Amaroo Solar Farm Flora and Fauna Assessment Report

Lot 392 DP 751780, Moree NSW 2400

NCA21R124450

20 May 2021

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APPENDICES

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Kleinfelder was engaged by SLR Consulting, on behalf of Providence Asset Group, to prepare a Flora and Fauna Assessment for a proposed Solar Farm development, located within Lot 392 DP 751780, Moree NSW 2400 (**Figure 1**). The project will be assessed under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The following terms are used throughout this report to describe geographical areas

- Study Area –Lot boundaries (Part Lot 392 DP 751780) pertaining to the development (**Figure 2**).
- Proposed Development Site (development footprint) – areas of the Study Area proposed for development, including access tracks.
- Locality – land within a 5 km radius of the study area.

An assessment of the likely impacts on identified threatened species, habitat features, wildlife corridors and vegetation communities resulting from the proposed development has undertaken.

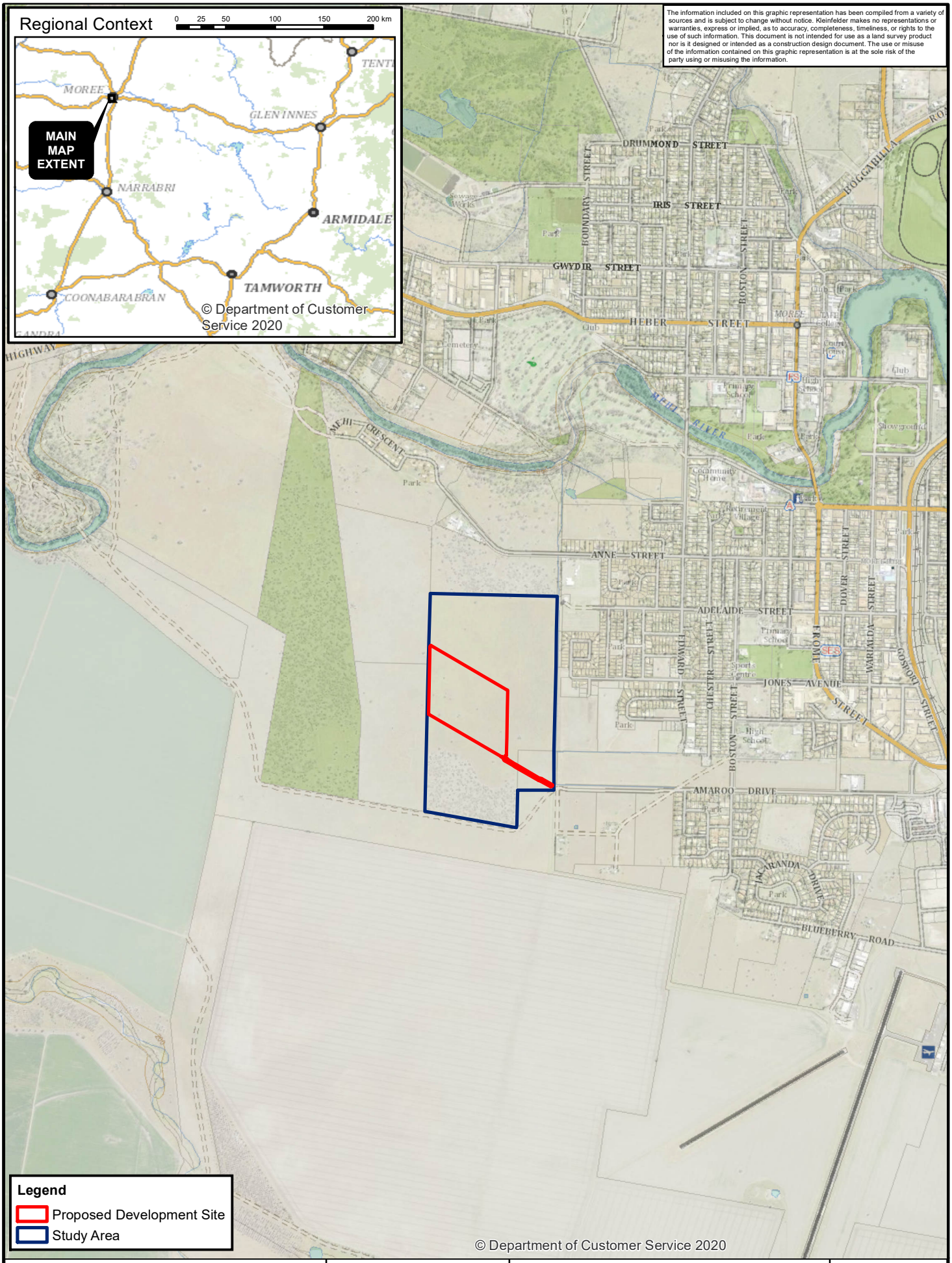
1.2 SITE DESCRIPTION

The Study Area is located on the western edge of the township of Moree and lies within the Moree Plains Shire Council Local Government Area (LGA). It is zoned 'RU1 – Primary Production' under the Moree Plains Local Environmental Plan 2011.

The Study Area is approximately 67.71 ha in size and is located 150m west of Amaroo Drive. It is characterised by a mix of remnant native woodland on the southern boundary of the Lot, followed by a managed native grassland (**Figure 2**).The topography is generally flat, with no defined gullies or low-lying areas. The grassland community within the Development Site has been extensively cleared, likely for agricultural purposes, with few canopy trees remaining.

The Development Site is located within the cleared section of the Lot with limited trees and shrubs. The access tracks for the proposed solar farm extend southeast from the Proposed Development Site and connect to an unsealed road. There are no watercourses or water bodies within the Study Area.

Site photographs are provided in **Appendix A.**



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DATA SOURCE:
NSW DFSI - 2020
NSW OEH - 2019

Locality

Providence Asset Group
Flora & Fauna Assessment Report
Amaroo Solar Farm, Moree NSW

FIGURE:

1

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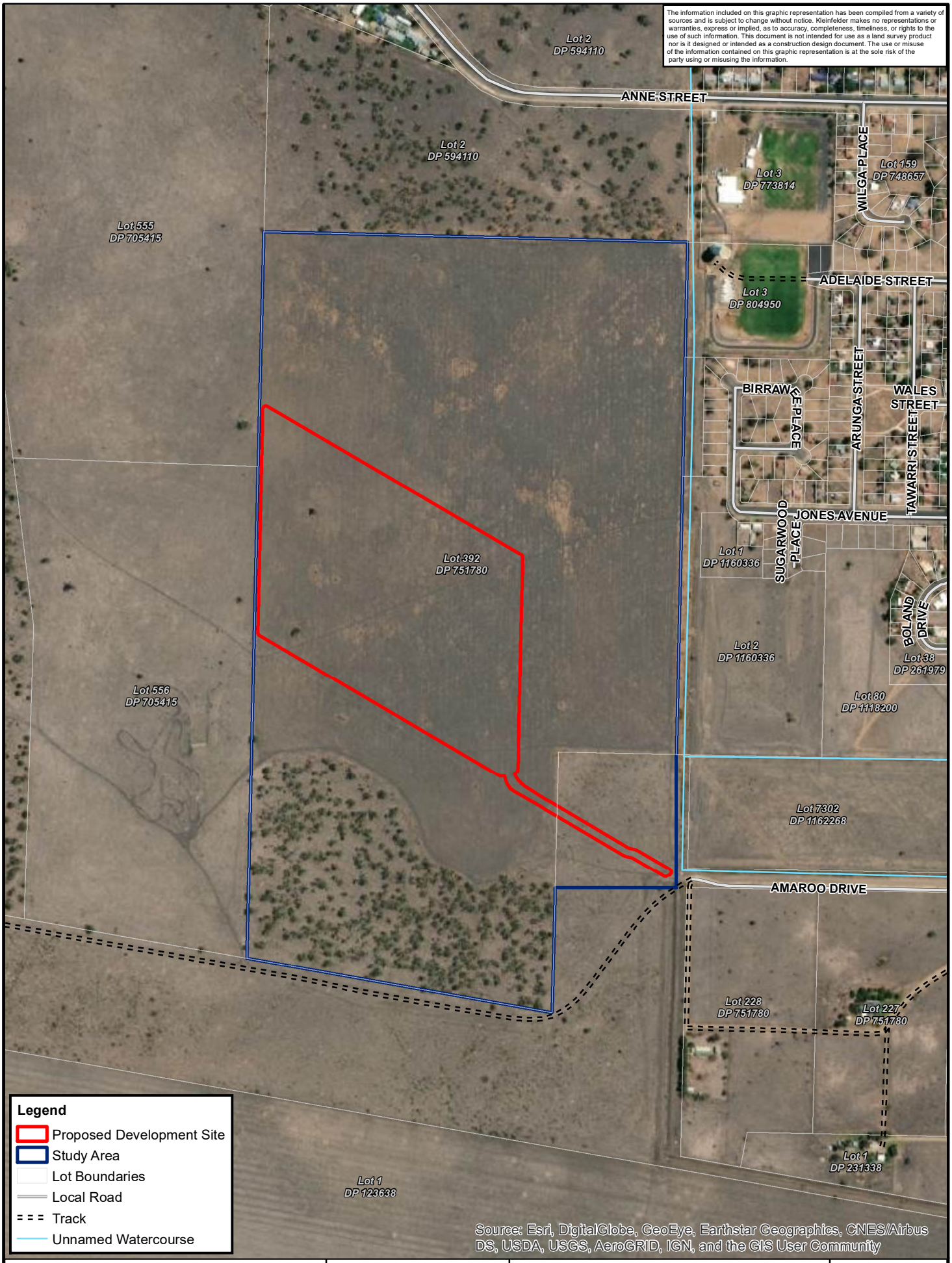

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DATA SOURCE:
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Study Area and Subject Site

Providence Asset Group
Flora & Fauna Assessment Report
Amaroo Solar Farm, Moree NSW

FIGURE:

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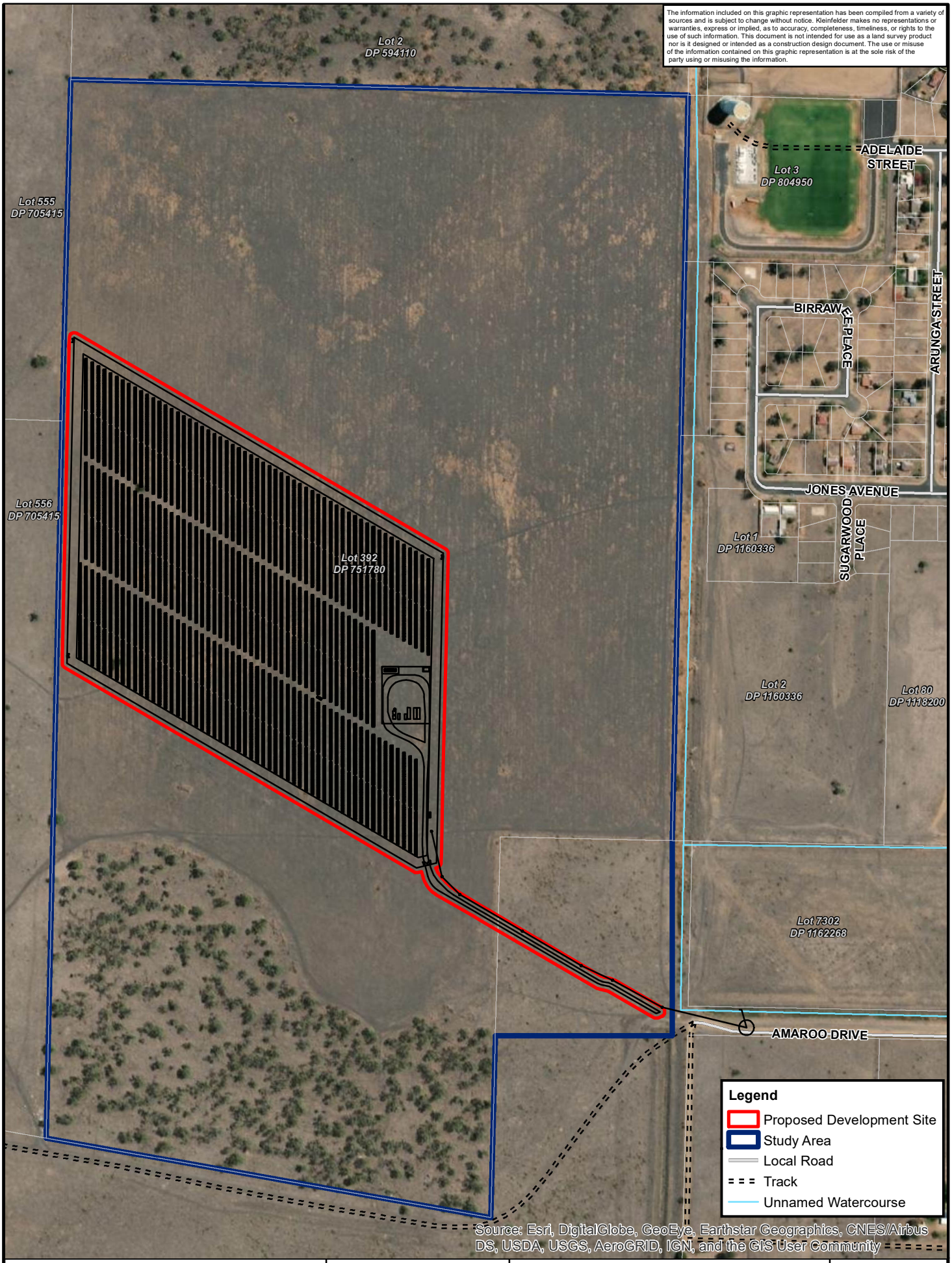
1.3 PROPOSED DEVELOPMENT

The proposed development within Lot 392 DP 751780 includes the construction of a solar farm that would occupy the central-west portion of the Study Area. The development footprint is roughly 14.5 hectares (ha) in area. The access track will extend from the southeast portion of the Development Site and join an unsealed road via Amaroo Drive to the southeast of Lot 392. The proposed project layout is provided in **Figure 3**.

1.4 REPORT OBJECTIVES

The objectives of the Flora and Fauna Assessment include:

- Complete a desktop assessment of relevant threatened biota and regional vegetation mapping.
- Describe the flora and fauna (and their habitats) present on, or likely to occur on the Development Site.
- Identification of native vegetation, noting the extent and condition of plant community types, as well as the presence, condition and extent of any threatened ecological communities.
- Assess the relevance and value of the Development Site for threatened species and ecological communities (and their habitats) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act).
- Assess the potential impacts of the proposed development on threatened species and ecological communities, pursuant to Section 7.3 of the BC Act (5-part test).
- Comment on the likely occurrence and relevance of matters of national environmental significance listed under the Commonwealth *Environment Planning and Biodiversity Conservation Act 1999* (EPBC Act).
- Describe steps to avoid and mitigate any identified impacts on flora and fauna and to protect the natural environment of the Development Site.



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Providence Asset Group - 2021
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Proposed Site Layout

Providence Asset Group
Flora & Fauna Assessment Report
Amaroo Solar Farm, Moree NSW

FIGURE:

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2 LEGISLATIVE CONTEXT

2.1 COMMONWEALTH LEGISLATION

2.1.1 *Environment Protection & Biodiversity Conservation Act 1999*

The purpose of the 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 proposal, 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.

The EPBC Act identifies nine MNES:

- World heritage properties.
- National heritage places.
- Wetlands of international importance (Ramsar Wetlands).
- Threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water resource, in relation to coal seam gas development and large coal mining development.

As part of the current assessment, MNES that are predicted to occur within the locality (applying a 10 km buffer) were obtained from the on-line Protected Matters Search Tool (DAWE 2021a). These records are discussed in **Section 4.9**. The EPBC Act has been further addressed in this assessment through:

- Field surveys for EPBC Act listed threatened biota and migratory species.
- Assessment of potential impacts on EPBC Act listed threatened species and migratory biota.
- Identification of suitable impact mitigation and environmental management measures for EPBC Act listed threatened species and migratory biota.

2.2 STATE LEGISLATION

2.2.1 *Environmental Planning and Assessment Act 1979*

The EP&A Act forms the legal and policy platform for proposal assessment and approval in NSW and aims to 'encourage the proper management, development and conservation of natural and artificial resources'. All development in NSW is assessed in accordance with the provisions of the EP&A Act and the EP&A Regulation 2000.

Development activities that require consent are assessed and determined in accordance with Part 4 of the EP&A Act. The determining authority for the project is Moree Plains Shire Council.

2.2.2 Biodiversity Conservation Act 2016

The NSW BC Act, the NSW *Biodiversity Conservation Regulation 2017* (NSW BC Regulation) and amendments to the NSW *Local Land Services Act 2013* (LLS Act) commenced on 25 August 2017. The legislation aims to deliver "a strategic approach to conservation in NSW whilst supporting improved farm productivity and sustainable development". The NSW BC Act repeals several pre-existing Acts, most notably the NSW, *Threatened Species Conservation Act 1995* (TSC Act) the NSW *Nature Conservation Trust Act 2001* and the NSW *Native Vegetation Act 2003* (NV Act).

In accordance with the NSW BC Act, entry into the Biodiversity Offsets Scheme (BOS) is not required for the proposed development due to the following:

- The proposed development is not deemed to be 'State Significant' under the NSW EP&A Act.
- The proposed development will not impact an Area of Outstanding Biodiversity Value (AOBV) as listed under Part 3 of the NSW BC Act.
- The proposed development is unlikely to cause a significant impact on a threatened species, population or ecological community, as listed under Schedules 1 and 2 of the NSW BC Act, as determined by application of a five-part-test of significance under Section 7.3 of the NSW BC Act.
- The proposed development will not impact areas mapped as having 'high biodiversity value' as indicated by the NSW Biodiversity Values Map (BV Map). Searched 22/03/2021.
- The proposed development will result in the removal of 0.91 ha of native vegetation (further discussed in **Section 5.1.1**); therefore, the project will not involve clearing of native vegetation that exceeds the BOS threshold for the site (1 ha) as determined by the NSW BC Regulation.

In consideration of the criteria listed above, a Biodiversity Development Assessment Report (BDAR) is not required for the proposed development.

As part of the current assessment, threatened species and ecological communities as listed under the NSW BC Act that have previously been recorded within the locality (applying a 5 km buffer) were obtained from the on-line BioNet Atlas of NSW Wildlife (DPIE, 2020a). These records are discussed in Section 4 of this report. The NSW BC Act has been further addressed in this assessment through:

- Field surveys to assess the presence of threatened species, populations and ecological communities, as listed under Schedules 1 and 2 of the NSW BC Act, within the Development Site.
- Assessment of potential impacts threatened species, populations and ecological communities, as listed under Schedules 1 and 2 of the NSW BC Act, as determined by application of a five-part-test of significance under Section 7.3 of the NSW BC Act.
- Identification of suitable impact mitigation and environmental management measures.

2.2.3 Local Land Services Act

The Study Area exhibits historical and ongoing land use consistent with category 1- exempt land under Section 60H of the *Local Land Services Act 2013* (LLS Act), which defines category 1-exempt land as follows:

- (1) Land is to be designated as category 1-exempt land if the Environment Agency Head reasonably believes that:
    - (a) the land was cleared of native vegetation as of 1 January 1990, or
    - (b) the land was lawfully cleared of native vegetation between 1 January 1990 and the commencement of this Part.
- (2) Land is to be designated as category 1-exempt land if the Environment Agency Head reasonably believes that:
    - (a) the land contains low conservation value grasslands, or
    - (b) 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
    - (c) the land is of a kind prescribed by the regulations as category 1-exempt land.

For developments requiring some degree of land clearing as defined in Part 5A of the LLS Act, the BC Act stipulates under what conditions the BAM is to be used to determine possible entry into the BOS. In relation to category 1-exempt land, Clause 6.8(3) of the BC Act states:

- (3) The biodiversity assessment method is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1-exempt land (within the meaning of Part 5A of the LLS Act, other than any impacts prescribed by the regulations under section 6.3.

As the Native Vegetation Regulatory Map, which is intended to show the extent of areas of classified as category 1-exempt and category 2-regulated, is still under development, transitional arrangements require assessment against multiple data sources and field surveys. Classification of the subject site for the purposes of this development application as category 1-exempt was assessed using the following data sources:

- An ecological field survey (described in this report).
- Historical aerial photography - 1958, 1985, 1991, 1996, 2002, 2011, 2015 and 2018 (**Appendix F**).
- 2011 Woody vegetation extent maps.
- 2017 Land Use Map.
- Native Vegetation Regulatory Map (showing no areas of vulnerable regulated, sensitive regulated or excluded land).

In relation to Section 60H of the LLS Act, no aerial imagery was available for 1 January 1990. Consequently, images from 1958, 1985, 1991, 2002, 2011, 2015 and 2018 were assessed (**Appendix F**) Aerial imagery from 1958 shows the subject site to be extensively modified and cleared of native vegetation for cropping and/or pastural improvement purposes. A later image taken in 1985 shows regrowth in the southern portion of the subject site however the area designated for the proposed development remains largely clear of native vegetation except for a few scattered trees, demonstrating clear ongoing agricultural practices on the subject site. Post-1990 imagery shows consistent ongoing land use with the same native regrowth visible in the southern portion of the lot only in 1991, while more recent satellite imagery from 2002 to 2018 clearly shows cultivation furrows.

The NSW 2011 Woody Vegetation Extent (**Appendix F**) indicates no woody vegetation is mapped with the development area. The 2017 Land Use Dataset (**Appendix F**) shows the development area proposed in the subject site to be classified as 3.3.0 Cropping, which is consistent with aerial imagery. Finally, the Native

Vegetation Regulatory Map (**Appendix F**) does not identify any sensitive regulated or vulnerable regulated land within the Study Area.

Based on the above data sources, the Development Site has been under regular cropping, grazing and pasture improvement since prior to 1990. Therefore, in accordance with the LLS Act, the Development Site would meet the definition of category 1-exempt land.

2.2.4 Biosecurity Act 2015

The NSW Biosecurity Act 2015 provides a streamlined statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds. The primary objective 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.

Weed species recorded within the Development Site during the current investigation are discussed in **Section 4**.

2.2.5 National Parks and Wildlife Act 1974

The NSW *National Parks and Wildlife Act 1979* (NPWS Act) aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and provides for the preservation and management of national parks, historic sites and certain other areas identified under the Act.

No areas of National Park estate occur within or adjacent to the Development Site.

2.2.6 Water Management Act 2000

Controlled activities carried out in, on or under waterfront land are regulated by the NSW WM Act. The NSW Natural Resource Asset Regulator (NRAR) administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to 'waterfront land' as a consequence of carrying out the controlled activity. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 m of the highest bank of the river, lake or estuary (NRAR, 2018). This means that a controlled activity approval must be obtained from the NRAR before commencing the activity.

No natural watercourses occur within the study area (**Figure 2**), therefore the WM Act does not apply to the proposed development. An assessment of indirect impacts of the proposed development on aquatic habitat and downstream aquatic habitats is provided in **Section 5.1.6**.

2.2.7 State Environmental Planning Policy (Koala Habitat Protection) 2020

State Environmental Planning Policy (Koala Habitat Protection) 2020 aims to encourage the conservation and management of areas of natural vegetation that provide habitat for Koalas to support a permanent free-living population over their present range and reverse the current trend of Koala population decline.

The Koala Habitat Protection SEPP applies to Part 4 developments; while no specific Koala Plan of Management has been developed for the Moree Plains Shire, a Koala Habitat Map displaying potential Koala habitat in

accordance with SEPP 44 guidelines (now repealed by Koala Habitat Protection SEPP 2020) was developed as part of the Moree Plains Shire Council Growth Management Strategy (2009).

See **Section 5.1.4** for a consideration of direct and indirect impacts to Koala habitat.

2.3 Local Planning Instruments

2.3.1 Moree Plains Shire Council Local Environmental Plan 2011

The Study Area is located within the Moree Plains Shire Council LGA. The Moree Plains Shire Council Local Environmental Plan 2011 (Moree Plains LEP) controls development within the Study Area through zoning and development controls. These controls are described in greater detail by the supporting Moree Plains Development Control Plan 2013 (Moree Plains DCP).

2.3.2 Moree Plains Development Control Plan 2013

The Moree Plains DCP supports the Moree Plains LEP by providing additional detail and guidance on addressing biodiversity issues associated with development. In regard to biodiversity, the DCP contains provisions that relate to environmental effects, soil and erosion control and vegetation. These provisions have been considered during the assessment.

3 MATERIALS AND METHODS

3.1 DESKTOP ASSESSMENT

Existing information on the flora and fauna of the Development Site and the locality, including relevant threatened biota was obtained from:

- Regional vegetation mapping: State Vegetation Type Map: Border Rivers Gwydir / Namoi Region Version 2.0 VIS_ID 4467 (DPIE, 2016).
- The BioNet Atlas of NSW Wildlife (DPIE, 2020a) for previous records of threatened species, populations and ecological communities (as listed under the BC Act) within a 10 km radius of the Development Site (data retrieved 22/03/2021).
- The Department of the Environment and Energy (DAWE 2021a) Protected Matters Search Tool, which involved a search for matters of national environmental significance within a 10 km radius of the Development Site (conducted on 12/04/2021).
- Relevant published literature on threatened biota (see References).

The results of the database searches were used to compile a list of threatened species, populations and communities, as listed under the BC Act and EPBC Act that could potentially occur on the Development Site, and their likelihood of occurrence (**Appendix B**).

3.2 FIELD SURVEY

3.2.1 Vegetation Assessment

A diurnal inspection of the Development Site and surrounds was undertaken on the 7th – 8th April 2021 to provide specific observations for this report.

Native vegetation types were identified based on dominant flora species present within each structural layer (i.e, shrub and ground layers). Exotic or highly modified native vegetation was defined based on structure and species composition. Boundaries of vegetation types and communities were marked with a hand-held GPS and mapped using geographical information system (GIS) software.

Vegetation types were assessed against identification criteria for State and Commonwealth listed threatened ecological communities (DAWE 2021b; DPIE 2021d). Vegetation and habitats were compared with descriptions provided in the BioNet Vegetation Classification to identify Plant Community Types (PCTs).

Four 400 m² floristic plot/transects was sampled in accordance with Section 5.3.4 of the NSW Biodiversity Assessment Method (BAM) (DPIE, 2020). Percentage cover and relative abundance was recorded for all plant species within each plot/transect. Plot/ transects were positioned to sample areas that were most representative of the floristic characteristics of each PCT.

Plant identification and nomenclature were based on species descriptions presented within The Flora of New South Wales Volumes 1 to 4 (Harden, 1993) and with reference to taxonomic updates in PlantNET - The Plant

Information Network System of Botanic Gardens Trust, Sydney, Australia (Botanic Gardens Trust, 2020). The locations of all floristic plot/ transects are presented in **Figure 4**.

3.2.2 Fauna Habitat Assessment

The locations of any important habitat features, such as microbat roosting habitat, hollow-bearing trees, terrestrial refugia and nests/burrows were captured with a handheld Trimble GPS and photographed where appropriate.

Searches for potential habitat for threatened fauna species included but were not limited to:

- Koala feed trees.
- Foraging trees for threatened birds.
- Hollow-bearing trees.
- Potential roosts for microbats.
- Vegetated ponds, riparian vegetation and drainage lines for frogs and waterbirds.
- Woody debris, leaf litter and bush rock.

Diurnal opportunistic and incidental observations of fauna species were recorded during field surveys. These included opportunistic observation of fauna activity such as scats, tracks, burrows or other traces. Spotlighting was undertaken by two ecologists for a one-hour period over one night (7th April 2021) to detect the presence of threatened fauna within the Development Site and its surrounds.

3.2.3 Microbat Surveys

Microbat surveys were conducted using high frequency call recorders called 'Anabats', which capture call signatures specific to each microbat species. An Anabat Express detector (Titley Scientific) was deployed for one hour at dusk in the northern edge of the remnant wooded community to collect microbat call data (**Figure 4**). This area was deemed as having the best chance at detecting microbats based on vegetative structure.

Analysis of all bat calls was completed using zero-crossing analysis and AnalookW software by visually comparing the time-frequency graph and call characteristics (e.g. characteristic frequency and call shape) with reference calls and/or species call descriptions from published guidelines. Call identification was also assisted by consulting distribution information for possible species (Churchill, 2009; Duffy, Lumsden, Caddle, Chick, & Newell, 2000; Pennay, Law, & Reinhold, 2004). No reference calls were collected during the survey.

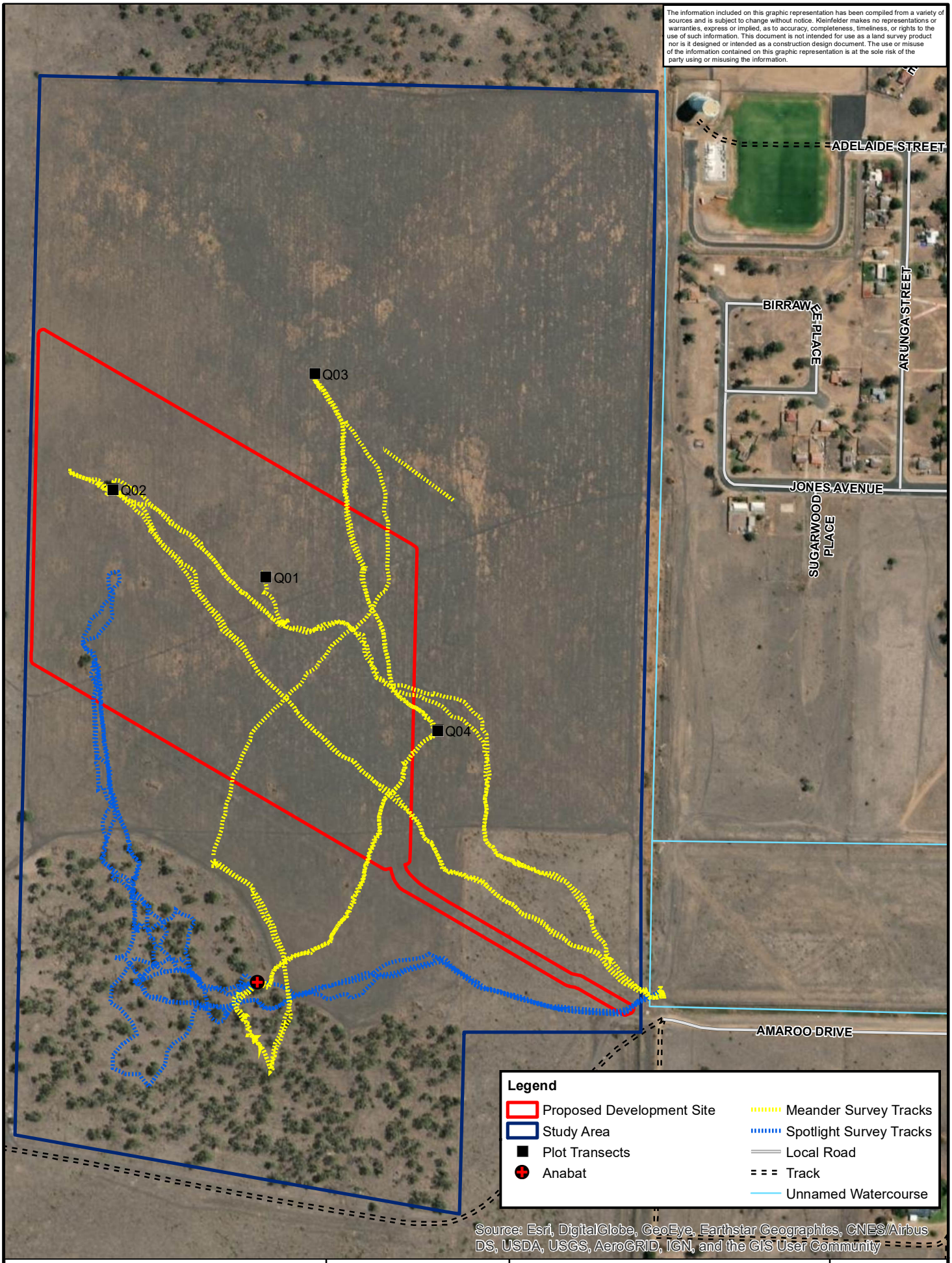
3.3 Survey Limitations

The survey techniques and survey effort applied for this study were commensurate with the nature and condition of the Development Site. Due to these limitations, priority was given to habitat assessment for relevant threatened biota. A 'likelihood of occurrence' assessment was applied to all species previously recorded or predicted to occur within the locality based on State and Commonwealth information sources.

The field survey was undertaken by two ecologists. While a moderate diversity of native and exotic flora species was recorded, a longer survey duration or multiple seasonal surveys would likely result in the detection of a greater diversity of species. The Development Site is considered to be unsuitable for most threatened plant

species known to occur in the locality; therefore, the survey effort that is recommended in The NSW Guide to Surveying Threatened Plants (OEH, 2016) is not considered to be applicable.

Nocturnal fauna surveys were completed on the 7th of April 2021. Given the limited habitat complexity within the Development Site, the survey effort was considered adequate to detect the fauna species most likely to be present.



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Survey Effort

Providence Asset Group
Flora & Fauna Assessment Report
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FIGURE:

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4 RESULTS

4.1 PLANT DIVERSITY

A total of 32 plant species were identified during the assessment. These were comprised of 5 exotics and 27 natives. The majority of the exotic plant species were comprised of annual herbs and grasses associated with the grasslands. Native plant species consisted mainly of grasses and low-lying shrubs (Chenopods). Native tree species were primarily restricted to woodland areas outside the development footprint, with one exception.

A complete list of flora species is presented in **Appendix C.**

4.2 WEEDS

One priority weed species for the Central Tablelands Local Land Services Region (DPI, 2021) and 1 Weed of National Significance (DAWE, 2021c) was identified within the Development Site:

- *Lycium ferocissimum* (African Boxthorn).

Minor infestations of other exotic species were also identified within the site, including the following species:

- *Tribulus terrestris* (Calltrop),
- *Citrullus amarus* (Wild Melon)
- *Medicago truncatula* (Barrel Medic)
- *Cenchrus ciliaris* (Buffel Grass)

Mitigation measures to prevent the spread of weeds are presented in **Section 5.2.2**.

4.3 PLANT COMMUNITY TYPES

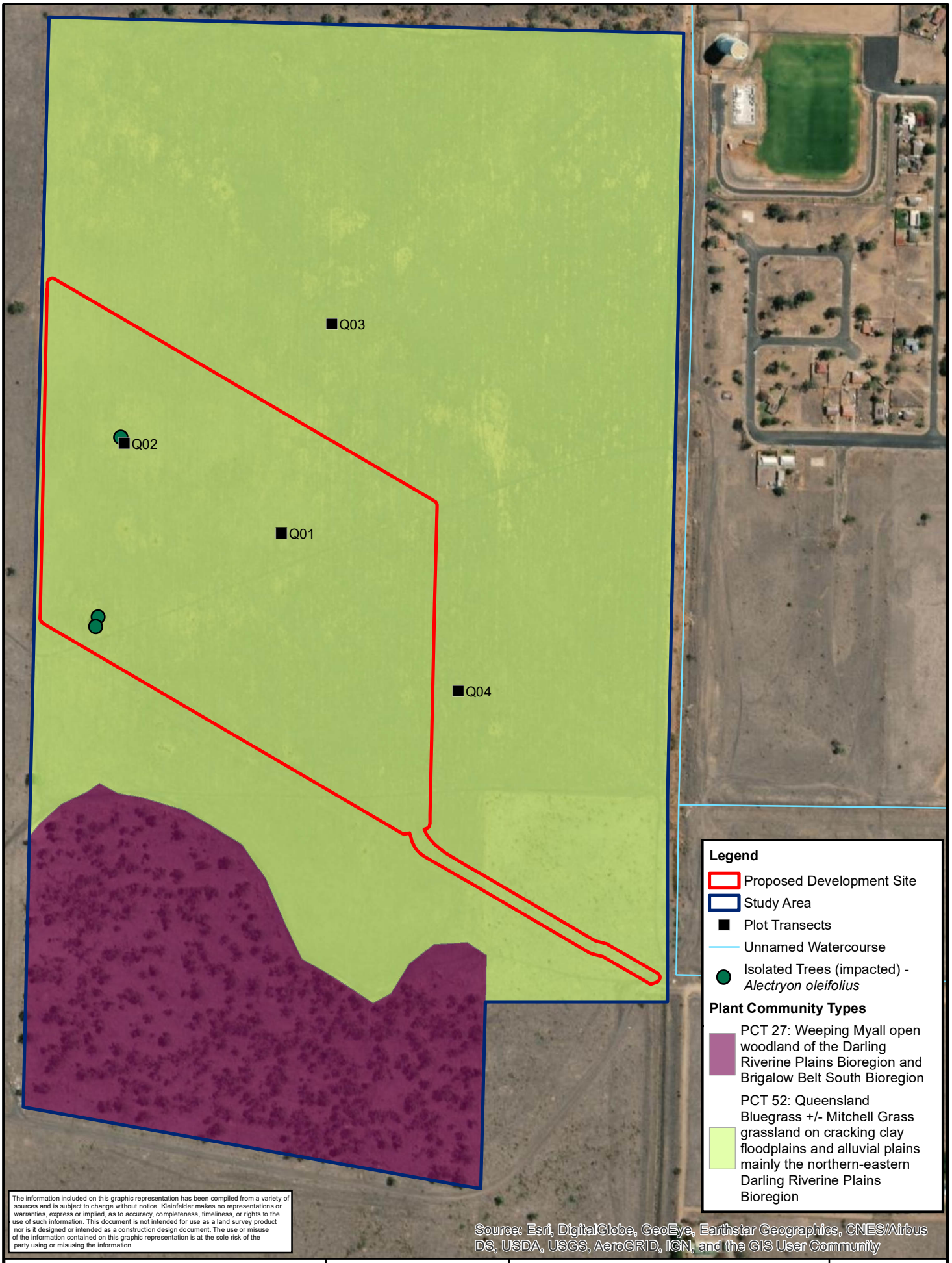
Regional vegetation mapping identifies one small patch of woodland vegetation within the study area as *PCT 27: Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion under the State Vegetation Type Map (DPIE, 2016).* PCT 27 is dominated by Weeping Myall *Acacia pendula*, Bimble Box *E. populnea* and Black Box *E. largiflorens.* The remaining grassland area within the Study Area is listed as non-native vegetation.

The assessment determined that the regional vegetation mapping for the area is reasonably accurate, with PCT 27 occurring within the southern region of the Study Area, outside of the proposed development footprint. The vegetation within the Development Site does not represent this community and is more representative of *PCT 52 - Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains, mainly the northern-eastern Darling Riverine Plains Bioregion*, which is mapped throughout the Development Site. A description of this PCT is provided below.

Plate 1 **PCT 52 - Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains, mainly the northern-eastern Darling Riverine Plains Bioregion**

PCT 52 - Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains, mainly the northern-eastern Darling Riverine Plains Bioregion (Moderate Condition)	
Vegetation Formation and Class	Grasslands Semi-arid Floodplain Grasslands
Area within Development Site	16.07 ha
Survey Effort	**Conducted: 4** plots/transects.
Floristic description	The vegetation within this zone was characterised by a lack of canopy with few remnant trees of *Alectryon oleifolius* (Western Rosewood) sparsely throughout the Development Site. The vegetation consists of an open midstorey of *Vachellia farnesiana* (Mimosa Bush), *Sclerolaena muricata* (Black Rolypoly), *Enchylaena tomentosa* (Ruby Saltbush) and *Salsola australis.* The ground cover is dominated by a mix of three grass species (inc. *Panicum decompositum* [Native Millet], *Paspalidium globoideum* [Shot Grass], and *Dichanthium sericeum* [Queensland Bluegrass]). A variety of herbs such as *Phyllanthus virgatus, Vittadinia cuneata* (Fuzzweed), and *Leiocarpa tomentosa* [Woolly Plover-daisy] are also present. Several exotics were recorded in small numbers within the vegetation zone, including *Lycium ferocissimum* (African Boxthorn) and *Cenchrus ciliaris* (Buffel Grass).

PCT 52 - Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains, mainly the northern-eastern Darling Riverine Plains Bioregion (Moderate Condition)	
Condition within Development Site	The vegetation within this zone is in moderate condition with a diverse native ground cover and minimal exotic plant infiltration. Disturbances include the clearing of native canopy for agricultural purposes and the subsequent establishment of alien plant species. Few canopy trees remain within the development footprint, which has reduced the Subject Area's habitat capacity and overall condition. Additionally, the site has the Weed of National Significance, *Lycium ferocissimum* (African Boxthorn), sparsely located throughout. The ground cover itself is primarily native in origin with consistent coverage.
Justification for PCT selection	PCT 52 was deemed the most suitable community for the Subject Area due to the site's groundcover assemblage and grassland structure. This PCT is the only PCT that is associated with all three of the identified dominant grass species, *Panicum decompositum* (Native Millet), *Paspalidium globoideum* (Shot Grass), and *Dichanthium sericeum* (Queensland Bluegrass), within the Northern Outwash IBRA sub-region. These three species comprised the vast majority of the vegetation found within the site. Additionally, the single remnant canopy species, *Alectryon oleifolius* (Western Rosewood) and the dominant shrub species *Vachellia farnesiana* (Mimosa bush), are represented within this community. As a whole, the floristics found within the subject area closely align with PCT 52. Additionally, this community is associated with the grey loam soil present on-site and an open canopy. Although the Development Site's canopy has been altered through historical land-use practices, it likely would have had an open canopy structure dominated by *Alectryon oleifolius* (Western Rosewood). Additionally, this community formation is known to occur within the LGA.
Status	**BC Act:** Does not meet requirements of the associated EEC, Native Vegetation on Cracking Clay Soils of the Liverpool Plains.
	EPBC Act: Does not meet requirements of the associated EEC, Native Vegetation on Cracking Clay Soils of the Liverpool Plains.
SAII	No
PCT % Cleared	70%



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Vegetation Communities, Isolated Trees and Plot Transects

Providence Asset Group
Flora & Fauna Assessment Report
Amaroo Solar Farm, Moree NSW

FIGURE: 5

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4.4 Endangered Ecological Communities

The grassland vegetation within the Development Site represents moderate condition PCT 52. This PCT may be associated with *Native Vegetation on Cracking Clay Soils of the Liverpool Plain*s, which is listed as an Endangered Ecological Community (EEC) under the BC Act. The grassland vegetation was determined not to represent the EEC given that the scientific determination indicates that the EEC is restricted to the Liverpool Plains Catchment, which does not extend as far north as Moree (Sim and Unwin 1983; NSW Scientific Committee 2001).

The grasslands vegetation within the Development Site is commensurate with *Natural Grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland* Threatened Ecological Community, which is listed as a Critically Endangered Ecological Community (CEEC) under the EPBC. This vegetation community is discussed in **Section 4.9.**

4.5 Threatened Flora Species

No threatened flora species were identified within the Development Site during the assessment. A search of the BioNet Atlas of NSW Wildlife (DPIE, 2021a) returned three records of threatened plant species within a 5 km radius of the Study Area. An EPBC Protected Matters Search returned a list of three threatened plant species predicted to occur within the locality of the Development Site.

A "likelihood of occurrence' assessment determined that the Development Site is unlikely to constitute suitable habitat for any threatened plant species predicted or recorded within the locality (**Appendix B**).

4.6 Fauna Habitat

The Study Area is characterised by an area of intact open acacia forest with shrubby/grassy ground cover and the northern grassland, with the canopy, cleared previously. The Development Site is located within the grassland community, which has few large trees and no hollow-bearing trees. The vegetation within the Development Site is likely to represent marginal foraging habitat for fauna species, including birds and mammal species. Key fauna habitat features identified during the site assessment includes the following:

- Mature trees within the Development Site may provide marginal foraging and nesting habitat for several common native bird species.
- No watercourses or water bodies exist within the Development Site; however, there is evidence of flooding previously, which could provide temporary habitat for native fauna such as amphibians and wetland birds.

4.7 Fauna Species

A total of 6 fauna species were identified during the assessment. The Anabat surveys did not detect any microchiropteran bats during the survey period. A complete list of fauna species is presented in **Appendix C**.

No threatened fauna species were detected within the Development Site. A search of the BioNet Atlas of NSW Wildlife (DPIE, 2021a) returned a list of 14 threatened fauna species that have previously been recorded within 5 km of the Development Site: An EPBC Protected Matters Search returned 13 threatened fauna species predicted to occur within the locality of the Development Site.

A "likelihood of occurrence" assessment (see **Appendix B**) determined a low likelihood of occurrence for these fauna species within the Development Site. No fauna species were considered to have a moderate or high likelihood of occurrence.

4.8 Koala Habitat

The vegetation within the Development Site is dominated by native grasses such as *Panicum decompositum* (Native Millet) and *Paspalidium globoideum* (Shot Grass) and lacks a canopy stratum layer. A single tree species, *Alectryon oleifolius* (Western Rosewood), is found sparsely within the Development Site. This species is not listed under the Northwest Slopes section of Schedule 2 (Koala Feed Tree Species) within the NSW Koala Habitat Protection SEPP 2021.

The Development Site does not represent Potential or Core Koala Habitat in accordance with the Koala SEPP and is unlikely to represent habitat for this species.

4.9 EPBC Protected Matters

4.9.1 Threatened and Migratory Species

A 'likelihood of occurrence' assessment was conducted for all threatened species and migratory species returned by the EPBC Protected Matters Search (**Appendix B**). The habitats present within the Development Site were considered to be unsuitable for most fauna species due to a lack of key habitat features such as hollow-bearing trees and habitat logs. Migratory species such as the *Motacilla flava* (Yellow Wagtail) and *Myiagra cyanoleuca* (Satin Flycatcher) may occasionally forage within the site. Both bird species may forage aerially over an extensive range of habitats, including vegetated and non-vegetated areas. The proposed development will not remove habitat features considered to be necessary to these species. The extent of their foraging habitat is likely to be unaffected.

4.9.2 Threatened Ecological Communities

The grasslands vegetation within the Development Site is commensurate with *Natural Grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland Threatened Ecological Community* TEC. This determination was based on the following Commonwealth listing advice (DAWE 2009):

- The vegetation occurs on the Moree Plains of northern NSW.
- The vegetation is associated with fine textured cracking clay soils derived from alluvium.
- The Study Area is a relatively flat landform (less than 5 percent/1degree).
- The canopy vegetation is sparse, comprising less than 10% projective crown cover.
- The ground layer is dominated by perennial native grasses and contains the following four indicator native species:
    - *Astrebla lappacea* (Curly Mitchell Grass)
    - *Dichanthium sericeum* (Queensland Bluegrass)
    - *Digitaria divaricatissima* (Umbrella Grass)
    - *Panicum decompositum* (Native Millet)

The EPBC Significant Impact Guidelines (DSEWPC 2013) were used to assess the potential for impacts to the TEC in **Appendix E**. This assessment determined that the proposed activity is unlikely to have a significant impact on the CEEC. An EPBC referral to the Commonwealth Minister for the Environment is not recommended.

5 DISCUSSION

5.1 IMPACT ASSESSMENT

5.1.1 Direct Impacts to Native Vegetation

Impacts to native vegetation within the Development Site will be limited to the removal of three isolated trees and low condition native groundcover (**Figure 5**). It is estimated that approximately 0.91 ha of groundcover is expected to disturbed/removed as shown in **Table 1**. As stated previously in **Section 2.2.2**, the project will not involve clearing of native vegetation that exceeds the BOS threshold for the site (1 ha) as determined by the NSW BC Regulation.

Table 1 Vegetation (groundcover) removal for the proposed development

Activity	Length (m)	Width (m)	Qty	Area (m2)
Trenching	1000	1	1	1000.0
Piling (3 string tracker)	0.153162	0.1016	1932	30.1
Hardstand	-	-	--	2216.0
Access Road	-	-	-	1960.0
Metering and Grid Connection Kiosk	-	-	-	20.0
Stormwater detention basin and swales	-	-	-	3062.0
Security fence	1560	0.5	1	780.0
			Total (m2)	**9068**
			Total (Ha)	**0.91**

5.1.2 Indirect Impacts to Native Vegetation

Potential indirect impacts of the proposed development to native vegetation include the following:

- Weed incursions as a result of the clearing and maintenance of the proposed development and associated APZ area.

Mitigation measures to minimise the potential for disturbance of native vegetation within the Development Site are presented in **Section 5.2.2**.

5.1.3 Impacts to Fauna

Direct impacts of the proposed development on fauna habitat include the following:

- The clearing of native grassland may temporarily displace fauna that exists within the development footprint

Potential indirect impacts of the proposed development on resident fauna populations include the following:

- Noise and lighting during the construction phase may cause minor disturbance to resident fauna within the locality and disrupt their natural behaviour.
- Pollution such as chemical spills from construction machinery may have adverse effects on biota within the development footprint.
- Ground disturbance by machinery during the construction phase may create dust and facilitate the movement of sediment.

Management measures are presented in **Section 5.2.2** to reduce the potential for these impacts.

5.1.4 Impacts to Threatened Species Habitat

No threatened species were identified within the Development Site during the assessment. Additionally, the habitat is considered to be too degraded to support populations of threatened species. No key habitat features such as hollow-bearing trees will be removed for the proposed development. Impacts from the proposed development on threatened species that potentially utilise the Study Area are likely to be negligible.

5.1.5 Impacts to Threatened Ecological Communities

No TECs were identified within the Development Site.

5.1.6 Impacts to Aquatic Habitat

There are no natural watercourses within the Study Area. There are no direct impacts to waterways associated with the proposed development. Potential indirect impacts include the following:

- The excavation of soil within the Development Site during the construction phase can facilitate erosion and sediment movement. Run-off from the Development Site has the potential to introduce nutrients and other toxins to downstream aquatic habitats.
- The introduction of chemicals such as fuels for vehicles and machinery during the construction phase can cause pollution to downstream aquatic habitat.

Recommendations to reduce the potential for adverse environmental impacts to aquatic habitat are presented in **Section 5.2.2**.

5.1.7 Cumulative Impacts

Cumulative impacts arise from the interaction of individual elements associated with the proposed development and the additive effects of other external projects. No other known projects within the locality are known to have relevance to this project that could exacerbate cumulative impacts.

5.2 Impact Amelioration

5.2.1 Avoidance Measures

Impacts on biodiversity values have been addressed through an iterative design process to avoid areas of higher biodiversity value within the Development Site. The design of the solar panel array will ensure that few mature trees will be removed within the study area.

5.2.2 Mitigation Measures

5.2.2.1 Erosion Control

Mitigation measures to reduce soil erosion and pollutant run-off during construction activities should include:

- Installation of erosion and sediment control structures within 40 m of development site prior to any construction works and in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004).
- Regular inspection of erosion and sediment control measures, particularly following rainfall events, to ensure their ongoing functionality.

- The immediate removal of any excavated materials offsite
- Avoid stockpiling of materials adjacent to native vegetation but instead, use areas that are already cleared/ disturbed.
- Undertake maintenance of silt fences and other mitigation measures to isolate run-off.

5.2.2.2 Dust Control

Specific measures to minimise the generation of dust and associated impacts on adjacent natural environments should include:

- Setting maximum speed limits for all traffic within the Development Site to limit dust generation.
- Use of a water tanker to spray unpaved access tracks during the construction phase where required.
- Application of dust suppressants or covers on soil stockpiles.

5.2.2.3 Chemical Spills

Specific measures to minimise the potential for chemical spills and associated impacts on adjacent natural environments should include the following:

- All chemicals must be kept in clearly marked bunded areas.
- Regularly inspect vehicles and mechanical plant for leakage of fuel or oil.
- No re-fuelling, maintenance or washing of vehicles and plant to be undertaken within 20 m of natural drainage lines.

5.2.2.4 Vegetation Clearing (Tree Removal)

The following recommendations are to be implemented during vegetation clearing:

- A suitably qualified Ecologist should complete a pre-clearance assessment before the commencement of works. An appropriately trained Ecologist should be present on-site to supervise vegetation clearing activities and manage displaced fauna species.
- Areas of vegetation outside the development footprint are clearly demarcated to prevent accidental clearing during the construction phase.
- Vegetation should be cleared in a way that will allow fauna species living in or near the clearing site enough time to move out of the area without additional human intervention.
- No clearing should occur during the early evening or at night.

5.2.2.5 Management of Displaced Fauna

The following recommendations apply to the management of any displaced fauna species during vegetation clearing activities:

- A suitably trained Ecologist should conduct all handling of fauna species. Displaced fauna species are to be relocated to adjacent bushland.

- Nocturnal fauna species, such as microbats, are to be 'soft released' using bat boxes placed in adjacent habitat. Nocturnal fauna species, such as gliders and possums, are to be secured in suitable enclosures and kept in a quiet, dark and cool environment until they can be released into suitable habitat after dark.
- If any injured fauna species are found during the construction period, construction must stop immediately so that the injured animal can be taken to a vet or wildlife carer.

5.2.2.6 Management of Weeds

One listed Priority Weed, *Lycium ferocissimum* (African Boxthorn) and four exotic species were recorded within the Development Site during the site assessment. The following weed management measures should be implemented during the construction phase to minimise weed incursions into surrounding intact native vegetation:

- All vehicles should be cleaned prior to entering the site to prevent the introduction of new weed species.
- The site should be monitored during and after construction to ensure that Priority Weeds for the region and Weeds of National Significance are not introduced.

6 CONCLUSION

The proposed development will require the removal of 0.91 ha of low condition native grassland. This vegetation is degraded from long-term agricultural development and is generally unsuitable for threatened flora and fauna species. The Study Area exhibits historical and ongoing land use consistent with category 1- exempt land under Section 60H of the Local Land Services Act 2013 (LLS Act).The proposed development is unlikely to cause a significant impact to any threatened species, populations or ecological communities listed under the NSW BC Act.

One EPBC listed ecological communities was identified within the Development Site: *Natural Grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland Threatened Ecological Community*. This vegetation is in a degraded state due to long-term agricultural management practises and is not considered to be important to the long-term survival of the community in the locality. The habitats present within the Development Site are not considered to be important for any other ecological communities, threatened species or migratory species. An EPBC referral to the Commonwealth Minister for the Environment is not recommended.

Avoidance and mitigation measures have been presented to reduce potential impacts to biodiversity values within the Development Site and the environment.

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APPENDIX A – SITE PHOTOGRAPHS

Plate 2: Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion (Moderate Condition) within the central portion of the Development Site.

Plate 3 PCT 27: Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion under the State Vegetation Type in the southern portion of the study area outside of development footprint

APPENDIX B – THREATENED SPECIES' LIKELIHOOD OF OCCURRENCE'

THREATENED SPECIES' LIKELIHOOD OF OCCURRENCE'

A list of threatened species, populations and ecological communities that have been reported or modelled to occur from within a five-kilometre radius of the Study Area was obtained from the following databases:

- NSW Office of Environment and Heritage (OEH) BioNet Atlas: (http://www.bionet.nsw.gov.au/); and
- Department of Environment and Energy (DoTEE) Protected Matters search tool: (www.environment.gov.au/erin/ert/epbc/index.html).

An assessment was then made of the likelihood of the threatened species, populations, and ecological communities reported or modelled to occur in the locality occurring within the Study Area or using the habitat within the Study Area as an essential part of a foraging range.

The table below summarises the likelihood of threatened species and EPBC Act listed migratory species occurring within the Study Area based on the habitat requirements of each species. A brief definition of the likelihood of occurrence criteria is provided below:

- Known – species identified within the site during surveys.
- High – species known from the area (OEH Wildlife Atlas records), suitable habitat (such as roosting and foraging habitat) present within the site.
- Moderate – species may be known from the area, potential habitat is present within the site.
- Low – species not known from the area and/or marginal habitat is present within the site; and
- Nil – habitat requirements not met for this species within the site

Table B1 Likelihood of occurrence

	Species	Status*		Records**	Source***	Habitat	LoO	Justification
		BC	EPBC					
Flora								
1.	*Cadellia pentastylis* **Ooline**	V	V	-	PMST	Occurs along the western edge of the North West Slopes from north of Gunnedah to west of Tenterfield. There appears to be a strong correlation between the presence of Ooline and low- to medium-nutrient soils of sandy clay or clayey consistencies, with a typical soil profile having a sandy loam surface layer, grading from a light clay to a medium clay with depth.	Low	Little suitable habitat on site. Not recorded during site assessment.
2.	*Dichanthium setosum* **Bluegrass**	V	V	-	PMST	Bluegrass occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. It is associated with heavy basaltic black soils and red-brown loams with clay subsoil. It is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture,	Low	Little suitable habitat on site. Not recorded during site assessment.
3.	*Desmodium campylocaulon* **Creeping Tick-trefoil**	E	-	28	BioNet	It chiefly occurs in the Collarenebri and Moree districts in the north-western plains of NSW. Creeping Tick-Trefoil is confined to clay soils, usually with *Astrebla* and *Iseilema* species.	Low	Little suitable habitat on site. Not recorded during site assessment.
4.	*Digitaria porrecta* **Finger Panic Grass**	E	-	3	BioNet	Finger Panic Grass occurs in NSW and Queensland. In NSW it is found on the North West Slopes and Plains, from near Moree south to Tambar Springs and from Tamworth to Coonabarabran. Primarily found in native grasslands, woodlands or open forests with a grassy understorey, on richer soils.	Low	Little suitable habitat on site. Not recorded during site assessment.

	Species	Status*		Records**	Source***	Habitat	LoO	Justification
		BC	EPBC					
5.	*Swainsona murrayana* **Slender Darling Pea**	V	V	1	BioNet, PMST	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. It grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with *Maireana* species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	Low	Little suitable habitat on site. Not recorded during site assessment.
Birds								
1.	*Botaurus poiciloptilus* **Australasian Bittern**	E	E	-	PMST	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. It favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.).	Nil	No suitable habitat on-site
2.	*Calidris ferruginea* **Curlew Sandpiper**	E	CE	-	PMST	The species occurs along the entire coast of NSW, particularly in the Hunter Estuary, and freshwater wetlands in the Murray-Darling Basin. Breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales can be found mainly in intertidal mudflats of sheltered coasts.	Nil	No suitable habitat on site.
3.	*Ephippiorhynchus asiaticus* **Black-necked Stork**	E	-	1	BioNet	Primarily inhabits permanent freshwater wetlands and surrounding vegetation including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters. Will also forage in inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water. This species breeds during summer, nesting in or near a freshwater swamp.	Nil	No suitable habitat on-site

	Species	Status*		Records**	Source***	Habitat	LoO	Justification
		BC	EPBC					
4.	*Falco hypoleucos* **Grey Falcon**	E	V	-	PMST	Medium-sized, compact, pale falcon with a heavy, thick-set, deep-chested appearance. The species is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	Low	Little suitable habitat on site. Not recorded during site assessment.
5.	*Geophaps scripta scripta* **Squatter Pigeon (southern)**	CE	V	-	PMST	They are found from north Queensland to the North West Slopes of NSW and extending down to the Liverpool Plains and Dubbo. Today they are very rare in the southern parts of their range. Squatter Pigeons prefer grassy woodlands and plains that are close to water.	Low	Little suitable habitat on site. Not recorded during site assessment.
6.	*Grantiella picta* **Painted Honeyeater**	V	V	-	PMST	The species is nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Habitat for the species includes Boree, Brigalow and Box Gum woodlands and Box-Ironbark forests.	Low	Little suitable habitat on site. Not recorded during site assessment.
7.	*Haliaeetus leucogaster* **White-bellied Sea-Eagle**	V	-	1	BioNet	Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).	Nill	No suitable habitat on-site
8.	*Hieraaetus morphnoides* **Little Eagle**	V	-	1	BioNet	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	Low	Little suitable habitat on site. Not recorded during site assessment.

	Species	Status*		Records**	Source***	Habitat	LoO	Justification
		BC	EPBC					
9.	*Ninox connivens* **Barking Owl**	V	-	1	BioNet	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils.	Low	Little suitable habitat on site. Not recorded during site assessment.
10.	*Lophoictinia insura* **Square-tailed Kite**	V	-	2	BioNet	It is found in a variety of timbered habitats including dry woodlands and open forests where it shows a particular preference for timbered watercourses. In arid north-western NSW, it has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.	Low	Little suitable habitat on site. Not recorded during site assessment.
11.	*Polytelis swainsonii* **Superb Parrot**	V	V	-	PMST	Slim medium-sized parrot (37 to 42 cm) with a long narrow tail and pointed backswept wings, the eastern subspecies is restricted to areas around the Murray River in South Australia, Victoria and NSW. The species nests within River Red Gum forests along the Murray, Wakool and lower Murrumbidgee Rivers. Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands	Nil	No suitable habitat on site.
12.	*Rostratula australis* **Australian Painted Snipe**	E	E	-	PMST	Normally found in permanent or ephemeral shallow inland wetlands, either freshwater or brackish. The species nests on the ground amongst tall reed-like vegetation near water. Habitat for the species includes the fringes of swamps, dams and nearby marshy areas with cover of grasses, lignum, low scrub or open timber.	Nil	No suitable habitat on site.
Mammals								
1.	*Chalinolobus dwyeri* **Large-eared Pied Bat**	V	V	-	PMST	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. They roost in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features.	Low	Little suitable habitat on site. Not recorded during site assessment.

	Species	Status*		Records**	Source***	Habitat	LoO	Justification
		BC	EPBC					
2.	*Macropus dorsalis* **Black-stripped Wallaby**	E,P	-	1	BioNet	Its preferred habitat is characterised by dense woody or shrubby vegetation within three metres of the ground. This dense vegetation must occur near a more open, grassy area to provide suitable feeding habitat. On the north west slopes, associated with dense vegetation, including brigalow, ooline and semi-evergreen vine thicket.	Low	Little suitable habitat on site. Not recorded during site assessment.
3.	*Nyctophilus corbeni* **Corben's Long-eared Bat**	V	V	-	PMST	Inhabits a variety of vegetation types, including mallee, Bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	Low	Little suitable habitat on site. Not recorded during site assessment.
4.	*Phascolarctos cinereus* **Koala**	V,P	V	4	BioNet, PMST	Fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Nil	No suitable habitat on site.
5.	*Pseudomys gouldii* Gould's Mouse	PE	E	1	BioNet	Sightings of live animals and reports of subfossil remains indicate that Gould's Mouse was formerly distributed throughout south-west Western Australia, eastern South Australia and New South Wales. The species is reported to have preferred sandhills and plains, and to make burrows under bushes in loose soil.	Low	Little suitable habitat on site. Not recorded during site assessment.

	Species	Status*		Records**	Source***	Habitat	LoO	Justification
		BC	EPBC					
6.	*Pteropus poliocephalus* **Grey-headed Flying-fox**	V	V	1	BioNet	Generally this species is found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. Inhabit subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Nil	No suitable habitat on site.
7.	*Saccolaimus flaviventris* **Yellow-bellied Sheathtail-bat**	V	-	1	BioNet	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Low	Little suitable habitat on site. Not recorded during site assessment.
Reptiles								
1.	*Anomalopus mackayi* **Five-clawed Worm-skink**	E	V	-	PMST	It has a patchy distribution on the North West Slopes and Plains of north-east NSW and southeast Queensland, from the Ashford area west to Mungindi and Walgett in NSW and north to Dalby in Queensland. It is often close to or on the lower slopes of slight rises in grassy White Box woodland on moist black soils, and River Red Gum-Coolibah-Bimble Box woodland on deep cracking loose clay soils. May also occur in grassland areas and open paddocks with scattered trees.	Nil	No suitable habitat on site.
2.	*Hoplocephalus bitorquatus* **Pale-headed Snake**	V	-	1	BioNet	Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas.	Low	Little suitable habitat on site.
Threatened Ecological Communities								

	Species	Status*		Records**	Source***	Habitat	LoO	Justification
		BC	EPBC					
1.	Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions.	E	E	-	PMST	Abiotic factors that help define this community are that it typically occurs on grey self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands and stream levees. The vegetative community provides characteristic habitat features of value to particular fauna, including a grassy understorey with scattered fallen logs and areas of deep-cracking clay soils,	Nil	Nil
2.	Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland	-	CE	-	PMST	This community is strongly reliant on soil type as it is associated with fine textured, often cracking clays* derived from either basalt or quaternary* alluvium. The ecological community generally occurs on flat to low slopes, of no more than 5% (or less than 1 degree) inclination. The ground layer component of these woodlands may be similar to the grasslands but the soils are not generally the same cracking clays as on the plains.	Nil	Nil
3.	Poplar Box Grassy Woodland on Alluvial Plains.	-	E	-	PMST	The ecological community mostly now occurs as scattered remnant patches inland of the Great Dividing Range in New South Wales and Queensland, within the Brigalow Belt North, Brigalow Belt South, Cobar Peneplain, Darling Riverine Plains, NSW South Western Slopes and Riverina IBRA bioregions.	Nil	Nil
4.	Weeping Myall Woodland	-	CE	-	PMST	The Weeping Myall Woodlands occurs on the inland alluvial plains west of the Great Dividing Range in NSW and QLD. It occurs in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Murray-Darling Depression, Nandewar and Cobar Peneplain Interim Biogeographic Regionalisation for Australia (IBRA) bioregions. The ecological community generally occurs on flat areas, shallow depressions or gilgais on raised alluvial plains.	Present	Detected within the Study Area, outside the Development Site.
Migratory Terrestrial Species								
1.	*Motacilla flava* **Yellow Wagtail**	-	M	-	PMST	IUCN listed this species as least concern in the Red List of Threatened Species 2015.	Nil	No suitable habitat on site.

	Species	Status*		Records**	Source***	Habitat	LoO	Justification
		BC	EPBC					
2.	*Myiagra cyanoleuca* **Satin Flycatcher**	-	M	-	PMST	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	Nil	No suitable habitat on site.

Note: Aquatic and wetland species were omitted from this appendix due to the lack of waterbodies on site.

APPENDIX C – FLORA AND FAUNA SPECIES LIST

Table C1 Flora Species List

Family	Scientific Name	Common Name	QO1		QO2		QO3		QO4	
			Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund
Aizoaceae	*Tetragonia tetragonioides*	New Zealand Spinach			0.1	1				
Asteraceae	*Brachyscome paludicola*		0.1	5	0.1	5				
Asteraceae	*Leiocarpa tomentosa*	Woolly Plover-daisy	0.1	3	0.1	3			0.1	1
Asteraceae	*Vittadinia cuneata*	Fuzzweed	0.2	20	0.5	40	0.5	20	0.2	10
Chenopodiaceae	*Enchylaena tomentosa*	Ruby Saltbush	0.1	2	0.1	5				
Chenopodiaceae	*Rhagodia spinescens*	Spiny Saltbush			1	3				
Chenopodiaceae	*Salsola australis*		1	50	0.5	10	0.2	5	0.1	2
Chenopodiaceae	*Sclerolaena muricata*	Black Rolypoly			0.1	2				
Convolvulaceae	*Convolvulus graminetinus*		0.1	5	0.1	5	0.1	5	0.1	5
Curcurbitaceae	*Citrullus amarus*	Wild Melon					0.1	1		
Ephorbiaceae	*Euphorbia dallachyana*	Mat Spurge	0.1	5			0.1	5		
Euphorbiaceae	*Euphorbia planiticola*	Plains Spurge	0.1	5			0.1	1	0.1	1
Fabaceae (Faboideae)	*Lotus sp.*		0.2	20	0.2	10	0.2	10	0.1	5
Fabaceae (Faboideae)	*Medicago truncatula*	Barrel Medic	0.1	10	0.5	30				
Fabaceae (Faboideae)	*Rhynchosia minima*						0.2	5	30	500
Fabaceae (Faboideae)	*Vicia spp.*				0.1	1			0.1	1
Fabaceae (Mimosoideae)	*Vachellia farnesiana*	Mimosa bush	0.3	40	0.2	10	0.5	20	0.2	10
Malvaceae	*Hibiscus tridactylites*	Narrow Leaf Bladder Ketmia					0.1	2		
Phyllanthaceae	*Phyllanthus virgatus*	-	0.1	2			0.1	2		
Poaceae	*Arundinella nepalensis*	Reedgrass							0.1	1
Poaceae	*Astrebla lappacea*	Curly Mitchell Grass	0.5	20						
Poaceae	*Cenchrus ciliaris*	Buffel Grass			0.1	2				
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	10	400	1	50	1	50	7	75
Poaceae	*Digitaria divaricatissima*	Umbrella Grass	0.5	20			0.1	5		

Family	Scientific Name	Common Name	QO1		QO2		QO3		QO4	
			Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund
Poaceae	*Digitaria spp.*								0.2	5
Poaceae	*Leptochloa divaricatissima*				0.1	5				
Poaceae	*Panicum decompositum*	Native Millet	30	1000	50	1500	20	1500	45	1000
Poaceae	*Paspalidium globoideum*	Shot Grass	45	1500	35	1000	65	1500	5	75
Poaceae	*Sporobolus caroli*	Fairy Grass	0.1	5						
Sapindaceae	*Alectryon oleifolius*	Western Rosewood			12.5	3				
Solanaceae	*Lycium ferocissimum*	African Boxthorn			0.1	2				
Verbenaceae	*Verbena africana*	-					0.1	1		
Verbenaceae	*Verbena gaudichaudii*		0.1	5						
Zygophyllaceae	*Tribulus terrestris*	Calltrop					0.1	1		

Table C2 Fauna Species List

No.	Scientific Name	Common Name	Status		Observation Type*	General Abundance within Development Site**
			BC	EPBC		
1.	*Coturnix ypsilophora*	Brown Quail	-	-	O	C
2.	*Limnodynastes salmini*	Salmon-striped Frog	-	-	O	I
3.	*Litoria caerulea*	Green Tree Frog	-	-	O	I
4.	*Macropus rufus*	Red Kangaroo	-	-	O	C
5.	*Podargus strigoides*	Tawny Frogmouth	-	-	O	I
6.	*Vulpes vulpes*	Red Fox	-	-	E	I

*Observation Type: O (Visual Observation), H (Heard whilst on site), E (Evidence recorded inc scats, tracks or markings), R (Recorded through the use of call detectors [level of confidence C: Confident, Pr: Probable, Po: Possible]).

** General Abundance: I (Individual record), UC (Uncommon, 2-5 records), C(Common occurrence on site >5 records)

APPENDIX D – ASSESSMENT OF SIGNIFICANCE (PURSUANT TO SECTION 7.3 OF THE BC ACT)

D.1 FACTORS OF ASSESSMENT - BIODIVERSITY CONSERVATION ACT 2016

The five factors considered in the test of significance under s.7.3 of BC Act are shown in the table below. The tests of significance for all threatened species, populations and ecological communities considered likely to occur within the Study Area are provided in the proceeding sub-sections.

Table D1 Factors addressed in the assessment of significance

Factor	Species	Population	Ecological Community
(a) in the case of a **threatened species**, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.	*x*	-	-
(b) in the case of an **endangered ecological community or critically endangered ecological community**, whether the proposed development or activity: (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	-	x	-
(c) in relation to the **habitat of a threatened species, population or ecological community**: (i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality	*x*	x	x
(d) whether the proposed development or activity is likely to have an adverse effect any declared **area of outstanding biodiversity value** (either directly or indirectly).	-	-	-
(e) whether the proposed development or activity is or is part of a **key threatening process** or is likely to increase the impact of, a key threatening process.	*x*	x	x

D.2 THREATENED ECOLOGICAL COMMUNITY

Table D2 Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions EEC

Factor	Assessment
(a) Effect on life cycle of **threatened species**.	Not Applicable
(b) (i) Effect on extent of **EEC** or **CEEC**.	The development footprint will not impact any areas of the site identified as Myall Woodland EEC. The extent of the EEC will not be directly impacted by the proposal.
(b) (ii) Effect on composition of **EEC** or **CEEC**.	The development footprint is outside the relevant remnant community and therefore is unlikely to directly impact its overall composition. The establishment of exotic species in the Development Site could indirectly lead to the establishment of weed species in the adjacent EEC.
(c) (i) Extent of habitat removal or modification for **threatened species**, **population** or **ecological community**	The development footprint will not impact any areas of the Development Site identified as the EEC.
(c) (ii) Extent of fragmentation or isolation of habitat for **threatened species**, **population** or **ecological community.**	No areas of EEC will be directly impacted; therefore, the proposed development is unlikely to significantly increase the level of fragmentation or isolation of available habitat for the EEC. All areas of the EEC will be retained following the proposed development.
(c) (iii) The importance of habitat to **threatened species**, **populations** or **ecological community**.	The EEC is highly restricted within the locality; therefore, the vegetation patch is considered to have high importance. The vegetation is also likely to represent habitat for threatened species that may use the habitat as part of a broader network of habitats within the locality.
***(d)* Area of Outstanding Biodiversity Value**	No Areas of Outstanding Biodiversity Value (AOBV) will be impacted by the proposed development.
***(e)* Key Threatening Processes**	The following Key Threatening Processes (KTPs) are listed in order of their relevance to the community and the proposed development: • Removal of native vegetation Given the small scale of proposed clearing and that it is outside of the area classified as EEC, the proposed development is likely to facilitate the above listed KTPs to a minor extent. Impacts are likely to be negligible
Conclusion	The proposed development footprint exists outside of the EEC and will not impact its extent. The Key Threatening Process (removal of native vegetation) associated with the proposed development is not being carried out within the EEC. The proposed development is considered unlikely to have a significant impact on the EEC in the locality.

APPENDIX E –SIGNIFICANT IMPACT CRITERIA (EPBC ACT)

E.1 THREATENED ECOLOGICAL COMMUNITY

Table E1 Natural Grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland Threatened Ecological Community

Factor	Species
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:	
(a) reduce the extent of an ecological community.	The proposed development will result in the removal of 0.91 ha of a low condition form of the CEEC.
(b) fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	No areas of habitat will be isolated following completion of the proposed activity. Impacts of habitat fragmentation are therefore likely to be negligible.
(d) adversely affect habitat critical to the survival of an ecological community.	The habitat contains a low diversity of native groundcover species has been degraded from long-term agricultural development. The habitat is not considered to be important to the long-term survival of the CEEC in the locality.
(e) 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.	Given the nature of the proposed development (solar farm), impacts to abiotic (non-living) factors are likely to be negligible. Mitigation measures to reduce the potential for impacts during the construction phase have been provided.
(d) cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	The CEEC is considered to be in a degraded state and it is likely that the composition in retained areas will remain in a similar condition state following completion of the proposed development.
(f) cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: i) assisting invasive species, that are harmful to the listed ecological community, to become established, or ii) 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 proposed activity has the potential to introduce exotic plant species (weeds) during the construction phase. Mobilisation of fertilisers, herbicides or other chemicals or pollutants are unlikely given the nature of the proposed activity. Impacts from these factors following completion of the proposed activity may be less than current land use (i.e. agriculture).
(g) interfere with the recovery of an ecological community.	Areas of the CEEC to be retained within the Study Area will not be directly impacted or adversely affected by the proposed development
Conclusion	The proposed activity is unlikely to have a significant impact on the CEEC. An EPBC referral to the Commonwealth Minister for the Environment is not recommended.

APPENDIX F – HISTORICAL AERIAL IMAGERY

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Historic Imagery - 1958 (NSW Spatial Services)

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APPENDIX:

E-1

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E-2

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E-3

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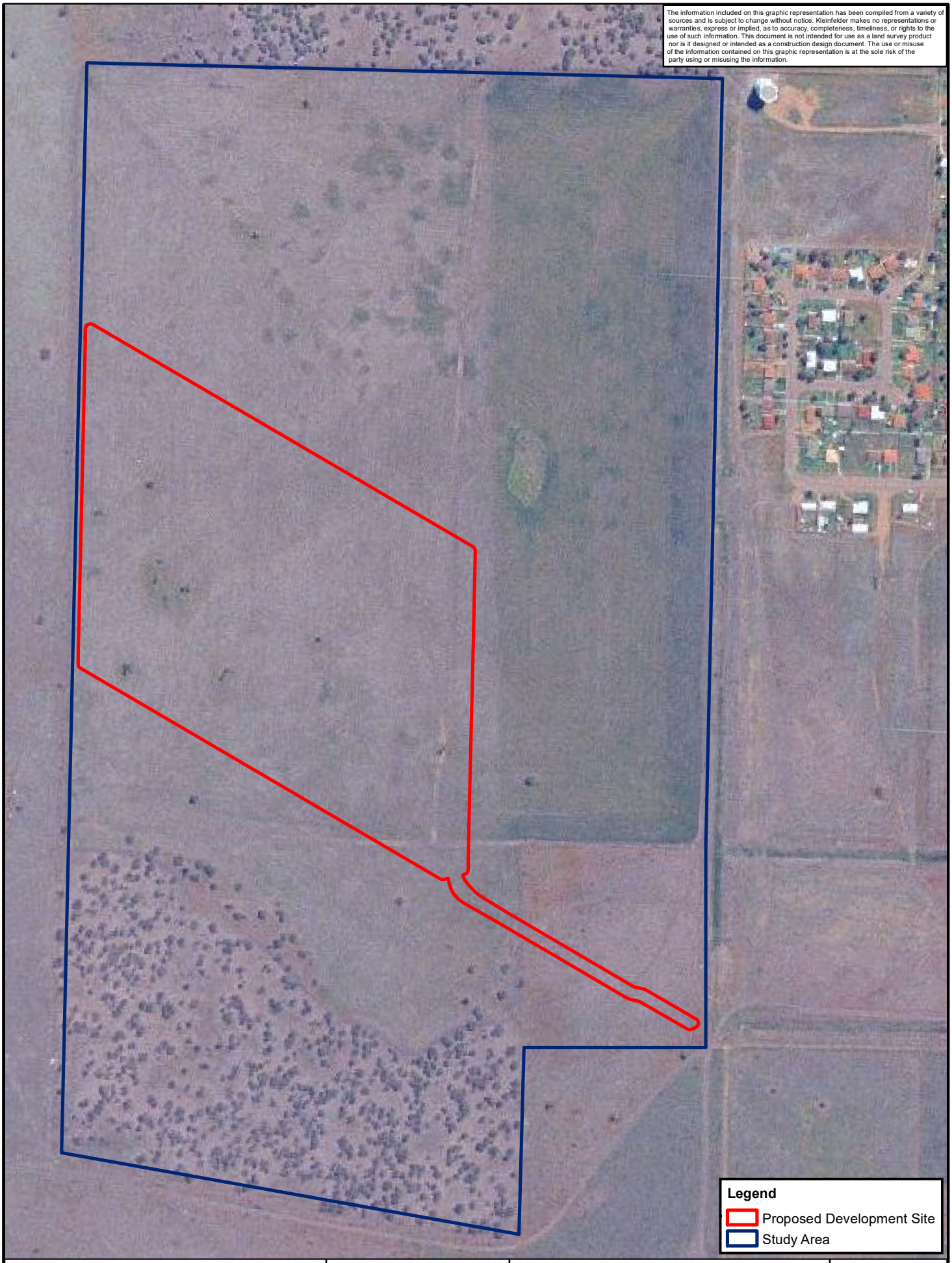

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E-4

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Historic Imagery - 2002 (Google Earth)

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E-5

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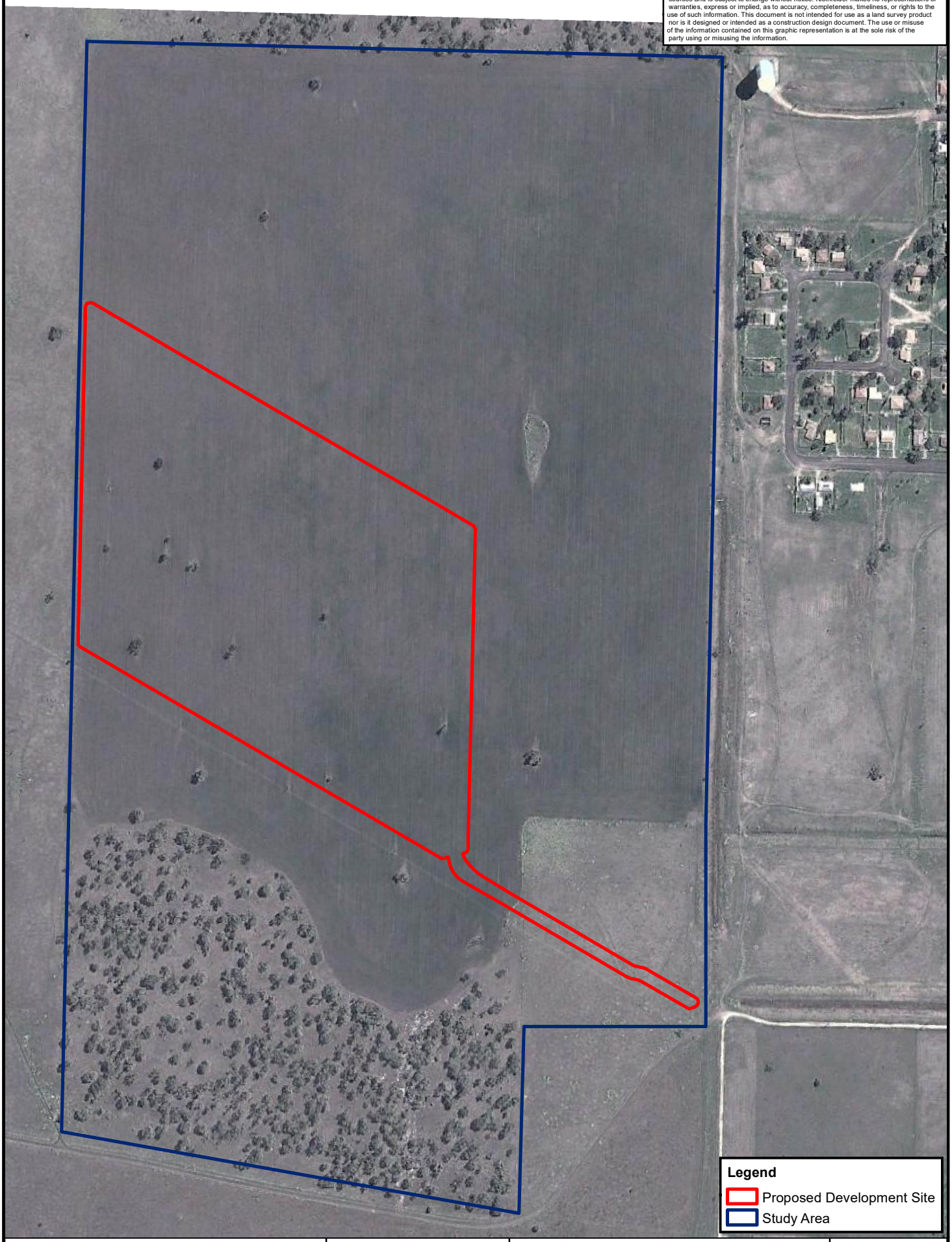

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E-6

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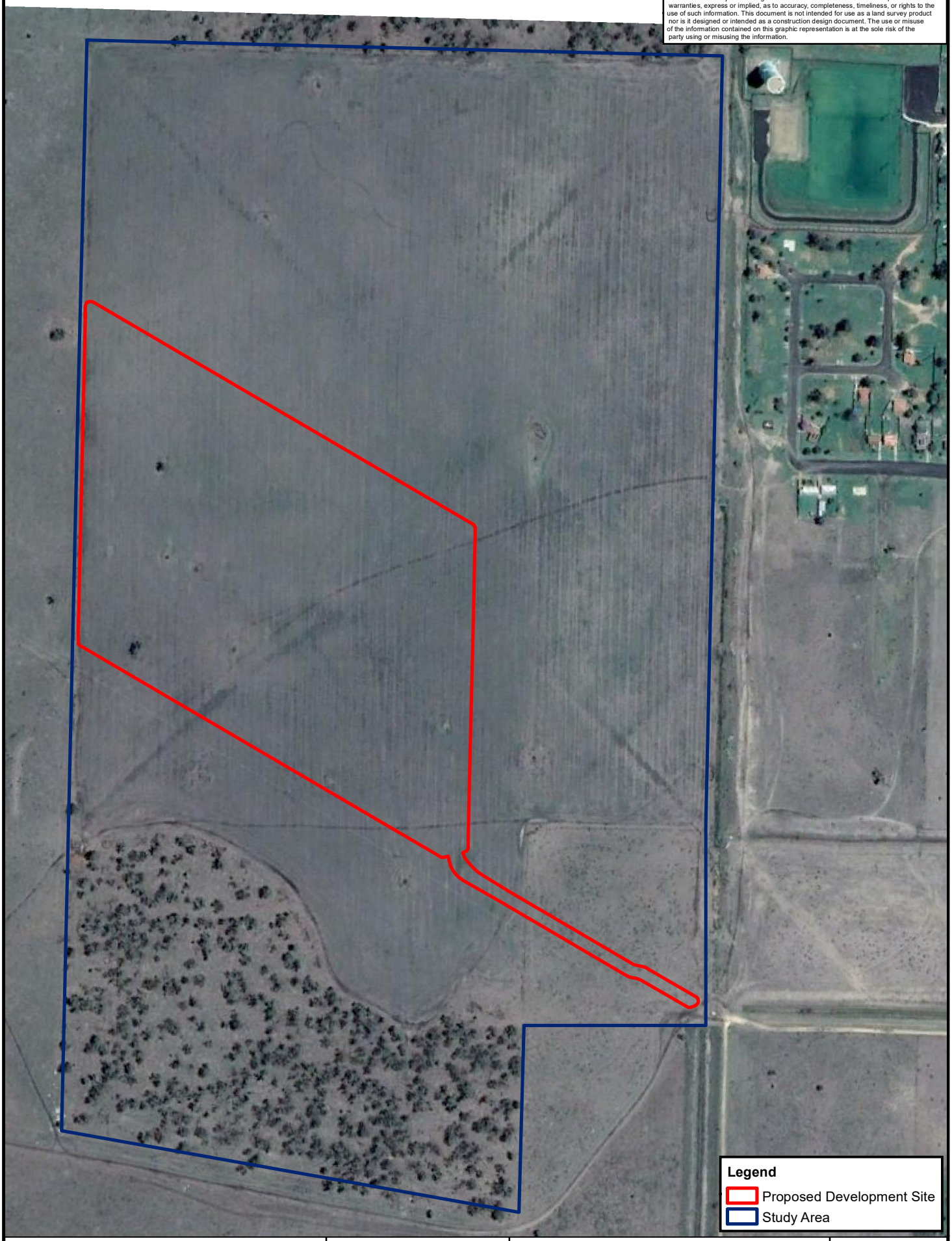

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APPENDIX G – STAFF CONTRIBUTIONS

The following staff were involved in the compilation of this report.

Name	Qualification	Title/Experience	Contribution
James Baldry	BBiod&Cons MConsBio	Ecologist	Field surveys, Flora and Fauna Assessment Report Author.
Ben Stewart	MMSc&Mgt	Ecologist (Botanist)	Field Surveys, Flora and Fauna Assessment Report Author.
Gayle Joyce	BSc Forestry (Hons)	GIS Specialist	GIS data management and figure preparation
Gilbert Whyte	BSc (Hons) PhD	Senior Ecologist	Report Review

APPENDIX H – LICENSE AND PERMITS

Kleinfelder employees involved in the current study are licensed or approved under the *Biodiversity Conservation Act 2016* (License Number: SL100730, Expiry: 31 March 2021) and the *Animal Research Act 1985* to harm/trap/release protected native fauna and to pick for identification purposes native flora and to undertake fauna surveys.