire	Bushfire management	<p><i>A bushfire management plan would be prepared in consultation with the NSW Rural Fire Service (NSW RFS) Namoi Gwydir Fire Control Centre and NSW RFS District Office. This plan would include but not limited to the following:</i></p> <p>24 hour emergency contact details, including alternative telephone contact</p> <p>Management of fuel loads onsite and identification of hazards (physical, chemical and electrical) at risk of fire ignition with potential to impact fire-fighting operations</p> <p><i>Sub-plans including:</i></p> <p><i>Site infrastructure plan</i></p> <p><i>Fire-fighting water supply plan</i></p> <p><i>Site access and internal road plan</i></p> <p><i>Operational procedures relating to mitigation and suppression of bush fire relevant to the operation of a solar farm, including management of identified hazards during fire-fighting operations</i></p> <p>Management activities with a risk of fire ignition</p> <p>Management of fuel loads onsite</p> <p>The below requirements of Planning for Bush Fire Protection 2006:</p> <p><i>Identifying, construction and maintenance of asset protection zones (APZs)</i></p> <p><i>Providing adequate egress/access to the site</i></p> <p><i>Emergency evacuation measures</i></p> <p>Storage and maintenance of firefighting equipment including siting and provision of adequate water supplies, including provision of an appropriately sized tank within the APZ, located adjacent to the internal access road</p>	Pre-construction Construction, <i>Operation</i>

Issues	Impact	Measure	Timing
Socio-economic	Community consultation	<p>A community consultation plan would be implemented to manage the concerns and impacts on stakeholders including adjacent property owners. The plan would include (but not be limited to) the following:</p> <p>Protocols to keep the community updated about the progress of the project and its benefits</p> <p>Protocols to inform relevant stakeholders of potential impacts</p> <p>Protocols for allow the community to identify any concerns or issues with the project, particularly during construction and decommissioning</p> <p>The plan would be prepared in consultation with Narrabri Shire Council.</p>	Pre-construction Construction
Air quality and climate change	Air quality	<p>The CEMP would include measures to minimise impacts on air quality including:</p> <p>A map identifying locations of sensitive receivers</p> <p>Identification of potential risks/impacts due to the work/activities as dust generation activities</p> <p>Management measures to minimise risk including a progressive stabilisation plan</p> <p>A process for monitoring dust on-site and weather conditions</p> <p>A process for altering management measures as required</p> <p>A process of the review of the plan prior to the decommissioning works to ensure it is update at the time of the works occurring</p>	Pre-construction Construction
	Dust emissions	<i>Sections of Logan Lane to be sealed in consultation with Council.</i>	<i>Pre-construction</i>
		Surveillance for visible dust generation would occur at all times.	Construction
		Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h) when this may affect receivers (visibility on roads, dust and debris near recreational areas, residences and commercial premises).	Construction
		Stockpiled materials would be covered, stabilised or stored in areas not subject to high wind.	Construction
		All trucks would be covered when transporting material to and from the site.	Construction
		Work activities would be reprogrammed if the safeguards and management measures are not adequately restricting dust generation.	Construction
		Maximum speed limits would be enforced for construction traffic within the site to limit dust generation.	Construction
		Use of a water tanker or similar to spray unpaved roads and exposed areas during construction where required.	Construction
	Exhaust emissions	Construction plant and equipment would be maintained in a good working condition in order to limit impacts on air quality.	Construction
		Construction equipment, plant and vehicles would be appropriately sized for the task.	Construction
		Equipment would be serviced frequently to ensure they are operating efficiently.	Construction
	Impacts on sensitive receivers	Local residents would be advised of hours of operation and duration of work and supplied with a contact name and number for queries or complaints regarding air quality. The CEMP will also include a procedure for handling any queries or complaints.	Pre-construction Construction

Issues	Impact	Measure	Timing
	Climate change	The use of alternative fuels and power sources for construction plant and equipment would be investigated and implemented, where appropriate.	Pre-construction Construction
		The energy efficiency and related carbon emissions would be considered in the selection of vehicle and plant equipment.	Pre-construction Construction
		Materials would be delivered as full loads and local suppliers would be used where possible.	Pre-construction Construction
Non-Aboriginal heritage	Unexpected finds	In the event that a site or artefact (as defined by the <i>Heritage Act 1977</i>) is identified during construction works, works would cease at the location.	Construction
		The find would be immediately reported to ENGIE, and the regulator (OEH Heritage Division) in accordance with legislation. No work would commence in the vicinity of the find until any required approvals have been given by the regulator.	Construction
Waste management	Construction waste	A Waste Management Plan would be developed for the proposal and would form part of the CEMP. It would include but not be limited to the following: Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy and WARR Act Quantification and classification of all waste streams Provision for recycling management onsite Provision of toilet facilities for onsite workers and how sillage would be disposed of (i.e., pump out to local sewage treatment plant) Tracking of all waste leaving the site Disposal of waste at facilities permitted to accept the waste Requirements for hauling waste (such as covered loads)	Pre-construction Construction
		Where possible waste would be removed on a daily basis, or as soon as reasonably practical, to maintain the site in a tidy and litter free condition.	Construction
	Wastewater	Septic tanks to be installed and operated in accordance with Narrabri Shire Council's requirements.	Construction Operation
Cumulative impacts	Cumulative traffic impacts	Consultation with ARTC and RMS TfNSW to identify if the construction phase of the proposal will overlap with ARTC Inland Rail or RMS TfNSW Newell Highway projects. Traffic management plans would be developed to address potential traffic impacts caused by concurrent projects generating construction traffic.	Pre-construction Construction
	Cumulative noise impacts	Cumulative construction noise impacts would be addressed in a Noise Management Plan. Consultation with ARTC and RMS TfNSW , and other proponents if applicable, would be completed to determine if construction activities may take place in close proximity to adjoining projects. Where possible, noise generating activities would be scheduled for different areas of the proposal site to avoid cumulative construction noise impacts. This would include periods where the nearby airstrip is in regular use.	Pre-construction Construction

Issues	Impact	Measure	Timing
	Cumulative impacts on services and accommodation	If there is potential for construction of multiple projects to occur in and around Narrabri at the same time, and large workforce numbers are required, consideration would be given to alternative accommodation options such as neighbouring towns.	Pre-construction Construction



ghd.com

→ **The Power of Commitment**