EPBC Act referral

Australian Government
Department of Agriculture, Water and the Environment

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Title of proposal	**2021/9018 - Kumbarilla Renewable Energy Park, 40kms west Dalby, QLD**

Section 1

Summary of your proposed action

1.1 Project industry type Energy Generation and Supply (renewable)

1.2 Provide a detailed description of the proposed action, including all proposed activities

The proposed action involves the construction and operation of a 200 hectare (ha) photovoltaic (PC) 100 megawatt (MW) power station and access corridor 40 kilometres (km) west of Dalby, Queensland, referred to as the Kumbarilla Renewable Energy Park (K-REP)(the Project).

The proposed system arrangement is to achieve a 100-megawatt (MW) installation utilising a maximum Ground Cover Ratio (GCR) of 0.5MW/hectare (ha) to fit within the physical site constraints and 200 ha negotiated lease arrangement. This shall include all ancillary systems and balance of plant. Due to the existing topography and undulating nature of the site, horizon shading must be avoided from natural formations as much as reasonably practicable.

Provision has been included for one permanent Project Operations Area. Refer to Appendix B of the supporting document for a detailed layout of the PV power station area. This includes provisions for the following permanent structures:

- Site 33kV Switch room (2x12.2 m container)
- Low voltage, power plant controller and supervisory control and data acquisition control room (6x9 m structure)
- Office and control centre (6x9 m structure)
- Amenities (6x9 m structure)
- Store 1 (6x9 m structure)
- Store 2 (6x9 m structure)
- Space for 20 car park bays (unsealed); and
- Through road, truck parking bay and turnaround bay.

All structures shall generally be prefabricated off site, delivered and installed on raised structural posts. Surrounding staircases, ramps, pathways, verandas and similar shall be constructed on site to suit the final configuration. The compound will be fenced and secured with appropriate physical and electronic security measures in place. The compound will be lightning protected and generally treated as a critical services zone for ongoing operation.

Within the Project Operations Area will be the 33kV site distribution switch room. This is planned around a prefabricated ABB ‘Eco Flex’ containerised system including all required self-contained services. A Powerlink compliant 132kV to 33kV substation is required to be located on the Project site to provide the solar farms 33kV point of connection and coupling. A spatial allowance of 150x100 m has been provisioned for this substation with a 5m wide perimeter emergency egress and access road.

The Project includes a 5.7 km (approximately 22 ha) long access corridor (within a public road reserve known as Forest Road). Forest Road provides the final portion of the approved access road and is a rural access road constructed in a road reserve. Condition 61 of the Material Change of Use approval requires the upgrading of Forest Road to provide an all-weather 7 m wide gravel pavement on an 8 m formation. There is no stipulation about upgrading Forest Road in its current formed location or in the dedicated road reserve. An approximate 2.5 km section of the public road reserve for Forest Road occurs adjacent to the Weranga State Forest (Lot 201 on FTY1243). As with many rural roads in Queensland, the actual formed location of the road deviates from the road reserve and enters the State Forest lot at two locations totaling approximately 420 m (Figure 1 and Attachment 1 of the Referral Supporting Document). Based on aerial imagery, these deviations are assumed to be associated with on-ground constraints (e.g. drainage lines).

Operation and maintenance requirements are expected to be minimal, and generally automated. When problems arise, most faults will be electrical in nature and will require specialist technical personnel and equipment to resolve. When operational, the Project will be manned during the daytime, with an ongoing anticipated maximum workforce of 5 full time equivalent staff.

A detailed description of the Project is provided in KREP_EPBC Referral Support Document_03082021.pdf / Section 2 / Page 7.

Project construction activities are detailed in KREP_EPBC Referral Support Document_03082021.pdf / Section 2.7 / Page 9. Activities which have the potential to impact on conservation significant fauna include vegetation clearing, earthworks including excavations, operation of plant and vehicles around the site, and storage and use of chemicals and fuel.

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Potential impacts are related to habitat clearing and connectivity, direct fauna mortality, introduction of pest and weeds, dust, noise, accidental release of pollutants, fire and heat island effect. Potential impacts from these activities are detailed in KREP_EPBC Referral Support Document_03082021.pdf / Section 6 / Page 66.

1.3 What is the extent and location of your proposed action?

See Appendix B

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland)

The Project footprint is comprised of a 191 ha area allocated to the PV power station and the associated 22 ha access corridor, approximately 40 km west of Dalby, Queensland and located within the Western Downs Regional Council (WDRC) Local Government Area (LGA). The PV power station is to be wholly located within a 400 ha property described as Lot 4 DY457 (Estate in fee Simple/freehold) including easements over Lot C SP107383 and Lot B SP107382 The access corridor is to be located within a gazetted corridor (crown land) that is the named road, Forest Road, and an unnamed track leading to Lot 4 DY457, crossing to the north of Weranga State Forest (refer to KREP_EPBC Referral Support Document_03082021. pdf/Section 1/Page 3/Figure 1-1 and KREP_EPBC Referral Support Document_03082021.pdf/Section 1/Page 4/Figure 1-2 and App A - Project Boundary Coordinate Nodes.pdf for a referral area map and coordinates).

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

The Project disturbance area is 212.58 ha comprised of a 190.92 ha area allocated to the PV power station and 21.66 ha area allocated to the access corridor.

Refer to App C - Earthworks Plans.pdf.

Within the PV Power Station area, the Project footprint is the disturbance area, with the exception of a portion of the Project which is being altered to avoid Kogan Waxflower (Philotheca sporadica) plants, listed as Near Threatened under the Nature Conservation Act 1992. The exact details of this area is yet to be confirmed, however the disturbance area will end up being less than the stated 212.58 ha. The Project layout will be updated in iterative design drawings.

Within the access road corridor, disturbance will be limited, however the alignment of the road has not been confirmed within the corridor so the entire area of the corridor has been used. The actual disturbance area will be smaller than the stated 21.66 ha, subject to refinement during the detailed design phase.

1.7 Proposed action location

Other - PV power station located in Lot 4 DY457 and access corridor located in gazetted corridor.

1.8 Primary jurisdiction	Queensland

1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?

☐ Yes ☑ No

1.10 Is the proposed action subject to local government planning approval?

☑ Yes ☐ No

1.10.1 Is there a local government area and council contact for the proposal?

☑ Yes ☐ No

1.10.1.0 Council contact officer details

1.10.1.1 Name of relevant council contact officer	NA
1.10.1.2 E-mail	info@wdrc.qld.gov.au
1.10.1.3 Telephone Number	07 4679 4000

1.11 Provide an estimated start and estimated end date for the proposed action	Start Date	15/12/2021
	End Date	15/11/2061

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1.12 Provide details of the context, planning framework and state and/or local Government requirements

Approval and legislative context is provided in Section 3 of the Supporting Referral Document.

A Development Application for the Project was lodged with Western Downs Regional Council (WDRC) in accordance with he requirements of the Planning Act 2016. The Project was considered a 'Material Change of Use' as defined in Schedule 2 of the Planning Act 2016 as 'the start of a new use of the premises', and also met the definition of a 'code assessment' development under Section 45(3) of the Planning Act 2016. The Material Change of Use Application for the Project to WDRC was approved (Approval Number: 030.2020.120.001) on 1 October 2020. Refer to App D - Material Change of Use Approval-v2-19082021.pdf. Subsequent lower tier approvals and permits are in progress and will be obtained prior to construction of the Project.

1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders

Despite the MCU Application being a code assessable development application, consultation with various local and state government departments was undertaken as well as the community, surrounding landholders and cultural heritage parties.

GENERAL COMMUNITY

Elecseed has developed a website in order to keep the community informed. This website confirms the intention to deliver an innovative Project to drive the future of renewable energies in Queensland and Australia. There is the ability to request further information by utilising the contact link. We understand that there have been no concerns raised via this portal. Elecseed have also printed up brochures for distribution to interested parties to promote awareness of the Project.

GOVERNMENT ORGANISATIONS

Discussions have been held with various government organisations who represent the community. The various opportunities afforded to the area via the investment in the community have been discussed and have been widely supported, this has included Trade and Investment Queensland. Elecseed have had numerous meetings with Trade and Investment Queensland and they have actively endorsed the proposed development and recognised the strategic importance of the investment. There has also been support from the Western Downs Regional Council.

A pre-referral meeting was held with the Commonwealth DAWE in May 2021. Other Project related meetings have been held with the Queensland Department of Resources in February 2021 and two meetings with the Queensland Department of Environment in July 2021.

SURROUNDING LANDHOLDERS

Early consultation was undertaken with adjacent landowners. The initial stages related to queries in the quest for suitable land and landowners were made aware of the scope and requirements of the project. The adjacent landowners appear to be open to the construction of renewable energy projects on their land and did not voice any concerns relating to the proposed development. This included:

- Discussions with landholders on Lot 4 SP 271223 in June 2019.
- Discussions and negotiations with the plant adjacent to the Project were made aware of the Project in May 2019.

Consultation has been ongoing with QGC and Shell continue, details of which cannot be disclosed due to a non-disclosure agreement (NDA) being in place with necessary agreements finalised.

CULTURAL HERITAGE

The Proponent has commenced discussions with the Barunggam people who are the relevant Cultural Heritage Party. Necessary agreements will occur and if required a Cultural Heritage Management Plan will be prepared and developed in collaboration with the Barunggam people.

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project

See KREP_EPBC Referral Support Document_03082021.pdf/Section 4/Page 15 and Section 5/Page 20 and App I - Ecological Survey Field Sheets.pdf. Desktop and ecological surveys, including:

- Preliminary Survey of the PV power station was undertaken over a 3-day/2-night period between 6-8 May 2020
- Targeted Survey undertaken between 18-22 January 2021
- BioCondition and Habitat Quality Assessment undertaken in the PV power station area between 24-27 May
- Access Corridor Survey undertaken between 24-27 May 2021.

In addition to the ecological assessments a number of other surveys and evaluations were undertaken to assess if the Project's activities would have the potential to cause environmental impacts have been completed for the Project, including:

- Soil survey and associated reporting;
- Stormwater and drainage reporting (App J - Stormwater Drainage Report-v2-19082021.pdf);

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- Traffic and transport impact assessment and reporting; and
- Bushfire risk assessment and reporting.

1.15 Is this action part of a staged development (or a component of a larger project)?

☐ Yes ☑ No

1.16 Is the proposed action related to other actions or proposals in the region?

☐ Yes ☑ No

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Section 2

Matters of national environmental significance

2.1 Is the proposed action likely to have any direct or indirect impact on the values of any World Heritage properties?

☐ Yes ☑ No

2.2 Is the proposed action likely to have any direct or indirect impact on the values of any National Heritage places?

☐ Yes ☑ No

2.3 Is the proposed action likely to have any direct or indirect impact on the ecological character of a Ramsar wetland?

☐ Yes ☑ No

2.4 Is the proposed action likely to have any direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

☑ Yes ☐ No

Species or threatened ecological community

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.1/Page 80 for threatened fauna.
Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 5.3.5.3/Page 53 for Likelihood of Occurrence assessment for EVNT fauna.
Six fauna species listed as Vulnerable under the EPBC Act are considered as possibly occurring, likely or known to occur in the Project area. These species include:

- Yakka Skink (Egernia rugosa)
- Squatter Pigeon (Geophaps scripta scripta)
- Painted Honeyeater (Grantiella picta)
- White-throated Needletail (Hirundapus caudacutus)
- Central Greater Glider (Petauroides amillutus)
- Koala (Phascolarctos cinereus)

Impact

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 6/Page 66 for potential impacts and mitigation measures.

Potential impacts to EPBC listed threatened species include:

- Direct disturbance to fauna and habitat through vegetation clearing
- Loss of habitat
- Habitat degradation through spills and contamination
- Noise
- Dust
- Lighting
- Direct mortality through vehicle strikes
- Weeds and pest species
- Unplanned fire

Species or threatened ecological community

YAKKA SKINK
Suitable habitat is present within the Project area. Inspections of potential habitat found no presence of this species however, extensive rock cavities in RE 11.7.4/11.7.5 community suggests potential impact is possible.

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Impact

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.1.1/Page 81.
While no yakka skink were observed within the Project disturbance footprint, there is some potential for impacts associated with construction activities. The potential introduction of pest species could also cause a decline in numbers through predation.

Species or threatened ecological community

SQUATTER PIGEON
The species occurs in grassy woodlands and it is known to prefer sandy soils in areas close to water. This species can also occur in cleared areas. Known to occur in the wider area, suitable habitat is present, although marginal at best. No sightings of Squatter Pigeon were made during surveys. A maximum breeding habitat of 188.7 ha occurs in the Project area and a maximum foraging habitat of 18.2 ha occurs in the Project area.

Impact

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.1.2/Page 84.
While an 'important population' has been identified within the greater region, and suitable habitat exists within the Project area, no individuals were observed during field surveys. It is uncertain whether or how many individuals may be using these areas of habitat, but it is assumed to be low numbers if at all. Potential impacts may include loss of habitat and habitat disturbance associated with construction activities and a decline in numbers through predation as a result of introduced pest species.

Species or threatened ecological community

PAINTED HONEY EATER
Possibly occurs on site. Essential habitat was mapped for Painted honeyeater within the Project area and surveys concluded that suitable habitat on site is consistent with woodland habitat of Painted honeyeater. Mistletoe was observed in low densities within the Project area, however not of the Amyema genus.

Impact

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.1.3/Page 88.
No Painted honeyeater were observed on site during surveys. Suitable habitat does exist on site, however the low density of mistletoe and lack of the Amyema genus suggests the likelihood of occurrence is low and likelihood of impact is very low.

Species or threatened ecological community

WHITE-THROATED NEEDLETAIL
Wide ranging aerial species which migrates from the northern hemisphere to eastern Australia. Essential habit was mapped for Painted Honeyeater within the Project area. May occur over the Project area in the summer months. The species is known to roost in trees amongst dense foliage in the canopy or in hollows. No sightings during field surveys. Two ALA records within 10 km buffer of Project area.

Impact

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.1.4/Page 91.
Potential habitat will be impacted by clearing activities within the PV Power Station and sections of the access road corridor. However, the species is wide ranging and mostly aerial. Any impacts to White-throated needletail are expected to be minimal and short term. Any individuals present during construction are likely to move away from any disturbance in the area.

Species or threatened ecological community

CENTRAL GREATER GLIDER
One ALA record within 10 km buffer of the Project area. Suitable hollow-bearing trees were identified on site however no animals, scat or scratch evidence were observed during targeted searches and spotlighting activities. Only two small patches of potential habitat, a maximum of 2.3 ha, were identified within the Project area.

Impact

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.1.5/Page 94.
Two patches of potential habitat were identified within the access road corridor. Vegetation clearing activities have the potential to result in loss of habitat, disturbance and direct mortality.

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Species or threatened ecological community

KOALA
The koala is known to occur on site. Two skulls were found on Project site and eucalyptus on site, along with discovery of Koala scats. Five ALA records found in a 10 km buffer of the Project area.

Impact

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.1.6/Page 97.
The Project involves clearing of up to 206.9 ha of habitat identified as critical to the survival of the species. Other potential impacts include disturbance and direct mortality during clearing activities, predation by introduced pest species, death and injury as a result of vehicle strikes, introduction of disease and/or pathogens affecting habitat.

2.4.2 Do you consider this impact to be significant?

☑ Yes ☐ No

2.5 Is the proposed action likely to have any direct or indirect impact on the members of any listed migratory species or their habitat?

☑ Yes ☐ No

Migratory species

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.2/Page 100.

The Protected Matters search tool identified 13 migratory birds as potentially occurring in the study area within a 25 km radius of the Project area. Of these (not including those also listed as threatened species), three species were considered as possibly occurring in the Project area based on mapped suitable habitat and/or ALA records within a 10 km buffer of the Project area. These include:

- Fork-tailed Swift (Apus pacificus)
- Satin flycatcher (Myiagra cyanoleuca)
- Rufous fantail (Phipidura rufifrons).

Impact

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 7.2/Page 100.
An assessment of impacts was undertaken against the significant impact criteria for migratory species (Refer to Table 7-15 of the Referral Supporting Document). There is no habitat suitable for migratory bird species associated with wetlands in or adjacent to the Project area apart from the small dam on site. Aerial species such as the Fork-tailed Swift may occur over heavily disturbed areas as well as natural habitats and will not be impacted by Project activities. The ecological assessment determined that the Project area would not represent useful habitat for migratory species, and that these species are unlikely to occur on site. No significant impacts to species listed as Migratory are expected to occur as a result of Project activities

2.5.2 Do you consider this impact to be significant?

☐ Yes ☑ No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

☐ Yes ☑ No

2.7 Is the proposed action likely to be taken on or near Commonwealth land?

☐ Yes ☑ No

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2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

☐ Yes ☑ No

2.9 Is the proposed action likely to have any direct or indirect impact on a water resource from coal seam gas or large coal mining development?

☐ Yes ☑ No

2.10 Is the proposed action a nuclear action?

☐ Yes ☑ No

2.11 Is the proposed action to be taken by a Commonwealth agency?

☐ Yes ☑ No

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage place overseas?

☐ Yes ☑ No

2.13 Is the proposed action likely to have any direct or indirect impact on any part of the environment in the Commonwealth marine area?

☐ Yes ☑ No

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Section 3

Description of the project area

3.1 Describe the flora and fauna relevant to the project area

FLORA

A total of 246 flora species are known to occur within a 25 km radius of the Project area (based on Wildlife Online database records). Sixteen conservation significant flora species are known or predicted to occur within a 25 km radius of the Project area based on database searches (EPBC Protected Matters Search Tool and Wildlife Online).

Likelihood of occurrence assessments determined that no listed MNES flora species are likely to occur within the Project area (see KREP_EPBC Referral Support Document_03082021.pdf/Section 5.3.3/Table 5-9/Page 42). One conservation significant species, Kogan waxflower (Philotheca sporadica) (listed as near threatened under the Nature Conservation Act 1992) was identified during field surveys. A list of flora species recorded during field surveys is provided in App G - Survey Flora and Fauna Species Lists.pdf.

A number of exotic plant species were recorded within the Project area. Two Weeds of National Significance were recorded within the access road corridor (Common Prickly Pear (Opuntia stricta) and Velvety Tree Pear (Opuntia tomentosa). These two species are also listed as Category 3 restricted matter under the Queensland Biosecurity Act 2004. African Lovegrass (Eragrostis curvula) was also identified in the access corridor. Whilst not a declared plant under the Biosecurity Act, African Lovegrass is recognized as requiring low priority control within the Western Downs Local Government Area as per the Western Downs Regional Council Biosecurity Plan 2017.

FAUNA

A total of 398 species of terrestrial vertebrate fauna are known to occur within a 25 km radius of the site (based on Wildlife Online database records), comprising 30 frogs, 95 reptiles, 219 birds and 54 mammal species. Thirty six conservation significant species listed under the NC Act and/or EPBC Act are known or considered to have some potential, albeit unlikely, to occur occasionally in the area based on database searches (EPBC Protected Matters Search Tool (see App E - Protected Matters Search Results.pdf) and Wildlife Online (App F - Wildlfe Online Database Search)) and Likelihood of occurrence assessments (see KREP_EPBC Referral Support Document_03082021.pdf/Section 5.3.5/Page 45 and KREP_EPBC Referral Support Document_03082021.pdf/ Section 5.3.5/Table 5-10/Page 46). A list of fauna species recorded during field surveys is provided in App G - Survey Flora and Fauna Species Lists.pdf..

Only one MNES fauna species was confirmed as occurring on site. Koala scats and scratches were recorded and two koala skulls were found during field surveys (refer to App H - Koala Technical Memorandum.pdf for more information). In addition, suitable habitat exists on site for the following MNES species (although no individuals were observed, or evidence of their presence on site):

- Yakka Skink (Egernia rugosa)
- Squatter Pigeon (southern) (Geophaps scripta scripta)
- Painted Honeyeater (Grantiella picta)
- White-throated Needletail (Hirundapus caudacutus)
- Central Greater Glider (Petauroides amillatus)

Three introduced species were recorded during field surveys; cane toad, feral pig and wild dog.

3.2 Describe the hydrology relevant to the project area (including water flows)

A stream order one water feature is mapped outside the PV power station on the southern boundary. This watercourse was assessed as a natural drainage feature which develops into a watercourse as it progresses downstream. It was assessed that there would be no impact to this water feature as a result of the Project.

The access corridor intersects a low stream order (2) creek. The creek is typically dry for most of the year and only flows during heavy rainfall events. For this reason, the creek is considered not to have permanent flow conditions and exhibits ephemeral flow characteristics. The creek has a discernible low flow/high flow channel as well as high banks. The creek is partly incised into the underlying bedrock and there are semi-permanent waterholes present within the main channel. The creek is mapped as an Amber (Moderate) waterway under the Queensland Waterways for Waterway Barrier Works, as defined under the Fisheries Act 1994. The field determination of the creek is as a defined watercourse under the Water Act 2000.

Groundwater is unlikely to be encountered as a part of construction works. A review of registered bores in the area record aquifers upwards of approximately 200 m below the ground level.

A stormwater and drainage report has been prepared for the PV power station (App J - Stormwater Drainage Report-v2-19082021.pdf). Stormwater runoff will be conveyed via a series of open channels and culverts where required. Open channels shall be either V-Drains or Trapezoidal Drains, depending on flow rates (as outlined in KREP_EPBC Referral

Support Document_03082021.pdf/Section 5/Table 5-12/Page 65). Open Channels shall include rock riffles at regular centres, to be determined by slope to detain flows and provide additional storage.

The open channel and pipe network will divert stormwater to central stormwater detention basins at 6 locations across the proposed site. Basin storage will be sized to maintain outflows at pre-development flow rates and will be sized to accommodate the 10% annual exceedance probability (AEP) event. Outflows from the basin will be via infiltration, evaporation and outflow at predevelopment flow rates.

The proposed drainage basins will need to have the drainage characteristics confirmed during insitu investigations. These basins have been sized to contain the anticipated 10% AEP rainfall. The basins are expected to be open, accessible and integrated into the landscape, with the sides of the basins graded at a maximum of 1 in 6 for unfenced basins. The sides may be steepened for fenced basins. An infiltration rate of 0.12m/day, and an evaporation rate of 6.2mm/day have been assumed in the storage calculations.

The conclusion from the report found that no adverse impacts due to additional hard surfaces (solar panels, access tracks and buildings) would occur on the land.

3.3 Describe the soil and vegetation characteristics relevant to the project area

SOILS

See KREP_EPBC Referral Support Document_03082021.pdf/Section 5.1.4/Page 24.

Field investigation identified Sodosol and Kurosol soil throughout the Project area which have been subdivided by colour into brown sodosol and brown kurosol. Physical properties for both soils are similar, they increase in clay throughout profiles, are generally permeable (some drainage issues possible given high clay content and have high erosion susceptibility. Both soils are strongly acidic and have a very low to medium cation exchange capacity. Brown sodosols have very low to very high salinity, are strongly sodic and low to medium total organic carbon. Brown kurosols have low to medium salinity, are sodic with medium total organic carbon.

VEGETATION

Field surveys confirmed the Project area does not contain any threatened ecological communities protected under the EPBC Act. Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 5.2.3/Page 33 and KREP_EPBC Referral Support Document_03082021.pdf/Section 5.3.1/Page 38.

The vegetation across the PV power station component of the Project area is generally Least Concern RE 11.5.1. Some areas mapped as remnant least concern is considered high value regrowth – mostly in the western portion of the Project area. All vegetation communities are Least Concern. A small area of Endangered RE (RE 11.9.5 - Acacia harpophylla and/or Casuarina cristata open forest on fine-grained sedimentary rocks) which is mapped along the southern portion of the Lot on State mapping was ground-truthed and determined to be incorrect.

Six REs were verified as occurring along the length of the access corridor including RE 11.3.25, 11.3.27, 11.5.1, 11.5.4, 11.7.4 and 11.7.5. These REs were observed to be in average to good condition with little apparent edge effect from adjacent clearing and the road corridor, in most parts. Ecological function has been limited due to the narrow nature of the vegetation though it would be considered a useful corridor for wildlife movement due to the low traffic volume on the road.

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 5.2.4/Page 33 and KREP_EPBC Referral Support Document_03082021.pdf/Section 5.3.2/Page 38.

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area

There is no outstanding natural feature, or other important or unique values, within or near the Project area

3.5 Describe the status of native vegetation relevant to the project area

The Project area is mapped as Category B (remnant vegetation) and Category C (high-value regrowth) Regulated Vegetation under the Vegetation Management Act 1999. Refer to KREP_EPBC Referral Support Document_03082021. pdf/Section 5/Figure 5-10/Page 35.

The Project area has been subject to historical clearing and fire regimes however vegetation is generally in average to good condition. The PV power station footprint area is comprised of mostly remnant vegetation with about a third of the area being advanced regrowth vegetation. The access road corridor is a mix of remnant and non remnant vegetation. Some weeds are present, mostly in the understorey however the site displays little apparent edge effect from adjacent clearing and the road corridor.

3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area

Topography across the PV power station ranges from 337.8m AHD to 442.1m Australian Height Datum (AHD) above sea level. Although there is over 100 m difference between the lowest and highest point, which is due to a small section

containing a rocky outcrop, the area can be considered as flat with gently undulating areas from the southwest to the northeast (where the lowest point is located). Refer to KREP_EPBC Referral Support Document_03082021/Section 5.1.1 /Page 20 and KREP_EPBC Referral Support Document_03082021.pdf/Section 5.1.1/Figure 5-1/Page 21.

3.7 Describe the current condition of the environment relevant to the project area

The lands within and adjacent the Project area footprint have been subject to disturbance through historical clearing and fire regimes however the majority of vegetation within the Project area is remnant. The primary land uses in the vicinity of the Project area include Forestry/Production Native Forests (i.e. Braemar State Forest and Daandine State Forest), grazing native vegetation and coal-seam gas wells (north and west). There is cropping land to the south and east and some minor residential and farming infrastructure to the south west.

A State-wide biodiversity corridor runs north-south along the western boundary of Lot 4 DY457. The Lot is partially within a buffer area for the corridor, however, the Project area is located outside of this buffer area. Another State biodiversity corridor runs north-south to the east of Kumbarilla Lane, the eastern terminus of the proposed site access.
Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 5/Figure 5-2/Page 22.

Vegetation condition within the Project area was considered average to good. BioCondition assessments undertaken within the PV Power Station area scored an average of 9 and the Landscape Scale Attributes, which is based on size of the area, context and connectivity, was scored at 20 out of a possible 20.

3.8 Describe any Commonwealth Heritage places or other places recognised as having heritage values relevant to the project

There are no Commonwealth Heritage places relevant to the Project. A search of the Queensland Heritage Register confirmed there are no registered European Heritage sites within the Project site or proximity. Additionally, a Local Heritage search was undertaken for the WDRC and there were no local heritage places registered or in close proximity.

3.9 Describe any Indigenous heritage values relevant to the project area

The Aboriginal Cultural Heritage Act 2003 (ACHA) is the primary piece of legislation governing Aboriginal cultural heritage in Queensland. The ACHA requires developers to identify reasonable and practicable measures for ensuring the activities are managed to avoid or minimise harm to Aboriginal cultural heritage in a way that meets the duty of care requirements under Section 23 of the ACHA.

The Cultural Heritage Duty of Care Guidelines (the Guidelines) provide guidance in determining whether a person or activity complies with the cultural heritage duty of care. The Guidelines recognise that it is unlikely that Aboriginal cultural heritage will be harmed where:
- The current or proposed activity in an area previously subjected to significant ground disturbance and the activity will impact only on the area subject to the previous ground disturbance; or
- The impact of the current or proposed activity is unlikely to cause any additional harm to Aboriginal cultural heritage than that has already occurred.

A "Lot on Plan Search" of the Department of Aboriginal, Torres Strait Islander Partnerships (DATSIP) Aboriginal and Torres Strait Islander Cultural Heritage Database and Register confirmed one cultural heritage site point for the area of interest (Lot 4 on DY457). The site (Site ID JB-0255-1; Latitude -27.2414, Longitude 150.836037) is a scarred tree, registered November 26, 2018. The relevant Cultural Heritage Party are the Barunggam People.

Additionally, as part of the ecological survey undertaken by ecologists of Lot 4 DY457 in May noted a large Iron Bark with a potential scar.

The Proponent is currently in discussion with the Barunggam people. Necessary agreements will occur and if required a Cultural Heritage Management Plan will be prepared and developed in collaboration with the Barunggam people.

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area

The PV power station is located on Lot4DY457 which is freehold. The access corridor is located in a road parcel.

3.11 Describe any existing or any proposed uses relevant to the project area

Refer to KREP_EPBC Referral Support Document_03082021.pdf/Section 5.1.2/Figure 5-2/Page 22.

The principal land uses in the vicinity of the Project area include Forestry/Production Native Forests (including the Breamar State Forest) with coal-seam gas wells (north and west), Weranga Forest (south east) and the Daandien State Forest (east). There is some cropping land to the south and some minor residential and farming infrastructure to the south west.
QGC has an existing 132 kilovolt (kV) Substation fed by the Powerlink Kumbarilla Park 275/132kV Substation located

adjacent the proposed Project. The high voltage transmission line supplies QGC's Gas Compression Facility, at the Ruby site at Kumbarilla Park, West of Dalby. The Powerlink Kumbarilla Park 275/132kV Substation is the proposed point of connection for Project.

There is a proposed electricity sub-station to help facilitate the Project adjacent to the K-REP facility connecting through proposed infrastructure along the existing easement.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 4

Measures to avoid or reduce impacts

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action

Mitigation measures are detailed in KREP_EPBC Referral Support Document_03082021.pdf/Section 6/Page 66.

HABITAT CLEARING, CONNECTIVITY AND FAUNA MORTALITY

- Vegetation located adjacent to the Project construction works to be appropriately marked to avoid unnecessary clearing/vegetation damage.
- Revegetation works to be undertaken where land has been disturbed for construction where land is not required for operations.
- Environmental awareness training aimed at ecological issues as part of site induction.
- Design and construction of fencing/infrastructure to direct fauna towards safe passage and around construction area.
- Appropriate speed limits to be in place throughout the site and all contractors will be educated on the risks to local fauna to minimise impacts when driving.
- All fauna recorded during pre-clearing surveys should be recorded on a dedicated fauna register.
- Prior to any vegetation disturbance, a trained ecologist or other qualified environmental specialist to be onsite to inspect and remove fauna (if required).
- Avoid clearing trees with obvious hollows. If trees are required to be removed the proponent shall engage the services of a licensed, qualified Spotter Catcher to complete pre-clearing checks and be present during removal.

PESTS AND WEEDS

- Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.
- Implementation of sediment control mechanisms to minimise the risk of weed seed washing into drainage channels.
- Onsite waste disposal strategies (particularly for food wastes) to be employed that will not encourage the presence of pest fauna

DUST

- Implementation of dust suppression measures.
- Trigger points for management decisions.
- Suspension of earthworks during high wind conditions.
- Monitor dust control measures regularly for effectiveness.
- Areas stripped of topsoil for Project construction will be rehabilitated as soon as practicable where not required during operations.

NOISE

- Work hours are restricted to 6.30 am to 6.30 pm Monday to Sunday (noise generating activities). If work required outside of normal hours consultation to be undertaken with Environmental Representative.
- Use of horns, bells, beepers, and other audible signals will be minimised as much as practicable without contravening safe work procedures.
- Sensitive receptors located in proximity to the proposed works will be consulted with and given advance warning of any out of hours or high noise work activities.
- Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project operations.

ACCIDENTAL RELEASE OF POLLUTANTS

- All refuelling activities and the storage and handling of oil and chemicals will comply with relevant Australian Standards.
- Appropriate spill control materials including booms and absorbent materials will be onsite at refuelling facilities at all times. These will be used for mitigating and managing events where a substance is spilled into surrounding waters.
- Locate and design roads and other built infrastructure so that minimal runoff to waterways occurs.
- Wash-down areas will be clearly marked to prevent contaminated water from leaching into soils or flowing into nearby watercourses.

FIRE

- Protocols outlining the fire management measures for the Project will be developed and implemented prior to the commencement of Project operations;
- Onsite burning of any material will not be undertaken without a valid permit from the relevant QFES Fire Warden.
- Fire management measures for the Project to be developed and implemented.
- Specific onsite smoking areas will be designated.
- Ensure onsite fire-fighting equipment is regularly maintained and adequate staff training is implemented.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

KOALA HABITAT

- Koala proof fencing will be established along the PV power station area.
- Inclusion of Koala escape mechanisms i.e. climbing poles along road corridor will be implemented.
- A 60 km/h speed limit on the access corridor at dawn and dusk with appropriate signage recommendation will be put forward to Council. As part of site inductions, staff will be reminded to adhere to this recommendation to not exceed 60 km/h..
- Road signage to be used to alert drivers of potential koala movement across the road
- Guidelines will be added to the Project Operation and Maintenance Plan outlining procedures on recording sick, injured or dead Koalas located in the Project area, and reporting to DES on 1300 ANIMAL (1300 264 625).
- Visual monitoring of adjacent habitat by site personnel to record and notify DES of any koalas and potential disease occurrence.
- Koala food trees will be retained where possible along clearing boundaries.
- Vegetation clearing limits will be clearly marked to ensure no unnecessary clearing outside disturbance footprint
- Fauna egress infrastructure installed along fencing to prevent entrapment.

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved

The overall environmental outcome for the Project will be no significant impacts to matters protected by the EPBC Act including Koala, through the implementation of the mitigation measures described in KREP_EPBC Referral Support Document_03082021.pdf/Section 6.8/Page 76, including the implementation of a Project EMP.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 5

Conclusion on the likelihood of significant impacts

5.1 You indicated the below ticked items to be of significant impact and therefore you consider the action to be a controlled action

- ☐ World Heritage properties
- ☐ National Heritage places
- ☐ Wetlands of international importance (declared Ramsar wetlands)
- ☑ Listed threatened species or any threatened ecological community
- ☐ Listed migratory species
- ☐ Marine environment outside Commonwealth marine areas
- ☐ Protection of the environment from actions involving Commonwealth land
- ☐ Great Barrier Reef Marine Park
- ☐ A water resource, in relation to coal seam gas development and large coal mining development
- ☐ Protection of the environment from nuclear actions
- ☐ Protection of the environment from Commonwealth actions
- ☐ Commonwealth Heritage places overseas
- ☐ Commonwealth marine areas

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action

Significant impacts to critical habitat for Koala were identified and therefore the proposed action is a controlled action.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 6

Environmental record of the person proposing to take the action

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Explain in further detail

Elecseed Pty Ltd (Elecseed) - YES.
Korea Midland Power Company Ltd (KOMIPO) - YES.
Elecseed is the Project proponent in a joint venture with KOMIPO (South Korean government organisation who has completed renewable projects throughout the world). As Elecseed are a new company operating in Australia, it does not have a long history of conducting operations in Australia. However, Elecseed are in process of developing an environmental policy.
KOMIPO has maintained ISO 14001 Environmental Management Systems certification. KOMIPO operates a Sustainability Management Committee which is in charge of making rational and efficient major decisions on sustainability management. KOMIPO has established environmental guidelines and plans for long term environmental management. KOMIPO conducts an environmental audit every year that assesses the efficient operation of its environmental management system and suitability of its environmental management plan to minimise potential environmental risks.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application

As Elecseed Pty Ltd are a new company operating in Australia, it does not have have any past or present proceedings. KOMIPO does not have any past or present proceedings.

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

☑ Yes ☐ No

6.3.1 If the person taking the action is a corporation, provide details of the corporation's environmental policy and planning framework

As Elecseed are a new company operating in Australia, it does not have an environmental policy or framework at this point in time.

As KOMIPO does not have an Australian environmental policy or framework at this point in time, it will operate under KOMIPO environmental policies and frameworks.

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

☐ Yes ☑ No

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 7

Information sources

Reference source

Barron-Gafford, GA, Minor, RL, Allen, NA, Cronin, AD, Brooks, AE & Pavao-Zuckerman, MA 2016, 'The photovoltaic heat island effect: Larger solar power plants increase local temperatures' Scientific Reports, vol 6, 35070. DOI: 10.1038 /srep35070.

Chaston, K and Doley, D 2006, 'Mineral Particulates and Vegetation: Effects of Coal Dust, Overburden and Flyash on Light Interception and Leaf Temperature, Clean Air and Environmental Quality, Vol. 40, pp. 40-44.

Debus, S. 2012. Birds of prey of Australia, Second Ed. CSIRO Publishing, Collingwood, Victoria Australia.

Reliability

All reference sources utilised are considered sufficiently robust and reliable for the purpose of use, and in assisting the overall consideration of whether the action is likely to cause significant impacts to MNES

Uncertainties

There is some uncertainty regarding mapping and species search tools. Site surveys were completed to provide data to inform determination of whether the project is likely to cause significant impacts to MNES.

Only other uncertainties associated with data limitations and assumptions made within the reference sources

Reference source

DECC 2007. Terrestrial vertebrate fauna of the Greater Southern Sydney Region: Volume 2 Species of conservation concern and priority pest species. A joint project between the Sydney Catchment Authority and the Parks and Wildlife Division of the Department of Environment and Climate Change by the Information and Assessment Section, Metropolitan Branch, Climate Change and Environment Protection Group, Department of Environment and Climate Change.

DEWHA 2008. Commonwealth Conservation Advice for Acacia lauta. Department of the Environment, Water and Heritage and the Arts. Available at: http://www.environment.gov.au/biodiversity/threatened species/species/pubs/4165-conservation-advice.pdf

DoE 2013. Matters of National Environmental Significance - Significant Impact Guidelines

Reliability

All reference sources utilised are considered sufficiently robust and reliable for the purpose of use, and in assisting the overall consideration of whether the action is likely to cause significant impacts to MNES.

Uncertainties

There is some uncertainty regarding mapping and species search tools. Site surveys were completed to provide data to inform determination of whether the project is likely to cause significant impacts to MNES.

Reference source

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2012a. Department of Sustainability, Environment, Water, Population and Communities Annual Report 2012–2013, Commonwealth of Australia 2013: https://www.environment.gov.au/system/files/resources/63db8a54-bfcb-429e-93b4-e5efe21a356e/files/dsewpac-annual-report-12-13new.pdf

DSEWPaC 2012b. Commonwealth Conservation Advice for Phascolarctos cinereus (combined population in Queensland, New South Wales and the Australian Capital Territory). Department of Sustainability, Environment, Water, Populations and Communities, Canberra. Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/197-conservation-advice.pdf.

Department of Environment and Resource Management (DERM) 2011. National recovery plan for the large-eared pied bat Chalinolobus dwyeri. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Reliability

All reference sources utilised are considered sufficiently robust and reliable for the purpose of use, and in assisting the overall consideration of whether the action is likely to cause significant impacts to MNES.

Uncertainties

There is some uncertainty regarding mapping and species search tools. Site surveys were completed to provide data to

inform determination of whether the project is likely to cause significant impacts to MNES.

Reference source

Duncan, A., G.B. Baker & N. Montgomery. 1999. The Action Plan for Australian Bats. Canberra: Environment Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/action/bats/index.html.

Exon, N., F. 1967. Geology of the Surat Basin in Queensland, Bulletin 166

Farmer, AM 1993, 'The Effect of Dust on Vegetation: a Review.' Environmental Pollution, Vol. 79, pp. 63-75.

Fthenakis, V.,& Yu, Y. 2013. Analysis of the potential for a heat island effect in large PV power stations. Photovoltaic Specialists Conference (PVSC), 2013 IEEE 39th.

Geoscience Australia 2021. Surat Basin Province and Sedimentary Basin, Available: https://www.ga.gov.au/scientific-topics/energy/province-sedimentary-basin-geology/petroleum/onshore-australia/surat-basin

Higgins, P.J. (ed.) 1999. Handbook of Australian, New Zealand and Antarctic birds. Vol. 4, parrots to dollarbird. Melbourne, Oxford University Press.

Reliability

All reference sources utilised are considered sufficiently robust and reliable for the purpose of use, and in assisting the overall consideration of whether the action is likely to cause significant impacts to MNES.

Uncertainties

There is some uncertainty regarding mapping and species search tools. Site surveys were completed to provide data to inform determination of whether the project is likely to cause significant impacts to MNES.

Reference source

Huggett, A.J. 2000. An experimental study of the impact of gaps and clusters silviculture on insectivorous birds in a continuous forest landscape. Ph.D. Thesis. University of New England, Armidale, NSW.

Isbell, R. F. 2002. The Australian Soil Classification. Revised Edition. CSIRO Publishing, Melbourne.

Longcore, T and Rich, C. 2004. 'Ecological light pollution.' Frontiers in Ecology and Environment, vol. 2, pp. 191-198.

Matsuki, M, Gardener, MR, Smith, A, Howard, RK and Gove. A 2016. 'Impacts of dust on plant health, survivorship and plant communities in semi-arid environments', Austral Ecology, early view article (published online – 25 Feb, 2016).

Reliability

All reference sources utilised are considered sufficiently robust and reliable for the purpose of use, and in assisting the overall consideration of whether the action is likely to cause significant impacts to MNES.

Uncertainties

There is some uncertainty regarding mapping and species search tools. Site surveys were completed to provide data to inform determination of whether the project is likely to cause significant impacts to MNES.

Reference source

Pizzey and Knight. 2012. The field guide to the Birds of Australia birds Ninth Ed, CSIRO Publishing, Collingwood, Victoria Australia

Planning Panels Victoria 2018. Greater Shepparton Permit Applications 2017-162, 2017-274, 2017-301 and 2017-344, https://www.planning.vic.gov.au/__data/assets/pdf_file/0025/394261/Shepparton-Solar-Farm-Permits-Call-in-Panel-Report.pdf

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Queensland Herbarium 2021. Regional Ecosystem Description Database (REDD). Version 12 (March 2021) (Queensland Department of Environment and Science: Brisbane).

Radle, AL. 2007. Effects of noise on wildlife: a literature review, Available at: http://wfae.proscenia.net/library/articles.

Rich, C and Longcore, (eds.) T. 2006. Ecological consequences of artificial night lighting, Island Press, Washington

Squatter Pigeon Workshop 2011. Proceedings from the workshop for the Squatter Pigeon (southern). 14-15 December 2011.

Reliability

All reference sources utilised are considered sufficiently robust and reliable for the purpose of use, and in assisting the overall consideration of whether the action is likely to cause significant impacts to MNES.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Uncertainties

There is some uncertainty regarding mapping and species search tools. Site surveys were completed to provide data to inform determination of whether the project is likely to cause significant impacts to MNES.

Reference source

Threatened Species Scientific Committee (TSSC) 2012. Commonwealth Listing Advice on Chalinolobus dwyeri (Large-eared Pied Bat). Department of Sustainability, Environment, Water, Population and Communities. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/183-listing-advice.pdf. In effect under the EPBC Act from 29-Jun-2012.

TSSC 2020. Conservation Advice Falco hypoleucos Grey Falcon. Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/929-conservation-advice-09072020.pdf. In effect under the EPBC Act from 09-Jul-2020.

Yang L, Gao X, Lv F, Hui X, Ma L, and Hou X. 2018. Study on the local climatic effects of large photovoltaic solar farms in desert areas Solar Energy 144, 244–253, 2017.

Reliability

All reference sources utilised are considered sufficiently robust and reliable for the purpose of use, and in assisting the overall consideration of whether the action is likely to cause significant impacts to MNES.

Uncertainties

There is some uncertainty regarding mapping and species search tools. Site surveys were completed to provide data to inform determination of whether the project is likely to cause significant impacts to MNES.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 8

Proposed alternatives

Do you have any feasible alternatives to taking the proposed action?

Yes ☑ No

Australian Government
Department of Agriculture, Water and the Environment

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 9

Person proposing the action

9.1.1 Is the person proposing the action a member of an organisation?
☒ Yes ☐ No

Organisation

Organisation name	Elecseed Pty Ltd
Business name	
ABN	57632472327
ACN	
Business address	310 Edward St, Brisbane City, 4000, QLD, Australia
Postal address	310 Edward St, Brisbane City, 4000, QLD, Australia
Main Phone number	0422 297 508
Fax	
Primary email address	Kyuhong.lee@elecseed.io
Secondary email address	

9.1.2 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:
☐ Small business
☒ Not applicable

9.1.2.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations *
☐ Yes ☒ No

9.1.3 Contact

First name	Kyu Hong
Last name	Lee
Job title	Chief Strategy Officer
Phone	0422 297 508
Mobile	0422 297 508
Fax	
Email	Kyuhong.lee@elecseed.io
Primary address	310 Edward St, Brisbane City, 4000, QLD, Australia
Address	

Declaration: Person proposing the action

I, Kyu Hong Lee, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity.

Signature: Kyu Hong Lee **Date:** 25-08-2021

I, Kyu Hong Lee, the person proposing the action, consent to the designation of Kyu Hong Lee as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature: Kyu Hong Lee **Date:** 25-08-2021

In making this declaration I acknowledge that it is intended that this action is proposed to be undertaken with KOMIPO Ltd as multiple persons proposing the action.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 9

Person proposing the action

9.1.1 Is the person proposing the action a member of an organisation?

☒ Yes ☐ No

Organisation

Organisation name	Korea Midland Power Co Ltd
Business name	
ABN	Not Applicable
ACN	
Business address	160 Boryeongbuk-ro, Boryeong, Chunggnam 33439 KOREA
Postal address	160 Boryeongbuk-ro, Boryeong, Chunggnam 33439 KOREA
Main Phone number	+82-70-7511-1561 (KOR)
Fax	
Primary email address	reyshim@komipo.co.kr
Secondary email address	

9.1.2 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

☐ Small business
☒ Not applicable

9.1.2.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations *

☐ Yes ☒ No

9.1.3 Contact

First name	Rey
Last name	Shim
Job title	Project Director
Phone	+82-70-7511-1561 (KOR)
Mobile	N/A
Fax	-
Email	reyshim@komipo.co.kr
Primary address	160 Boryeongbuk-ro, Boryeong, Chunggnam 33439 KOREA
Address	

Declaration: Person proposing the action

I, Rey Shim , declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity.

Rey Shim 25-08-2021

Signature: ..... Date: .....

I, Rey Shim , the person proposing the action, consent to the designation of Rey Shim as the proponent for the purposes of the action described in this EPBC Act Referral.

Rey Shim 25-08-2021

Signature:.....Date: .....

In making this declaration I acknowledge that it is intended that this action is proposed to be undertaken with Elecseed Pty Ltd as multiple persons proposing the action.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Proposed designated proponent

9.2.1 Is the proposed designated proponent a member of an organisation?

☒ Yes ☐ No

Organisation

Organisation name	Elecseed Pty Ltd
Business name	
ABN	57632472327
ACN	
Business address	310 Edward St, Brisbane City, 4000, QLD, Australia
Postal address	310 Edward St, Brisbane City, 4000, QLD, Australia
Main Phone number	0422 297 508
Fax	
Primary email address	Kyuhong.lee@elecseed.io
Secondary email address	

9.2.2 Contact

First name	Kyu Hong
Last name	Lee
Job title	Chief Strategy Officer
Phone	0422 297 508
Mobile	0422 297 508
Fax	
Email	Kyuhong.lee@elecseed.io
Primary address	310 Edward St, Brisbane City, 4000, QLD, Australia
Address	

Declaration: Proposed Designated Proponent

I, Kyu Hong Lee, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature: Kyu Hong Lee **Date:** 25-08-2021

In making this declaration I acknowledge that it is intended that this action is proposed to be undertaken with KOMIPO Ltd as multiple proponents for the action.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Proposed designated proponent

9.2.1 Is the proposed designated proponent a member of an organisation?

☒ Yes ☐ No

Organisation

Organisation name	Korea Midland Power Co Ltd
Business name	
ABN	Not Applicable
ACN	
Business address	160 Boryeongbuk-ro, Boryeong, Chunggnam 33439 KOREA
Postal address	160 Boryeongbuk-ro, Boryeong, Chunggnam 33439 KOREA
Main Phone number	+82-70-7511-1561 (KOR)
Fax	
Primary email address	reyshim@komipo.co.kr
Secondary email address	

9.2.2 Contact

First name	Rey
Last name	Shim
Job title	Project Director
Phone	+82-70-7511-1561 (KOR)
Mobile	N/A
Fax	-
Email	reyshim@komipo.co.kr
Primary address	160 Boryeongbuk-ro, Boryeong, Chunggnam 33439 KOREA
Address	

Declaration: Proposed Designated Proponent

I, Rey Shim ,the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Rey Shim 25-08-2021

Signature: ..... Date: .....

In making this declaration I acknowledge that it is intended that this action is proposed to be undertaken with Elecseed Pty Ltd as multiple proponents for the action.

Australian Government
Department of Agriculture, Water and the Environment

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Referring party (person preparing the information)

9.3.1 Is the referring party (person preparing the information) a member of an organisation?

☒ Yes ☐ No

Organisation

Organisation name	CDM Smith Australia Pty Ltd
Business name	
ABN	88152082936
ACN	
Business address	Level 4, 51 Alfred Street Fortitude Valley, 4006 Queensland, Australia
Postal address	
Main Phone number	07 3828 6900
Fax	
Primary email address	australia@cdmsmith.com
Secondary email address	

9.3.2 Contact

First name	John
Last name	Herron
Job title	Principal Environmental Scientist
Phone	0410 066 806
Mobile	
Fax	
Email	herronjf@cdmsmith.com
Primary address	Level 4, 51 Alfred Street, Fortitude Valley, 4006, Queensland, Australia
Address	

Declaration: Referring party (person preparing the information)

I, John Herron, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.

Signature: ..... **Date:** 26-08-2021 .....

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Appendix A

Attachment

Document Type	File Name
action_area_images	App A - Project Boundary Coordinate Nodes.pdf
action_area_images	App B - Project Layout.pdf
action_area_images	App C - Earthworks Plans.pdf
localgov_approval_consent	*App D - Material Change of Use Approval.pdf
localgov_approval_consent	App D - Material Change of Use Approval-v2-19082021.pdf
supporting_tech_reports	KREP_EPBC Referral Support Document_03082021.pdf
flora_fauna_investigation	App G - Survey Flora and Fauna Species Lists.pdf
flora_fauna_investigation	App I - Ecological Survey Field Sheets.pdf
flora_fauna_investigation	App E - Protected Matters Search Results.pdf
flora_fauna_investigation	App F - WIldlife Online Database Search.pdf
flora_fauna_investigation	App H - Koala Technical Memorandum.pdf
hydro_investigation_files	*App J - Stormwater and Drainage Report.pdf
hydro_investigation_files	App J - Stormwater Drainage Report-v2-19082021.pdf

* NOT PUBLISHED - SUPERSEDED

Appendix B

Coordinates

Area 1
-27.236029915691,150.84417453374
-27.249394396144,150.82767968051
-27.249398741303,150.82768386905
-27.24980219615,150.82809302613
-27.250604199132,150.82710301249
-27.253259233927,150.84877179558
-27.253286666355,150.84899590948
-27.253518730136,150.8508912321
-27.253557040622,150.85077573407
-27.253598816569,150.85063315896
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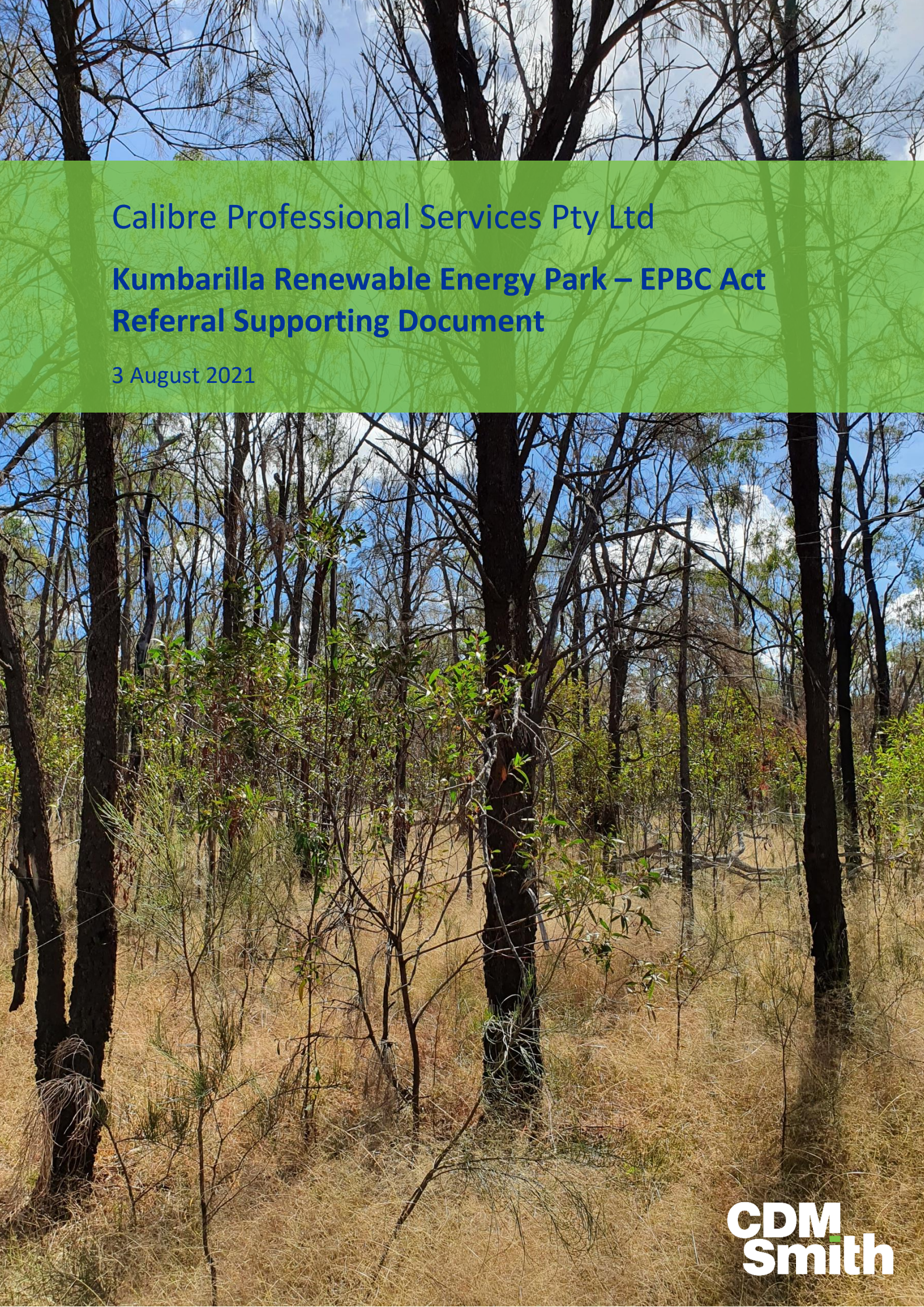

Calibre Professional Services Pty Ltd

Kumbarilla Renewable Energy Park – EPBC Act Referral Supporting Document

3 August 2021

CDM Smith

Executive Summary

On behalf of Calibre Professional Services Pty Ltd (Calibre), CDM Smith Australia Pty Ltd (CDM Smith) has prepared this report (the report) to support a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Kumbarilla Renewable Energy Park, a photovoltaic (PV) solar farm proposed 40 km west of Dalby (the Project). The Project includes two components:

- A PV power station – 100-megawatt (MW) PV power station wholly located within a 400-hectare (ha) property described as Lot 4 DY457 (Estate in fee Simple/freehold) including easements over Lot C SP107383 and Lot B SP10738. This component includes the onsite power generation and distribution; and
- Access corridor – The access corridor located within a gazetted corridor (crown land) that is the named road, Forest Road, and an unnamed track leading to Lot 4 DY457, crossing to the north of Weranga State Forest.

A desktop assessment and field assessments have been undertaken to establish the existing environmental values of the Project site and determine the level of likely impact of the Project. Various ecological surveys have been completed across the PV power station component of the Project area (and partly outside). The surveys were carried out by Paul Fox (Principal Environmental Scientist/ Project Manager – Fox & Co Environmental) and Dave Moore (Principal Botanist - Fox & Co Environmental), Bruce McLennan (Arcadian Ecology Pty Ltd) and Ben Nottidge (GreenLeaf Ecology):

- **Preliminary Survey -** A preliminary ecology survey of the PV power station was undertaken over a 3-day / 2-night period between 6-8 May 2020 to ground-truth desktop information and identify any additional flora and fauna values not identified through the desktop study;
- **Targeted Survey -** A subsequent survey was undertaken between 18-22 January 2021 and included a targeted protected plant survey, Koala (*Phascolarctos cinereus)* habitat survey, quaternary vegetation assessments and targeted Corben's long-eared bat (*Nyctophilus corbeni*) surveys;
- **BioCondition and Habitat Quality Assessment -** A BioCondition survey and habitat quality assessment was undertaken in the PV power station area between 24-27 May 2021 to verify RE mapping for the PV power station footprint of the Project area, identify any conservation significant species under the Queensland NC Act and Commonwealth EPBC Act and to identify and conduct BioCondition assessments as prescribed; and
- **Access Corridor Survey -** An additional ecological survey was undertaken between 24-27 May 2021 within the access corridor to ground-truth desktop information and identify any additional flora and fauna values.

In addition to the ecological assessments a number of other surveys and evaluations were undertaken to assess if the Project's activities would have the potential to cause environmental impacts. The following have been completed for the Project:

- Soil survey and associated reporting;
- Stormwater and drainage reporting;
- Traffic and transport impact assessment and reporting; and
- Bushfire risk assessment and reporting.

A summary of Project area findings is provided below:

- The Project area did not contain any TEC's protected under the EPBC Act;
- Field surveys identified the presence of the Kogan waxflower (*Philotheca sporadica*). The Kogan waxflower is listed as Near Threatened under the *Nature Conservation Act 1992* (NC Act). A second targeted survey was conducted to identify the extent of the population;
- Koala scats and two skulls have been found onsite which confirmed the presence of the Koala. Koalas are listed as Vulnerable under the EPBC Act and Vulnerable under the NC Act. Results from the field survey suggest a low density

of Koala have been present within the site several months prior to the survey. Assessment of the Project site proposed to be cleared scored eight (8) on the Department of Agriculture, Water and the Environment Koala Habitat Assessment Tool;

- A bat survey was undertaken in accordance with the guidelines for threatened bat (Department of the Environment, Water, Heritage and the Art's, 2010). Trapping was undertaken using harp traps with a survey effort of 20 trap nights over a 5-night period. 50 bats (4 species) were captured during the survey period. 50 bats (4 species) were captured during the survey period and were identified as least concern species under the NC Act and not listed under the EPBC Act. The four (4) species captured were the little broad-nosed bat, lesser long-eared bat, Gould's long-eared bat and the Gould's wattled bat;
- A portion of the Project area is mapped as Essential Habitat (EH) for Golden-tailed gecko (*Strophurus taenicauda*) (Near Threatened under the NC Act) and Painted honeyeater (*Grantiella picta*) (Vulnerable under the EPBC Act and Vulnerable under the NC Act). Targeted surveys did not record these species. Golden-tailed gecko are considered likely to occur given proximate records and suitable habitat on site;
- Mistletoe is the preferred food of Painted honeyeaters. Mistletoe was observed in low density within the Project area, however not of the *Amyema* genus. The woodland on site is consistent with the woodland habitat of Painted Honeyeaters, however the lack of *Amyema* observed, suggests that Painted Honeyeaters may be moderately likely to occur, rather than highly likely;
- The small area of Endangered RE (RE 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks) along the southern portion of the Lot which is mapped on State mapping was ground-truthed and determined to be incorrect. The vegetation is Least Concern RE 11.5.1;
- No gliders or other arboreal mammals (excluding Koalas) were observed within the Project area at the time of surveys;
- There are some hollow-bearing trees scattered through the site however due to previous selective logging activity (going back over 100 years), large hollow-bearing habitat trees are sparse; and
- Seasonal species that grow or transit the site at other times of the year may not have been detectable at the time of survey.

Six fauna species listed as Vulnerable under the EPBC Act are considered as possibly occurring, likely or known to occur in the Project area, these include:

- Yakka skink (*Egernia rugosa*);
- Squatter pigeon (southern subspecies) (*Geophaps scripta scripta*);
- Painted honeyeater (*Grantiella picta*);
- White-throated needletail (*Hirundapus caudacutus*);
- Central greater glider (*Petauroides armillatus*); and
- Koala (*Phascolarctos cinereus*)

The Project footprint is comprised of an approximately 192 ha area allocated to the PV power station and the associated 22 ha access corridor. Assessment of the Project area proposed to be cleared scored eight (8) on the koala habitat assessment tool (KHAT). Under the referral guidelines for Koala (DotE 2014) it is recommended that a project be referred where it is proposed to 'clear ≥ 20 ha of habitat containing known Koala food trees in an area with a habitat score ≥ 8. The Project area will impact up to 206.9 ha of habitat containing known Koala habitat. On this basis, and the potential for residual impacts to Koala, it is considered that the Project may be deemed a controlled action requiring assessment and approval under the EPBC Act.

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Document history & status

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Section 1 Introduction

On behalf of Calibre Professional Services Pty Ltd (Calibre), CDM Smith Australia Pty Ltd (CDM Smith) has prepared this report (the report) to support a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Kumbarilla Renewable Energy Park, a photovoltaic solar farm proposed 40 km west of Dalby.

The Kumbarilla Renewable Energy Park is a photovoltaic (PV) power station and access corridor proposed 40 km west of Dalby, Queensland (the Action, herein referred to as the Project or K-REP). The Project may have an impact on Matters of National Environmental Significance (MNES) as it requires clearing of potential habitat for species listed under the EPBC Act. As such, this referral is being made to the Department of Agriculture, Water and the Environment (DAWE) for a controlled action decision by the Australian Government Minister for the Environment (the Minister).

1.1 Purpose and Scope

This purpose of this report is to describe the existing environmental values at the Project site. The assessment entailed a desktop review followed by substantial ecology surveys of the proposed Project footprint and its periphery.

The Project includes two components:

- PV power station – A 100-megawatt (MW) PV power station wholly located within a 400-hectare (ha) property described as Lot 4 DY457 (Estate in fee Simple/freehold) including easements over Lot C SP107383 and Lot B SP10738. This component includes the onsite power generation and distribution; and
- Access corridor – The access corridor is located within a gazetted corridor (crown land) that is the named road, Forest Road, and an unnamed track leading to Lot 4 DY457, crossing to the north of Weranga State Forest.

The ecology assessment has been prepared to provide the following:

- Identification of potential regulatory triggers under Commonwealth legislation;
- A description of the environmental values associated with the Project area resulting from desktop and field ground-truthing assessments including:
  - A list of fauna and flora observed in the survey area.
  - Identification of ecological constraints and identification of impacts and management measures.
  - Assessment against significant impact criteria.

1.2 Environment Policy and Record of the Proponent

Elecseed Pty Ltd (Elecseed) is the Project's proponent. Elecseed states, "We understand that our environmental performance is critical to the sustainable success of the organisation and we will implement an environmental management framework that is accessible, innovative and enduring.

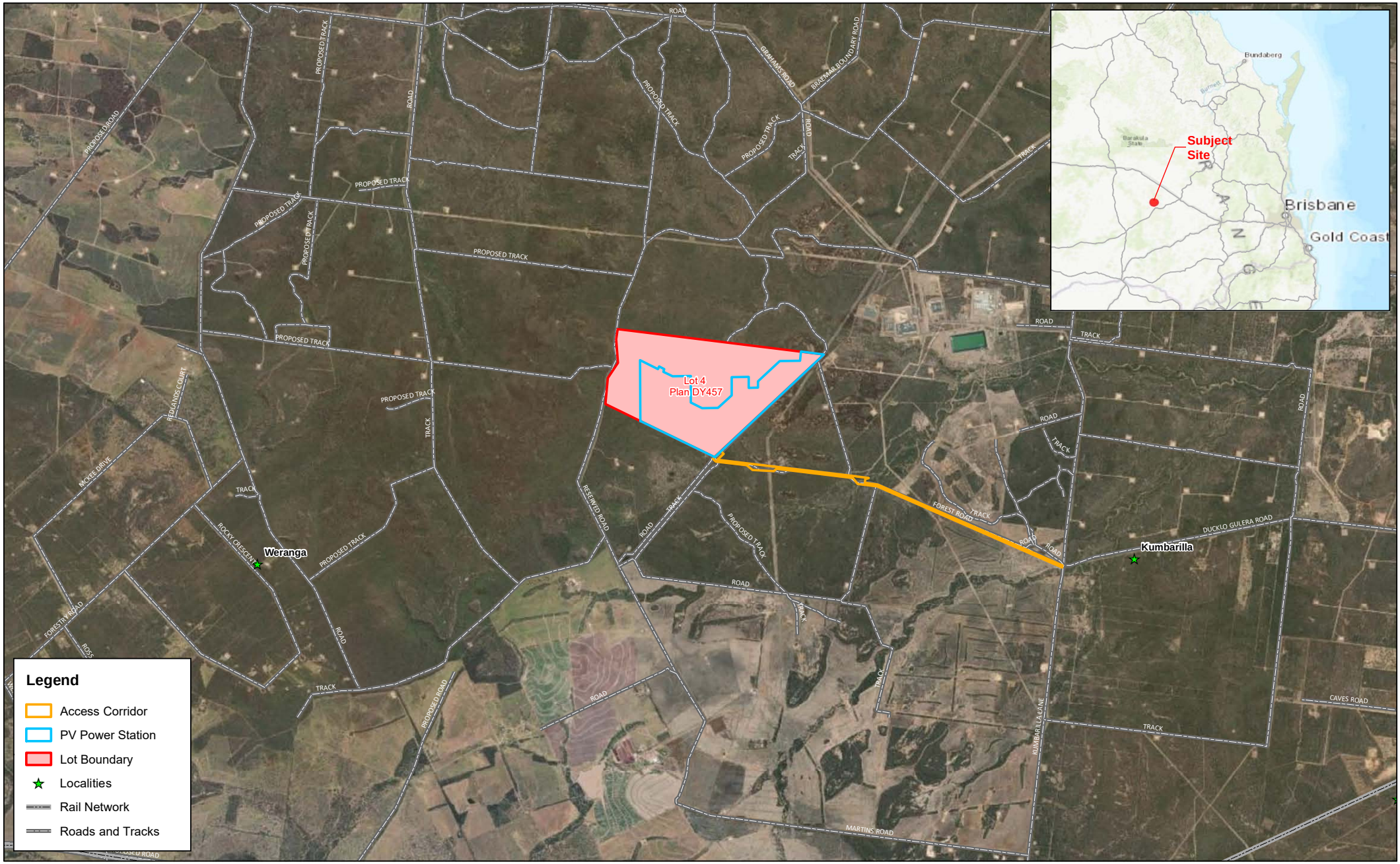
Elecseed will undertake its Australian operations in a manner which meets our legal obligations, recognises the importance of working closely with our internal and external stakeholders, and strives to prevent environmental harm and improve our environmental performance."

1.3 Project Area and Locality

The Project footprint is comprised of an approximately 191 ha area allocated to the PV power station and the associated 22 ha access corridor approximately 40 km west of Dalby, Queensland and located within the Western Downs Regional Council (WDRC) Local Government Area (LGA). The PV power station is to be wholly located within a 400 ha property described as Lot 4 DY457 (Estate in fee Simple/freehold) including easements over Lot C SP107383 and Lot B SP107382 The access corridor is to be located within a gazetted corridor (crown land) that is the named road, Forest Road, and an unnamed track leading to Lot 4 DY457, crossing to the north of Weranga State Forest (refer to Figure 1-1 and Figure 1-2). Refer to **Appendix A** for a referral area map and coordinates.

The PV power station area is currently vacant and contains mapped remnant and regrowth woody vegetation covering the majority of the site with the exception of access roads / vehicle tracks and a small non-referrable dam located slightly north-west along the northern boundary of the Lot.

QGC has an existing 132 kilovolt (kV) Substation fed by the Powerlink Kumbarilla Park 275/132kV Substation located adjacent the proposed Project. The high voltage transmission line supplies QGC's Gas Compression Facility, at the Ruby site at Kumbarilla Park, West of Dalby. The Powerlink Kumbarilla Park 275/132kV Substation is the proposed point of connection for Project.



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1 cm = 550 meters

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DATA SOURCE
QLD Government Open Source Data

DESIGNER

CDM Smith
cdmsmith.com

CLIENT

calibre

FIGURE 1-1

REGIONAL AREA

DRG Ref: **Figure 1-1 Regional Area**

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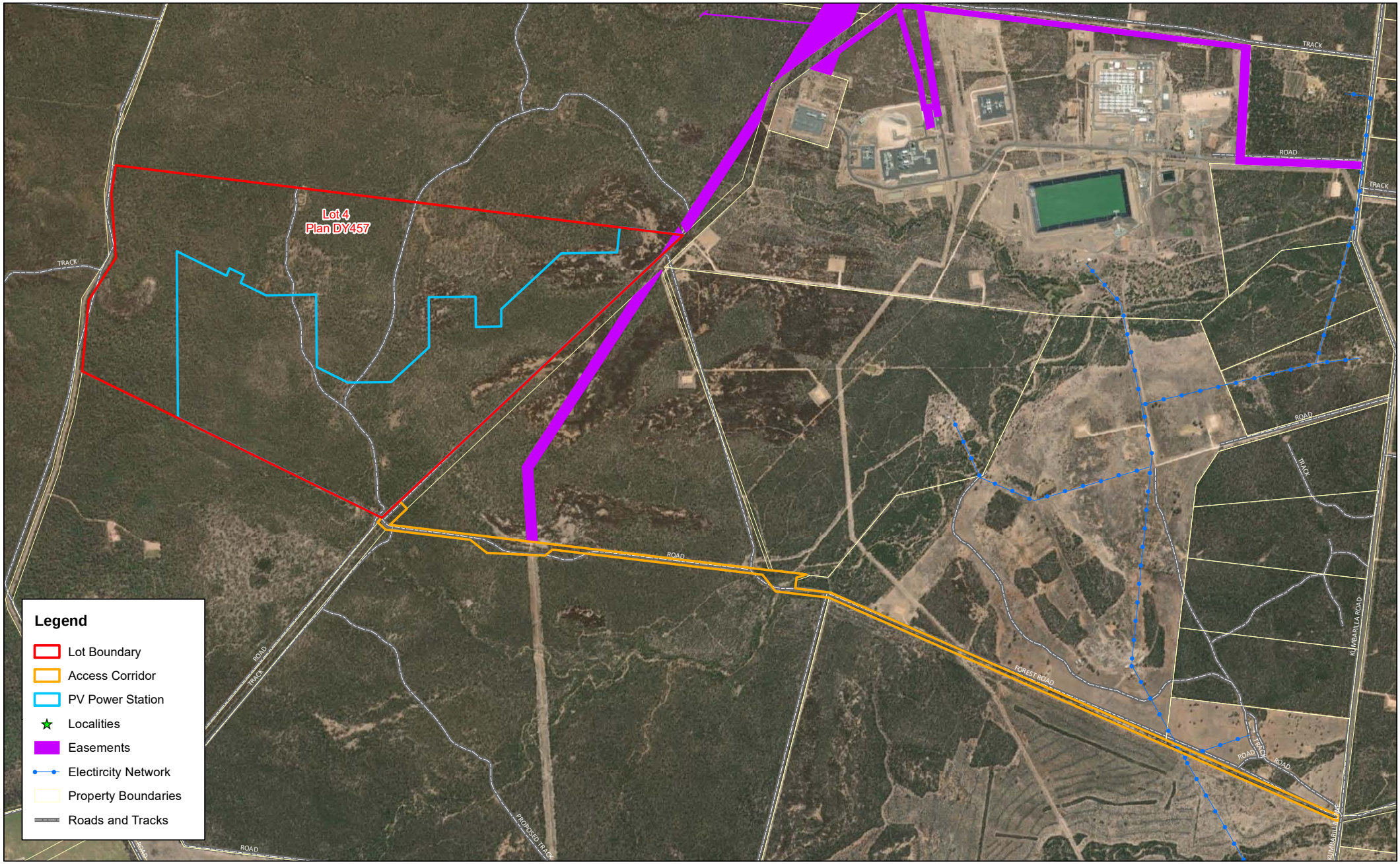

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DATA SOURCE
QLD Government Open Source Data

DESIGNER
CDM Smith
cdmsmith.com

CLIENT
calibre

FIGURE 1-2

PROJECT AREA

DRG Ref: **Figure 1-2 Project Area**

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1.4 Project Overview

The proposed system arrangement is to achieve a 100 MW installation utilising a maximum Ground Cover Ratio (GCR) of 0.5 MW/ ha to fit within the physical site constraints and an approximate 200 ha negotiated lease arrangement. This shall include all ancillary systems and balance of plant. Due to the existing topography and undulating nature of the site, horizon shading must be avoided from natural formations as much as reasonably practicable.

Provision has been included for one permanent Project Operations Area. Refer to **Appendix B** for a detailed layout of the PV power station area. The includes provisions for the following permanent structures:

- Site 33 kV Switch room (2x12.2m container);
- Low voltage, power plant controller and supervisory control and data acquisition control room (6x9m structure);
- Office and control centre (6x9m structure);
- Amenities (6x9m structure);
- Store 1 (6x9m structure);
- Store 2 (6x9m structure);
- Space for 20 car park bays (unsealed); and
- Through road, truck parking bay and turnaround bay.

All structures shall largely be prefabricated off site, delivered and installed on raised structural posts. Surrounding staircases, ramps, pathways, verandas and similar shall be constructed on site to suit the final configuration. The compound shall be fenced and secured with appropriate physical and electronic security measures in place. The compound shall be lightning protected and generally treated as a critical services zone for ongoing operation.

Within the Project Operations Area will be the 33kV site distribution switch room. This is planned around a prefabricated ABB 'Eco Flex' containerised system including all required self-contained services. A Powerlink-compliant 132kV to 33kV substation is required to be located on the Project site to provide the PV power stations 33kV point of connection and coupling. A spatial allowance of 150x100m has been provisioned for this substation with a 5m wide perimeter emergency egress and access road.

The Project includes a 5.7 km (approximately 22 ha) long access corridor (within a public road reserve known as Forest Road). Forest Road provides the final portion of the approved access road and is a rural access road constructed in a road reserve. Condition 61 of the Material Change of Use (MCU) approval requires the upgrading of Forest Road to provide an all-weather 7 m wide gravel pavement on an 8 m formation. There is no stipulation about upgrading Forest Road in its current formed location or in the dedicated road reserve. An approximate 2.5 km section of the public road reserve for Forest Road occurs adjacent to the Weranga State Forest (Lot 201 on FTY1243). As with many rural roads in Queensland, the actual formed location of the road deviates from the road reserve and enters the State Forest lot at two locations totalling approximately 420 m. Based on aerial imagery, these deviations are assumed to be associated with on ground constraints (e.g. drainage lines).

1.5 Staged Referral

The K-REP website describes the Project as a two-stage development of PV power station and green hydrogen production facility (note that this hydrogen production facility is a future development aspiration which is not part of current planning. Allowance was made for a clearing pad for a possible future hydrogen plant within the MCU approval area, with later plans for an additional 100 MWp PV power station and 80 MW hydrogen plant. The EPBC Act policy regarding staged development or split referrals has been reviewed, with regard to the Project. As per the policy, when deciding whether a project constitutes a split referral, the following questions are considered:

1. **What is the larger action?** The K-REP website states the potential for an additional 100 MWp PV power station and 80 MW hydrogen plant, however there are no plans provided or details of spatial extent to this development. There is insufficient information in the public domain, nor even in our domain, to sufficiently understand what any larger action would involve, nor any business decision by the proponent to undertake this development. The expansion of the current proposal is a theoretical possibility, rather than a considered prospect.
2. **Can the referred action stand alone?** Yes - the Project does not rely on any other actions. It includes the access corridor, power generation and distribution (substation). The current action could operate separate of any expansion.
3. **Are the referred action and related actions co-dependent?** Potentially – however, the location of the second stage is unknown and the ability of the hydrolyser plant to operate just on the power supplied by Stage 2 is unknown. It is also not necessary for any future hydrolyser to be physically collocated with this project nor considered part of it due to the nature of the reticulated electricity grid affording locational flexibility of any such infrastructure should it ever be developed.
4. **What is the timeframe between the referred action and the related action?** Unknown – and a presumption of a lengthy or indefinite timeframe between the two actions supports the assertion that the actions are separate.
5. **What is the geographic relationship between the referred action and the related action?** Unknown. It is assumed to be proximal on the basis of a reduction in transmission losses notwithstanding the implied flexibility of any connection to a broader electricity network.
6. **Is there an overall plan or vision for the larger action and does that plan encompass the referred action?** The policy refers to existence of a masterplan or other planning documentation. There is no overall plan or vision of a larger action beyond what is purported to be technically plausible on the K-REP website.
7. **Are the actions authorised by a single local government or State/Territory permit, licence or other authorisation?** A separate local government permit and state permits would be required for the separate action. A development approval for the solar farm has been obtained, refer to Section 3.2.
8. **Will the action be financed from a single funding source?** At this point in the Project development, the final details of capital expenditure for the development have not been finalised as they are likely contingent on securing all necessary approvals.

Based on the policy questions, the Project is not considered part of a staged development or larger project for the purposes of consideration under the EPBC Act. Justification for this is as follows:

- There are no designs or layouts produced by the proponent for any larger action than is being referred;
- Technical studies have been limited to the extents of the action provided in the referral;
- The MCU application to WDRC and subsequent conditional approval only account for the action included in the current referral;
- It is possible that any expansion of the Project (should it occur in the future) may be undertaken by a separate proponent and through a separate funding source; and
- Should the proponent or separate proponent wish to expand the action in the future, consideration of the obligations under the EPBC Act will be undertaken at such time and with consideration of the action details which are currently not available.

Section 2 Project Description

2.1 Project Infrastructure

2.1.1 Solar Arrays

Solar PV modules are devices that can convert the sunlight into electricity. Tier One solar PV panels will be used. Modules will utilise monocrystalline bifacial technology with a power class likely between 550Wp to 650Wp. The panels will be elevated off the ground on support columns which include solar trackers to maximise yield and protect the assets from extreme weather events. Refer to **Appendix B** for the location of the solar PV modules.

String combiners take the wires from several different solar panels and combine them into one main feed. A string combiner will be used to combine the output of multiple strings of solar PV modules, and will be connected to the substation.

2.1.2 Substation

The substation area is located at the north eastern section of the site (refer to **Appendix B**). The substation will contain the Powerlink compliant 132kV to 33kV substation transformer and be the point of electrical connection. Earthworks and hardstand will be undertaken to give a flat site above the Q200 (0.5% AEP) flood event.

2.1.3 Site-Operation Compound

The site operation compound will contain an open area with shed facilities to store equipment and work space to complete maintenance works. Car parking will be provided as required.

2.1.4 Access Road

The access road to the site is from existing Forest Road which is currently an unsealed formed rural road. This road will be regraded and enlarged to a 9m wide gravel pavement with a 8m wide bitumen seal.

Internal access roads will allow vehicular access between solar PV panel blocks. Internal roads will form into two categories:

- Main roads – consisting of a 6m wide gravel formation with a 3m wide bitumen surface designed to accommodate large trucks. Passing bays may be required subject to detailed design.
- Minor roads – these will be a graded dirt tracks to enable a maintenance vehicle to access solar panels.

2.1.5 Drainage

Forest Road will be constructed to a rural standard with table drains and cross-road culverts as necessary.

Internal roads and site areas will be disturbed by clearing and earthworks. The site will be designed with table drains, diversion bunds and stormwater pit and pipe necessary to direct water into the multiple basins onsite for treatment.

2.2 Communications and Power

Telecommunications are currently not provided to the site. Telecommunications will be installed, either through existing established networks in the region, or through remote networking.

During construction, portable diesel generators will be utilised to provide power for construction works, while operational power will be sourced directly from the solar farm's substation. As such, no connection to the localised low voltage transmission network is proposed.

2.3 Transport

Details on the number of vehicles for the construction phase is currently unconfirmed. Once construction is complete the number of maintenance vehicles entering the site will be very low.

2.4 Water

The Bushfire Management Plan prepared by Blackash Bushfire Consulting has recommended that a 50,000 litre on-site dedicated water supply be provided. This is expected to be provided in above ground water tanks connected to shed roofs.

During the construction period, it is expected that water will be trucked to site. This water will be used for construction and potable uses. Water will be required for construction dust suppression, wheel washing and workforce facilities.

During operation, water will be required for worker facilities; however, with minimal employees, water requirements will be minimal and primarily for functioning of the ablutions block, potable purposes and bushfire fighting purposes. It is expected that water will be trucked to and stored on-site throughout the Project's lifetime. Should it be determined that trucking is incapable of supplying the required amounts or is too costly, a range of supplementary water supply options may be considered, including:

- Connection to mains water under a licence agreement;
- Construction of bores;
- Rainwater capture and storage; and
- Runoff water capture and storage.

2.5 Wastewater and Solid Waste

No onsite effluent treatment is proposed. During construction wastewater will be captured and removed from site using a licensed waste contractor. Solid waste will be handled by onsite bins for disposal off site to an approved facility.

A small operational sewage treatment plant will be designed and constructed to manage the minimal operational staff. The design peak capacity of the sewage treatment plan will cater for visitors expected at the site.

2.6 Waste

There is not expected to be significant waste output from the Project. Much of the waste is expected to be recyclable, including the pallets that transport the solar panel modules. Waste is expected to be managed locally, where a number of waste treatment and disposal centres are available. A dedicated waste storage and handling section will be provided in the laydown area.

Any waste will be disposed of safely in accordance with Queensland regulations and spill kits will be provided in hazardous material storage areas. Unused or excess chemicals and material will be removed and disposed of correctly, in accordance with safety data sheets (SDS) and waste disposal guidelines.

Material moving to and from site, will be tracked using dockets and receipts. Licensed transporters will be used to collect and dispose of the waste

2.7 Project Construction

2.7.1 Workforce and Hours

The construction workforce for the Project may vary; however, it has an estimated peak of 144 personnel. Most construction positions will be short-term and temporary, and it is expected the bulk of the construction workforce will be provided by contractors. The workforce is likely to be sourced locally, wherever possible. The workers who do not reside locally will be housed within local accommodation facilities in Dalby or surrounding localities.

The bulk of construction activities are proposed to be undertaken in daytime hours 7 days per week from 6.30 am to 6.30 pm; however, some critical path work may be undertaken at night from time to time. It is recognised that a number of construction and commissioning activities may need to be undertaken at times when there are minimal personnel on-site to progress time critical activities

2.7.2 Plant and Equipment

The Project will require a number of specialist plant and equipment, which will be mobilised to site, these include:

- Generators;
- Excavators;
- Grader;
- Cranes;
- Trenching machine;
- Wheeled crane; and
- Trailer mounted fuel pod.

2.7.3 Construction Methodology

2.7.3.1 Site Preparation

The Project site will be surveyed and marked out. The Project site will then be predominately cleared where required for the construction of solar panels and other associated infrastructure.

Site grading and minimal earthworks will occur for the construction of access tracks, solar module areas, temporary facilities, the substation, trenches for electrical cabling and site drainage features. As per the earthworks plans included in **Appendix C**, earthworks are described as follows:

- Main – earthworks associated with the construction of road formation, stormwater basins and building pads; and
- Minor – clearing and grade over the surface to remove surface rills, mounds and vegetation for minor roads and solar panels.

Topsoil that is left over will remain on-site and will be used for restoration following the construction activities. Erosion and sediment control measures will be installed as required. The site road network will be developed with internal access tracks and a perimeter road.

Clearing will progress along internal roads to locations of sediment basins and pad areas to enable basins to be formed before the balance of the site is cleared.

2.7.3.2 Mechanical, Structure and Electrical Works

Mechanical, structural, and electrical works will involve the installation of solar panels and substation.

The Project will require the excavation and removal of in-situ material and placement of material and grounding to allow the construction of electrical equipment and the substation. In order to secure the solar panel arrays, piles will be driven or screwed into the ground using an excavator or piling rig. Solar panel piles will be driven or screwed to a depth of approximately 1.5 m to 2 m depending on the undulation of the land.

Electrical cabling from the modules to the substation will generally be trenched (using a trenching machine) but may be routed over ground in cable trays or conduit. Once the piles and structural support system for the solar panels are in place, the solar panels will be fitted to the support structure. Trenches will be to depths will be between 0.9 m to 1.2 m.

2.7.3.3 Commissioning

Following completion of site works all construction equipment will be demobilised. The solar panels and systems will undergo a commissioning process. Solar panel commissioning ensures that systems are safe, high performing and in accordance with expectations. Predicted and actual energy performance of the Project will be examined and compared. Solar panel arrays will be tested. The Project will be connected to the grid sequentially

2.8 Operation and Maintenance

Operation and maintenance requirements are expected to be minimal, and generally automated. When problems arise, most faults will be electrical in nature and will require specialist technical personnel and equipment to resolve. When operational, the Project will be manned during the daytime, with an ongoing anticipated maximum workforce of 5 full time equivalent staff.

Section 3 Statutory Considerations

The following legislation below are relevant to identifying the impacts and constraints relevant to the site and provide guidance in the assessment of the ecological values of the site.

3.1 Commonwealth Legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework to protect and manage MNES including nationally and internationally important flora, fauna, ecological communities, heritage places and water resources. The EPBC Act implements obligations under international conventions and treaties, such as protection of migratory species (Migratory Bird Agreements and the Bonn Convention 1979) and World Heritage Area values (World Heritage Convention 1972). The EPBC Act is administered by the Commonwealth DAWE.

The EPBC Act establishes a process for assessment and approval of proposed actions that have, or are likely to have, a significant impact on MNES. There are nine MNES listed under the EPBC Act, being:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- Nuclear actions; and
- A water resource in relation to coal seam gas and large coal mining development (the 'water trigger')

Proponents may refer projects to the Australian Government Minister for the Environment (the Minister) for a determination on whether their project is a controlled action or not a controlled action. If the referral is deemed to be a controlled action, then it is likely to have the potential for a significant impact on MNES and the necessary assessment and approvals process must be undertaken in accordance with the decision from the Minister. Where significant impacts to MNES are deemed to likely occur and are unavoidable, a project proponent may be required to compensate through the acquiring of environmental offsets as set out in the EPBC Act Environmental Offsets Policy (DSEWPaC 2012a).

3.1.2 Aboriginal and Torres Strait Island Heritage Protection Act 1984

The *Aboriginal and Torres Strait Island Heritage Protection Act 1984* preserves and protects areas and objects of particular significance to Aboriginals in accordance with Aboriginal tradition. Cultural heritage may also be protected under the EPBC Act as a MNES or under the *Native Title Act 1993* (NT Act) where a native title claim exists. The Proponent is currently undergoing discussion with the relevant cultural heritage party for the region, the Barunggam people.

Should the Proponent discover anything that has "reasonable grounds to suspect to be Aboriginal remains "[s20(1)] during construction of the Project, the proponent will report the discovery to the Commonwealth Minister in accordance with Part 2, Division 3 of the Act. Negotiations are required if triggered.

3.1.3 Native Title Act 1993

The Commonwealth *Native Title Act 1993* (NT Act) recognises the rights and interests of Indigenous peoples in respect of land on which they historically resided and regulates the conduct of 'future acts', including development. The Commonwealth NT Act includes requirements for native title party notification and consultation, where a proponent seeks to undertake a 'future act'.

3.2 State and Local Approvals

The Project is located within the WDRC local government area. A MCU approval (030.2020.120.001) was given for a Renewable Energy Facility (PV power station) from WDRC. Refer to a copy of the MCU approval in **Appendix D**.

The State regulatory framework that applies to the Project, and additional information regarding these is identified in the following sections:

- *Aboriginal Cultural Heritage Act 2003*
- *Biosecurity Act 2014*;
- *Building Act 1975*;
- *Environmental Protection Act 1994*;
- *Land Act 1994*;
- *Nature Conservation Act 1992*;
- *Planning Act 2016*, including the following local instrument:
  - Western Downs Planning Scheme
- *Transport Infrastructure Act 1994*; and
- *Vegetation Management Act 1999*;

3.2.1 Planning Act 2016

The *Planning Act 2016* (Planning Act) is Queensland's principal planning legislation and comprises three main elements: plan making, development assessment and dispute resolution. The aim of the Planning Act is to provide a planning system that enables responsible development and delivers prosperity, sustainability and liveability.

The State Planning Policy (SPP) is a statutory instrument prepared under the Planning Act that relates to matters of Queensland interest. The SPP applies to a range of circumstances under the SP Act, including for development assessment and when proposed new planning schemes are made or amended. The SPP is applicable to assessable development within Queensland. The provisions of the SPP may also be considered under the standard criteria of the EP Act which includes ecological MSES including: Biodiversity - MSES - Regulated vegetation and Regulated vegetation (intersecting a watercourse) and waterway barriers.

The Western Downs Planning Scheme (planning scheme) was prepared in accordance with the Planning Act as a framework for managing development in a way that advances the purpose of the Planning Act. The planning scheme identifies particular ecological interest areas in mapping overlays targeting biodiversity areas (MSES), wetlands and waterway corridors.

3.2.2 Nature Conservation Act 1992

The objective of the *Nature Conservation Act 1992* (NC Act) is the conservation of nature while allowing for the involvement of indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition or Island custom.

In the context of the Project the NC Act provides for the protection and management of native wildlife and habitat that supports native species with particular regard to:

- Administering the clearing of plants protected under the NC Act;
- Managing activities that may cause disturbance (that is tamper, damage, destroy, mark, move or dig up) to animal breeding places; and
- Managing the taking of native flora and fauna.

Subordinate legislation lists protected species and areas to which the regulatory provisions of the NC Act apply, namely the Nature Conservation (Animals) Regulation 2020: this regulation lists terrestrial and aquatic plant and animal species presumed extinct, endangered, vulnerable, near threatened, least concern, international or prohibited. It recommends management objectives for the protection and maintenance of these species in Queensland, as appropriate.

3.2.3 Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) regulates the conservation and management of woody vegetation communities, providing protection for the following:

- Regional Ecosystems (REs) classified as 'endangered' or 'of concern' (including remnant and high-value regrowth);
- REs classified as 'least concern' associated with mapped waterways;
- Management of category, A, B, C, R and X areas;
- Mapped 'essential habitat' for threatened flora and fauna species listed under the NC Act; and
- Specific wetlands as mapped under the VM Act.

3.2.4 Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) provides legislative measures to manage pests and weeds, diseases, and environmental contaminants, and to address the impacts they have on the economy, environment, agriculture, tourism and society.

The Act provides statutory powers to prohibit or restrict the introduction and spread of plant and animal pests to and within Queensland. Restricted matter is listed in the Act and includes a range of invasive plants that are present in Queensland. These invasive plants are having significant adverse impacts in Queensland and it is desirable to manage them and prevent their spread, thereby protecting un-infested parts of the State. The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive plants and animals under their control. This is called a general biosecurity obligation (GBO).

Weeds and pests pose one of the most significant threats to environmental values and agriculture within the region. Accordingly, appropriate management measures will be implemented to restrict the introduction and/or spread of weed species as a means of protecting the values of the surrounding cattle grazing activity.

3.2.5 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) provides the key legislative framework for environmental management and protection in Queensland. The objective of the EP Act is to: 'Protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends' (s 3). Under the EP Act, every person must comply with the general environmental duty that stipulates: "A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm (the general environmental duty)" (s 319). The Act also obliges the duty of persons to notify the administering authority where they suspect an event has happened that causes or threatens serious or material environmental harm.

3.2.6 Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (EO Act) (Qld), Environmental Offsets Regulation 2014 and the Queensland Government Environmental Offsets Policy 2014 provides a streamlined framework for environmental offset requirements. Offsets are required where there is an unavoidable impact on significant Environmental Values (EVs). In addition, an environmental offset can only be required if impacts from a prescribed activity constitute a significant residual impact as identified through the following guidelines:

- The State guideline that provides guidance on what constitutes a significant residual impact for Matters of State Environmental Significance (MSES);
- The Commonwealth Significant Impact Guidelines for what constitutes a significant residual impact on MNES; and
- Any relevant local government significant impact guideline for Matters of Local Environmental Significance (MLES).

To avoid duplication with offsets required under the Commonwealth's EPBC Act Environmental Offsets Policy 2012, the policy provides that the administering agency must consider other relevant offset conditions which apply for the same, or substantially the same prescribed impact. If duplicate conditions are imposed, it allows the proponent to remove the duplication.

3.2.7 Aboriginal Cultural Heritage Act 2003

The *Aboriginal Cultural Heritage Act 2003* (ACHA) is the primary piece of legislation governing Aboriginal Cultural Heritage in Queensland. The ACHA requires developers to identify reasonable and practicable measures for ensuring the activities are managed to avoid or minimise harm to Aboriginal cultural heritage in a way that meets the duty of care requirements under Section 23 of the ACHA.

The Cultural Heritage Duty of Care Guidelines (the Guidelines) provides guidance in determining whether a person or activity complies with the cultural heritage duty of care. The Guidelines recognise that it is unlikely that Aboriginal cultural heritage will be harmed where:

- The current or proposed activity in an area is in an area previously subjected to significant ground disturbance and the activity will impact only on the area subject to the previous ground disturbance; or
- The impact of the current or proposed activity is unlikely to cause any additional harm to Aboriginal cultural heritage than that has already occurred.

A "Lot on Plan Search" of the Department of Aboriginal, Torres Strait Islander Partnerships (DATSIP) Aboriginal and Torres Strait Islander Cultural Heritage Database and Register confirmed one (1) cultural heritage site point for the PV power station area of interest (Lot 4 on DY457) in Table 3-1. As identified in Table 3-1, the relevant Cultural Heritage Part are the Barunggam People.

Table 3-1 Cultural Heritage Site Points for Lot 4 DY 457

Site ID	Latitude	Longitude	Record date	Attribute	Cultural Heritage Party
JB-0255-1	-27.2414	150.836037	Nov 26, 2018	Scarred Tree	Barunggam People

The Proponent is currently in discussion with the Barunggam people. Necessary agreements will occur and if required a Cultural Heritage Management Plan (CHMP) will be prepared and developed in collaboration with the Barunggam people.

Section 4 Assessment Methodology

4.1 Nomenclature

Botanical nomenclature within this report follows taxonomy accepted by the Queensland Herbarium and Queensland Museum. Zoological nomenclature follows the Birdlife Australia Rarities Committee checklist (for birds) and the Queensland Department of Environment and Science (DES) Wildlife Online database taxonomy (for all other fauna), unless otherwise noted. All species in this report will be referred to initially by both their common and scientific names and then only by the common name.

4.2 Methodology

The methodology for the ecology assessment includes a combination of desktop and field-based assessment methods:

- A desktop review of relevant Commonwealth, State and local databases, vegetation mapping, published ecological studies and any other relevant literature. The desktop review was used to identify vegetation communities predicted to occur within the Project area, and individual flora and fauna species known, or which have the potential to occur within the Project area;
- Field survey to ground-truth the presence of listed species and / or suitable habitat, and vegetation communities identified during the desktop review;
- Follow-up field surveys to identify details of flora and fauna; and
- Review of field vegetation site data and recent aerial imagery to refine existing mapping at the property scale.

In addition to the ecological assessments a number of other surveys and evaluations were undertaken to assess if the Project's activities would have the potential to cause environmental impacts. The following studies have been completed for the Project:

- Soil survey and associated reporting;
- Stormwater and drainage reporting;
- Traffic and transport impact assessment and reporting; and
- Bushfire risk assessment and reporting.

4.2.1 Desktop Review

Desktop studies were undertaken prior to field assessments. The desktop review was used to obtain background information relating to the potential presence and distribution of species and ecological communities (including connectivity across the regional landscape), particularly those listed under the VM Act, NC Act and EPBC Act (Cth). Desktop studies involved database searches and review of:

- Commonwealth EPBC Act Protected Matters Search Tool (PMST) (DAWE) (to confirm current legislative status of listed species);
- Commonwealth DAWE PMST;
- Current publicly available RE mapping – V12 (Queensland Herbarium 2021);
- DES WildNet (Wildlife Online) database search results;
- Atlas of Living Australia (ALA) species database; and
- Mapping for the Protected Plants Trigger Survey Map and MSES.

Database searches were undertaken over a 25 km radius (10 km for the ALA species database) of the Project area. The EPBC Act PMST, whilst based on some species records, primarily relies on modelling of suitable habitats (with mapped boundary constraints accounted for) and is largely a predictive tool with associated caveats.

Wildlife Online database records are based on records of species from a wide variety of observers and although the records are generally accurate in terms of spatial location, not all records have been verified. The ALA records are largely verified and include specimen records from museum collections across Australia.

4.2.2 Field Surveys

Various ecological surveys have been completed across the PV power station component of the Project area (and partly outside). The surveys were carried out by Paul Fox (Principal Environmental Scientist/ Project Manager – Fox & Co Environmental), Dave Moore (Principal Botanist - Fox & Co Environmental), Bruce McLennan (Arcadian Ecology Pty Ltd) and Ben Nottidge (GreenLeaf Ecology):

- **Preliminary Survey -** A preliminary ecology survey of the PV power station was undertaken over a 3-day / 2-night period between 6-8 May 2020 (herein referred to as the **preliminary survey**). This was undertaken to ground-truth desktop information and identify any additional flora and fauna values not identified through the desktop study. Following this preliminary survey, a population of Kogan waxflower (*Philotheca sporadica*), a near threatened (NT) flora species listed under the NC Act and not Listed (delisted recently in December 2020) under the EPBC Act was identified in the south-eastern portion of the site. Refer to additional information below.

  The site was fully accessible at the time of the surveys. The ecology survey was conducted over approximately 200 ha. The PV power station was traversed by vehicle and on foot

- **Targeted Survey -** A subsequent survey was undertaken between 18-22 January 2021 (herein referred to as the **targeted survey**). This included a targeted protected plant survey, Koala (*Phascolarctos cinereus)* habitat survey, quaternary vegetation assessments1 and targeted Corben's long-eared bat (*Nyctophilus corbeni*) surveys.

  Fox & Co Environmental Pty Ltd (Fox & Co) partnered with the specialist Koala Detection Team (KDT) from the University of the Sunshine Coast (USC) to assist with Koala surveys for the Project Area. The KDT have provided a stand-alone report outlining the results of the Koala field assessment which includes mapping of presence/absence and the survey coverage area (Detection Dogs for Conservation, 2021). Fox & Co have subsequently prepared an assessment of the Koala habitat using the Koala Habitat Assessment Tool in accordance with the Matters of National Environmental Significance, Significant Impact Guidelines (1.1), Department of Environment (DoE), 2013 and the EPBC Act Referral Guidelines for the Vulnerable Koala, DoE, 2014 (Department of the Environment, 2013; Department of the Environment, 2014)

  The site was fully accessible at the time of the surveys. The ecology surveys were conducted over approximately 200 ha. The PV power station was traversed by vehicle and on foot.

- **BioCondition and Habitat Quality Assessment -** A BioCondition survey and habitat quality assessment was undertaken in the PV power station area between 24-27 May 2021 by Bruce McLennan (Principal Ecologist - Arcadian Ecology) (herein referred to as the **BioCondition survey**). This assessment was to verify RE mapping for the PV power station footprint of the Project area, identify any conservation significant species under the Queensland NC Act and Commonwealth EPBC Act and to identify and conduct BioCondition assessments as prescribed. Ecological values present within the study area were measured through the BioCondition assessment method. The data scores derived provide the baseline for deriving Terrestrial Habitat Quality through the *Guide to determining terrestrial habitat quality – Methods for assessing habitat quality under the Queensland*

[1] Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020) Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

Environmental Offsets Policy (DES 2020) as well as forming the basis for any offset calculator scoring of MNES offsets required under the EPBC Act;

- **Access Corridor Survey -** An additional ecological survey was undertaken between 24-27 May 2021 within the access corridor (herein referred to as the **access corridor survey**). The survey was conducted by Bruce McLennan (Principal Ecologist - Arcadian Ecology) and Ben Nottidge (Ecologist - Greenleaf Ecology). This was undertaken to ground-truth desktop information and identify any additional flora and fauna values.

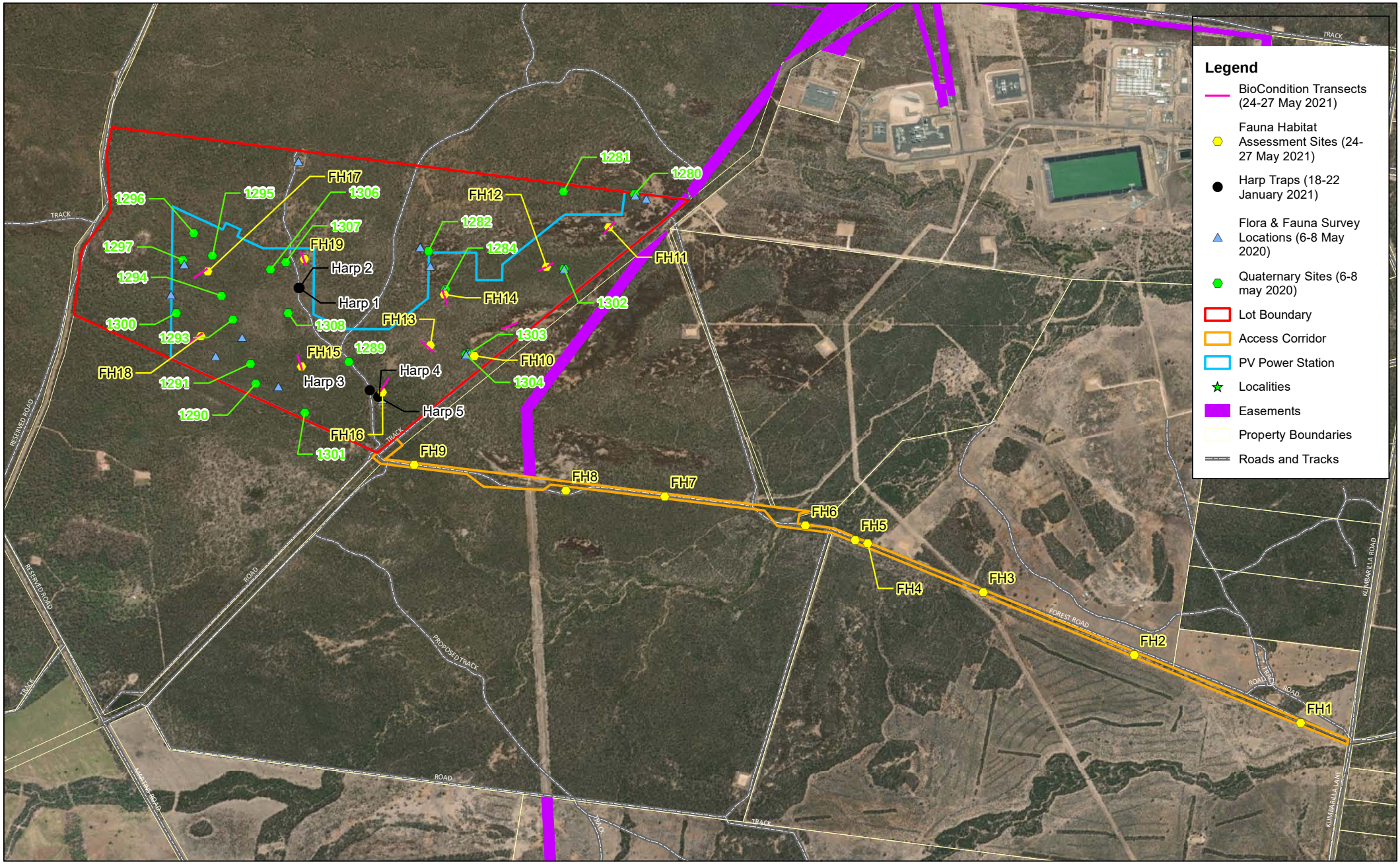
  The access corridor (approximately 22 ha) was fully accessible at the time of the surveys and was traversed by vehicle and by foot.

Data was collected using general site notes, photo points with waypoint references. The waypoints correlate to Quaternary Vegetation Assessment, RE assessments, Song Meter™, camera locations and general environmental points. Refer to Figure 4-1 for quaternary site locations and flora and fauna assessment locations. Survey methods included:

- **Quaternary Assessments -** Quaternary assessments at sites across the Project area were completed. Vegetation community assessment were undertaken using the quaternary level of assessment as described within the Methodology for survey and mapping of REs and vegetation communities in Queensland (Neldner, et al., 2020);
- **BioCondition Assessments** - Field surveys were undertaken to confirm the identity of REs and correct the mapping, collect BioCondition data and to conduct targeted searches for endangered, vulnerable and near threatened (EVNT) flora species across the proposed impact area. RE boundaries were assessed using the State RE mapping (Version 11, DR 2021), historical imagery from QImagery and the latest available aerial imagery for the area (Queensland Globe 2021) and field assessment results.

  Vegetation communities within 5 assigned assessment units were assessed at a total of 10 sites. A BioCondition and fauna habitat survey was conducted at each site. Further information on method is explained below in the Habitat Quality section.
- **Fauna Habitat Assessments** - Fauna surveys were undertaken at 12 locations within the PV power station area as part of the BioCondition survey and 9 within the access corridor as part of the access corridor survey. Comprehensive survey sites were 100 m x 50 m. Survey methods were consistent with those recommended in the 'Terrestrial Vertebrate Fauna Survey Guidelines for Queensland' (Eyre et al. 2014).
- **Opportunistic Fauna Observations** - Opportunistic fauna observations were recorded during all surveys;
- **Nocturnal surveys** - Completed during the preliminary survey 2 night with 2 people for approximately 12 hrs in total for nocturnal assessment);
- **Targeted Species Searches** - Targeted searches were undertaken for:
  - Golden-tailed geckos (*Strophurus taenicauda*) and reptiles through nocturnal surveys during the preliminary survey (2 nights/2 people - approximately 12 hrs in total for nocturnal assessments) and turning logs and debris in areas within the mapped Essential Habitat (EH) and also outside of these areas.
  - The presence of the NT listed Kogan Wax Flower which was discovered during the preliminary survey which triggered the targeted survey conducted on 21 February 2021 to assess the extent of the species. The flora surveys was prepared in accordance with the Flora Survey Guidelines – Protected Plants v2.01 (Department of Environment and Science, 2020).;
  - Koala surveys were conducted during the targeted survey with the assistance of Koala detection dogs to find evidence of Koala populations within the Project Area;
  - Bat surveys was undertaken over a five-night period during the targeted survey (18-22 January 2021).
  - As part of the access corridor survey, rigorous field searches were undertaken within suitable habitat for evidence of Koala, Greater Glider, Yakka Skink and Golden-tailed Gecko.

- **Bird Surveys –** Twenty-minute bird census surveys were undertaken over the entire survey period during the preliminary survey including around the onsite water bodies;
- **Remote Cameras** - three remote cameras were established over a two-night period during the preliminary survey; and
- **Song-meters** - three song-meters were deployed over a two-night period for microbats during the preliminary survey.



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Meters

1 cm = 220 meters

GCS GDA 1994 MGA Zone 56

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DATA SOURCE
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FIGURE 4-1

FLORA AND FAUNA SURVEY LOCATIONS

DRG Ref: **Figure 2 Flora and Fauna Survey Locations**

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Section 5 Existing Environmental Values

5.1 Land Systems

5.1.1 Topography

Topography across the PV power station ranges from 337.8m AHD to 442.1m AHD above sea level. Although there is over 100 m difference between the lowest and highest point, which is due to a small section containing a rocky outcrop, the area can be considered as flat with gently undulating areas from the southwest to the northeast (where the lowest point is located) (refer to Figure 5-1).

5.1.2 Land Use

The primary land uses in the vicinity of the Project area include Forestry/ Production Native Forests (i.e. Braemar State Forest) with coal-seam gas wells (north and west), Weranga State Forest (south east) and the Daandine State Forest (east) (refer to Figure 5-2). There is some cropping land to the south and some minor residential and farming infrastructure to the south west.

The proposed electricity sub-station to help facilitate the project is approximately 1km to the north of the Project connecting through proposed infrastructure along the existing easements.

5.1.3 Geology

5.1.3.1 Regional Setting

The Project is located in the Surat Basin Regional Mapping Extent. This basin is a large, mature intracratonic, early Jurassic to Albian (early Cretaceous) basin (Geoscience Australia 2021). The basin has a maximum sediment thickness of 2500 m and deposition was relatively continuous and widespread. The basin is generally flat-lying and sedimentation is widespread and relatively uniform (Geoscience Australia 2021).

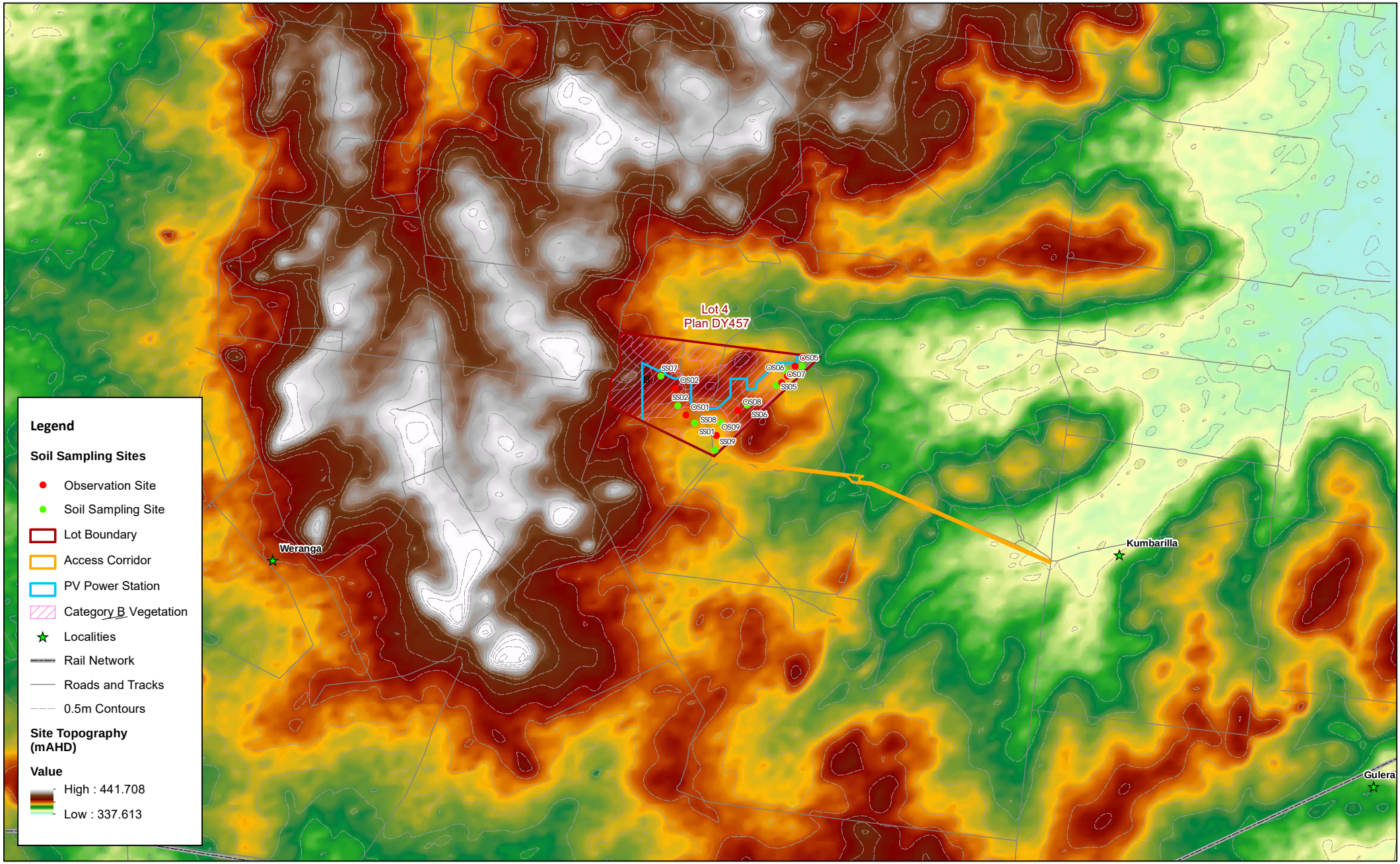
The Surat Basin is bordered in the east by the Auburn Arch and the New England Fold Belt. Between these two blocks it intertongues with the Moreton Basin across the Kumbarilla Ridge (Exon, 1967). To the west the Surat Basin interrelates with the Eromanga Basin across the Nebine Ridge and its broad southerly extension, the Cunnamulla Shelf (Exon, 1967). In the south it is bounded by the Central West Folded Belt, and in the north it has been eroded (Exon, 1967).

5.1.3.2 Surface Geology

The Project is located in the mid-central portion of the Surat Basin as shown on Figure 5-3. The detailed surface geology of the Project area summarised in Table 5-1.

Table 5-1 Detailed Surface Geology

Rock-Unit Name	Lithological Summary	Dominant Rock	Rock Type	Age
Qs-SQ	Sand, red sandy soil, silt and some gravel; floodout and sheet sand with some alluvium	Miscellaneous Unconsolidated Sediment	Stratified Unit (Including Volcanic and Metamorphic	Quaternary
Kumbarilla beds(w) (JKk(w)	Sandstone, siltstone, mudstone, conglomerate - kaolinized deeply weathered sediments	Arenite-Mudrock	Stratified Unit (Including Volcanic and Metamorphic)	Late Jurassic - Early Cretaceous



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Meters

1 cm = 570 meters

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FIGURE 5-1

TOPOGRAPHY

DRG Ref: **Figure 3 Topography**

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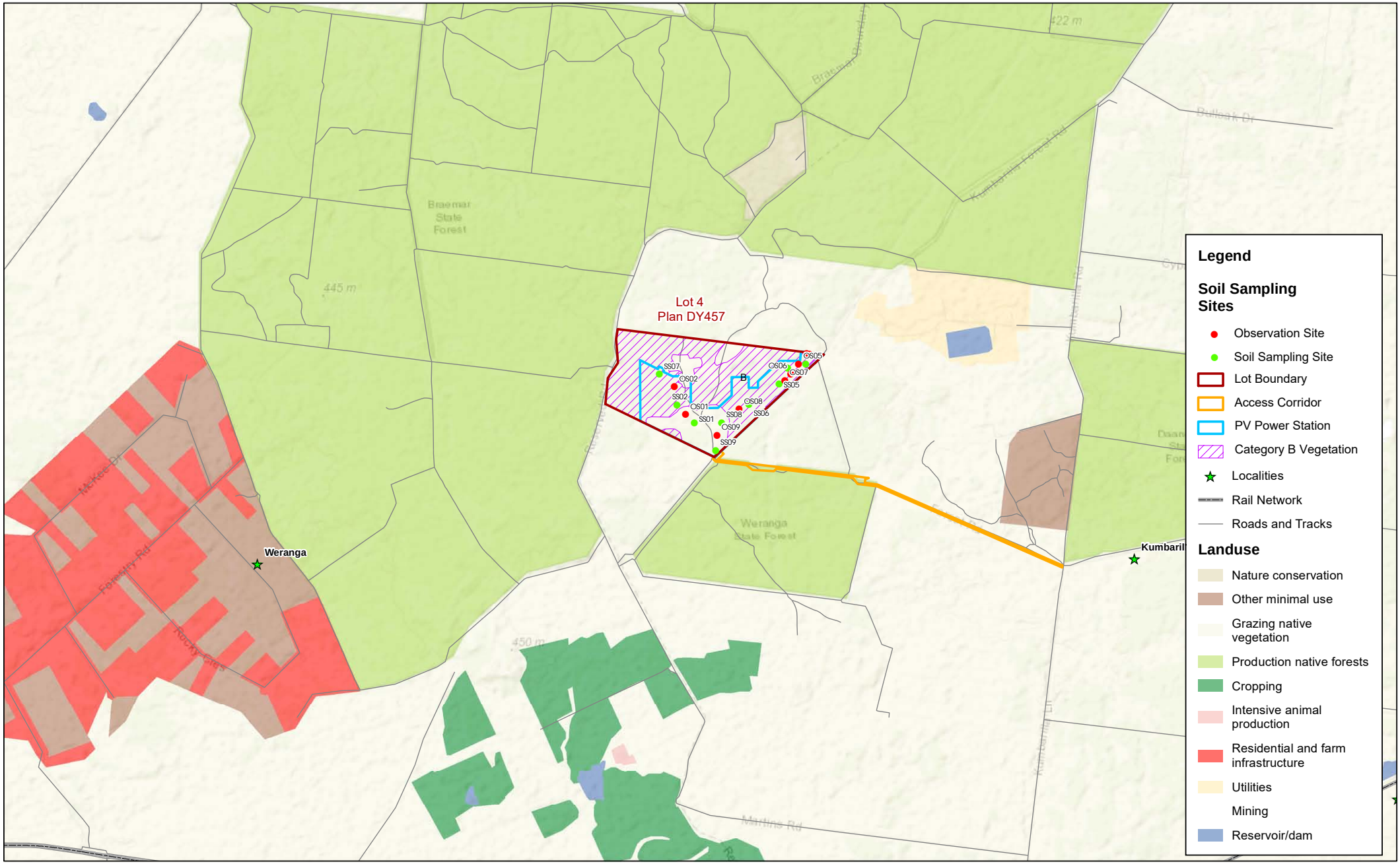

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FIGURE 5-2

LANDUSE

DRG Ref: **Figure 4 Landuse**

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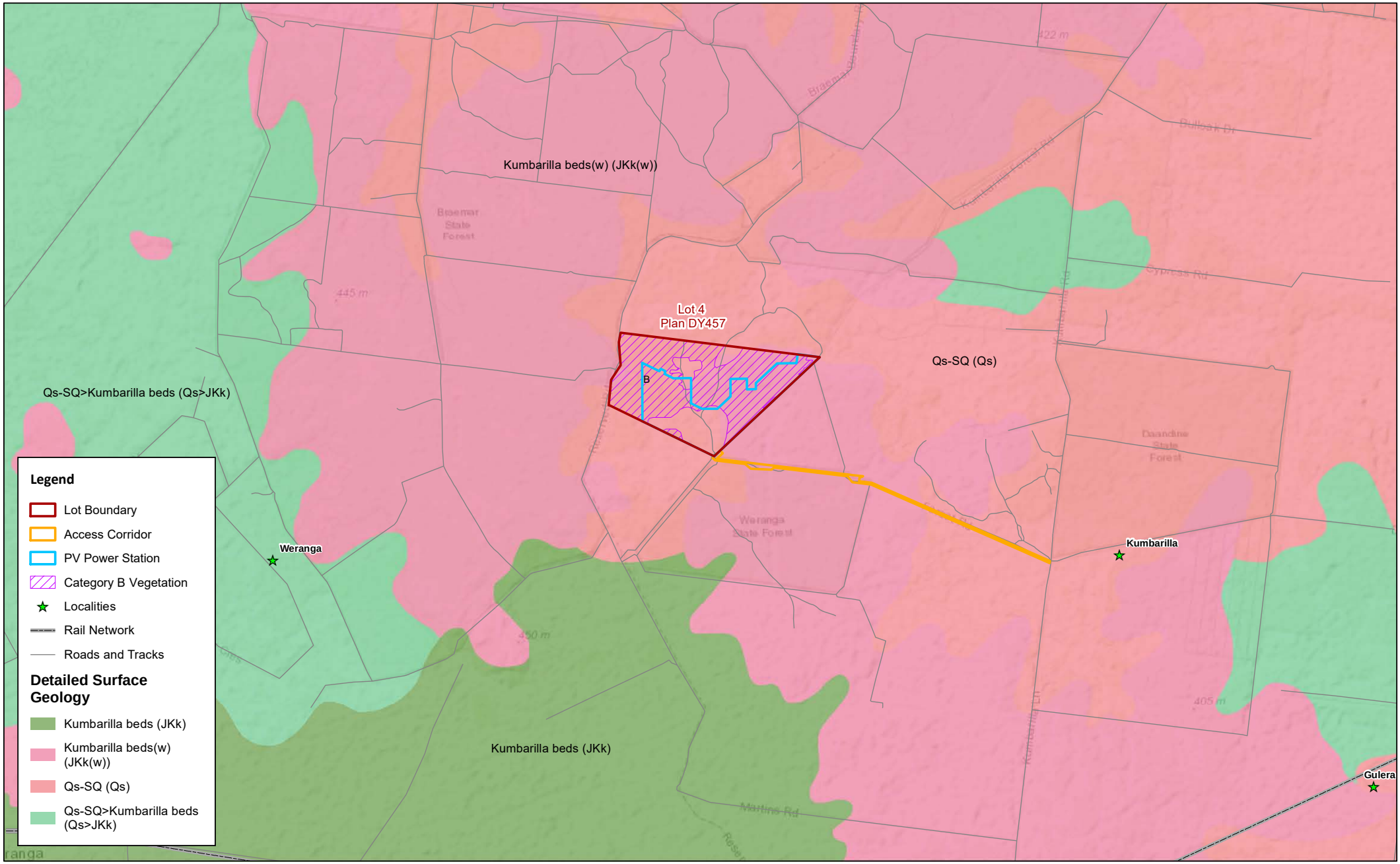

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Notes:

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Meters

1 cm = 570 meters

GCS GDA 1994 MGA Zone 56

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FIGURE 5-3

GEOLOGY

DRG Ref: **Figure 5 Geology**

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5.1.4 Soils

A soil mapping, sampling and characterisation exercise was undertaken for the PV power station. This was undertaken to acquire sufficient soil property data to inform the development of a Salinity Management Plan (SMP) and Erosion and Sediment Control Plan (ESCP) for the Project. It was completed to adequately assess the potential impacts that the Project may have on soils. The following assessments have been undertaken in the PV power station area:

- Desktop assessment, including review of publicly available literature, maps and resources relevant to the geology, soils and landforms in the Project area (this report and subsequent reporting); and
- Field assessment and laboratory analyses were undertaken focusing on characterisation of soils for land use suitability and potential rehabilitation (as required) to improve understanding of soils within the Project area. A detailed field soil survey of the Project area was conducted over a three-day period between 20 January 2021 and 22 January 2021.

Information provided below summarises findings of these assessments. Detailed soil profile descriptions were made at nine sites in the Project area (shown as the soil sample locations in Figure 5-4). The detailed sites were augured to the second profile change or until refusal was reached. Soil sampling of profiles was conducted as per the Guidelines for Surveying Soil and Land Resources (McKenzie et al. 2008).

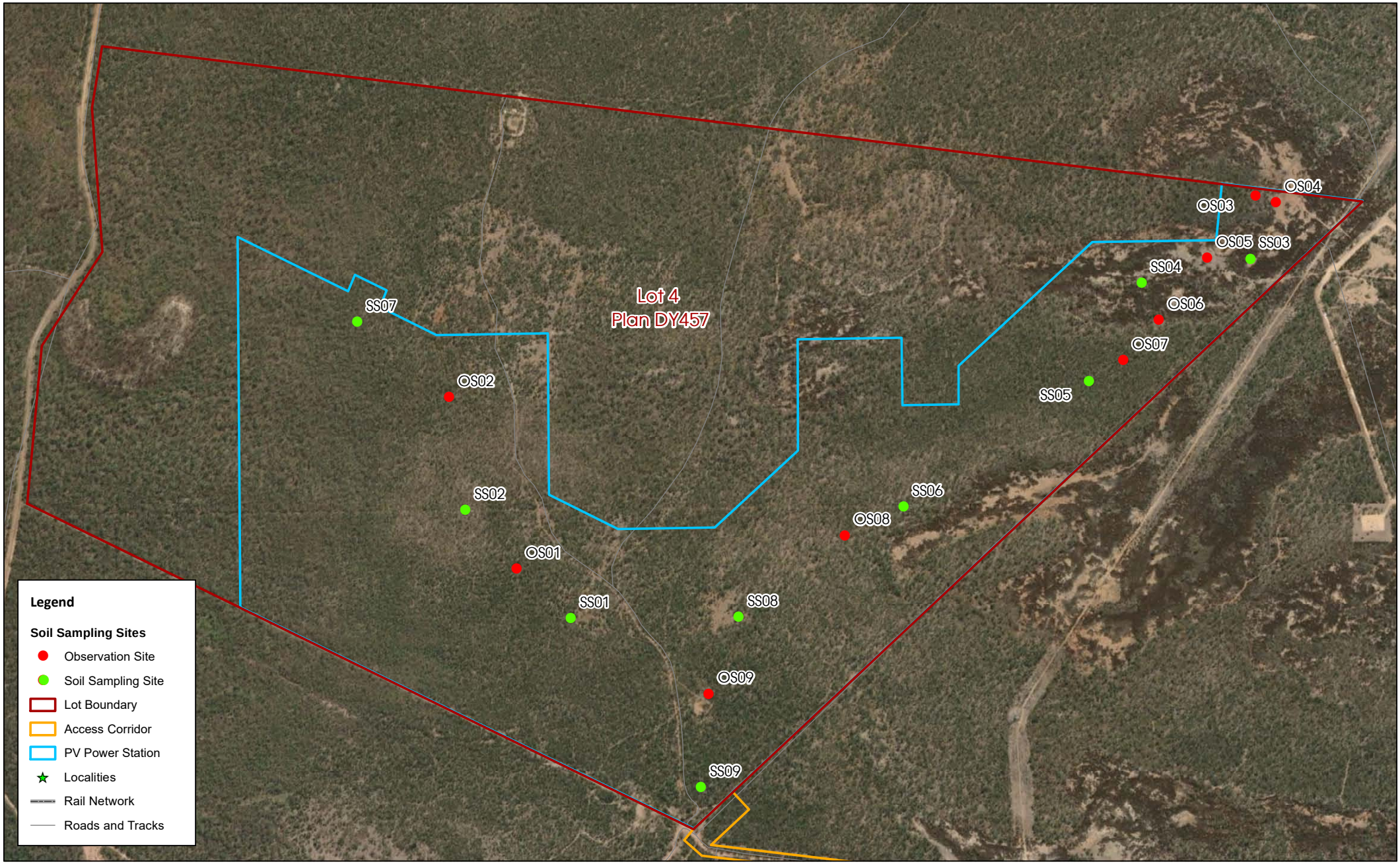
5.1.4.1 Desktop Assessment Summary

An assessment of publicly available soil mapping data provides an indication of relevant soil types across and surrounding the Project area. Results from the desktop assessment as they relate to soils and landforms show the majority of the Project area mapped as landscape unit Va24 (Isbell 2002) which are gently undulating plains with soil type characterised by duplex yellow-grey, hard setting soils. Areas to the north east are Fz3 which are low hills and dissected low ranges with the soil type characterised as uniform medium soils (see Figure 5-5).

Chromosols and Kurosols are mapped as the dominant soil types across the site (see Figure 5-6). These are different to the type of soil identified as part of the field assessment as indicated in Section 4. Sodosols as identified during the field assessment also occur in the area. See a general description of these from the Australian Soil Classification below:

- **Kuroso**l: Soils other than Hydrosols[2] with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is strongly acid;
- **Chromosol**: Soils other than Hydrosols with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is not sodic and not strongly acid. Soils with strongly subplastic upper B2 horizons are also included even if they are sodic; and
- **Sodosol:** Soils with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2m thick) is sodic and not strongly acid. Hydrosols and soils with strongly subplastic upper B2 horizons are excluded.

[2] Hydrosols are soils that are saturated with water for long periods of time—typically a grey (or greenish-grey) colour. This soil type covers less than 1% of the state and is mainly found near coastal areas. However, many inland wetlands are dominated by Hydrosols even though these areas may only be intermittently inundated.



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0 100 200 400

Meters

1 cm = 90 meters

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FIGURE 5-4

SOIL SAMPLING
LOCATION SITES AND
OBSERVATION SITES

DRG Ref: **Figure 2 Detailed Sampling Locations**

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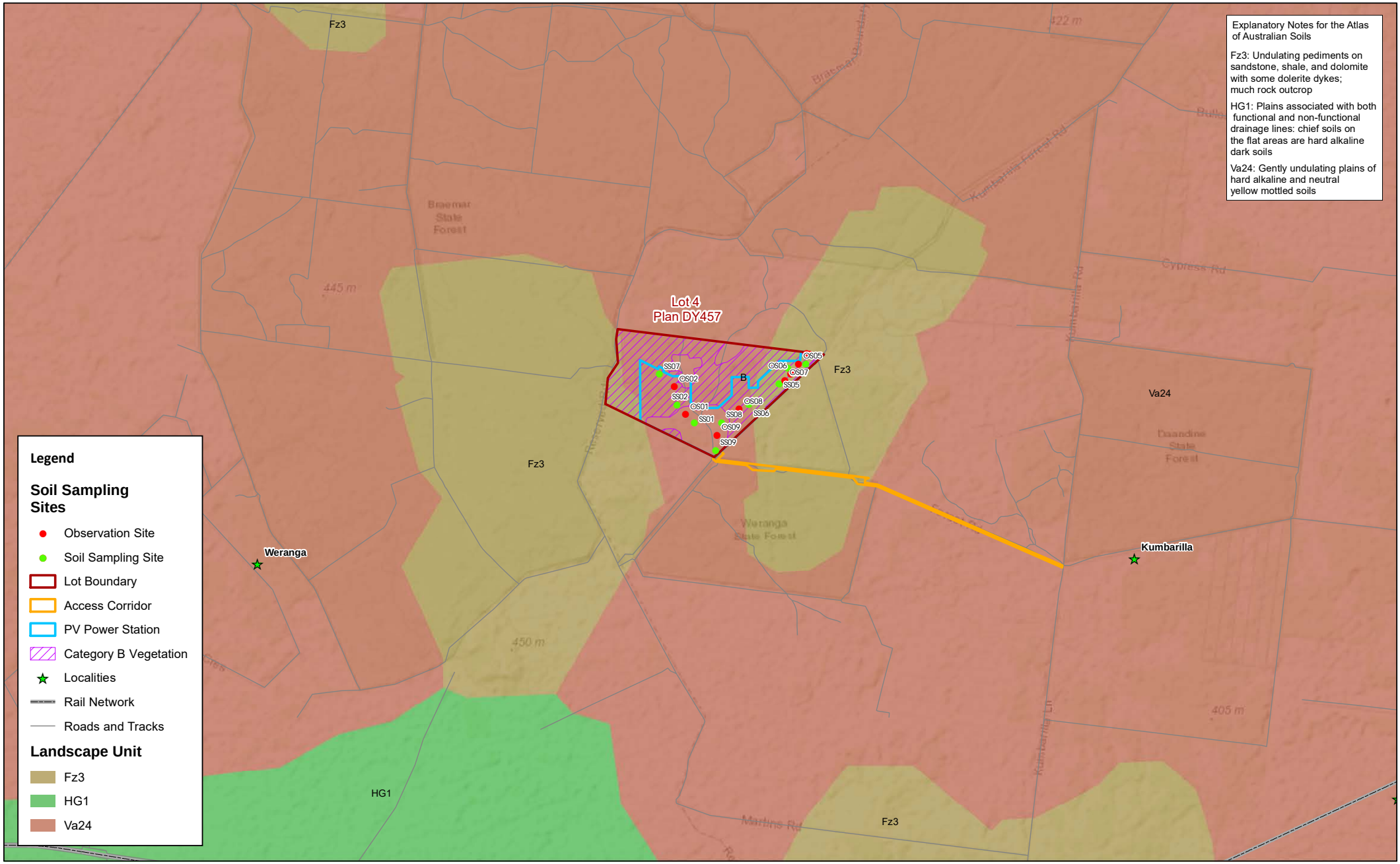

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Notes:

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0 600 1,200 2,400

Meters

1 cm = 550 meters

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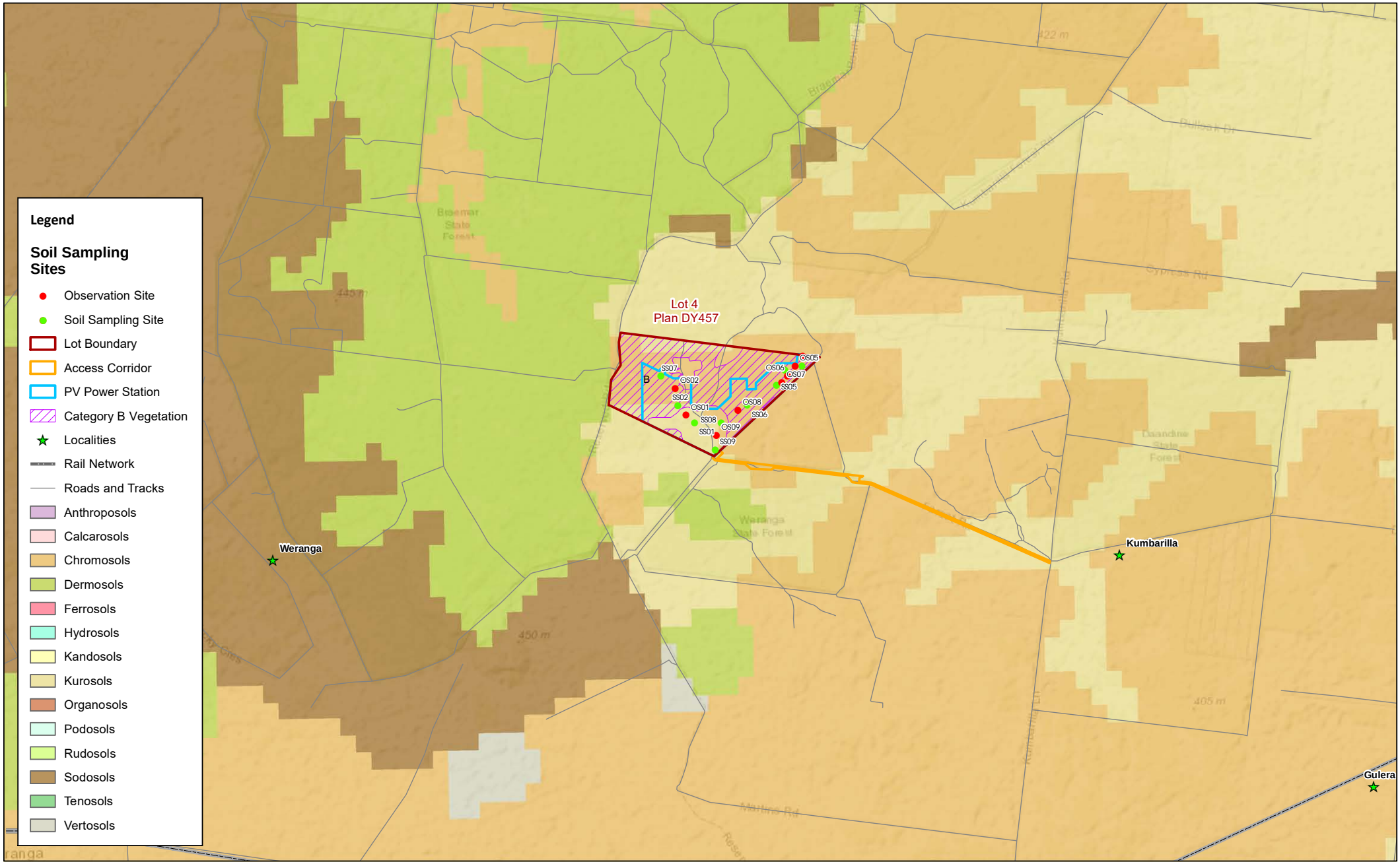
FIGURE 5-5

PROJECT MAPPED LANDSCAPE UNITS

DRG Ref: **Figure 6 Project Mapped Landscape Units**

P:\Project\1000525 - Dalby Solar Farm\02 MXD\July 2021\Figure 6 Project Mapped Landscape Units.mxd



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N

0 600 1,200 2,400
Meters
1 cm = 570 meters
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FIGURE 5-6

MAPPED
DOMINANT SOILS

DRG Ref: **Figure 7 Mapped Dominant Soils**

P:\Project\1000525 - Dalby Solar Farm\02 MXD\July 2021\Figure 7 Mapped Dominant Soils.mxd

5.1.4.2 Field Assessment Summary

Nine soil samples were collected (SS01 – SS09) and 9 soil observations undertaken (OS01 to OS09). The description of each of the full soil samples are included in the soils report.

Evidence of sodicity was encountered at several sites, resulting in a reclassification of the mapped units (defined by the desktop mapping) from kurosols or chromosols into sodosols. The field investigation has identified Sodosol and Kurosol soil throughout the Project area which have been subdivided by colour into brown sodosol and brown kurosol.

A summary of the field-based soil types has been provided in Table 5-2.

Table 5-2 Field Based Soil Summary

Soil Properties	Brown Sodosol	Brown Kurosol
Soil Physical Properties		
Texture	Increase in clay throughout profiles	Increase in clay throughout profiles
Permeability	Generally permeable. Some drainage issues possible given high clay content.	Generally permeable. Some drainage issues possible given high clay content.
Soil Erosion Susceptibility	High soil erosion susceptibility	High soil erosion susceptibility
Soil Chemical Properties		
pH	Strongly Acidic	Strongly Acidic
Salinity	Very Low to Very High	Low to Medium
Sodicity	Strongly sodic	Sodic
Cation Exchange Capacity	Very Low to Medium	Very Low to Medium
Total Organic Carbon	Low to Medium	Medium

Soil Salinity

This soil sampling program was largely done to assess soil salinity issues onsite. As indicated by soil analysis, soils across the site are non-saline. This indicates that areas of high salinity are unlikely to be encountered throughout the site. The following sites and their salinity results are included below, these are the sites that are located on or near the potential salinity expression areas:

- SS03:
  - 0.0 – 0.1 m : Medium salinity rating
- SS04
  - 0.01-0.3 : Very Low salinity rating
- SS05
  - 0.15 m : Very Low salinity rating
  - 0.3 – 0.4 m : Medium salinity rating
- SS06
  - 0.0 – 0.15 m : Medium salinity rating
  - 0.25 – 0.45 m : Low salinity rating

Topsoils were generally non-saline and salinity profiles were indicative of downwards leaching processes (with some salt accumulation in subsoils) as opposed to an upwards migration of salt which would result in saline surface soils. Shallow groundwater or evidence of shallow groundwater was not encountered.

As such, it is not expected that salinity expression areas will be encountered onsite. It is suggested the requirement for the preparation of a SMP be discussed with the department as it is not thought that this is required.

Soil Erosion Susceptibility

Given their sodicity and high dispersion potential, soils within the PV power station area appear to be susceptible to dispersion and erosion on disturbance.

Therefore, an ESCP prepared by a Certified Professional in Erosion and Sediment Control (CPESC), will be developed for the construction and operation phases of the Project. The plan will need to consider and address the variables in a seasonal context to measure (using the Revised Universal Soil Loss Equation) and manage the risk of soil erosion from all activities associated with the Project. Soil conservation and site rehabilitation shall also be integrated into the detailed ESCP.

The site's erosion hazard and erosion risk are considered important in determining the appropriate erosion and sediment controls (ESC) to be implemented as part of the Project's construction and operation phases. Soil erosion hazard can be described as the susceptibility of a parcel of land to the prevailing agents of erosion, and soil erosion risk is the likelihood of environmental harm occurring due to disturbance activities of the Project.

An assessment of soil erosion susceptibility is provided in Table 5-3, which lists influencing factors for each soil type that has been field classified.

Table 5-3 Soil Erosion Susceptibility

Soil Order	Sodicity	Texture	Landform	Vegetation cover	Erosion susceptibility
Brown Sodosol	Sodic	Clay Loam	Flat with gently undulating areas.	Buffel Grass dominated grassland on clay soils (land zone 9). Occasional regrowth Brigalow and semi-evergreen vine thicket species.	Low to medium susceptibility due to clay texture and flat terrain
Brown Kurosol	Sodic	Clay Loam	Flat with gently undulating areas.	Buffel Grass dominated grassland on clay soils (land zone 9). Occasional regrowth Brigalow and semi-evergreen vine thicket species.	Low to medium susceptibility due to clay texture and flat terrain

As the Project area is in a humid subtropical climate, soil erosion management shall be undertaken in a two-season approach - wet season (October to March) and dry season (April to September). The erosion hazard based on average monthly rainfall depth (recorded for nearby weather stations) referenced from the International Erosion Control Association (IECA) – Best Practice Erosion and Sediment Control Guidelines (IECA 2008) is described in Table 5-4.

Table 5-4 Erosion Hazard Based on Average Monthly Rainfall Depth (Dalby)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Moderate	Moderate	Moderate	Low	Low	Low	Low	V Low	Low	Moderate	Moderate	High

Source: IECA 2008 Table 4.4.5

5.2 Ecology Desktop Review

5.2.1 Matters of National Environmental Significance

The PMST identified the following MNES potentially occurring in the Project area within a 5 km radius of the Project area (refer to **Appendix E)**:

- Five Threatened Ecological Communities (TECs);
- Ten threatened flora species and 22 threatened fauna species; and
- 13 migratory bird species.

Other MNES are summarised below:

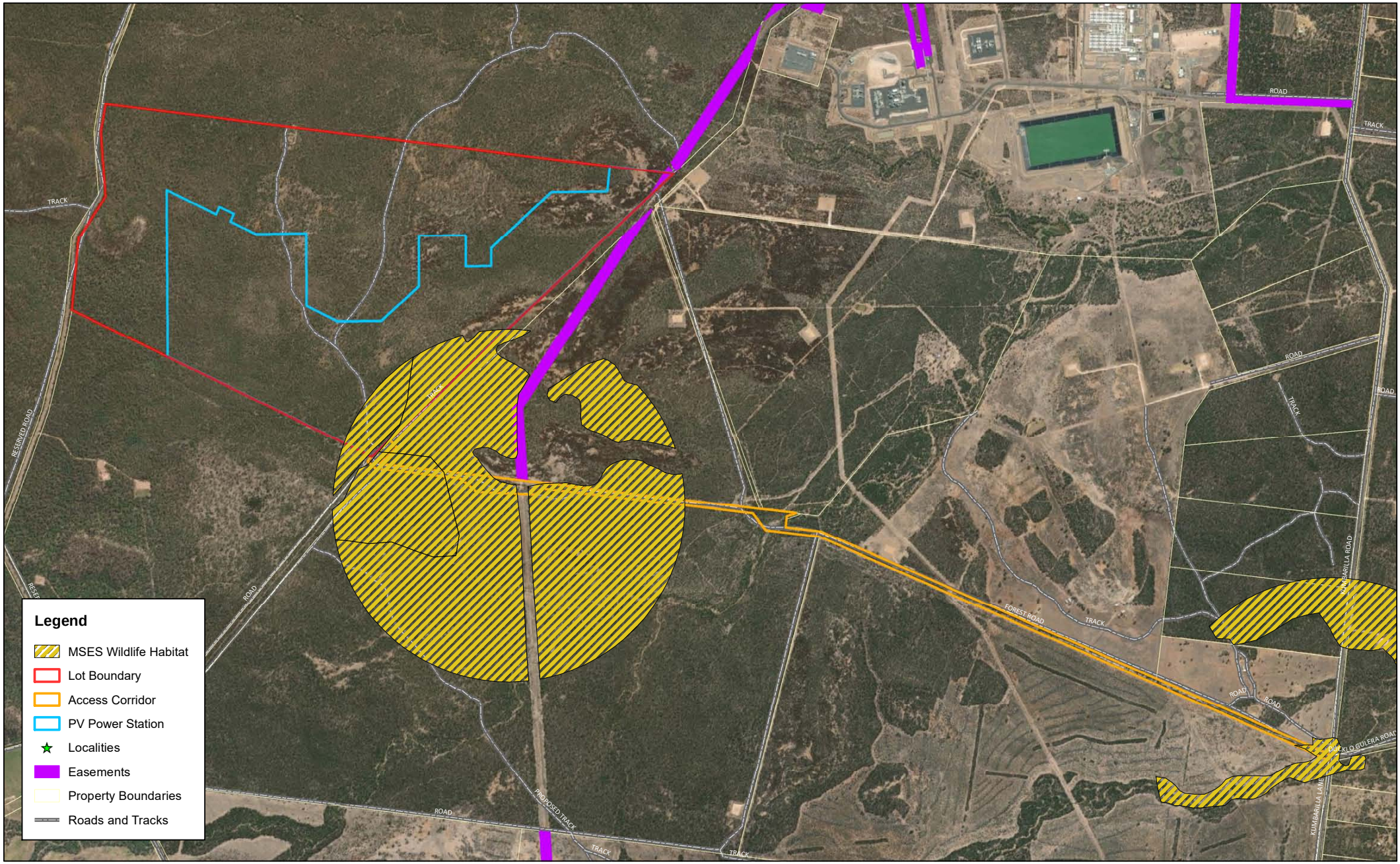
- There are no World Heritage Properties;
- There are no National Heritage Places;
- There are four Wetlands of International Importance, being:
  - Banrock station wetland complex: 1200 - 1300km
  - Narran lake nature reserve: 400 - 500km upstream
  - Riverland: 1100 - 1200km
  - The Coorong, and Lakes Alexandrina and albert wetland: 1400 - 1500km
- There are no Great Barrier Reef Marine Parks.

The EPBC Act PMST results are included at **Appendix E.**

5.2.2 Matters of State Environmental Significance

The DES maintains a mapping database of MSES as a guide to assist the planning and development decision-making process. Schedule 2 of the Environmental Offsets Regulation 2014 lists prescribed environmental matters that may require offsets for resource activities. As shown on Figure 5-7 there is an area mapped as MSES Wildlife Habitat, which indicates wildlife habitat for threatened and special least concerned animals.

As shown on Figure 5-8, regulated vegetation essential habitat is located in south-east corner of the Project area and in the north-east corner of the Project area. There are also areas of Regulated Vegetation, Category B Endangered or Of Concern mapped within the Project area (Figure 5-8).



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APPROVED	SM	DATE	02/08/21
Notes:			

N

0 220 440 880

Meters

1 cm = 200 meters

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FIGURE 5-7

MSES - WILDLIFE HABITAT

DRG Ref: **Figure 4-1 MSES - Wildlife Habitat**

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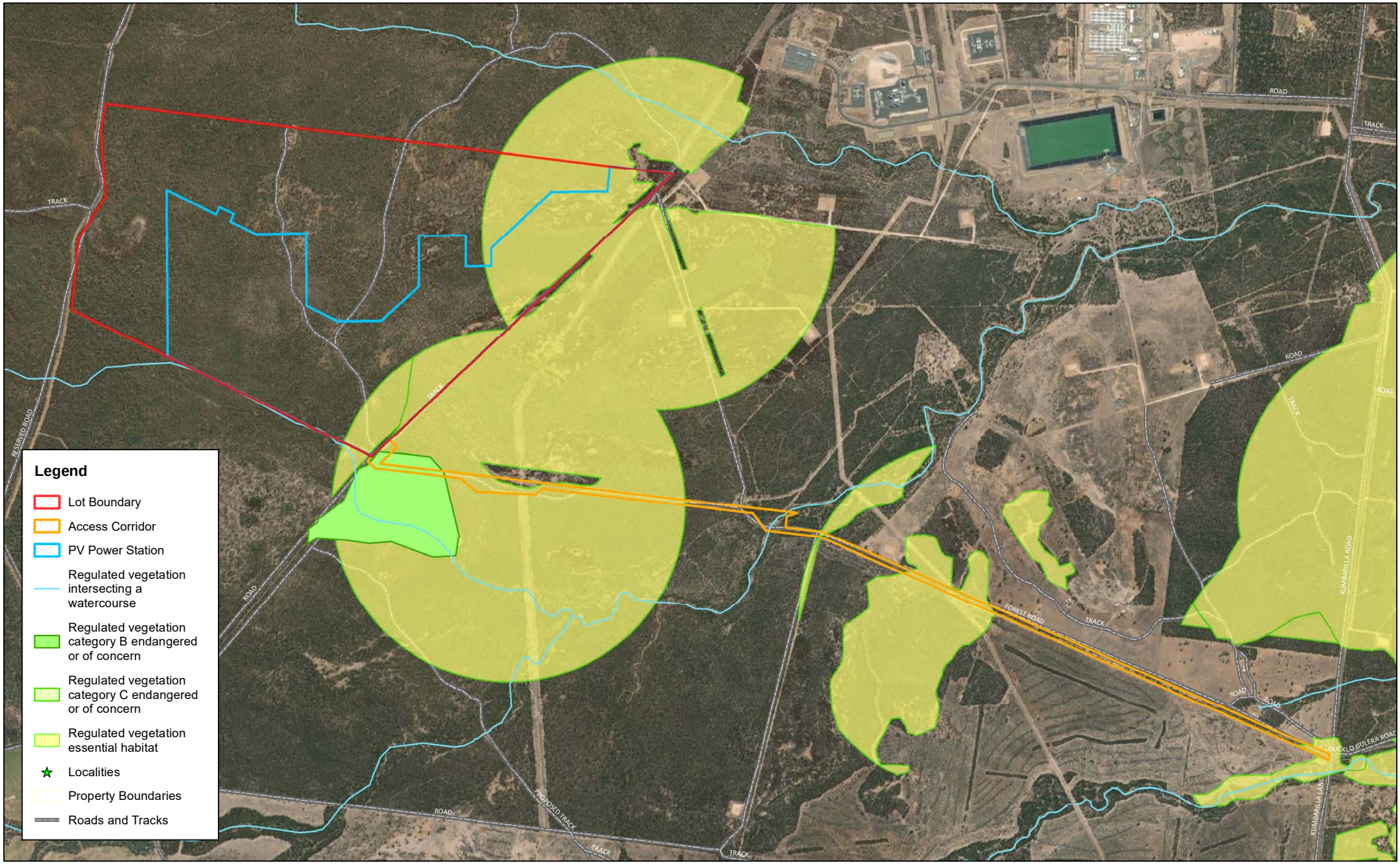

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FIGURE 5-8

MSES - REGULATED VEGETATION

DRG Ref: **Figure 4-2 MSES - Regulated Vegetation**

P:\Project\1000525 - Dalby Solar Farm\02 MXD\July 2021\Figure 4-2 MSES - Regulated Vegetation.mxd

5.2.3 Threatened Ecological Communities

The PMST identified five TEC as having potential to occur within a 25 km radius of the Project area, including:

- Brigalow (*Acacia harpophylla* dominant and codominant);
- Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions;
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland;
- Poplar Box Grassy Woodland on Alluvial Plains; and
- Weeping Myall Woodlands.

5.2.4 Regional Ecosystems

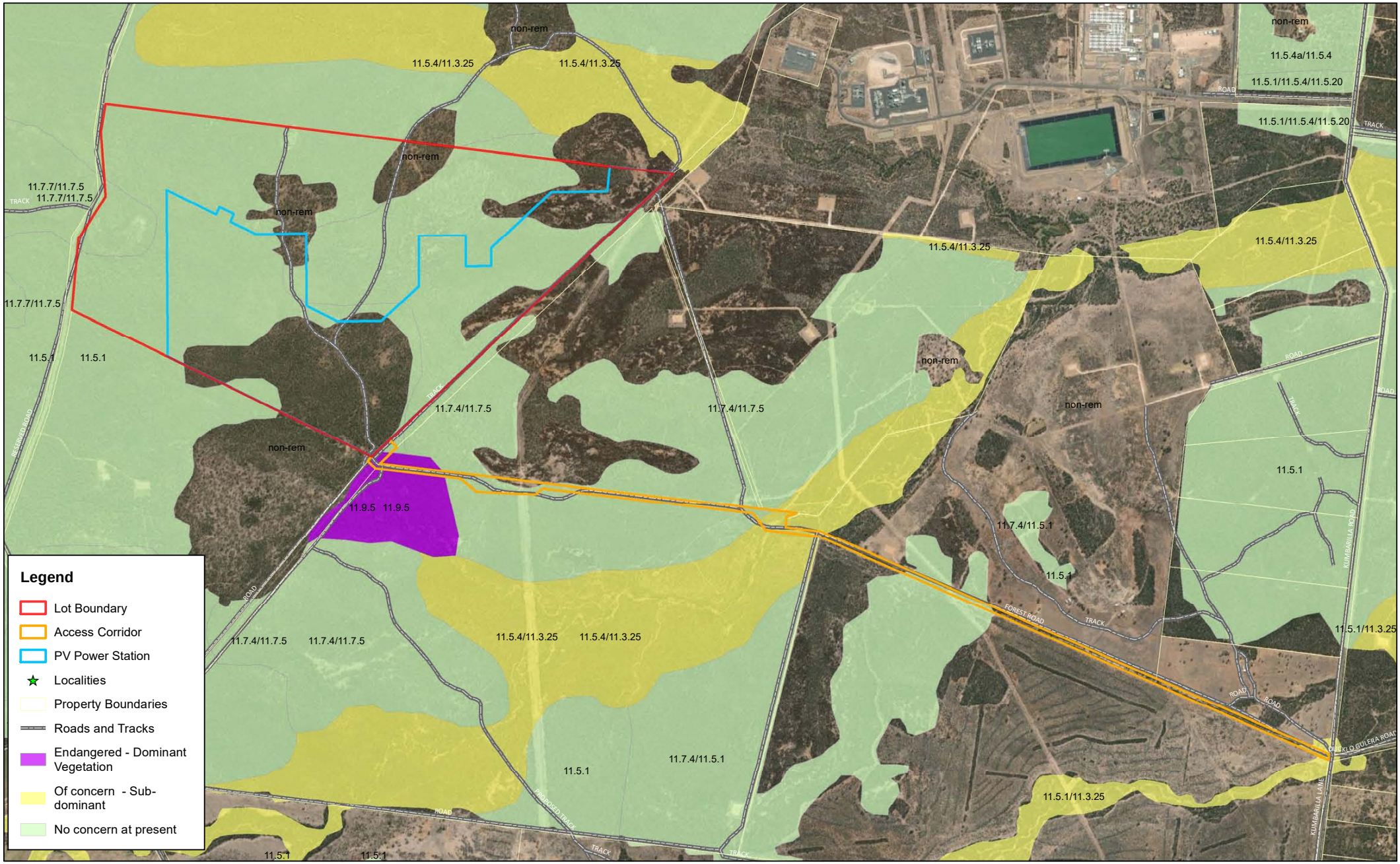
A list of REs considered to have potential to occur within the assessment area based on the desktop study is provided in Table 5-5. These are shown on Figure 5-9 and Figure 5-10.

Table 5-5 Mapped Regional Ecosystems within and surrounding the Project area

RE	VM Act Status	Biodiversity Status	Description
11.3.25	Least Concern	Of Concern	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines
11.5.1	Least Concern	No concern at present	*Eucalyptus crebra* and/or *E. populnea, Callitris glaucophylla*, *Angophora leiocarpa*, *Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces
11.5.4	Least Concern	No Concern at present	*Eucalyptus crebra* and/or *E. populnea, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces.
11.7.4	Least Concern	No concern at present	*Eucalyptus decorticans* and/or *Eucalyptus spp., Corymbia spp., Acacia spp., Lysicarpus angustifolius* woodland on Cainozoic lateritic duricrust
11.7.5	Least Concern	No concern at present	Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks
11.7.7	Least Concern	No concern at present	*Eucalyptus fibrosa subsp. nubilis +/- Corymbia spp. +/- Eucalyptus* spp. woodland on Cainozoic lateritic duricrust
11.9.5	Endangered	Endangered	*Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks.
Non-remnant	None	None	None

5.2.5 Protected Plants Flora Survey Trigger Map

The Project area does not intersect any areas mapped under the Protected Plants Survey Trigger Mapping administered by DES.



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Meters

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FIGURE 5-9

REGIONAL ECOSYSTEMS (BIODIVERSITY STATUS)

DRG Ref: **Figure 4-4**

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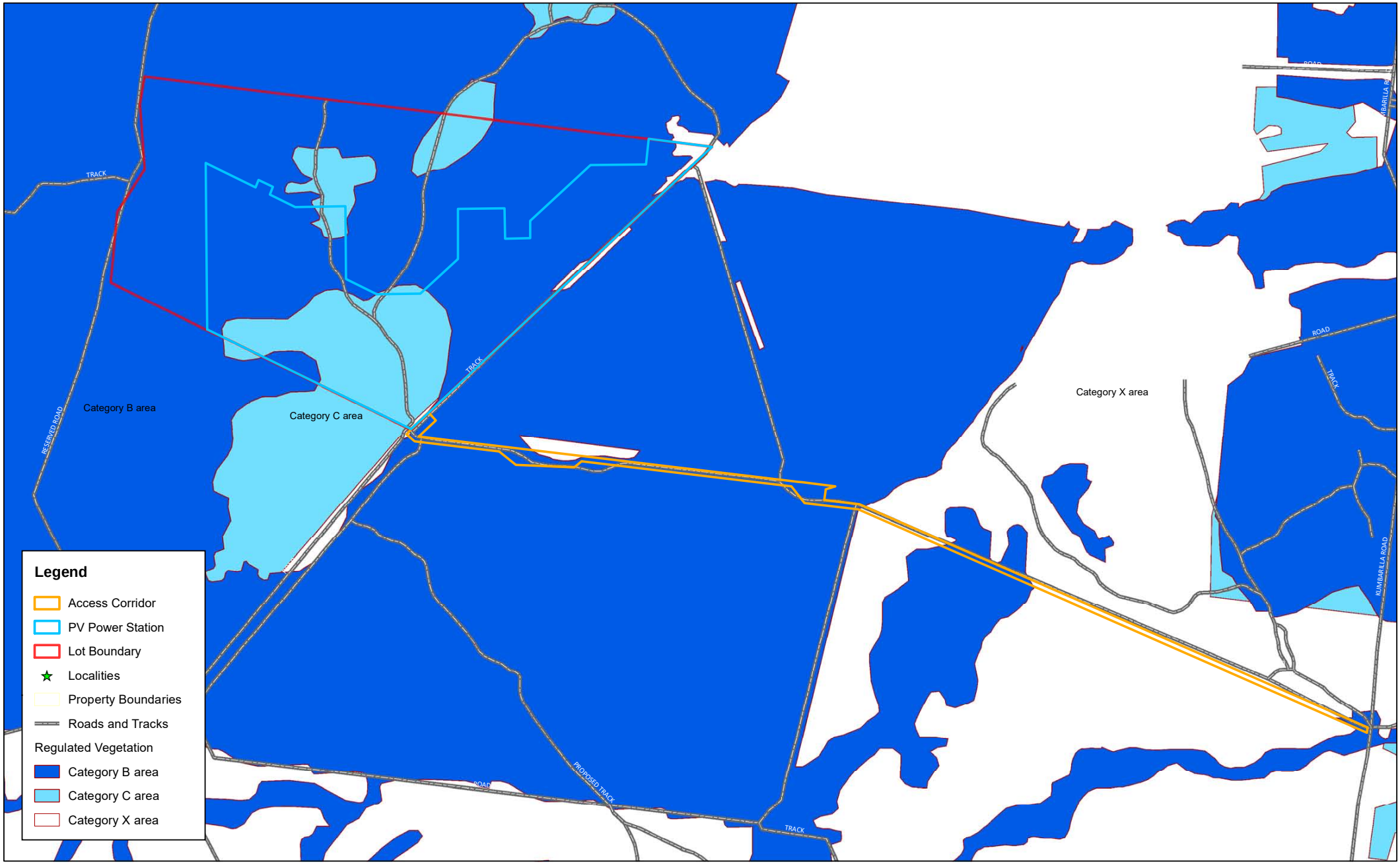

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FIGURE 5-10

REGIONAL ECOSYSTEMS (VEGETATION MANAGEMENT ACT)

DRG Ref: **Figure 4-5 Regional Ecosystems VMA**

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5.2.6 Terrestrial Flora

A total of 246 flora species are known to occur within a 25 km radius of the Project area (based on the Wildlife Online database search). Sixteen conservation significant flora species are known or predicted to occur within a 25 km radius of the Project area based on the database searches (EPBC PMST (**Appendix E**) and Wildlife Online (**Appendix F**)).

Section 5.3.5 outlines the relevant conservation significant species and their likelihood of occurring on site based on the presence of suitable habitat on site and historical records.

5.2.7 Weed Species

The PMST identified seven Weeds of National Significance (WoNS) as having the potential to occur in the Project area (Table 5-6). All of these species are also listed as Restricted Matters under the Biosecurity Act.

An additional 12 introduced plant species were recorded on the Wildnet database within the 25 km buffered radius of the site. This includes one WoNS listed species and 5 other species listed as Restricted Matters under the Biosecurity Act.

Table 5-6 Weed Species

Species name	Common name	WoNS	Restricted Matter	Wildnet record
Bryophyllum delagoense	Mother of Millions		*	*
Harrisia sp.	Harrisia cactus		*	*
Lantana camera	Lantana	*	*	*
Lycium ferocissmum	African Boxthorn	*	*	*
Opuntia spp.	Prickly pear	*	*	*
Parthenium hysterophorus	Parthenium	*	*	
Pinus radiata	Radiata Pine	*	*	
Prosopis sp.	Mesquite	*	*	
Salvinia molesta	Salvinia	*	*	
Solanum elaeagnifolium	Night shade	*	*	*

5.2.8 Terrestrial Fauna

A total of 398 species of terrestrial vertebrate are known to occur within a 25 km radius of the site (based on the Wildlife Online database search), comprising 30 frogs, 95 reptiles, 219 birds and 54 mammal species **(Appendix F**).

Refer to Section 5.3.5 for a list of the relevant conservation significant species.

A total of 13 bird species listed as Migratory species under the EPBC Act (with Migratory species also being listed as Special Least Concern under the NC Act) are predicted to occur. Of these, 10 species are known to occur within a 25 km radius of the site based on the records in the Wildlife Online database.

According to desktop review, 36 conservation significant and migratory fauna within a 25km radius of the Project area (EPBC PMST and Wildlife Online database search) are noted. The following conservation significant and migratory fauna species were identified (refer to Section 5.3.5 for further information)

- Ten species of birds;
- Seven species of mammals;
- Six species of reptiles;

- 11 listed migratory species (birds not included above); and
- One listed marine species (bird – not included above).

5.2.9 Pest Fauna Species

Database (EPBC Act PMST and Wildlife online) searches of the surrounding area encountered records of 17 introduced terrestrial fauna species. Three of these species are also listed as Restricted Matters under the Biosecurity Act (Table 5-7). Under the Act, a person who has control over a 'Restricted Matter' must not do the following:

- Category 3 – a person who has, or has a thing infested with, the 'Restricted Matter' in the person's possession or under the person's control must not distribute or dispose of the restricted matter unless the distribution or disposal is carried out via the methods set out in the Biosecurity Act;
- Category 4 – move the 'Restricted Matter', or cause or allow to be moved;
- Category 5 – keep in the person's possession or under the person' control; and
- Category 6 – give food to the 'Restricted Matter'.

Table 5-7 Introduced Fauna Species Known from the Project and Surrounding Areas

Species name	Common name	Biosecurity Act Category Numbers
Rhinella marina	cane toad	-
Columba livia	rock dove	-
Streptopelia chinensis	spotted dove	-
Passer domesticus	house sparrow	-
Sturnus vulgaris	common starling	-
Acridotheres tristis	common myna	-
Danaus plexippus	monarch	-
Capra hircus	wild goat	-
Canis sp.	wild dog	-
Vulpes vulpes	European red fox	-
Canis familiaris	dog	Categories 3,4,6
Felis catus	cat	Categories 3,4,6
Lepus europaeus	European brown hare	-
Oryctolagus cuniculus	rabbit	-
Mus musculus	house mouse	-
Rattus rattus	black rat	-
Sus scrofa	feral pig	Categories 3,4,6

5.3 Ecology Field Survey Results

5.3.1 Threatened Ecological Communities

Field surveys confirmed the Project area did not contain any TEC protected under the EPBC Act. A polygon of RE 11.9.5 (*Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks) which as mapped in the southern part of the Project area has been incorrectly mapped (see Section 5.3.2). No vegetation corresponding to any EPBC listed TEC was observed within the PV power station or access corridor.

5.3.2 Regional Ecosystems

The vegetation across the PV power station component of the Project area is generally Least Concern RE 11.5.1. Some areas mapped as remnant least concern is considered high value regrowth – mostly in the western portion of the Project area. All vegetation communities are Least Concern. The small area of Endangered RE (RE 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks) along the southern portion of the Lot which is mapped on State mapping was ground-truthed and determined to be incorrect.

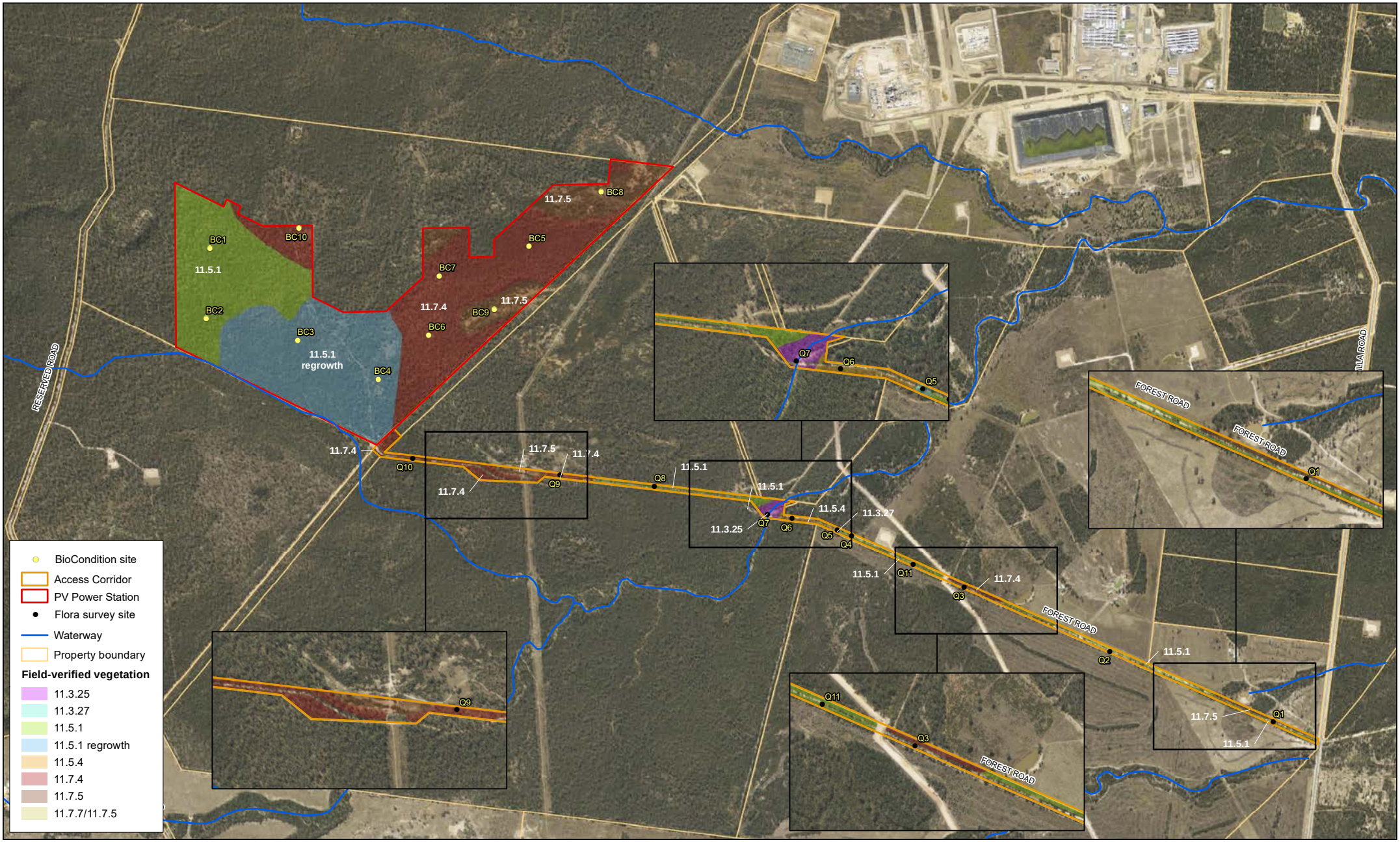
Key changes identified in the BioCondition assessment are below with corrected mapping shown on Figure 5-11 and areas brown shown in Table 5-8.

- Areas previously mapped as RE 11.7.4/11.7.5 high value regrowth (HVR) were determined to be RE 11.7.5 remnant. Historical aerial imagery suggested that those areas had never been cleared which was confirmed by field verification. The areas of RE 11.7.5 (three scald areas) were used to form BioCondition Assessment Unit (AU) 1;
- The area previously mapped as Category X and more recently as HVR RE 11.5.1 was assessed, at a desktop level, likely to be advanced regrowth. Historical aerial imagery revealed that the area had been previously cleared but now was likely to be advanced regrowth around 50 years age. Structurally the area was sparser than the remnant area of RE 11.5.1 to the west but not significantly different. The two subsequent BioCondition sites recorded within this polygon confirmed that the area was sufficiently regrown to meet the 50/70 rule for remnant vegetation in that the canopy cover had reached 50% of the remnant benchmark and canopy height had reached 70 % of the remnant benchmark. This area was used to form AU 3. The BioCondition scores for this AU were higher than for the remnant RE 11.5.1 unit, AU 5.
- The area previously mapped as RE 11.7.4/11.7.5 was determined to be exclusively RE 11.7.4. The ground truthed polygon boundary was roughly consistent with the state mapped boundary, however there is room to suggest that much of the mapped RE 11.7.4 could have been mapped as RE 11.5.1. Both REs are structurally similar and contain similar species in this locality. Structurally, RE 11.5.1 often contains a denser subcanopy dominated by bull oak whereas RE 11.7.4 has a subcanopy containing a higher diversity of species but often containing bull oak. Geologically, the difference between Landzone 7 and Landzone 5 is based on soil depth (Wilson and Taylor 2012). Landzone 7 soils are generally restricted to 0.5 m whereas Landzone 5 soils are deeper than 0.5 m. Further refining of the mapping could be done by testing soil depths, however there are only minor differences in the benchmarks between the two ecosystems and it is doubtful there would be a significant difference using either benchmark. This area was used to form AU 2;
- A small area previously mapped as high value regrowth RE 11.5.1 was determined to be more consistent with high value regrowth RE 11.7.4. This patch was used to form AU 4.
- The area of remnant RE 11.5.1 was confirmed to be correctly mapped and formed AU 5.

Six REs were verified as occurring along the length of the access corridor including RE 11.3.25, 11.3.27, 11.5.1, 11.5.4, 11.7.4 and 11.7.5. These REs were observed to be in average to good condition with little apparent edge effect from adjacent clearing and the road corridor, in most parts. Ecological function has been limited due to the narrow nature of the vegetation though it would be considered a useful corridor for wildlife movement due to the low traffic volume on the road.

Table 5-8 Ground-truthed Regional Ecosystems

Regional Ecosystem	Project Component (ha)		
	PV power station	Access Corridor	Total (Project Area)
11.3.25	-	1.2	1.2
11.3.27	-	0.1	0.1
11.5.1	45.9	6.8	52.7
11.5.1 regrowth	58.7	0.0	58.8
11.5.4	-	0.7	0.7
11.7.4	63.3	5.2	68.5
11.7.5	22.9	1.9	24.8
Non-remnant	-	5.7	5.7



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GCS GDA 1994 MGA Zone 55

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Figure 5-11

FIELD-VERIFIED VEGETATION

DRG Ref: FIG X-XX GT_Vegetation

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5.3.3 Terrestrial Flora

Flora species recorded during the surveys are included in **Appendix G**. Habitat requirements for flora species listed under the NC Act and/or EPBC Act were considered during the flora assessments. Opportunistic searches for threatened flora species were carried out during the flora survey / site traverse across the Project area. Table 5-9 lists 13 species that were identified through desktop searches and their potential to occur within the Project area.

The identification of the Kogan waxflower during the preliminary survey triggered an additional survey to determine the population extent and density in accordance with the Protected Plant Flora Survey Guidelines V2.01 (Department of Environment and Science, 2020). The population extent and the location of each individual of Kogan waxflower plant was recorded, with a total of 157 individual plants documented. Of the 157 plants, only 2 juvenile plants (15-20cm high) were recorded. The landscape the population of Kogan Waxflower was recorded on consisted of RE 11.7.5 with adjacent RE 11.7.4 and RE 11.5.1. This is consistent with where Kogan Waxflower is found in the local region (rocky scalds).

As identified in Table 5-9 there are no listed MNES flora species likely to occur within the Project area. Therefore, no MNES Significant Impact Assessment has been completed for any flora species in Section 7. No other state threatened flora was found within the Project area during field surveys.

Table 5-9 Likelihood of Occurrence of Conservation Significant Flora

Species	Status		Description and Habitat	Potential to Occur	Source
	NC Act	EPBC Act			
Acacia lauta Tara Wattle	Vulnerable	Vulnerable	*Acacia lauta* is a shrub 1.5-3 m high, branching from the base . Associated with sandy soils hosting ironbark woodland. Known populations have been mapped within REs 11.7.7, 11.7.4 and 11.7.5. Populations are localised to the area surrounding Tara and Inglewood	**Unlikely**: Suitable habitat is mapped, however over 15 km from closest historical record	WildNet
Acacia wardelii Wardell's Wattle	Near Threatened	-	*Acacia wardellii* grows in gravelly soil on shallow weathered sandstone in eucalypt woodland and has been recorded from disturbed and recently burnt areas (Queensland Herbarium 2011).	**Unlikely**: Suitable habitat not mapped. Two records within 10km buffer, Approximately 8km north east.	PMST WildNet
Cadellia pentastylis Ooline	Vulnerable	Vulnerable	Ooline is a very slow growing medium-sized tree that generally grows to 10 m high, but occasionally reaching 25 m. The species has glossy leaves with prominent venation that grow to 2-4 cm long, 1.5-2 cm wide and with broadly rounded tips. The upper sides of the leaves are darker and glossier than the undersides. The white flowers are small and usually single. Each flower produces a cluster of up to five rounded, brown berries, 3-5 mm wide. Grows in semievergreen vine thickets, brigalow and occasionally in adjacent eucalypt woodland.	**Unlikely:** Out of general species range. No ALA records within 10km.	PMST
Dichanthium setosum Bluegrass	-	Vulnerable	Erect perennial grass to about 70 cm tall. Occurs in heavy soils (predominantly cracking clays or alluvium, often in gilgai) in woodland or open woodland usually dominated by Acacia (brigalow) and/or Eucalyptus species.	**Unlikely** no ALA records within 10km.	PMST
Eucalyptus curtisii Plankett mallee	Near Threatened	-	In its natural habitat it forms a mallee-like shrub or small tree 2 - 7 m high. The main distinguishing character of mallees is their lignotuber - a swollen mass of woody tissue that occurs at ground level from which a number of thin stems arise. Prefers habitats associated with lateritic rises and stony jump-ups, Nearest record is over 40 km west of the assessment area	**Possible**: Suitable habitat exists within the Project area. Seven ALA records within 10 km buffer.	WildNet

Species	Status		Description and Habitat	Potential to Occur	Source
	NC Act	EPBC Act			
Homopholis belsonii Belson's Panic	Endangered	Vulnerable	Belson's Panic is a rhizomatous and stoloniferous perennial grass growing to 0.5 m high. Belson's Panic spreads mainly by the stolons and can form colonies in a matter of months. The leaves, mostly glabrous, are 0.8–1.5 mm long and blades are 2–4.5 mm wide. Primary branches are 8–15 cm long with hairy axils. Inflorescences are also 8–15 cm long and do not fully protrude from the main stem. There are two or three laterally compressed 4.8–8 mm long spikelets on a typical lowermost branch . It is most likely to be associated with RE 11.3.1, 11.3.17, 11.4.3, 11.9.5, 11.9.10.	**Unlikely:** Habitat within the assessment area is generally unsuitable for the species, although some potential within the access corridor. Only 4 ALA records within 50 km distance.	WildNet
Lepidium monoplocoides Winged Peppercress	Least Concern	Endangered	Occurs predominantly in mallee scrub in semi-arid areas	**Unlikely**: Nearest record is on the NSW/QLD border and from 1919. No other QLD records exist.	PMST
Picris barbororum	Vulnerable		An erect annual daisy from 5 cm to 60 cm tall with yellow flowers. herb 5 cm to 60 cm high. The species is known from native grassland (12.3.21) of *Dichanthium sericeum* in stock routes, road reserves adjacent to disturbed areas such as cultivated paddocks and road and rail lines on black clay soil. The nearest record is located 8.2 km east of the survey area on the Cecil Plains Road.	**Unlikely**: No ALA records within 10km radius of Project area.	WildNet
Philotheca sporadica Kogan Waxflower	Near Threatened	Delisted December 2020	*Philotheca sporadica* is an open to compact shrub that grows to 150 cm high and has numerous branches Along its length, each branch has many small (1–4 mm long) hairless, club-shaped leaves. The white flowers are 6–10 mm in diameter, solitary and occur on short stalks (up to 0.7 mm long) at the end of branchlets.	**Known**: Recorded in the Project area. Eight ALA records within 10km radius of project site	PMST WildNet
Pomadeeris coomingalensis	Endangered		*Pomaderris coomingalensis* is a shrub that grows from 3 to 5 m tall. The young stems have a dense, greyish covering of stellate (star-shaped) hairs. The leaves are ovate or elliptic, 20 to 60 mm long by 7 to 18 mm wide; the base is cuneate (wedge shaped), the margins are entire, the apex is obtuse; the upper side of the lamina is glabrous, smooth with the lateral veins not or slightly impressed; the lower side of the lamina is pubescent with dense, greyish stellate hairs.	**Possible:** 2 ALA records within 10km buffer radius of project site south west.	PMST

Species	Status		Description and Habitat	Potential to Occur	Source
	NC Act	EPBC Act			
Rhaponticum australe Austral Cornflower/Native Thistle	Vulnerable	Vulnerable	The Austral Cornflower is an erect, herbaceous perennial that grows up to 60 cm high. The stems are covered in woolly hairs and the flowers are deeply toothed. Flowering heads are purplish and are clustered into terminal heads, 36 mm in diameter. Austral cornflower grows in eucalypt open forest with grassy understorey, paddocks and along roadsides, on basalt soils and alluvial flats	**Unlikely**: no ALA records within 10km.	PMST
Rutidosis glandulosa	Near Threatened		*Rutidosis glandulosa* generally occurs on sandy or gravelly well drained soil in grassy open eucalypt woodland.	**Possible.** Suitable habitat exists within the study area, known to occur within 12 km although coordinates may be imprecise.	
Thesium australe Austral toadflax	Vulnerable	Vulnerable	Austral toadflax is a small biennial or perennial herb or subshrub. It grows to 40 cm tall, with wiry, slender stems. It has been collected within Popular Box woodland on alluvial flats (RE 11.3.2) northwest of Dalby. The species is a root parasite on native grasses, particularly *Themeda triandra* and *Dicanthium sericeum.*	**Unlikely:** Suitable habitat is mapped within the study area, however closest records over 30 m away.	
Tylophora linearis	Endangered	Endangered	*Tylophora linearis* is a slender, almost hairless twiner with a clear sap. Leaves dark green, linear, 1-5 cm long, 0.5-3 mm wide. Flowers purplish, 3-6 mm in diameter, in radiating groups of 3-8. Fruit is cigar shaped, up to 100mm long and approximately 5 mm diameter, hairless. Found in dry scrublands, open forests and woodlands at low altitudes and on sedimentary flats.	**Unlikely:** no ALA records within 10km.	
Xerothamnella herbacea	Endangered	Endangered	*Xerothamnella herbacea*, Family Acanthaceae, is a sparse, sprawling, perennial herb growing to a height of 30 cm. Stems arise from a central point but can root at the nodes where they contact the soil. Leaves in opposite pairs are soft, linear to narrowly ovate in outline, dark green above and paler beneath. Flowers are small, bright pink to mauve, two lipped, to 6.5 mm long, and occur in the upper leaf axils	**Unlikely:** Suitable habitat is mapped; however closest records are over 70 km away.	

5.3.4 Weed Species

Nine exotic plant species were recorded within the PV power station component of the Project area (refer to **Appendix G**), with no species classified as 'Restricted Matter' under the Biosecurity Act and no WoNS. Nine species identified within and adjacent the PV power station area are non-listed exotic/naturalised flora species were detected throughout the survey area, some of which have been introduced.

Field surveys within the access corridor recorded ten species of non-native plants. Of these species, two are listed as WoNS. The same two species are listed as Category 3 restricted plants under the *Queensland Biosecurity Act 2014.* The two species are:

- Common Prickly Pear (*Opuntia stricta*); and
- Velvety Tree Pear (*Opuntia tomentosa*).

Biosecurity Act 2014 Category 3 plants cannot be distributed (sold, released or traded) without a permit. WoNS must be managed as per state or local regulations. In this case, the *Queensland Biosecurity Act 2014* provides guidance on the management of these species at a state level.

African Lovegrass (*Eragrostis curvula*) was identified within the access corridor. Whilst not a declared plant under Biosecurity Act, African Lovegrass is recognised as requiring low priority control within the Western Downs Local Government area as per the Western Downs Regional Council Biosecurity Plan 2017.

5.3.5 Terrestrial Fauna

A total of 56 (potentially 58) terrestrial vertebrate species were recorded during the preliminary field survey, including 6 frog, 3 reptile, 31 bird and 16 (potentially 18) mammal species. The fauna species list of the Project area compiled from data collected is presented in **Appendix G**. Of these species, three introduced species, cane toad, feral pig and wild dog were also recorded during the Project area survey.

5.3.5.1 Survey Effort

As a result of the desktop literature review, preliminary threatened and migratory species likelihood assessment and as a result of previous surveys, on ground surveys have been conducted. Species identified during this with the potential to occur include:

- Yakka Skink (*Egernia rugosa)*;
- Squatter pigeon (Southern) (*Geophaps scripta scripta)*;
- Grey falcon (*Falco hypoleucos)*;
- Painted honeyeater (*Grantiella picta*);
- White throated needletail (*Hirundapus caudacutus*);
- Corben's long-eared bat (*Nyctophilus corbeni*);
- Central greater glider (*Petauroides volans)*; and
- Koala (*Phascolarctos cinereus*).

Refer to Table 5-10 for survey effort associated with these species. Refer to **Appendix I** for field notes associated with these surveys.

Table 5-10 Fauna – Survey Efforts

Species	Project Component	Survey Type(s)	Effort	Justification
Yakka Skink Survey guidelines for Australia's threatened reptiles Guidelines for detecting reptiles listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*	PV power station	1st Preliminary Ecological Survey (6-8 May 2020) • 3 remote cameras were established over a 2-night period • Nocturnal survey	Nocturnal surveys (2 nights/2 people - approximately 12 hrs in total for nocturnal assessments	Assessments completed in morning, day, afternoon and evening. Burrow assessments and nocturnal survey was completed as recommended. Elliot trapping not completed as no associated burrows identified.
		2nd Targeted Ecological Survey (18-22 Jan 2021) • Opportunistic survey	Five-day opportunistic survey of site.	
		3rd BioCondition Survey • Opportunistic survey • Habitat assessment	Two-day opportunistic survey of site and habitat assessment.	
	Access Corridor	3rd Access Corridor Survey (24-27 May 2021) • Opportunistic survey • Habitat assessment	Two-day opportunistic survey of site and habitat assessment.	
Squatter pigeon, Grey falcon, Painted honeyeater, White throated needletail Survey guidelines for Australia's threatened birds Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*	PV power station	1st Preliminary Ecological Survey (6-8 May 2020) • Opportunistic survey • Bird Census Surveys	• Three-day opportunistic diurnal survey of site. • 20-min bird census surveys were undertaken over the 3-day period including around the onsite water bodies; • 3 remote cameras were established over a 2-night period	Squatter Pigeon – transect surveys completed. Other – transect surveys, point surveys.
		2nd Targeted Ecological Survey (18-22 Jan 2021) • Opportunistic survey	Five-day opportunistic survey of site.	
		3rd BioCondition Survey (24-27 May 2021) • Opportunistic survey • Habitat assessment	Two-day opportunistic survey of site and habitat assessment.	
	Access Corridor	3rd Access Corridor Survey (24-27 May 2021) • Opportunistic survey • Habitat assessments	Two-day opportunistic survey of site and habitat assessment.	

Species	Project Component	Survey Type(s)	Effort	Justification
Corben's long-eared bat. Survey guidelines for Australia's threatened bats Guidelines for detecting bats listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*	PV power station	1st Preliminary Ecological Survey (6-8 May 2020) • Anabat recording	Anabat – four separate sites on nights of 6 and 7 May 2020.	Harp traps established in accordance with the survey guidelines. Traps successfully detected various bat types with the exception of the Corben's Long-eared Bat, Large-eared Pied Bat
		2nd Targeted Ecological Survey (18-22 Jan 2021) • Harp traps	A series of trapping, involving harp traps, was utilised and involved a survey effort of 20 trap nights.	
		3rd BioCondition Survey (24-27 May 2021) • Opportunistic survey • Habitat assessment	Two-day opportunistic survey of site and habitat assessment.	
	Access Corridor	3rd Access Corridor Survey (24-27 May 2021) • Opportunistic survey • Habitat assessments	Two-day opportunistic survey of site and habitat assessment.	
Central greater glider Survey guidelines for Australia's threatened mammals Guidelines for detecting mammals listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*	PV power station	1st Preliminary Ecological Survey (6-8 May 2020) • 3 remote cameras were established over a 2-night period • Nocturnal survey	Nocturnal surveys (2 nights/2 people - approximately 12 hrs in total for nocturnal assessments	Nocturnal surveys and hollow survey during the BioCondition and ecological surveys.
		2nd Targeted Ecological Survey (18-22 Jan 2021) • Opportunistic survey	Five-day opportunistic survey of site.	
		3rd BioCondition Survey (24-27 May 2021) • Opportunistic survey • Habitat assessments	Two-day opportunistic survey of site and habitat assessment.	
	Access Corridor	3rd Access Corridor Survey (24-27 May 2021) • Opportunistic survey • Habitat assessments	Two-day opportunistic survey of site and habitat assessment.	

Species	Project Component	Survey Type(s)	Effort	Justification
Koala EPBC Act referral guidelines for the vulnerable Koala	PV power station	1st Preliminary Ecological Survey (6-8 May 2020) • Presence and absence	3 remote cameras were established over a 2-night period	On ground surveys and koala detection dog have adequately assessed the potential for this species to occur in the Project area.
		2nd Targeted Ecological Survey (18-22 Jan 2021) • Koala detection team • Opportunistic survey	Koala detection dog covered 18.9 km section during the survey.	
		3rd BioCondition Survey (24-27 May 2021) • Opportunistic survey • Habitat assessments	Two-day opportunistic survey of site and habitat assessment.	
	Access Corridor	3rd Access Corridor Survey (24-27 May 2021) • Opportunistic survey • Habitat assessments	Two-day opportunistic survey of site and habitat assessment.	

5.3.5.2 EVNT Species – Survey Findings

Additional information relating to survey efforts as described above in Section 5.3.5.1 is included below and relates to Koala and bat species, specifically the Corben's long eared bat.

5.3.5.2.1 Koala

A technical memorandum has been prepared which summarises the survey effort and findings, refer to **Appendix H**.

Evidence of Koala was identified in the Project area during field surveys, through the discovery of Koala scats (see Plate 5-1) and Koala skulls (refer to Plate 5-2 and Plate 5-3) with the location of evidence shown in Figure 7-6. The low density, condition and sizes of the Koala scats within the PV power station area suggest a Koalas had been present several months prior to the surveys. The species is known to occur in the wider area. The Koala is listed as vulnerable under the EPBC Act and Vulnerable under NC Act. Details of evidence of Koala presence found during the surveys includes:

- Preliminary survey and targeted survey - Koala skull (refer to Plate 5-2 and Plate 5-3);
- Targeted survey - Scats age 4 (months old), of similar size and shape (likely from the same Koala) (refer to Plate 5-1);
- BioCondition survey – Evidence of koala skull and scats; and
- Access Corridor Survey – Evidence of presence in form of tree scratches and scats found at three survey locations.

Plate 5-1 **Typical Koala Scat Shape Found in the Field**

Plate 5-2 **On-site Koala (*Phascolarctos cinereus)* Skull – Photo 1**

Plate 5-3 On-site Koala (*Phascolarctos cinereus)* Skull – Photo 2

Additional information has been prepared outlining the results of the Koala field assessment and include mapping of presence / absence and the survey coverage area. In addition to the report, a table has been prepared that considers the Koala Habitat Assessment Tool in accordance with the Matters of National Environmental Significance, Significant Impact Guidelines (1.1), Department of Environment (DoE), 2013 and the EPBC Act referral guidelines for the vulnerable Koala, DoE, 2014 (Koala referral guidelines).

Assessment of the Project area scored eight on the Koala Habitat Assessment Tool. Impact areas that score five or more using the habitat assessment tool for the Koala are considered to contain habitat that is critical for the survival of the Koala.

The full technical memorandum of the Koala Habitat Assessment Tool which contains the details of responses to the matrix assessment tool used to achieve the site ranking (and associated site survey) can be viewed in **Appendix H**.

5.3.5.2.2 Bat Species

Due to the frequency of the bat calls during the preliminary survey, up to three species of the *Nyctophilus spp*. were recorded in the PV power station area. The species that could potentially occur in the Project area included the Corben's long eared bat; Lesser long-eared bat (*Nyctophilus geoffroyi*); and Gould's long-eared bat (*Nyctophilus gouldi*). The *Nyctophilus corbeni* is listed as Vulnerable under the EPBC Act and Vulnerable under the NC Act. The second ecological survey was completed to confirm the presence of this species.

50 bats (4 species) were captured during the survey period. All bats captured were least concern species under the NC Act and not listed under the EPBC Act. Corben's Long-eared Bat is considered unlikely to occur within the Project area on the basis that it was not recorded despite targeted survey efforts.

Species captured were:

- Little broad-nosed bat (*Scotorepens greyii*) (refer to Plate 5-4);
- Lesser long-eared bat (refer to Plate 5-5);
- Gould's long-eared bat (refer to Plate 5-6); and
- Gould's wattled bat (*Chalinolobus gouldii*) (refer to Plate 5-7).

Plate 5-4 Little broad-nosed bat (*Scotorepens greyii*)

Plate 5-5 Lesser long-eared bat (*Nyctophilus geoffroyi*)

Plate 5-6 Gould's long-eared bat (*Nyctophilus gouldi*)

Plate 5-7 Gould's wattled bat (*Chalinolobus gouldii*)

Suitable habitat for South-eastern Long-eared Bat (*Nyctophilus corbeni*) was present within the Project area in the form of standing trees with hollows and bark cavities, however, the species presence is considered unlikely given that targeted bat surveys of the PV power station failed to establish the presence of this species.

5.3.5.2.3 Other Species

Rocky sections of the Project area provide habitat suitable for reptiles, with large laterite overhangs and deep hollows under the rock platform. Suitable habitat for Yakka Skink (*Egernia rugosa*) was identified; however, no activity was detected at the time of the surveys. Other sections of the study area provide suitable microhabitat for the species.

Some suitable habitat was found for Dunmall's Snake (*Furina dunmalli*) within the Project area however no activity was detected. While this species is known to utilise coarse woody cover in Cypress Pine and Eucalypt woodland its preferred habitat is cracking clay soils, in particular those soils associated with Brigalow communities. These soils or communities were not found within the Project area. Similarly, it was considered that habitat for Grey Snake (*Hemiaspis damelii*) (NC Act Endangered), which utilises similar habitat, was considered unlikely to occur on the site. Similarly, other species that rely on undisturbed Brigalow communities such as the Imperial Hairstreak (*Jalmenus evagoras*), Brigalow Woodland Snail (*Adclarkia cameroni*) and Dulacca Woodland Snail (*Adclarkia dulacca*) were considered unlikely to occur.

Parts of the Project area contained marginally suitable habitat for Greater Glider (*Petauroides volans*). The presence of tree hollows combined with a belt of vegetation associated with a watercourse at the eastern end of Forest Road should be treated as having potential for Greater Glider although no evidence within the Project area for this species was found.

Suitable habitat for Painted honeyeater (*Grantiella picta*) was not found within the access corridor area however some suitable habitat was found within the PV power station area. This species prefers habitat with a high density and diversity of mistletoe species with some mistletoe species found in the PV power station area. No activity was detected at time of the surveys.

No sightings of Squatter pigeon (*Geophaps scripta scripta*) were made during the surveys. Vegetation toward the western end of the access corridor is unsuitable due to density. Areas adjacent to cleared country on the eastern end of the access corridor is marginally suited.

No sightings of the Grey falcon (*Falco hypoleucos*) were made during the surveys. Presence of the species is unlikely based on sighting history.

5.3.5.3 EVNT Fauna – Likelihood of Assessment

CDM Smith has approached the predicted occurrence of conservation significant fauna species in a precautionary manner. Analysis of impact has assumed that significant fauna species for which there is habitat present and localised sighting records exist near the Project area are considered present unless evidence to the contrary exists. 36 conservation significant species listed under the NC Act and/or EPBC Act are considered to have some potential, albeit unlikely, to occur occasionally in the area, refer to Table 5-11.

Table 5-11 Likelihood of Occurrence of Conservation Significant and Migratory Fauna

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Birds						
Calidris ferruginea Curlew sandpiper	Endangered	Critically Endangered, Migratory	This species largely forages and roosts in sheltered estuarine areas, particularly estuarine mudflats	**Unlikely**: Suitable habitat is lacking. No ALA records within 10km buffer of Project area.		*
Erythrotriorchis radiatus Red Goshawk	Endangered	Vulnerable	Endemic to northern and eastern Australia in coastal and subcoastal areas with large home ranges of up to 200km^2. Occurs in woodlands and forests and prefers mosaic habitats that hold a large population of birds and permanent water. Riparian areas are heavily favoured.	**Unlikely**: Species is not known to occur in region No ALA records within 10km buffer of Project area.		*
Falco hypoleaucos Grey Falcon		Vulnerable	Woodlands and lightly treed inland plains. Habitat is considered to cover many landscapes and vegetation communities. Considered more likely in more arid areas (<500 mm).	**Unlikely:** While it is possible, it is considered unlikely based on sighting history. Only seven ALA records within 100 km distance.		*
Geophaps scripta scripta Squatter pigeon (southern subspecies)	Vulnerable	Vulnerable	Occurs in dry woodland. Generally, on sandy soils close to water.	**Possible:** No sightings of Squatter Pigeon were made during surveys. Species is rarely recorded in the local area. Marginal habitat within eastern end of access corridor.	*	*

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Grantiella picta Painted Honeyeater	Vulnerable	Vulnerable	Occurs mainly in dry open woodlands and forests particularly where Brigalow (*Acacia harpophylla*) is present. Has a strong association with mistletoe. They also occur in riparian forest, on plains with scattered eucalypts and in remnant trees on farmland.	**Possible:** Mistletoe is the preferred food of painted honeyeaters. Mistletoe was observed in low density within the Project area, however not of the Amyema genus. The woodland on site is consistent with the woodland habitat of painted honeyeaters, however the lack of Amyema observed, and minimal potential habitat suggests that Painted Honeyeaters may possibly occur, rather than likely. One ALA records within 10 km buffer of Project area	*	*
Hirundapus caudacutus White-throated needletail	Vulnerable	Vulnerable, Migratory	An aerial non-breeding summer visitor may occur over any habitat type, including cleared land and infrastructure.	**Possible**: Wide ranging aerial species which migrates from the northern hemisphere to eastern Australia. The species is known to roost in trees amongst dense foliage in the canopy or in hollows. May occur over the Project area in the summer months. Two ALA records within 10 km buffer of Project area.	*	*
Rostratula australis Australian Painted Snipe	Vulnerable	Endangered	Terrestrial shallow wetlands, ephemeral and permanent, usually freshwater but occasionally brackish. They also use inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains.	**Unlikely.** No suitable habitat exists within the Project area. No ALA records within 10km buffer of Project area.		*
Calyptorhynchus lathami lathami Glossy black-cockatoo (eastern)	Vulnerable	-	Occurs in woodlands/habitats with she-oaks. Feeds exclusively on the cones of *Casuarina* and *Allocasuarina* trees. Needs large hollows for nesting.	**Possible**. Some hollows found onsite. Suitable habitat and feed trees present within the access corridor. Two ALA records within 10 km buffer of Project area.	*	

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Tringa stagnatilis Marsh greenshank	Special Least Concern	Migratory	May be found in both freshwater and estuarine habitats.	**Unlikely**: No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project area.	*	
Plegadis falcinellus Glossy ibis	Special Least Concern	Migratory	Terrestrial wetlands, preferring inland freshwater wetlands with abundant aquatic flora.	**Unlikely**: No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project area.	*	
Fish						
Maccullochella peelii Murray Cod	-	Vulnerable	Occurs in a wide range of habitats in lower to mid-reach of rivers. Occurs in the Condamine and Warrego Rivers.	**Unlikely:** Waterway through the Project area is unlikely to support this species. No ALA records within 10km buffer of Project area.		*
Mammals						
Chalinolobus dwyeri Large-eared Pied Bat		Vulnerable	Sandstone cliffs and fertile woodland valley habitat within close proximity of each other is habitat of importance to the Large-eared Pied Bat. Records from south-east Queensland suggest that rainforest and moist eucalypt forest habitats on other geological substrates (rhyolite, trachyte, and basalt) at high elevation are of similar importance to the species.	**Unlikely:** Escarpment may support this species however habitat is marginal. No Large-eared Pied Bats were recorded during targeted bat surveys. Closest ALA records over 60 km distance.		*
Dasyurus hallucatus Northern quoll	Least Concern	Endangered	Occurs in a range of dry sclerophyll and vine-thicket habitats but prefers rocky areas within its range	**Unlikely:** No ALA records within 10km buffer of Project area.		*

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Nyctophilus corbeni Corben's Long-eared Bat	Vulnerable	Vulnerable	The south-eastern long-eared bat is found in a wide range of inland woodland vegetation types. These include box / ironbark / cypress pine woodlands, Buloke woodlands, Brigalow woodland, Belah woodland, smooth-barked apple woodland, river red gum forest, black box woodland, and various types of tree malle.	**Unlikely:** A genus of bat the *Nyctophilus spp*. was recorded in the Project area. Due to the nature of the call up to three species of the *Nyctophilus spp*. potentially occur in the Project area, including the *Nyctophilus corbeni*. However, results from the 2nd survey did not find evidence of the *Nyctophilus corbeni.* Closest ALA records approximately 80 km distance.		*
Petauroides amillutus Central Greater Glider	Vulnerable	Vulnerable	May occur in a range of eucalypt dominated habitats from coastal areas to ranges. Needs large hollow-bearing trees for daytime roosting. Favours wooded habitats with a diversity of eucalypt species.	**Possible**: A small number of suitable hollows were present. Suitable habitat is mapped. However, despite targeted searches and spotlighting, no animals, scat or scratch evidence were observed. One ALA records within 10 km buffer of Project area.	*	*
Phascolarctos cinereus Koala	Vulnerable	Vulnerable	Feed almost entirely on eucalypts, most likely in riverine and riparian habitats.	**Known**. Two skulls found on Project site and eucalyptus on site, along with discovery of Koala scats. Five ALA records found in a 10km buffer of Project area.	*	*
Pteropus poliocephalus Grey-headed Flying-fox		Vulnerable	The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands,	**Unlikely**: Suitable habitat is mapped, however no sighting of this species during surveys and no evidence of recent occupation (i.e. roosting site damage). No ALA records within 10km buffer of Project area	*	*

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Tachyglossus aculeatus Short-beaked echidna	Special Least Concern	-	Occurs throughout Australia in almost all terrestrial habitats except for intensively managed farms. It shelters in logs, crevices, burrows, and leaf litter	**Known**: One individual identified during survey. Two ALA records in greater area.	*	
Reptiles						
Strophurus taenicauda Golden-tailed Gecko	Near Threatened	-	The golden-tailed gecko lives in open woodland and open forest where it shelters under loose bark and hollow limbs. Almost all known records of this species have occurred within the Brigalow Belt bioregion. *Strophurus t. taenicauda* is distributed in the south-eastern part of the Queensland Brigalow Belt bioregion, although a single record also exists from northern NSW. *Strophurus t. albiocularis* occupies the northern half of the range whilst *Strophurus t. triaureus* has a limited range in the central eastern part of the Brigalow Belt.	**Likely:** Suitable habitat is mapped within the study area and over 80 records within 20 km of the Project area.	*	
Anomalopus mackayi Five-clawed worm skink	-	Vulnerable	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. Live in permanent deep tunnel-like burrows and deep soil cracks, coming close to the surface under fallen timber and litter, especially partially buried logs.	**Unlikely**: Limited microhabitat available (cracking soils) and suitable grassland. No ALA records within 10km buffer of Project area.		*
Delma torquata Adorned Delma	-	Vulnerable	The most westerly records were made in Popular Box (*Eucalyptus populnea*) open woodland on alluvial plains.	**Unlikely:** No ALA records within 10km buffer of Project area.		*

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Egernia rugosa Yakka skink	Vulnerable	Vulnerable	Occurs in a variety of dry sclerophyll woodlands largely of the Brigalow Belt. Constructs burrows in a variety of soil types.	**Possible**: Suitable habitat is mapped. No ALA records within 10km buffer of Project area.	*	*
Furina dunmalli Dunmall's Snake	-	Vulnerable	Rarely encountered. Occurs in a variety of habitats including forests to woodlands on sandy soils, cracking soils with Brigalow scrub, and dry vine scrub. Dunmall's Snake has been found in a broad range of habitats, including: Forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow (Acacia *harpophylla*), other Wattles (*A. burowii, A. deanii, A. leioclyx*), native Cypress (*Callitris spp.*) or Bull-oak (*Allocasuarina luehmannii*) Various Blue Spotted Gum (*Corymbia citriodora*), Ironbark (*Eucalyptus crebra* and E. *melanophloia*), White Cypress Pine (*Callitris glaucophylla*) and Bulloak open forest and woodland associations on sandstone derived soils). In other environments, one specimen was found on the edge of dry vine scrub near Tarong Power Station, Queensland, whilst another was found in hard ironstone country (Queensland RE Land Zone 7) at Lake Broadwater near Dalby, Queensland.	**Unlikely:** Suitable habitat is mapped within the Project area, however field surveys determined the Brigalow community is not present. No ALA records within 10km buffer of Project area.		*

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Hemiaspis dameli Grey Snake	Endangered	-	Occurs on floodplains usually with cracking clay soils with deep leaf litter and/or low shrubby vegetation. Frog specialist so tends to occur near watercourses.	**Possible.** Once widespread but species has declined significantly with spread of agriculture, cattle grazing and changing fire regimes. Some suitable habitat (low shrubs) within the Project area. No ALA records within 10km buffer of Project area.	*	
Listed Migratory Species (not previously listed above)						
Apus pacificus Fork-tailed swift	Special Least Concern	Migratory	An aerial non-breeding summer visitor, may occur over any habitat type, including cleared land and infrastructure.	**Possible:** May occur over the Project area in the summer months. Eleven database records from the wider area. No ALA records within 10km buffer of Project area.	*	*
Cuculus optatus Oriental cuckoo	Special Least Concern	Migratory	Rainforest, vine thickets, wet sclerophyll forest and open forest and woodland (Higgins 1999).	**Unlikely:** Unlikely. Most records in Queensland are to the east of the Great Dividing Range. No ALA records within 10km buffer of Project area.		*
Motacilla flava Yellow wagtail	-	Migratory	In Australia occurs on the edge of shallow wetlands and short grassy areas such as sports fields. Occurs sporadically close to coast.	**Unlikely**: Vagrant to southern Queensland. EPBC Online search only. No ALA records within 10km buffer of Project area.		*
Myiagra cyanoleuca Satin flycatcher	Special Least Concern	Migratory	Mostly found in coastal forest, favouring wet forests, moist gullies and watercourses.	**Possible**: This species may occasionally utilise the Survey area during autumn/spring migrations but generally migrates along coastal areas and the Great Dividing Range. Two ALA records within 10 km buffer of Project area.	*	*

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Rhipidura rufifrons Rufous fantail	Special Least Concern	Migratory	Generally occur in dense vegetation, mainly in rainforests, but also in wet sclerophyll forests and other dense vegetation such as mangroves, drier sclerophyll forests, woodlands, parks and gardens.	**Possible:** May occur in woodlands in winter months. One ALA records within 10 km buffer of Project area.		*
Actitis hypoleucos Common sandpiper	Special Least Concern	Migratory	This species largely forages and roosts in sheltered estuarine areas, particularly estuarine mudflats	**Unlikely**. No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project area.		*
Calidris acuminata Sharp-tailed sandpiper	Special Least Concern	Migratory	Generally found on wetland habitat along the coast including tidal flats, salt pans and sewage ponds. They also occur on nearby coastal freshwater / brackish wetlands and less commonly on inland wetlands (Pizzey and Knight 2012).	**Unlikely**. No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project area.	*	*
Calidris melanotos Pectoral sandpiper	Special Least Concern	Migratory	Generally found on wetland habitat along the coast including tidal flats, salt pans and sewage ponds. They also occur on nearby coastal freshwater / brackish wetlands and less commonly on inland wetlands (Pizzey and Knight 2012).	**Unlikely**. No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project area.		*
Gallinago hardwickii Latham's snipe	Special Least Concern	Migratory	Occurs in generally low numbers in a variety of permanent or ephemeral wetlands across eastern Australia.	**Unlikely**. No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project area.	*	*
Pandio haliaetus Osprey	-	Migratory	Mainly coastal habitats but can occur on inland rivers and lakes (Debus, 2012).	**Unlikely:** No suitable habitat in Project area. No ALA records within 10km buffer of Project area.		*

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
Tringa nebularia Common greenshank	Special Least Concern	Migratory	May be found in both freshwater and estuarine habitats.	**Unlikely**: No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project area.	*	*
Listed Marine Species (not previously listed above)						
Rostratula benghalensis (sensu lato) Painted snipe	Endangered/ marine	Endangered	Prefers temporary shallow wetlands. Nests in freshly flooded wetlands with low vegetation.	**Unlikely:** No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project area.		*

5.3.6 Project area – Summary

A summary of Project area findings is provided below with general site notes provided in **Appendix I**:

- The Project area did not contain any TEC's protected under the EPBC Act;
- Field surveys identified the presence of the Kogan waxflower. The Kogan waxflower is listed as Near Threatened under the NC Act. A second targeted survey was conducted to identify the extent of the population;
- Koala scats and two skulls have been found onsite which confirmed the presence of the Koala. Koalas are listed as Vulnerable under the EPBC Act and Vulnerable under NC Act. Results from the field survey suggest a low density of Koala have been present within the site several months prior to the survey (refer to **Appendix H**);
- The bat survey was undertaken in accordance with the guidelines for threatened bat (Department of the Environment, Water, Heritage and the Art's, 2010). Trapping was undertaken using harp traps with a survey effort of 20 trap nights over a 5-night period. 50 bats (4 species) were captured during the survey period. 50 bats (4 species) were captured during the survey period and were identified as least concern species under the NC Act and not listed under the EPBC Act. The four (4) species captured were the little broad-nosed bat, lesser long-eared bat, Gould's long-eared bat and the Gould's wattled bat.
- A portion of the Project area is mapped as Essential Habitat (EH) for Golden-tailed gecko (Near Threatened under the NC Act) and Painted Honeyeater (Vulnerable under the EPBC Act and Vulnerable under the NC Act). Targeted surveys did not record these species. Golden-tailed gecko are considered likely to occur given proximate records and suitable habitat on site;
- Mistletoe is the preferred food of Painted Honeyeaters. Mistletoe was observed in low density within the Project area, however not of the *Amyema* genus. The woodland on site is consistent with the woodland habitat of Painted Honeyeaters, however the lack of *Amyema* observed, suggests that Painted Honeyeaters may be moderately likely to occur, rather than highly likely;
- The small area of Endangered RE (RE 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks) along the southern portion of the Lot which is mapped on State mapping was ground-truthed and determined to be incorrect. The vegetation is Least Concern RE 11.5.1;
- Evidence of the presence of gliders or other arboreal mammals (excluding Koalas) was found within the Project area at the time of surveys;
- There are some hollow-bearing trees scattered through the site however due to previous selective logging activity (going back over 100 years), large hollow-bearing habitat trees are sparse; and
- Seasonal species that grow or transit the site at other times of the year may not have been detectable at the time of survey.

5.4 Surface Water and Groundwater

A stream order one water feature is mapped outside the PV power station on the southern boundary (refer to Figure 5-11). This watercourse was assessed as a natural drainage feature which develops into a watercourse as it progresses downstream. It was assessed that there would be no impact to this water feature as a result of the Project. Refer to **Appendix I** for the field assessment sheets for this water feature.

The access corridor intersects a low stream order (2) creek (refer to Figure 5-11). The creek is typically dry for most of the year and only flows during heavy rainfall events. For this reason, the creek is considered not to have permanent flow conditions and exhibits ephemeral flow characteristics. The creek has a discernible low flow/high flow channel as well as high banks. The creek is partly incised into the underlying bedrock and there are semi-permanent waterholes present within the main channel. Plate 5-8, presents a view of this ephemeral creek, noting the recent rainfall event has filled the waterholes with a low trickle flow still occurring. Refer to **Appendix I** for the field assessment sheets for this water feature. The creek is mapped as an Amber (Moderate) waterway under the Queensland Waterways for Waterway Barrier Works, as defined under the *Fisheries Act 1994*. The field determination of the creek is as a defined watercourse under the *Water Act 2000*.

Plate 5-8 Access Corridor Creek

Groundwater is unlikely to be encountered as a part of construction works. A review of registered bores in the area record aquifers upwards of approximately 200 m below the ground level.

A stormwater and drainage report has been prepared for the PV power station (refer to **Appendix J**). Stormwater runoff will be conveyed via a series of open channels and culverts where required. Open channels shall be either V-Drains or

Trapezoidal Drains, depending on flow rates, as outlined in Table 5-12 below. Open Channels shall include rock riffles at regular centres, to be determined by slope to detain flows and provide additional storage.

Table 5-12 Open Channel Type

Open Channel	Description
Type A	V - Drain
Type B1	Base Width 1200mm
Type B2	Base Width 2000mm
Type B3	Base Width 3000mm
Type B4	Base Width 5000mm

The open channel and pipe network will divert stormwater to central stormwater detention basins at 6 locations across the proposed site. Basin storage will be sized to maintain outflows at pre-development flow rates and will be sized to accommodate the 10% annual exceedance probability (AEP) event. Outflows from the basin will be via infiltration, evaporation and outflow at predevelopment flow rates.

The proposed drainage basins will need to have the drainage characteristics confirmed during insitu investigations. These basins have been sized to contain the anticipated 10% AEP rainfall. The basins are expected to be open, accessible and integrated into the landscape, with the sides of the basins graded at a maximum of 1 in 6 for unfenced basins. The sides may be steepened for fenced basins. An infiltration rate of 0.12m/day, and an evaporation rate of 6.2mm/day have been assumed in the storage calculations.

The conclusion from the report found that no adverse impacts due to additional hard surfaces (solar panels, access tracks and buildings would occur on the land.

Section 6 Potential Impacts and Management Measures

The Project has the potential to impact terrestrial EVs and MSES, including threatened flora and fauna, vegetation communities and other ecological values within the Project area. These include:

- Potential habitat for threatened flora and fauna;
- Remnant vegetation;
- Populations of threatened flora and fauna;
- Ecological functioning (e.g. habitat connectivity).

Throughout the construction phase and operational phase, the Project has the potential to impact on these ecological values through the following activities:

- Vegetation clearing;
- Topsoil stripping;
- Construction of above ground buildings and facilities;
- Day and night-time operation and maintenance facilities;
- General transportation movements; and
- Glare and Lighting.

Mitigation measures have been developed to minimise impacts associated with construction and operation of the Project. Mitigation strategies have been developed based on the following hierarchical criteria:

- Avoid potential impacts where possible;
- Minimise the severity and/or duration of the impact; and
- Offset unavoidable impacts.

Future survey(s) such as pre-clearance surveys are proposed to occur prior to construction.

6.1 Habitat Clearing and Connectivity

The Project layout will require clearing of remnant vegetation as calculated in Table 6-1. There will be no impacts to threatened vegetation communities (including TECs) and any impacts to fauna will be those potentially utilising the remnant habitat on site.

Terrestrial habitat connectivity may be disturbed as a result of the Project by obstructing movement of fauna across the corridor within the existing remnant vegetation patches that occur in the Project area. Any impacts to remnant vegetation that are unavoidable have sought to clear areas adjacent to existing clearance, to avoid further fragmentation.

The terrestrial habitat connectivity was considered as part of the Project design. Lot 4 DY457 is partially in a State-wide biodiversity corridor buffer area for terrestrial corridors; however, the Project area is outside this corridor buffer area. The corridor buffer areas in vicinity to the Project area generally moves in a north-south direction. The lots surrounding the Project are generally undeveloped with the exception of some gas development infrastructure and roads. The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project, and the impact at a regional and local scale is expected to be minimal.

The southern boundary of the lot does not include the Project area fence right up to the boundary. This provides a corridor to facilitate east-west movements within the Lot boundary. This is shown on the site plan and is approximately

100 metres wide. The eastern section of the access corridor, although largely running through cleared pasture country, does provide a useable fauna corridor from Daandine State Forest (on the eastern side of Kumbarilla Road) to the west. The Project area will be fenced as to try to prevent fauna from entering the site and becoming trapped. Fauna ramps and climbing poles shall be provided at regular intervals around the internal Project area boundary to allow fauna to exit the facility should they become trapped.

The Landscape Fragmentation and Connectivity tool (DEHP 2014) is a desktop assessment of development impacts on connectivity areas containing remnant vegetation (classed as Category B on the Regulated Vegetation Management Map). The tool is used in Queensland as a decision support tool to identify and quantify any significant impact on connectivity for an individual impact area. The tool measures the extent and arrangement of the current regulated vegetation against the extent that would remain if the prescribed activity were to occur at that impact site.

A development impact on connectivity areas is determined to be significant if either of the following tests are true:

- The change in the core remnant ecosystem extent at the local scale (post impact) is greater than a threshold determined by the level of fragmentation at the regional scale (see table below); or
- Any core area that is greater than or equal to 1 hectare is lost or reduced to patch fragments (core to non-core).

The outcomes of the Landscape Fragmentation and Connectivity (LFC v1.6) tool conclude that the Project would not have a significant impact on connectivity, as both tests were 'false'. Therefore, at a State level, connectivity offsets are not likely to be required for the Project.

The Project has avoided remnant vegetation where possible. The Project will result in the clearing of up to 140.4 ha of Category B vegetation, 60.1 ha of Category C vegetation and 12 ha of Category X vegetation as described in Table 6-1.

The impacted remnant vegetation is considered Least Concern under the VM Act and is widespread in the surrounding area and bioregion. The following mitigation measures are recommended.

Table 6-1 Clearing per Project Component

Description	PV Power Station (ha)	Access Corridor (ha)	Total
Total area	190.92	21.66	212.58
Regional Ecosystems Biodiversity Status (Ground-truthed vegetation)			
11.3.25	-	1.2	1.2
11.3.27	-	0.1	0.1
11.5.1	45.9	6.8	52.7
11.5.1 regrowth	58.7	0.0	58.8
11.5.4	-	0.7	0.7
11.7.4	63.3	5.2	68.5
11.7.5	22.9	1.9	24.8
Non remnant	-	5.7	5.7
Regional Ecosystems VM Act			
Category B	127.0	13.4	140.4
Category C	60.1	0.0	60.1
Category X	3.7	8.3	12.0

The mitigation measures are proposed in Table 6-2 will be implemented.

Table 6-2 Habitat Clearing and Connectivity Objectives and Management Measures

Objective		
▪ Compliance with legal and other requirements e.g. permits, licences and approval condition; ▪ Environmental harm is minimised; ▪ Environmental performance and compliance is monitored; ▪ Ensure all staff are aware of the environmentally sensitive features on site.		
Management Measures		
No.	**Action**	**Responsibility**
1	Vegetation located adjacent to the Project construction works to be appropriately marked to avoid unnecessary clearing/vegetation damage.	Environmental Representative
2	Revegetation works to be undertaken where land has been disturbed for construction where land is not required for operations.	Environmental Representative
3	Refine location of work areas where it overlaps with ground-truthed remnant vegetation to avoid disturbance as far as possible;	Environmental Representative / Contractors
4	Survey and pegged disturbance footprint, prior to clearing to avoid unnecessary clearing of vegetation beyond that detailed during the design phase;	Environmental Representative / Contractors
5	Document measures within the Project Environmental Management Plan (EMP) to ensure clearing limits are adhered to, and limit access to approved access routes; and	Environmental Representative / Contractors
6	Prior to any vegetation disturbance, a trained ecologist or other qualified environmental specialist to be onsite to inspect and remove fauna (if required). All fauna recorded during pre-clearing surveys will be recorded on a dedicated fauna register. Construction areas that pose a risk to fauna to be fenced off where practical.	Environmental Representative
7	Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	Environmental Representative / Contractors
8	Minimise the occurrence of off-road vehicle movements.	All Staff and Contractors
9	The pre-construction environment should be reinstated, and vegetation re-established where it does not affect the Project operation and integrity.	Environmental Representative / Contractors
10	Visual inspection of progressively rehabilitated areas.	Environmental Representative / Contractors
11	Design and construction of fencing/infrastructure to direct fauna towards safe passage and around construction area.	Environmental Representative / Environmental Engineer
12	Vehicle washdown procedures.	Environmental Representative
13	Appropriate speed limits should be in place throughout the site and all contractors will be educated on the risks to local fauna to minimise impacts when driving.	Environmental Representative

14	To reduce the risk of mortality to native wildlife, no domestic animals are permitted onsite.	All Staff and Contractors
15	Environmental awareness training aimed at ecological issues as part of site induction.	Environmental Representative / Contractors
16	Avoid clearing trees with obvious hollows. If trees are required to be removed the proponent shall engage the services of a licensed, qualified Spotter Catcher to complete pre-clearing checks and be present during removal. They should also inspect the "no go" zone and clearing limits prior to clearing. If hollow bearing trees do require removal, they should first be inspected using an elevated work platform to determine if fauna are present. If fauna are detected, they would be safety removed prior to tree felling.	Environmental Representative / Contractors

6.2 Direct Fauna Mortality

Direct mortality of native fauna may occur because of the Project during habitat clearing and through vehicle collisions. Mortality during clearing will be managed through the presence of a suitably qualified fauna spotter/catcher during construction. It is anticipated that vehicle collisions caused by an increase in vehicle traffic may pose a risk to native fauna. The following mitigation measures are proposed and further detailed in Table 6-3:

- The Project EMP will include measures to establish protocols for pre-clearing surveys and data collection regarding fauna incidents; and
- Prior to any vegetation disturbance a trained ecologist or other qualified environmental specialist will be on site to remove fauna (if required).

Table 6-3 Direct Fauna Mortality Objectives and Management Measures

Objective		
▪ Compliance with legal and other requirements e.g. permits, licences and approval condition; ▪ Environmental harm is minimised; ▪ Environmental performance and compliance is monitored; ▪ Ensure all staff are aware of the environmentally sensitive features on site.		
Management Measures		
No.	**Action**	**Responsibility**
1	Vegetation located adjacent to the Project construction works to be appropriately marked to avoid unnecessary clearing/vegetation damage.	Environmental Representative
2	The Project EMP will include measures to establish protocols for pre-clearing surveys and data collection regarding fauna incidents;	Environmental Representative
3	Appropriate speed limits should be in place throughout the site and all contractors will be educated on the risks to local fauna to minimise impacts when driving; and	Environmental Representative / Contractors
4	All fauna recorded during pre-clearing surveys should be recorded on a dedicated fauna register.	Environmental Representative
5	Avoid impact on fauna habitat where possible.	All Staff and Contractors

6	Prior to any vegetation disturbance, a trained ecologist or other qualified environmental specialist to be onsite to inspect and remove fauna (if required). All fauna recorded during pre-clearing surveys will be recorded on a dedicated fauna register. Construction areas that pose a risk to fauna to be fenced off where practical.	Environmental Representative
7	Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	Environmental Representative / Contractors
8	Minimise the occurrence of off-road vehicle movements and limit movements to the construction footprint.	All Staff and Contractors
9	The pre-construction environment should be reinstated, and vegetation re-established where it does not affect the Project operation and integrity.	Environmental Representative / Contractors
10	Visual inspection of progressively rehabilitated areas.	Environmental Representative / Contractors
11	Appropriate speed limits should be in place throughout the site and all contractors will be educated on the risks to local fauna to minimise impacts when driving.	Environmental Representative
12	To reduce the risk of mortality to native wildlife, no domestic animals are permitted onsite.	All Staff and Contractors
13	Environmental awareness training aimed at ecological issues as part of site induction.	Environmental Representative / Contractors
14	Avoid clearing trees with obvious hollows. If trees are required to be removed the proponent shall engage the services of a licensed, qualified Spotter Catcher to complete pre-clearing checks and be present during removal. They should also inspect the “no go” zone and clearing limits prior to clearing. If hollow bearing trees do require removal, they should first be inspected using an elevated work platform to determine if fauna are present. If fauna are detected, they would be safety removed prior to tree felling.	Environmental Representative / Contractors

6.3 Pests and Weeds

Pests and particularly weeds may pose a threat to flora and fauna within the Project area. The field surveys detected several listed species although naturalised.

The transport and operation of construction vehicles and equipment has the potential to introduce pests and weeds into the Project area. Waste has the potential to impact flora and fauna, attracting pests and vermin through the supply of artificial food sources. This may impact on natural behaviour and natural species assemblages. A range of waste minimisation strategies will be in place to reduce waste streams generated. As such, it is not anticipated that waste generated as part of the Project will have a significant impact on flora and fauna communities within the Project area. Waste storages are not likely to have significant impacts on native fauna and flora within or adjacent to the Project area, as all waste produced as a result of the Project will be stored and disposed of appropriately, as per the relevant legislation.

Weed and pest management will be an important and integral part of proposed site management activities and will be detailed in specific weed and pest management protocols to be developed for the site. Proposed protocols and management measures are included in Table 6-4.

Table 6-4 Pests and Weeds Objectives and Management Measures

Objective		
▪ Compliance with legal and other requirements e.g. permits, licences and approval condition; ▪ Environmental harm is minimised; ▪ Environmental performance and compliance is monitored; and ▪ To prevent the introduction or spread of new declared weeds into construction area and control existing pest species within construction work areas during construction.		
Management Measures		
No.	**Action**	**Responsibility**
1	Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	Environmental Representative / Contractors
2	Minimise the occurrence of off-road vehicle movements.	All Staff and Contractors
3	The pre-construction environment should be reinstated, and vegetation re-established where it does not affect the Project operation and integrity.	Environmental Representative / Contractors
4	Visual inspection of progressively rehabilitated areas.	Environmental Representative / Contractors
5	Design and construction of fencing/infrastructure to direct fauna towards culverts providing safe passage.	Environmental Representative / Environmental Engineer
6	Implementation of sediment control mechanisms to minimise the risk of weed seed washing into drainage channels.	Environmental Representative / Environmental Engineer
7	Implement control strategies outlined in the Department of Agriculture and Fisheries (DAF) weed and pest animal fact sheets and other relevant government biosecurity management strategies.	Environmental Representative
8	Vehicle washdown procedures.	Environmental Representative
9	Onsite waste disposal strategies (particularly for food wastes) to be employed that will not encourage the presence of pest fauna	All Staff and Contractors
10	Monitoring and weed inspections particularly in response to reported outbreaks or complaints from adjacent property owners	Environmental Representative / Contractors
11	Regular onsite inspections of site infrastructure / equipment for resident pest fauna and establishment of a register for pest sightings	Environmental Representative / Contractors
12	To reduce the risk of mortality to native wildlife, no domestic animals are permitted onsite.	All Staff and Contractors
13	Environmental awareness training aimed at ecological issues as part of site induction.	Environmental Representative / Contractors

6.4 Dust

Increased dust resulting from clearing and earthworks, vehicle movement, construction of infrastructure has the potential to impact flora and fauna values within the Project area throughout construction and operation. Increased dust can result in respiratory issues in fauna, adverse impacts on plant photosynthesis and productivity (Chaston & Doley 2006), changes in soil properties ultimately impacting plant assemblages (Farmer 1993) and mortality and / or decrease in aquatic communities from the toxicity of poor water quality. Evidence of potential impacts on entire vegetation communities is scarce. Many studies focus on specific impacts to single species. Recent research on threatened flora in a semi-arid environment in Western Australia found no significant impact on plant health as a result of a range of dust accumulation loads caused by vehicle movements (Matsuki et al. 2016).

Dust is not anticipated to significantly impact terrestrial or aquatic habitats in the Project or surrounding areas. However, regular inspections for dust accumulation impacts on riparian vegetation located adjacent to the Project will be implemented as part of standard operating protocols for the Project. The following measures in Table 6-5 have been developed to ensure dust levels resulting from the Project are kept to a minimum.

Table 6-5 Air Objectives and Management Measures

Objective		
▪ No adverse impacts from air pollution and dust during construction and operation.		
Management Measures		
No.	**Action**	**Responsibility**
1	Implementation of dust suppression measures, if dust is visible or when wind conditions become adverse, including: ▪ Watering of exposed areas; and ▪ Physical barriers (e.g. covering of exposed soil piles). The aim of measures is to prevent an increase of particulates (PM^{10} and $PM^{2.5}$) above the current baseline conditions.	Environmental Representative
2	Trigger points for management decisions based on any or all of the following: ▪ Real-time measurements of wind conditions; ▪ Wind conditions as forecast by predictive numerical weather systems; and ▪ Dust monitoring at sensitive receptors when complaints are received.	Environmental Representative
3	Suspension of earthworks during high wind conditions.	All Staff and Contractors
4	Monitor dust control measures regularly for effectiveness.	Environmental Representative
5	Change in operations during worst-case conditions (e.g. implementation of stricter dust controls).	Environmental Representative
6	Speed limits will be developed and implemented where necessary to reduce the potential for impacts of dust emissions.	Environmental Representative
7	If required, vehicles carrying loads with the potential to produce dust will be covered when moving within or outside the construction-site.	All Staff and Contractors
8	Minimise extended engine idling and queuing adjacent to sensitive receptors.	All Staff and Contractors
9	Onsite burning of any material will not be undertaken without a valid permit from the relevant QFES Fire Warden.	Environmental Representative

10	Fire management measures for the Project to be developed and implemented.	Environmental Representative
11	Specific onsite smoking areas will be designated.	Environmental Representative
12	Ensure onsite fire-fighting equipment is regularly maintained and adequate staff training is implemented.	Environmental Representative
13	Weed management during and following rehabilitation to prevent habitat degradation and potential increased fire risk.	Environmental Representative
14	Provide timely, ongoing communication and consultation with all directly impacted landowners and other stakeholders.	Environmental Representative
15	Regular cleaning of machinery and vehicle tyres to prevent wheel entrained dust emissions.	Environmental Representative
16	Areas stripped of topsoil for Project construction will be rehabilitated as soon as practicable where not required during operations.	Environmental Representative
17	Applying water to road surfaces for dust suppression if required during construction.	Environmental Representative

6.5 Noise

Understanding the impact of noise on fauna is limited. There are no current government policies or guidelines that recommend thresholds or limits in relation to fauna. Noise may adversely affect wildlife by interfering with communication, masking the sound of predators and prey, causing stress or avoidance reactions, and in some cases, may lead to changes in reproductive or nesting behaviour. Excessive noise may lead some species to avoid noisy areas, potentially resulting in the fragmentation of species habitat. Radle (2007) states the consensus that terrestrial fauna will avoid any industrial plant or construction area where noise or vibration presents an annoyance to them. Additionally, many animals react to new noise initially as a potential threat, but quickly learn that the noise is not associated with a threat (Radle 2007).

Noise will be generated by the Project through the use of machinery, plant, and vehicles. The generation of construction and operational noise may be in areas which have the potential to support threatened fauna species. Individuals that occur on or near the site are expected to leave the area of impact. Project construction works and therefore potential noise impacts will be temporary. No further potential for impacts is expected following construction of the Project.

Noise from the Project's activities is not expected to have a significant impact on local fauna populations. However, the following measures in Table 6-6 will be implemented to reduce any impacts which may result from construction and operational noise.

Table 6-6 Noise Objectives and Management Measures

Objective		
▪ Minimise any potential nuisance or loss of amenity due to construction and operation activities of the Project in accordance with planning, environmental and other approvals.		
Management Measures		
No.	**Action**	**Responsibility**
1	Work hours are restricted to 6.30 am to 6.30 pm Monday to Sunday (noise generating activities). If work required outside of normal hours consultation to be undertaken with Environmental Representative.	All Staff and Contractors

2	Use of horns, bells, beepers, and other audible signals will be minimised as much as practicable without contravening safe work procedures.	All Staff and Contractors
3	Plant and equipment will be switched off when not required.	All Staff and Contractors
4	In cases where noise or vibration levels are identified as being too high, modification or substitution of work methods will be considered and undertaken where possible.	Environmental Representative
5	Noise to be mitigated by properly maintaining all equipment used onsite in accordance with manufacturers specifications.	Environmental Representative
6	Ensure that all operators of construction plant and haul trucks adhere to speed limits enforced onsite.	All Staff and Contractors
7	Designated access routes, unloading areas and parking areas.	All Staff and Contractors
8	Sensitive receptors located in proximity to the proposed works will be consulted with and given advance warning of any out of hours or high noise work activities.	Environmental Representative
9	Fit equipment with noise suppression equipment.	Environmental Representative / Engineering Representative
10	Minimise the drop heights of materials.	All Staff and Contractors
11	Provide timely, ongoing communication and consultation with all directly impacted landowners and other stakeholders.	Environmental Representative
12	Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project operations.	Environmental Representative
13	Enforcing speed limits to ensure that all operations are operating at the lowest operable noise level to minimise the impacts of noise and vibration upon wildlife; and	Environmental Representative

6.6 Accidental Release of Pollutants

The release of pollutants into the surrounding environment and waterways has the potential to degrade stream habitat quality near the site, degrade stream water quality and thereby impact vegetation communities and terrestrial fauna utilising these areas. Without mitigation, potential exists for contaminants to enter waterways through activities associated with the washdown and fuelling facilities, storage of lubricants and coolant, wastes and sewerage.

Surface water contaminants have the potential to impact the local catchment and vegetation communities in the surrounding areas. The following measures in Table 6-7 will be implemented to reduce any impacts which may result from accidental release of pollutants.

Table 6-7 Accidental Release of Pollutants Objectives and Management Measures

Objective		
▪ Minimise any potential pollution nuisance or damage to the surrounding environment due to construction activities of the Project in accordance with planning, environmental and other approvals.		
Management Measures		
No.	**Action**	**Responsibility**
1	All refuelling activities and the storage and handling of oil and chemicals will comply with relevant Australian Standards.	All Staff and Contractors

2	Bunding of chemical storage facilities and appropriate storage of chemicals according to AS 1940 'The storage and handling of flammable and combustible liquids'.	All Staff and Contractors
3	Appropriate spill control materials including booms and absorbent materials will be onsite at refuelling facilities at all times. These will be used for mitigating and managing events where a substance is spilled into surrounding waters.	All Staff and Contractors
4	Locate and design roads and other built infrastructure so that minimal runoff to waterways occurs.	Environmental Representative
5	Drainage design that allows for the retention of mine affected water prior to any discharge into the aquatic environment.	Environmental Representative
6	Wash-down areas will be clearly marked to prevent contaminated water from leaching into soils or flowing into nearby watercourses.	All Staff and Contractors

6.7 Fire

The Project has the potential to result in fires as a result of construction and operational tasks. Fire management measures have been developed to reduce the potential impacts of a site fire. Bushfire setbacks will be provided around Project infrastructure and powerlines in accordance with standards and legislation. Setbacks and firebreaks will be in accordance with the Australian Standard for the Construction of Buildings in Bushfire Prone Areas - AS3959 – 2009. AS3959. The following measures in Table 6-8 will be implemented to reduce any impacts which may result from fires.

Table 6-8 Fire Objectives and Management Measures

Objective		
▪ No adverse impacts from fire during construction and operation.		
Management Measures		
No.	**Action**	**Responsibility**
1	Protocols outlining the fire management measures for the Project will be developed and implemented prior to the commencement of Project operations;	Environmental Representative
2	Onsite burning of any material will not be undertaken without a valid permit from the relevant QFES Fire Warden.	Environmental Representative
3	Fire management measures for the Project to be developed and implemented.	Environmental Representative
4	Specific onsite smoking areas will be designated.	Environmental Representative
5	Ensure onsite fire-fighting equipment is regularly maintained and adequate staff training is implemented.	Environmental Representative
6	Weed management during and following rehabilitation to prevent habitat degradation and potential increased fire risk.	Environmental Representative
7	Vegetation within the site will be regularly inspected and managed for fuel loads; and	Environmental Representative

6.8 Koala Habitat

As per the Koala technical memorandum, as the activity scored ≥ 5 using the KHAT, the habitat is considered critical to the survival of the Koala, and therefore mitigation of impacts have been considered. In response to these, a number of mitigation measures are proposed, these are included in Table 6-9.

Table 6-9 Koala Habitat Objectives and Management Measures

Objective		
▪ No significant impacts to Koalas as a result of construction and operation.		
Management Measures		
No.	**Action**	**Responsibility**
1	Koala proof fencing will be established along the PV power station area and will: • Be a minimum 1.8m high, • Be 3 m from any retained trees or plantings and be clear of all overhanging branches, • Have a minimum 50 cm wide scratch panelling installed along the length of the fence	Environmental Representative / Engineering Representative
2	A fully-funded agreement will be put in place with a relevant organisation or authority for the maintenance and monitoring of the fencing in perpetuity	Environmental Representative / Environmental Engineer
3	Inclusion of Koala escape mechanisms i.e. climbing poles along road corridor will be implemented	Environmental Representative / Environmental Engineer
4	A 60 km/h speed limit on the access corridor at dawn and dusk with appropriate signage recommendation will be put forward to Council. As part of site inductions, staff will be reminded to adhere to this recommendation to not exceed 60 km/h.	Environmental Representative / Environmental Engineer
5	Road signage to be used to alert drivers of potential koala movement across the road	Environmental Representative / Environmental Engineer
6	Guidelines will be added to the Project Operation and Maintenance Plan outlining procedures on recording sick, injured or dead Koalas located in the Project area, and reporting to DES on 1300 ANIMAL (1300 264 625).	Environmental Representative
7	Fauna spotter/catchers aware of appropriate quarantine and biosecurity procedures for koalas found to be affected by disease	Environmental Representative
8	Biosecurity procedures will be added to the Construction EMP and Operation and Maintenance Plan for all persons and vehicles entering the site that may carry vegetation pathogens known to affect koala food trees. These procedures will be enforced.	Environmental Representative
9	Visual monitoring of adjacent habitat by site personnel to record and notify DES of any koalas and potential disease occurrence.	Environmental Representative
10	Biosecurity procedures will be enforced	Environmental Representative
11	Adjacent habitat will be monitored to identify disease occurrence	Environmental Representative

12	Koala food trees will be retained where possible along clearing boundaries.	Environmental Representative / Environmental Engineer
13	Vegetation clearing limits will be clearly marked to ensure no unnecessary clearing outside disturbance footprint (whereby minimising impacts to fauna habitat and movement around the site).	Environmental Representative / Environmental Engineer
14	Fauna egress infrastructure installed along fencing to prevent entrapment.	Environmental Representative / Environmental Engineer

6.9 Heat Island Effect

Studies to date have indicated that PV panels convert incident solar radiation into heat, and this can alter the airflow and temperature profiles within and adjacent to the panels. Such changes and impacts on near-by populations of humans and other species have been questioned (Fthenakis & Yu, 2013).

The issue regarding heat island effect has been subject to recent consideration by a Victorian Planning Panel for PV power stations proposed by Neoen and X-Elio in Greater Shepparton. This is detailed in the Panel Report for the Greater Shepparton Solar Energy Facility Planning Permit Application 2017-162, 2017-274, 2017-301 and 2017-344 (Panel Report 2018). Neoen, in preparation of a response to key issues raised in objecting submissions, commissioned a Statement of Evidence by Greg Barron-Gafford from the Research Group Biography, Ecosystem Science (University of Arizona) (Barron-Gafford 2018).

Studies completed indicate that results can be contradictory due to site and project specifics. Some studies suggest that photovoltaic systems can actually cause a cooling effect on the local environment, depending on the efficiency and placement of the photovoltaic panels while others demonstrate a warming effect (Barron-Gafford, Minor, Allen, Cronin, Brooks, & Pavao-Zuckerman, 2016). Other studies conclude that whilst air temperatures may increase within the solar plant itself, they rapidly decrease to the ambient temperature beyond the perimeter of the solar plant (Fthenakis & Yu, 2013).

Barron-Gafford (2018) in the Statement of Evidence to the Victorian Planning Panel included results on the radius of the measured heat effects. This identified that the heat island effect was indistinguishable from air temperatures over native vegetation when measured at a distance of 30 m from the edge of the photovoltaic array. In the SoE it was stated that '*this pattern held true for both daytime and night-time conditions. Because the PV panels themselves trap the energy from diffuse sunlight that was able to reach the ground underneath them, air temperatures remain elevated within a PV array. As you leave this "overstorey" of PV panels, energy is able to radiate back towards the atmosphere, as it does in a natural setting, and the PVHI quickly dissipates*'.

The Victorian Planning Panel Report (Panel Report 2018) accepted that solar arrays will affect air and soil temperatures within the solar array perimeter, and that in relation to outside of the solar array perimeter a heat island effect is unlikely to occur. It identified that any temperature increase within the solar array will be marginal and recommended a 30 m setback from any neighbouring property boundary.

Research to date (Yang et al 2017; Fthenakis and Yu 2013) indicates a small potential effect on micro-climate within the solar plant site. This effect may actually enhance retention of ground cover in very cold or hot conditions onsite. Negligible impacts on adjacent properties and agricultural activities such as plant growth and health of cattle are expected to occur. It is also considered unlikely that the heat would be carried offsite by the wind. Where sensitive land use occurs adjacent to solar panels, consideration to maintaining a 30 m buffer could be made.

The 30 m setback to neighbouring properties recommended by the Victorian Planning Panel Report has been adhered to, see approximate distances below:

- South – 70 m to Lot 30 DY457;
- East – 60 m to road parcel;
- North – 160 m to Lot 6 SP271223; and
- West – 350 m to road parcel.

As the areas that comprise solar panels will be cleared impacts to fauna are not expected to occur as a result of the heat island effects.

Section 7 MNES Significant Impact Assessment

The following section addresses potential significant impacts of the Project to MNES as referenced by '*Significant impact guideline 1.1*' (Department of the Environment). Table 7-1 summarises the potential impacts on the ten MNES that have been identified, where practicable.

Table 7-1 Summary of the Potential Impacts to MNES

Matters of National Significance	Relevant	Description
World Heritage Properties	X	There are no world heritage properties in close proximity to the Project area. The closest is Main Range National Park, which represents one component of the Gondwana Rainforests of Australia World Heritage Area, located over 150 km to the south east of the Project area.
National Heritage Places	X	There are no national heritage places in close proximity to the Project area. The closest is Main Range National Park, which represents one component of the national heritage listed Gondwana Rainforests of Australia, located over 150 km to the south east of the Project area.
Wetlands of international importance / Ramsar wetlands	X	There are no wetlands of international importance / Ramsar wetlands in close proximity to the Project area. The closest Ramsar wetland is Moreton Bay, located over 200 km to the east of the Project area.
The Great Barrier Reef Marine Park	X	The Project is not within the Great Barrier Reef Marine Park. The Project area is located over 300 km to the closest point (the southern boundary) of the Great Barrier Reef Marine Park.
Nationally Threatened Ecological Communities	X	No TEC's have been identified in the Project area and none are considered likely to occur.
Nationally Threatened Species	✓	Ecological assessments determined 6 nationally threatened fauna species could have the possibility or likelihood to occur within the Project area. Koala was the only species confirmed within the Project area during field surveys.
Migratory Species	✓	The Project area is not listed on the Ramsar Convention, in which Australia has entered into international agreements to protect the breeding and summer grounds of migratory birds. The ecological assessments determined that three migratory species could have the possibility or likelihood to occur within the Project area. No migratory species were identified within the Project area during field surveys.
Nuclear Actions (including Uranium Mining)	X	Not applicable.
A water resource, in relation to coal seam gas development and large coal mining development.	X	Not applicable.

For each MNES identified as being relevant to the Project in Table 7-1, the corresponding sub-section provides a table of assessment against the significant impact criteria for that matter based on the Significant Impact Guidelines 1.1.

7.1 Threatened Species

Six fauna species listed as Vulnerable under the EPBC Act are considered as possibly occurring, likely or known to occur in the Project area. The area of suitable habitat within the Project area and estimated disturbance for each species is provided in Table 7-2 with habitat figures prepared for the Project area. Current information about each listed species is summarised in the 'key data' tables shown in the following sections. Assessment of impact significance has been completed as per the Commonwealth's Significant Impact Guidelines 1.1 (DotE 2013). Despite the areas of habitat listed in Table 7-2, it is not expected clearing to these maximum values will be undertaken, as an example, clearing in the access corridor is not expected to be completed to the full extent of the road reserve.

Table 7-2 Predicted Impacts on MNES listed species habitat

Species	EPBC Act Status	Suitable Habitat (ha)		
		PV power station	Access Corridor	Total (Project Area)
Egernia rugosa Yakka skink	Vulnerable	*48.9*	*7.2*	*56.1*
Geophaps scripta scripta Squatter pigeon (southern subspecies) - breeding	Vulnerable	*173.4*	*15.3*	*188.7*
Geophaps scripta scripta Squatter pigeon (southern subspecies) - foraging	Vulnerable	*0.6*	*17.6*	*18.2*
Grantiella picta Painted Honeyeater	Vulnerable	-	*1.8*	*1.8*
Hirundapus caudacutus White-throated needletail	Vulnerable Migratory	*190.9*	*15.9*	*206.9*
Petauroides amillutus Central Greater Glider	Vulnerable	-	*2.3*	*2.3*
Phascolarctos cinereus Koala	Vulnerable	*190.9*	*15.9*	*206.9*

The vulnerable species assessments commence with an evaluation of the likely importance of the population, as defined within the significant impact criteria for vulnerable species.

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

Given the specificity of the above definitions and the scarcity of information and records available for most listed species and populations in the region (and Australia), it is difficult to determine: 1) attributes such as breeding and dispersal behaviour and whether the population is a 'key source' and 2) the genetic diversity of individuals inhabiting a population or sub-population. Given the paucity of information available, significance of impacts to threatened species has been based on experience of the assessment team and the latest available information.

7.1.1 Yakka Skink

Key data on the Yakka skink is included in Table 7-3 with an assessment against significant impact criteria provided in Table 7-4. Refer to Figure 7-1 for potential Yakka skink habitat ground-truthed during surveys.

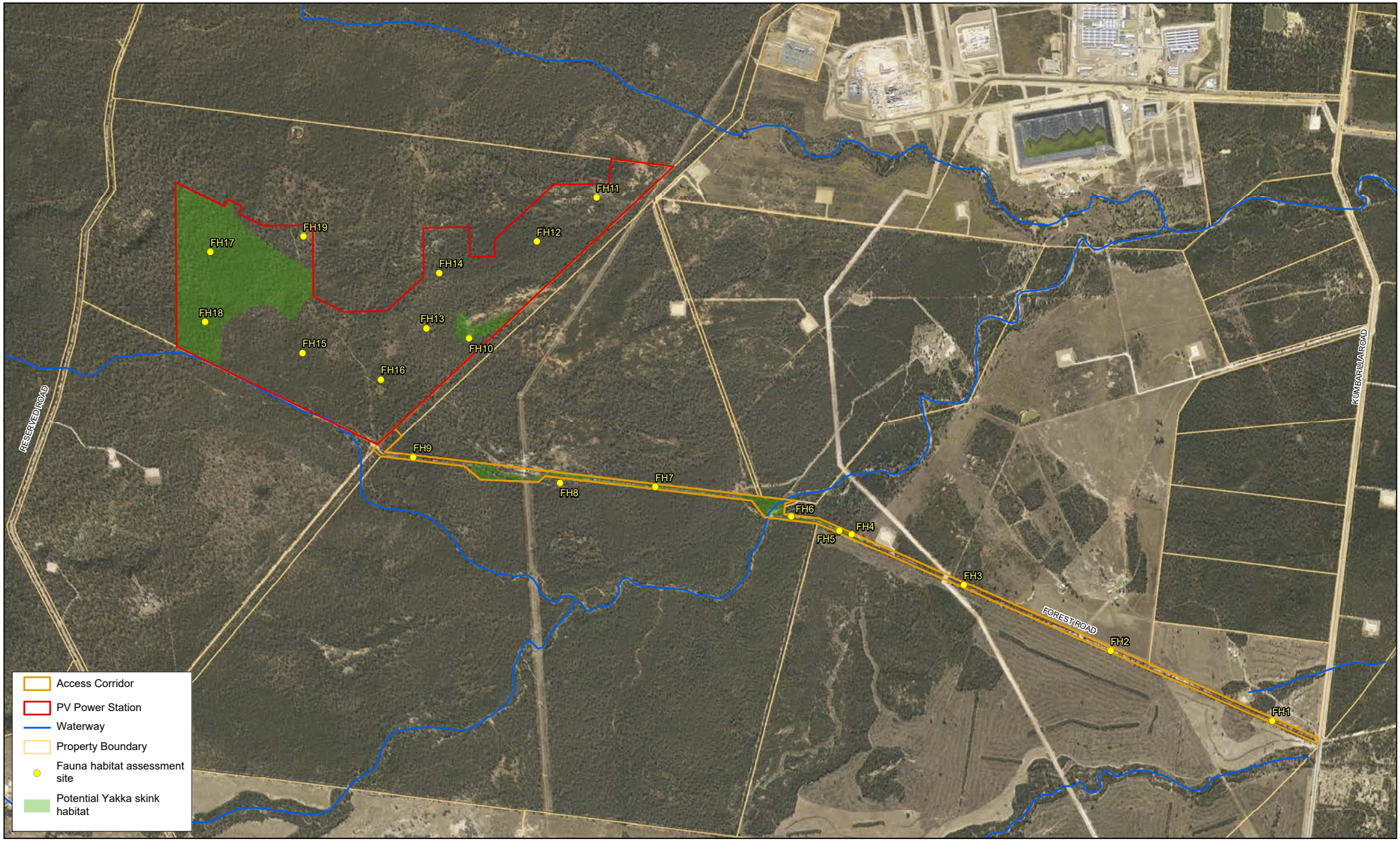
Table 7-3 Key Data on Yakka Skink

Yakka Skink (*Egernia rugosa*)
Baseline Data Results
Suitable habitat is present within the Project area. Inspections of potential habitat found no presence of this species however, extensive rock cavities in RE 11.7.4/11.7.5 community suggests potential impact is possible. Refer to Figure 7-1 for potential Yakka skink habitat. A maximum of 56.1 ha of habitat occurs in the Project area.
EPBC Status
Vulnerable
Key Threats
The main identified threat to the Yakka Skink is broadscale land clearing and habitat destruction. Other threats include: • Inappropriate roadside management; • Removal of wood debris and rock microhabitat features; • Ripping of rabbit warrens; and • Predation by feral animals.
Recovery Plans
A recovery plan is not considered to be required, the approved conservation advice for the species provides sufficient direction to implement priority actions and mitigate against key threats.

Table 7-4 Assessment Against Significant Impact Criteria: Yakka Skink

Criterion	Assessment against significance criteria (vulnerable)
Yakka Skink	
Lead to a long-term decrease in the size of an important population of the species.	**Unlikely**. No 'important population' has been identified within the Project area.
Reduce the area of occupancy of an important population.	**Unlikely**. No 'important population' has been identified for this species.
Fragment an existing important population into two or more populations.	**Unlikely**. No important population has been identified for this species.
Adversely affect habitat critical to the survival of the species.	**Unlikely**. There is no indication the Project area comprises habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	**Unlikely**. No 'important population' has been identified within the Project area.
Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely**. There is no indication the Project area comprises habitat critical to the survival of the species and therefore the Project is not considered likely to affect the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	**Unlikely.** The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.

Criterion	Assessment against significance criteria (vulnerable)
Introduce disease that may cause the species to decline.	**Unlikely.** The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Assessment of potential for significant residual impacts	**There have been no recent records within 10km buffer of Project area. The project's activities are considered unlikely to significantly impact the species.**



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DATA SOURCE
QLD Government Open Source Data
CDM Smith Modelling Data

DESIGNER
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FIGURE 7-1

POTENTIAL HABITAT FOR THE YAKKA SKINK (*EGERNIA RUGOSA*)

DRG Ref: FIG 7-1 YSkink Habitat

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7.1.2 Squatter Pigeon (Southern)

Key data on the Squatter pigeon (southern) is included in Table 7-5 with an assessment against significant impact criteria provided in Table 7-6. Refer to Figure 7-2 for potential Squatter pigeon foraging and breeding habitat ground-truthed during surveys.

Table 7-5 Key Data on Squatter Pigeon

Squatter Pigeon (*Geophaps scripta scripta*)
Baseline Data Results
The species occurs in grassy woodlands and it is known to prefer sandy soils in areas close to water. This species can also occur in cleared areas. Known to occur in the wider area, suitable habitat is present (broken down into foraging and breeding habitat), although marginal at best. No sightings of Squatter Pigeon were made during surveys. Refer to Figure 7-2 for potential Squatter pigeon habitat. A maximum breeding habitat of 188.7 ha occurs in the Project area and a maximum marginal foraging habitat of 18.2 ha occurs in the Project area.
EPBC Status
Vulnerable
Key Threats
Threats to the Squatter Pigeon include: • Vegetation clearing and fragmentation; • Overgrazing of habitat by livestock and feral herbivores; • Introduction of weeds; • Inappropriate fire regimes; • Thickening of understorey vegetation; predation by feral cats and foxes; • Trampling of nests by livestock; and • Illegal shooting.
Recovery Plans
There is no adopted or made Recovery Plan for this species.
Threat Abatement Plans
For Squatter Pigeon, the following Commonwealth Threat Abatement Plans are considered relevant: • Threat abatement plan for predation by feral cats (DotE 2015b): - Sets out four objectives for controlling feral cats including control in different landscapes, effectiveness of control options, alternative strategies to aid threatened species recovery and public support for cat management • Threat abatement plan for competition and land degradation by rabbits (DotEE 2016b): - Establishes a national framework to guide and coordinate Australia's response to the impacts of European rabbits on biodiversity. Identifies the research and management actions required to ensure the long-term survival of those native species and communities impacted by the presence of rabbits. Replaces the previous threat abatement plan published in 2008 (DEWHA) • Threat Abatement Plan for Predation by the European Red Fox (DEWHA 2008): - Sets out prioritising management areas including ascertain the degree of threat to the survival of threatened species and communities, the potential for recovery of threatened species and communities, threatened species likely to benefit through fox control in specific areas, and cost efficiency and effectiveness of fox control in a particular area.

The distribution of the Squatter Pigeon (southern) extends south from the Burdekin-Lynd divide in the southern region of Cape York Peninsula to the Border Ranges region of northern New South Wales, and from the east coast to Hughenden, Longreach and Charleville, Queensland.

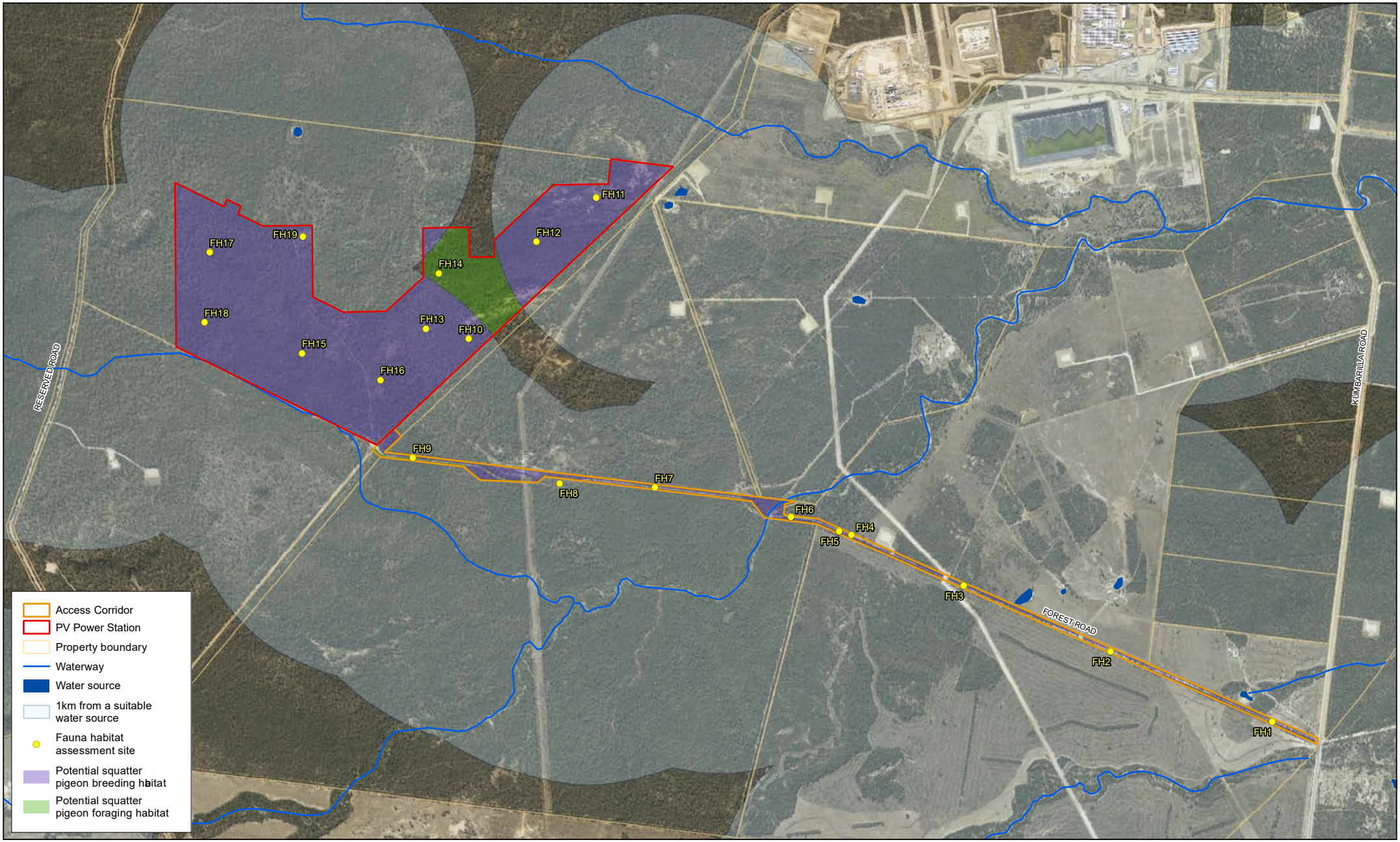
Important populations of the Squatter Pigeon have been identified as those isolated and sparsely distributed sub-populations that occur south of the Carnarvon Ranges in central and southern Queensland, including:

- Populations occurring in the Condamine River catchment and Darling Downs of southern Queensland;
- Populations occurring in the Warwick-Inglewood-Texas region of southern Queensland; and
- Any population that may potentially occur in New South Wales (Squatter Pigeon Workshop 2011).

Table 7-6 Assessment Against Significant Impact Criteria: Squatter Pigeon

Criterion	Assessment against significance criteria (vulnerable)
Squatter Pigeon	
Lead to a long-term decrease in the size of an important population of the species.	**Unlikely**. While an 'important population' has been identified within the greater region, the Project area possesses marginally suited habitat. No sightings were made during field surveys and it is uncertain whether or how many individuals may be using those areas of habitat, but it is assumed to be low numbers if at all.
Reduce the area of occupancy of an important population.	**Unlikely**. While an 'important population' has been identified within the greater region, the Project area possesses only marginally suited habitat and no sightings were made during field surveys. The Project area comprises areas of marginal potential habitat that will be impacted.
Fragment an existing important population into two or more populations.	**Unlikely**. While an 'important population' has been identified within the greater region, the Project area possesses only marginally suited habitat and no sightings were made during field surveys. While the subspecies is considered sedentary where food and water resources are reliable in the local region, it may disperse along vegetated corridors to access permanent water sources elsewhere in the region. Habitat connectivity has been considered in the design of the Project (see Section 6.1). The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project and the impact at a regional and local scale is expected to be minimal.
Adversely affect habitat critical to the survival of the species.	**Unlikely**. There is no indication the Project area comprises habitat critical to the survival of the species. The species occurs in grassy woodlands which remains abundant across much of its range including the local area surrounding the Project area. Squatter Pigeon may also occur in disturbed areas partially cleared for cattle grazing. The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project and the impact at a regional and local scale is expected to be minimal. The Project will not adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	**Unlikely**. While an 'important population' has been identified within the greater region, the Project area possesses marginally suited habitat. No sightings were made during field surveys and it is uncertain whether or how many individuals may be using those areas of habitat.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely**. The species occurs across a broad swathe of eastern Queensland from Townsville to the New South Wales border. The species preferred habitat is grassy woodlands which occurs widely across this area. No sightings were made of this species during field surveys, and it is uncertain whether or how many individuals may be using the area, but it is assumed to be low numbers if at all. Given the uniformity of the vegetation and landscape in the vicinity of the Project the Project is considered unlikely to decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	**Unlikely.** The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	**Unlikely.** The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.

Criterion	Assessment against significance criteria (vulnerable)
Interfere substantially with the recovery of the species.	**Unlikely**. There is no State or Commonwealth recovery plan for this species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on Squatter Pigeon, will be minor and is considered unlikely to interfere with the recovery of the species.
Assessment of potential for significant residual impacts	**While an 'important population' has been identified within the greater region, the Project area possesses marginally suitable habitat, no sightings were recorded. None of the above nine-part tests of significance conclude a significant impact on the species. As such, there will be no significant residual impact on an 'important population'.**



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DATA SOURCE
QLD Government Open Source Data
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FIGURE 7-2

POTENTIAL HABITAT FOR THE SQUATTER PIGEON (*GEOHAPS SCRIPTA SCRIPTA*)

DRG Ref: FIG X-XX Pigeon Habitat

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7.1.3 Painted Honeyeater

Key data on the Painted honeyeater is included in Table 7-7 with an assessment against significant impact criteria provided in Table 7-8. Refer to Figure 7-3 for potential Painted honeyeater habitat ground-truthed during surveys.

Table 7-7 Key Data on Painted Honeyeater

Painted Honeyeater (*Grantiella picta*)
Baseline Data Results
Possibly occurs on site. Essential habitat was mapped for Painted honeyeater within the Project area. Surveys concluded that suitable habitat on site is consistent with woodland habitat of Painted honeyeaters however the low density of mistletoe and lack of the *Amyema* genus suggests the likelihood of occurrence is low and likelihood of impact is very low. Refer to Figure 7-3 for potential Painted honeyeater habitat. A maximum of 1.8 ha of potential habitat occurs in the Project area.
EPBC Status
Vulnerable
Key Threats
Habitat loss is the key threat to this species.
Recovery Plans
There is no adopted or made Recovery Plan for this species.

Table 7-8 Assessment Against Significant Impact Criteria: Painted Honeyeater

Criterion	Assessment against significance criteria (vulnerable)
Painted Honeyeater	
Lead to a long-term decrease in the size of an important population of the species.	**Unlikely**. No 'important population' has been identified within the Project area.
Reduce the area of occupancy of an important population.	**Unlikely**. No 'important population' has been identified within the Project area.
Fragment an existing important population into two or more populations.	**Unlikely**. No 'important population' has been identified within the Project area.
Adversely affect habitat critical to the survival of the species.	**Unlikely**. There is no indication the Project area comprises habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	**Unlikely**. No 'important population' has been identified within the Project area.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely**. There is no indication the Project area comprises habitat critical to the survival of the species. Therefore the Project is not considered likely to affect the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	**Unlikely.** The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	**Unlikely.** The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.

Criterion	Assessment against significance criteria (vulnerable)
Interfere substantially with the recovery of the species.	**Unlikely**. There is no State or Commonwealth recovery plan for this species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on Squatter Pigeon will be minor and is considered unlikely to interfere with the recovery of the species.
Assessment of potential for significant residual impacts	**Only one record of this species occurring within 10km buffer of Project area exists. The project's activities are considered unlikely to result in significant residual impacts to the species.**

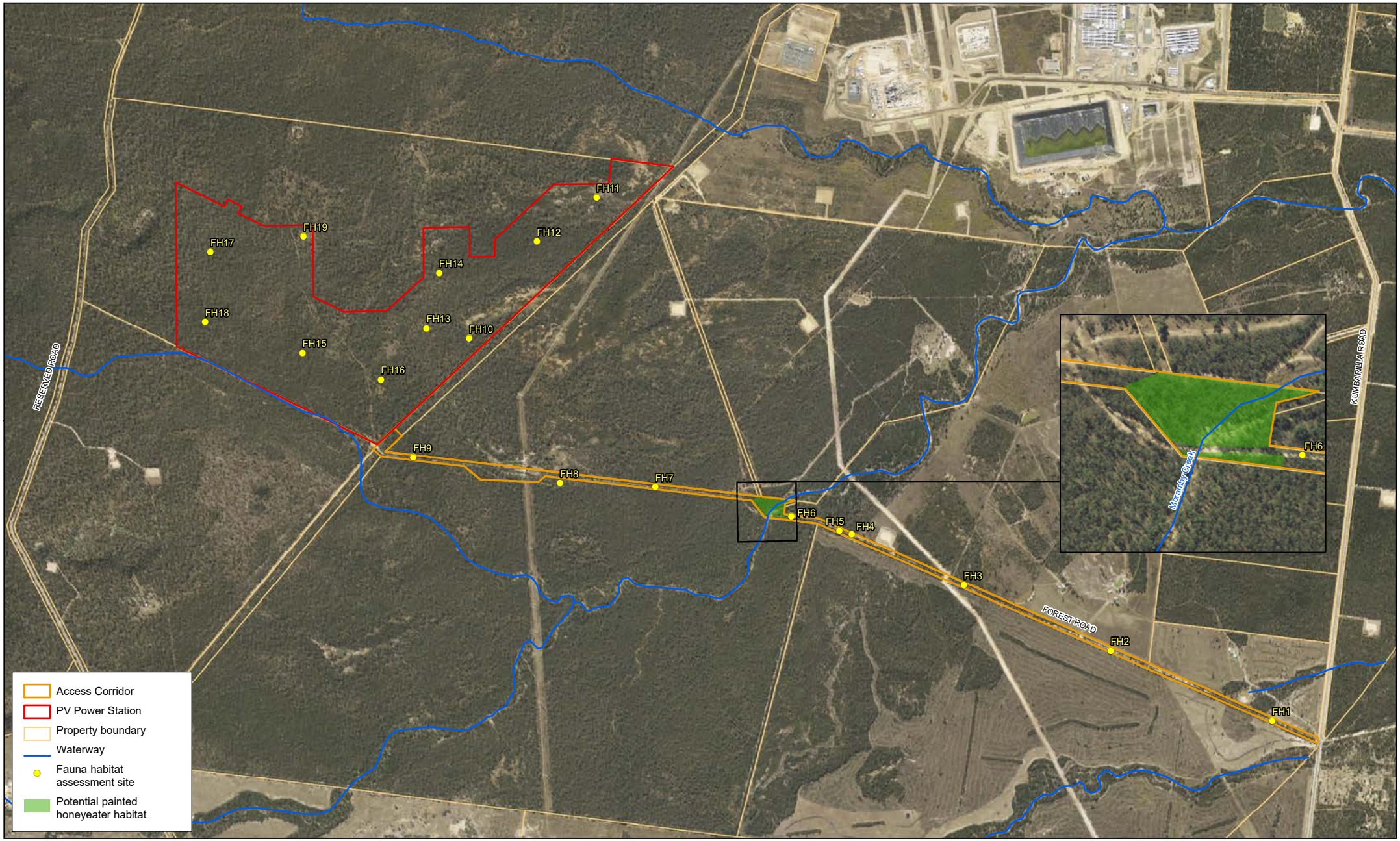

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FIGURE 7-3

POTENTIAL HABITAT FOR PAINTED HONEYEATER (*GRANTIELLA PICTA*)

DRG Ref: FIG 7-3 PHEater Habitat

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7.1.4 White-throated Needletail

Key data on the White-throated needletail is included in Table 7-9 with an assessment against significant impact criteria provided in Table 7-10. Refer to Figure 7-4 for potential White-throated needletail habitat ground-truthed during surveys.

Table 7-9 Key Data on White-throated Needletail

White-throated Needletail (*Hirundapus caudacutus*)
Baseline Data Results
Wide ranging aerial species which migrates from the northern hemisphere to eastern Australia. Essential habit was mapped for Painted Honeyeater within the Project area. May occur over the Project area in the summer months. The species is known to roost in trees amongst dense foliage in the canopy or in hollows. No sightings during field surveys. Two ALA records within 10 km buffer of Project area. A maximum of 206.9 ha of potential habitat occurs in the Project area.
EPBC Status
Vulnerable / Migratory
Key Threats
In Australia threats include collision with overhead wires, windows and lighthouses although this affects only a few individuals and therefore is not a threat to the species overall. Other threats may include the use of insecticides, loss of roosting sites in Australia.
Recovery Plans
There is no adopted or made Recovery Plan for this species.

Table 7-10 Assessment Against Significant Impact Criteria: White-throated Needletail

Criterion	**Assessment against significance criteria (vulnerable)**
White-throated Needletail	
Lead to a long-term decrease in the size of an important population of the species.	**Unlikely**. No 'important population' has been identified within the Project area.
Reduce the area of occupancy of an important population.	**Unlikely**. No 'important population' has been identified within the Project area.
Fragment an existing important population into two or more populations.	**Unlikely**. No 'important population' has been identified within the Project area.
Adversely affect habitat critical to the survival of the species.	**Unlikely**. While tree hollows on site could be used as roosting sites, there is no indication the Project area comprises habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	**Unlikely.** No 'important population' has been identified within the Project area. The species does not breed in Australia.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely**. There is no indication the Project area comprises habitat critical to the survival of the large-eared pied bat and therefore the Project is not considered likely to affect the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	**Unlikely.** The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.

Criterion	Assessment against significance criteria (vulnerable)
Introduce disease that may cause the species to decline.	**Unlikely.** The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	**Unlikely**. There is no State or Commonwealth recovery plan for this species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on White-throated needletail will be minor and is considered unlikely to interfere with the recovery of the species.
Assessment of potential for significant residual impacts	**Only two records of the species within 10km buffer of Project area exist. The project's activities are considered unlikely to result in significant residual impacts to the species. This is a wide-ranging aerial species that migrates from the northern hemisphere to eastern Australia.**

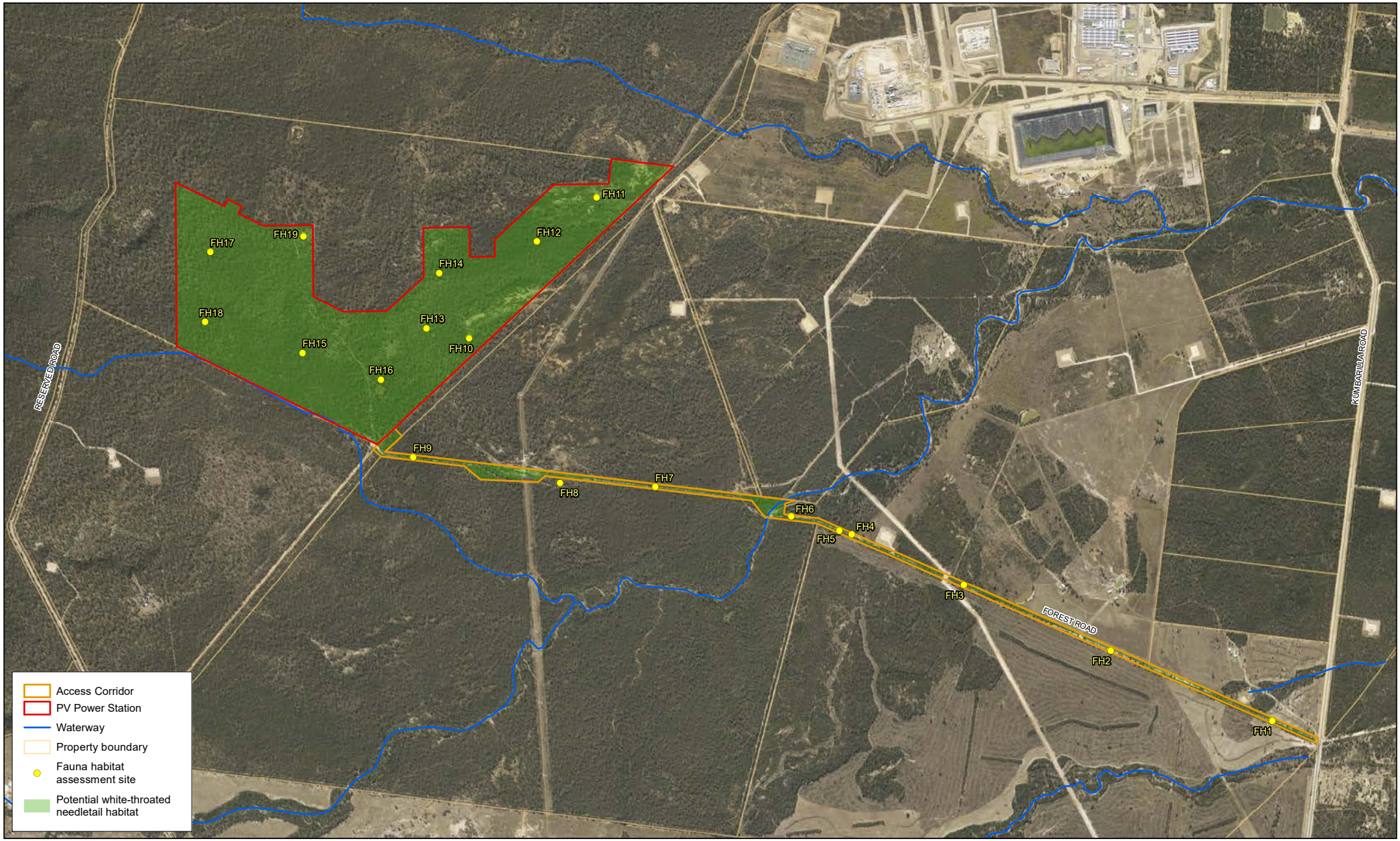

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FIGURE 7-4

POTENTIAL HABITAT FOR THE WHITE-THROATED NEEDLETAIL (*HIRUNDAPUS CAUDACUTUS*)

DRG Ref: FIG 7-4 WTNTail Habitat

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7.1.5 Central Greater Glider

Key data on the Central greater glider is included in Table 7-11 with an assessment against significant impact criteria provided in Table 7-12. Refer to Figure 7-5 for potential Greater glider habitat ground-truthed during surveys.

Table 7-11 Key Data on Greater Glider

Greater Glider (*Petauroides amillatus*)
Baseline Data Results
One ALA record within 10 km buffer of the Project area. Suitable hollow-bearing trees were identified on site however no animals, scat or scratch evidence were observed during targeted searches and spotlighting activities. Only two small patches of potential habitat were identified within the Project area (Figure 7-5). A maximum of 2.3 ha of potential habitat occurs in the Project area.
EPBC Status
Vulnerable
Key Threats
The broad area of occurrence likely remains similar to pre-European settlement, although the actual area of occupancy has declined substantially, mostly due to land clearing (TSSC 2016). The following are considered known threats to the Greater Glider: - Habitat loss and fragmentation; - High intensity or frequent fires; - Timber production; - Climate change (may reduce area of occupancy); - Barbed wire entanglement; - *Phytophthora* root fungus (known to impact on the health of eucalyptus); and - Over predation by owl species (TSSC 2016).
Recovery Plans
There is no recovery plan for this species. The Commonwealth's Approved Conservation Advice for Greater Glider (TSSC 2016) lists priority conservation actions that may be applicable to the Project including: - Reduce the frequency and intensity of prescribed burns; - Identify appropriate levels of patch retention, habitat tree retention, and logging rotation in hardwood production; and - Protect and retain hollow-bearing trees, suitable habitat and habitat connectivity.

The Greater Glider occurs from Victoria, north to the Atherton Tablelands in Queensland and until recently was conventionally accepted as a single species (*Petauroides volans).* The north Queensland population was considered a separate subspecies (*Petauroides volans minor*) from the widespread south eastern population (*Petauroides volans volans*). However, in 2020 it was discovered that there are three distinct species:

- *Petauroides minor* (Southern Greater Glider);
- *Petauroides armillatus* (Central Greater Glider); and
- *Petauroides Volans* (Norther Greater Glider).

The division of the Greater Glider into multiple species reduces the presumed widespread distribution of the original species. The Project area is located within the occurrence of what was the south eastern population which now corresponds with the Central Greater Glider.

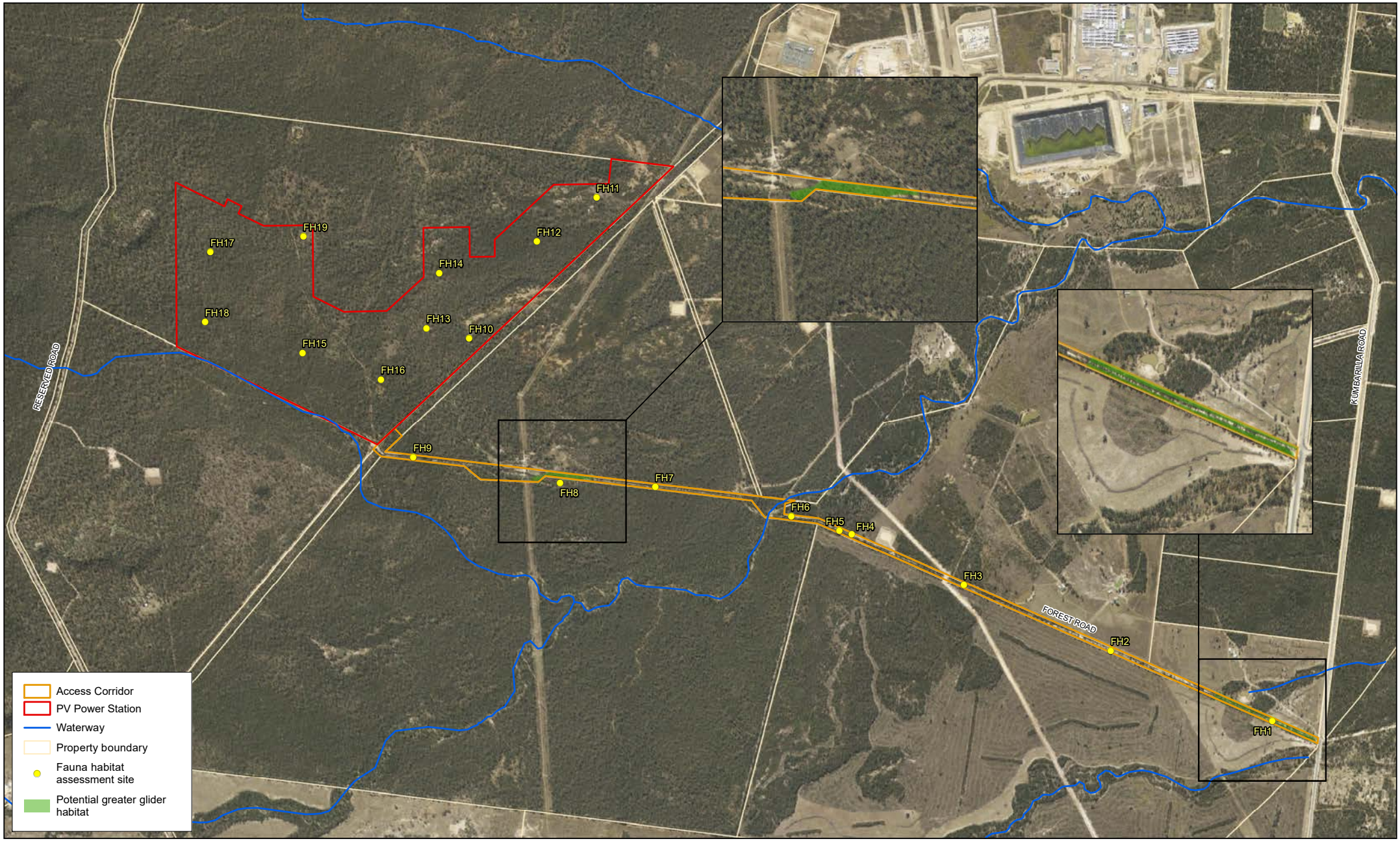

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FIGURE 7-5

POTENTIAL HABITAT FOR THE GREATER GLIDER (*PETAUROIDES VOLANS*)

DRG Ref: FIG 7-5 GGlider Habitat

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Table 7-12 Assessment Against Significant Impact Criteria: Greater Glider

Criterion	Assessment against significance criteria (vulnerable)
Greater Glider	
Lead to a long-term decrease in the size of an important population of the species.	**Unlikely**. No 'important population' has been identified within the Project area. No sightings were made during field surveys and it is uncertain whether or how many individuals may be using those areas of habitat, but it is assumed to be low numbers if at all.
Reduce the area of occupancy of an important population.	**Unlikely.** No 'important population' has been identified within the Project area. The species has not been recorded within the Project area. The Project requires a maximum clearing of 2.3 ha of potential habitat in which the species may possibly occur.
Fragment an existing important population into two or more populations.	**Unlikely.** No 'important population' has been identified within the Project area. The Project requires maximum clearing of 2.3 ha of potential habitat in which the species is most likely to occur. The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project and the impact at a regional and local scale is expected to be minimal. It is considered unlikely the Project will fragment an existing 'important population' into two or more populations.
Adversely affect habitat critical to the survival of the species.	**Unlikely.** There is no indication the Project area comprises habitat critical to the survival of the Greater Glider. The Project maximum clearing of 2.3 ha of potential habitat in which the species may possibly occur which. There is no indication the Project area comprises habitat critical to the survival of the Greater Glider.
Disrupt the breeding cycle of an important population.	**Unlikely.** No 'important population' has been identified within the Project area. Where possible, clearing activities will take place outside the known breeding season of the Greater Glider (March-June). A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing of potential habitat taking place. It is considered unlikely the Project will disrupt the breeding cycle of an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely**. Only a small amount of suitable habitat was identified on site. The Project will require maximum clearing of 2.3 ha of potential habitat. It is not considered that this area is of sufficient size to impact the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	**Unlikely**. The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	**Unlikely.** The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	**Unlikely**. There is no State or Commonwealth recovery plan for this species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on Central Greater Glider, should it occur within the Project area, will be minor and is considered unlikely to interfere with the recovery of the species or any of the actions outlined in the Approved Conservation Advice.
Assessment of potential for significant residual impacts	**Only one record of this species has been recorded within 10km buffer of Project area. The project's activities are considered unlikely to result in significant residual impacts to the species.**

7.1.6 Koala

Key data on the Koala is included in Table 7-13 with an assessment against significant impact criteria provided in Table 7-14. Refer to Figure 7-6 for potential Koala habitat ground-truthed during surveys.

Additional information is provided in Section 5.3.5.2.1 and **Appendix H**.

Table 7-13 Key Data on Koala

Koala (*Phascolarctos cinereus*)
Baseline Data Results
Known on site. Two skulls found on Project site and eucalyptus on site, along with discovery of Koala scats. Five ALA records found in a 10 km buffer of the Project area. Refer to Figure 7-6 for potential Koala habitat. A maximum of 206.9 ha of known habitat occurs in the Project area.
EPBC Status
Vulnerable
Key Threats
Koala populations have undergone a substantial decline in the past few decades. DSEWPaC (2012b) identified the following the following known threats to the Koala: - Habitat loss and fragmentation; - Deaths from vehicle collisions; - Deaths from dog (feral and domestic) attacks; - Diseases including *Chlamydia* strains and Koala Retrovirus; and - The effects of climate change and droughts.
Recovery Plans
- There is no adopted or made Recovery Plan for this species.

The 'EPBC Act referral guidelines for the vulnerable Koala' (DotE 2014) do not refer to any 'important populations' of Koala due to a lack of information at the time of writing. The guidelines provide a 'Koala habitat assessment tool' to assist in determining the sensitivity, value and quality of lands potentially impacted under development proposals. The assessment tool is to be used to determine whether lands may be considered 'critical to the survival of the Koala' and therefore critical to the long-term survival and recovery of the species. Impact areas that score five or more using the habitat assessment tool for the Koala contain habitat considered critical to the survival of the Koala. The results of the assessment are to aid the decision-making process and determine whether a Project may need to be referred to DAWE based on potential significant impacts to Koalas and/or habitat critical to the survival of the species. Koala habitat assessments undertaken for the Project area found the habitat within the access corridor constitutes habitat critical to the survival of the species (see **Appendix H**).

Under the referral guidelines for Koala (DotE 2014) it is recommended that a project be referred where it is proposed to 'clear ≥ 20 ha of habitat containing known Koala food trees in an area with a habitat score ≥ 8.' Where this is not proposed, the guidelines recommend that a referral be based on an appraisal of the Project considering factors such as Koala density and level of habitat fragmentation.

Evidence of Koala was identified in the Project area during field surveys, through the discovery of Koala scats and a Koala skull within the PV power station component of the Project area. The low density, condition and sizes of the Koala scats suggest a single Koala has been present within the site boundary several months prior to the survey. Evidence of Koala habitation in the form of scratches and scats was also located at three sites within the access corridor.

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FIGURE 7-6

KNOWN HABITAT FOR THE KOALA (*PHASCOLARCTOS CINEREUS*)

DRG Ref: FIG 7-6 Koala Habitat

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Table 7-14 Assessment Against Significant Impact Criteria: Koala

Criterion	Assessment against significance criteria (vulnerable)
Koala	
Lead to a long-term decrease in the size of an important population of the species.	**Unlikely.** No 'important population' has been identified within the Project area and no individuals have been observed during site surveys. Two koala skulls were identified in the PV power station area. Habitat that may be considered as 'critical to the survival of Koala' occurs within the Project area. The Project requires clearing 206.9 ha (PV power station 190.9 ha and access corridor 15.9 ha) of known habitat. The Project has the potential to lead to an increase in Koala road deaths along the access corridor although traffic will be minimal once construction is completed. Mitigation actions such as signage will be incorporated into the access road design. It is considered unlikely the Project will lead to a long-term decrease in the size of an important population of Koala.
Reduce the area of occupancy of an important population.	**Unlikely.** No 'important population' has been identified within the Project area although the species is known to occur. Habitat that may be considered as 'critical to the survival of Koala' occurs within the Project area. The Project requires clearing 206.9 ha of this habitat. However, the Project area remains contiguous with abundant similar habitat in the wider surrounds. It is considered unlikely the Project will reduce the area of occupancy of an important population of Koala in the area.
Fragment an existing important population into two or more populations.	**Unlikely.** No 'important population' has been identified within the Project area although the species is known to occur. Habitat connectivity has been considered in the design of the Project (see Section 6.1)). The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project and the impact at a regional and local scale is expected to be minimal. It is considered unlikely the Project will fragment an existing 'important population' into two or more populations.
Adversely affect habitat critical to the survival of the species.	Koala habitat is present throughout the study area. Koala habitat assessments against the EPBC Koala Habitat Assessment Tool identified the Project area as being habitat critical to the survival of the species. The Project requires clearing of 206.9 ha this habitat. This vegetation clearing will adversely impact habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	**Unlikely.** No 'important population' has been identified within the Project area. Where possible, clearing activities will take place outside the breeding season for Koala (October-May). A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing of potential Koala habitat taking place. It is considered unlikely the Project will disrupt the breeding cycle of an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely.** There is suitable woodland habitat for the species in the Project area. However, there is abundant suitable habitat for the species in the area surrounding the Project. It is considered unlikely the Project will impact the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	**Unlikely**. The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	**Unlikely.** The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	**Unlikely**. There is no State or Commonwealth recovery plan for this species. The Approved Conservation Advice for Koala (TSSC 2012) outlines the management actions intended to aid the recovery of the species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, an environmental offsets program, any potential impact on Koala will be minor and is considered unlikely to interfere with the recovery of the species or any of the actions outlined in the Approved Conservation Advice.

Criterion	Assessment against significance criteria (vulnerable)
Assessment of potential for significant residual impacts	**The species has been detected in the Project area. There is suitable habitat for this species within the Project area. Suitable habitat will be impacted by clearing activities including up to 206.9 ha of known habitat. It is unlikely the habitat will retain the necessary characteristics to locally support the species following the completion of construction activities and vegetation rehabilitation activities. There is a low potential for construction to impact the breeding cycle or for operational activities to impact the species with the proposed mitigation measures in place.** **It is considered that the Project is likely to be a controlled action requiring assessment under the EPBC Act due to potential impacts upon koalas.**

7.2 Migratory Species

The ecological assessment determined that while the Project area would not represent useful habitat for migratory species, there are three bird species (in addition to the White-throated Needletail which is also listed as Vulnerable) which have some possibility to occur. These are described in Table 7-16. No Migratory species were identified during field surveys.

Table 7-15 Significant Impact Assessment – Migratory Species

Common name	Habitat utilised by migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	Habitat that is of critical importance to the species at particular life-cycle stages, and/or	Habitat utilised by a migratory species which is at the limit of the species range, and/or	Habitat within an area where the species is declining	Likelihood of occurrence
Fork-tailed Swift	Widespread and scattered records in the wider region, concentrating towards the coast and south eastern Australia.	The Fork-tail swift is an aerial species utilising a variety of environments. It does not breed in Australia. May occur over heavily disturbed sites as well as natural habitats. The habitat within the Project area is unlikely to be of critical importance to the species due to its mobility and adaptability.	The species migrates to areas across all states and territories of Australia.	The IUCN classifies the species as 'least concern' and the Action Plan for Australian Birds 2010 classifies it as 'least concern'	Unlikely
Satin Flycatcher	Widespread and scattered records in the wider region, concentrating towards the coast and south eastern Australia.	May occasionally utilise the Project area during autumn/spring migrations but generally migrates along coastal areas and the Great Dividing Range. The habitat within the Project area is unlikely to be of critical importance to the species.	The species is widespread in eastern Australia.	The IUCN classifies the species as 'least concern' and the Action Plan for Australian Birds 2010 classifies it as 'least concern'	Unlikely

Common name	Habitat utilised by migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	Habitat that is of critical importance to the species at particular life-cycle stages, and/or	Habitat utilised by a migratory species which is at the limit of the species range, and/or	Habitat within an area where the species is declining	Likelihood of occurrence
Rufous Fantail	Widespread and scattered records in the wider region, concentrating towards the coast and south eastern Australia.	May possibly occur in woodlands in the Project area in winter months although most spend the winter in coastal lowlands and offshore islands in south-east Queensland. The habitat within the Project area is unlikely to be of critical importance.	The species is widespread in eastern Australia.	The IUCN classifies the species as 'least concern' and the Action Plan for Australian Birds 2010 classifies it as 'least concern'	Unlikely

An assessment of impacts was undertaken against the significant impact criteria for migratory species (Table 7-16). There is no habitat suitable for migratory bird species associated with wetlands in or adjacent to the Project area apart from the small dam on site. Aerial species such as the Fork-tailed Swift may occur over heavily disturbed areas as well as natural habitats and will not be impacted by Project activities. No impacts to species listed as Migratory are expected to occur as a result of Project activities.

Table 7-16 Assessment Against Significant Impact Criteria: Migratory Species

Criterion	Assessment
Migratory Species	
Does the migratory species habitat within the Project area represent 'important habitat'?	There is no evidence that habitat within the Project area should be considered as important habitat for a migratory species. None of the species listed as Migratory were observed during site surveys although it is possible that they may transiently occur at times. None of the species are known to be declining or are at the limit of their range. Therefore, migratory species habitat within the Project area is unlikely to represent 'important habitat'.
Substantially modify, destroy or isolate an area of important habitat for a migratory species.	Migratory species habitat within the Project area is unlikely to represent 'important habitat', as noted above. There is no reason to consider the Project will have a significant impact on 'important habitat' for any of the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	Migratory species habitat within the Project area is unlikely to represent 'important habitat', as noted above. The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project area to limit the potential impact of feral predators and weed species on migratory species and their habitat. The Project is considered unlikely to result in invasive species becoming established in migratory species habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	An 'ecologically significant proportion' of a population varies with the species. Factors that should be considered include the species population status, genetic distinctiveness and species-specific behavioural patterns (i.e. site fidelity and dispersal rates) DoE 2013. None of the species assessed as possibly occurring in the Project area have been recorded in large enough numbers that may represent an ecologically significant proportion of the population of a migratory species. Coupled with the lack of 'important habitat' for migratory species occurring within the Project area, no significant impacts on a migratory species are expected.
Assessment of potential for significant residual impacts	**The Project does not meet any of the criteria that would constitute a significant impact to migratory species. As such, it is concluded that the proposed development is unlikely to significantly impact any of the three potentially occurring species.**

7.3 Potential Residual Impacts and Offsets

The EPBC Act Environmental Offsets Policy 2012 (Offsets Policy) defines offsets as measures that compensate for the residual adverse impacts of an action on the environment. Avoidance and mitigation measures are the primary strategies for managing the potential significant impacts of a project. Offsets are not intended to reduce the likely impacts of the Project but are implemented to compensate any residual (after mitigation) significant impacts.

The Offsets Policy outlines the approach to environmental offsets under the EPBC Act. The policy applies to offsetting requirements in terrestrial and aquatic (including marine) environments and applies to projects assessed under the EPBC Act. Under the Offsets Policy, offsets act as a compensation mechanism for impacts (direct and indirect) to all protected matters under the EPBC Act including two relevant MNES for this Project: Listed threatened species and ecological communities. Offsets under Commonwealth legislation are only required where residual impacts are considered significant as defined under the detailed significance criteria.

The current Project footprint and design have been planned to avoid significant environmental impacts, where possible or practicable, however, potential residual environmental impacts may be unavoidable.

Ground-truthed MNES within the overall Project referral footprint include:

- Known habitat for Koala; and
- Potential habitat for Yakka skink, Squatter pigeon (southern), Painted honeyeater and Central greater glider.

Habitat located surrounding the Project area contains suitable habitat for MNES species to occur. As per the residual impacts likely to require referral stipulated in Section 8 of the Referral Guidelines for the Vulnerable Koala, the Project is unlikely to result in significant residual impacts to the Koala. The clearing of vegetation and habitat for the Koala will result in loss of habitat; however, if the activity is carried out with the mitigation measures proposed, the Project is not expected to result in significant residual impacts.

Section 8 Conclusion

This Project will contribute to reduced greenhouse gas emissions and will assist the transition towards cleaner electricity generation. The Project will result in direct and indirect employment opportunities during construction and operational phases.

Unmitigated impacts to ecological values as a result of the Project include removal of potential habitat for MNES species. The avoidance and mitigation measures for the Project follow the development mitigation hierarchy of avoid, mitigate, rehabilitate/restore and offset. Impacts to ecological values will be avoided by retaining native vegetation, implementing and maintaining functional mitigation measures. The main mitigation measures to reduce the likelihood of significant impacts to ecological values include implementing clearing protocols such as pre-clearance surveys, supervision of clearing by a spotter catcher, maintaining the hydrology of the site and implementing soil and erosion controls.

The total Project footprint is approximately 213 ha. The Project area will impact up to 206.9 ha of habitat containing known Koala habitat. On this basis, and potential residual impacts to Koala, it is considered that the Project will be deemed a controlled action. With the implementation of appropriate mitigation, it is considered likely that there will be no significant impacts to MNES. Impacts to other matters of environmental significance known or likely to occur within the site are not considered to be significant.

Section 9 Reference List

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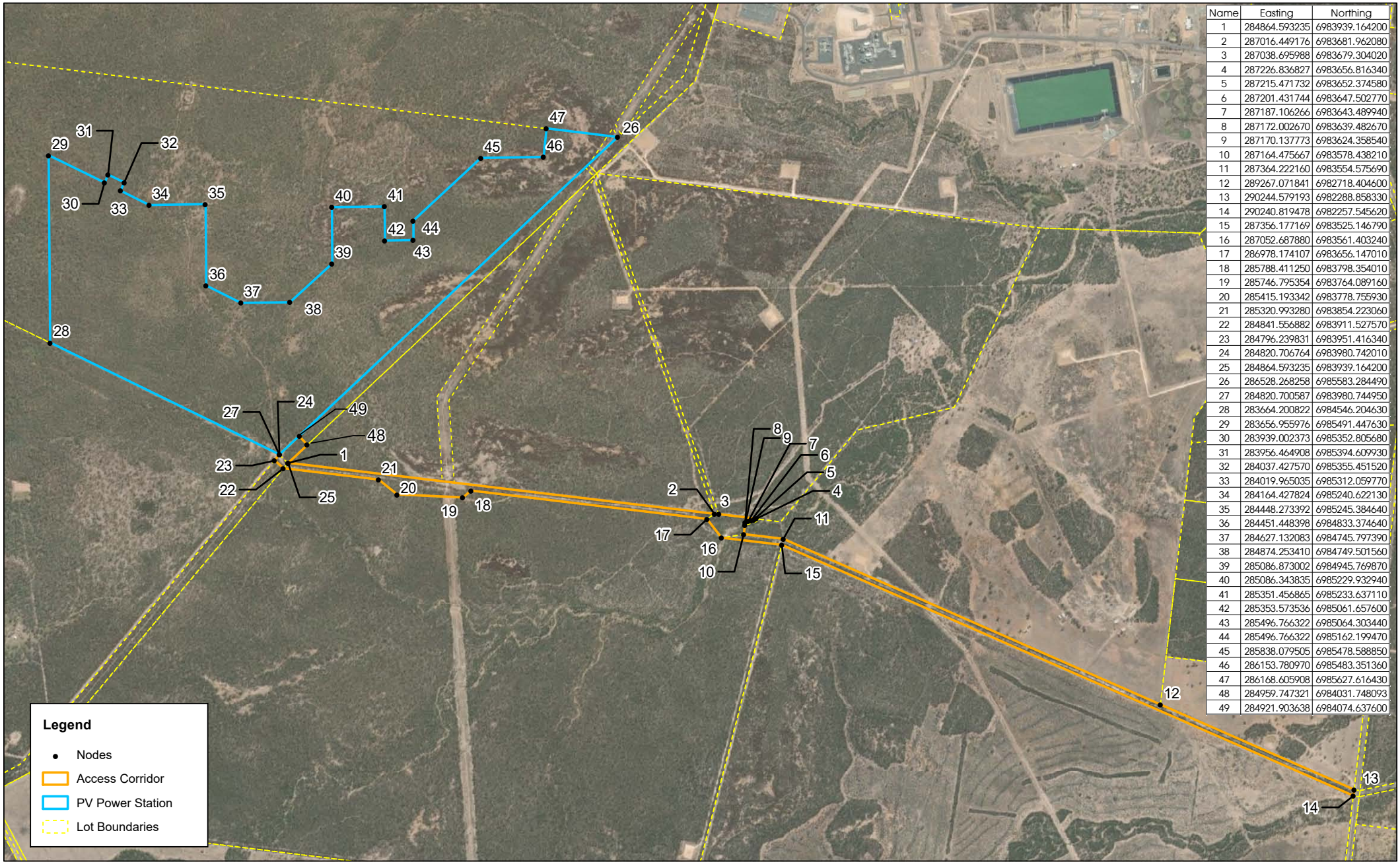
Appendix A Referral Area and Layout



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4	287226.836827	6983656.816340
5	287215.471732	6983652.374580
6	287201.431744	6983647.502770
7	287187.106266	6983643.489940
8	287172.002670	6983639.482670
9	287170.137773	6983624.358540
10	287164.475667	6983578.438210
11	287364.222160	6983554.575690
12	289267.071841	6982718.404600
13	290244.579193	6982288.858330
14	290240.819478	6982257.545620
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20	285415.193342	6983778.755930
21	285320.993280	6983854.223060
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23	284796.239831	6983951.416340
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R	Details	Date
1	Final	02/08/21
-	-	
-	-	
-	-	
-	-	
-	-	
-	-	

DESIGNED	SB	CHECKED	SM
DRAWN	SB	CHECKED	SM
APPROVED	SM	DATE	02/08/21
Notes:			

N

0 195 390 780

Meters

1 cm = 178 meters

GCS GDA 1994 MGA Zone 56

DISCLAIMER
CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Source Data

DESIGNER
CDM Smith
cdmsmith.com

CLIENT
calibre

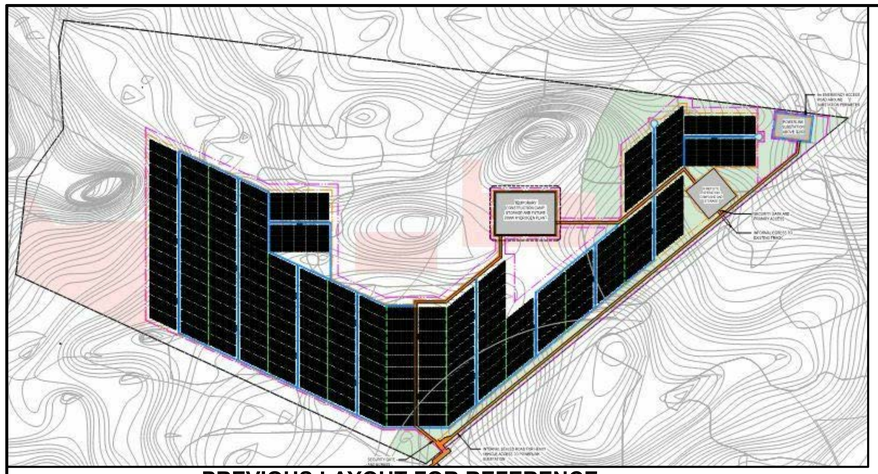
FIGURE 1

PROJECT BOUNDARY AND NODE COORDINATES

DRG Ref: **Attachment 1 Project Boundary Coordinate Nodes**

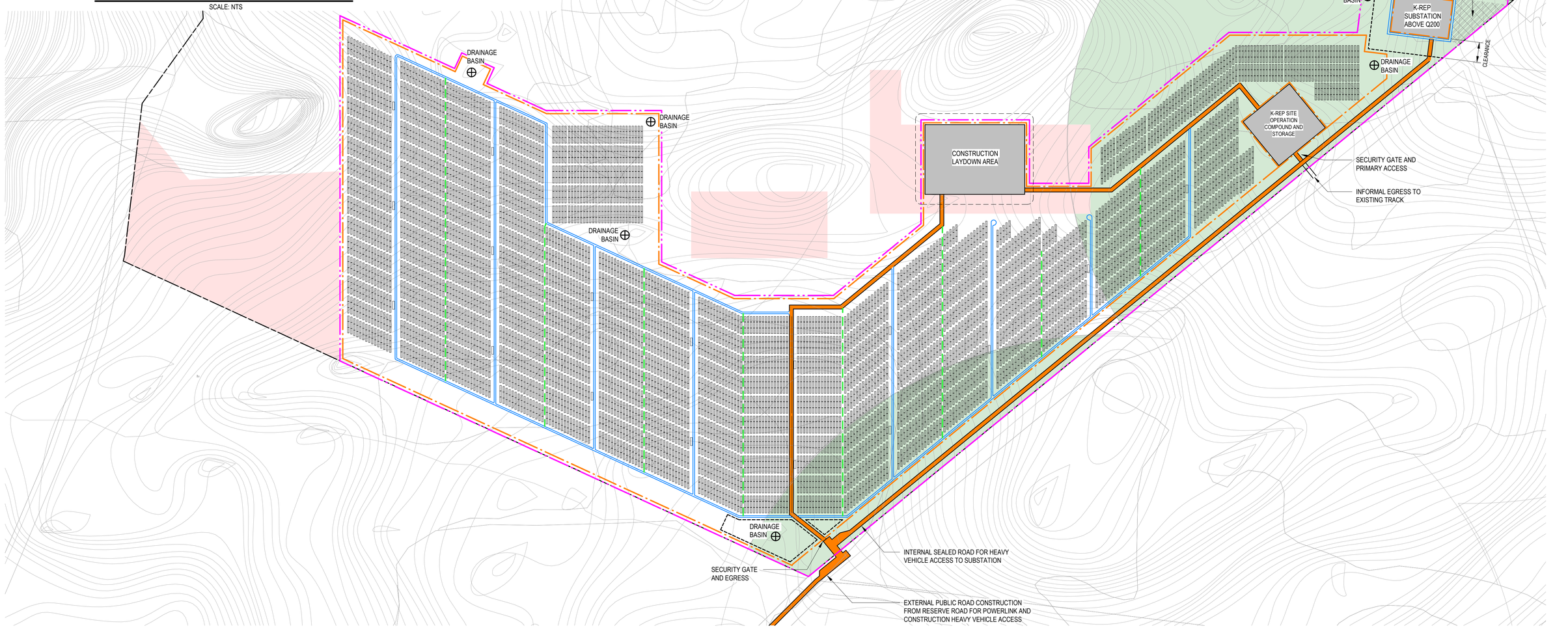
P:\Project\1000525 - Dalby Solar Farm\02 MXD\July 2021\Attachment 1 Project Boundary Coordinate Nodes.mxd

Appendix B Project Layout



PREVIOUS LAYOUT FOR REFERENCE

SCALE: NTS



SHADING KEY

- PV EXCLUSION ZONE DUE TO HORIZON SHADING
- MSES ESSENTIAL HABITAT ZONE FOR INVESTIGATION

ROADWAY KEY

- MAJOR ROAD - SEALED
- MINOR ROAD - UNSEALED
- INFORMAL ROAD - NATURAL LANDSCAPE

ELEMENTS KEY

- FENCE/SECURITY LINE EXTENT
- LAND CLEARING EXTENT
- ⊕ INDICATIVE LOCATION OF DRAINAGE BASIN (REFER DRAINAGE REPORT FOR LOCATION AND VOLUME)

N

REVISION	DATE	ISSUE DETAILS	DESIGN	DRAWN	CHECK
A	26.08.19	CONCEPT LAYOUT	JW	JC	
B	10.10.19	FS SUBMISSION	JW	JC	
C	01.07.20	MODIFIED TO CONSOLIDATE INTERNAL AREAS	JW	JW	
D	03.07.20	MODIFIED FOR DRAINAGE	JW	JW	

STATUS

INFORMATION ONLY

NOT FOR CONSTRUCTION

SCALE

0 100000 200000 300000 400000

SCALE: 1:5000

CLIENT

KOMIPO KOREA MIDLAND POWER CO.,LTD.

elecsee

PROJECT

KUMBARILLA RENEWABLE ENERGY PARK (K-REP)

KUMBARILLA, QLD 4405

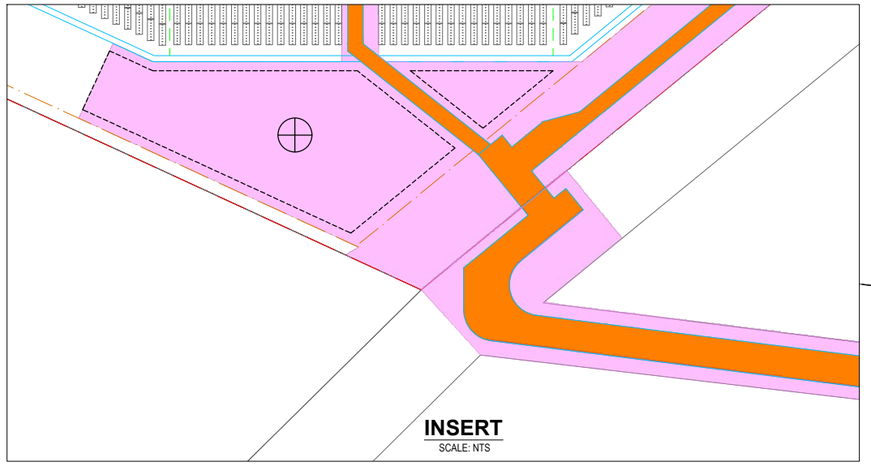
DRAWING TITLE

SITE LAYOUT - GENERAL

PROJECT No.	DRAWING No.	REVISION
19-000691	BR-E5251	D

A1

Appendix C Earthwork Plans



DRAINAGE BASIN
DRAINAGE BASIN
DRAINAGE BASIN
DRAINAGE BASIN
DRAINAGE BASIN
REDUCTION APPROXIMATELY 8.3 ha
ADDITION APPROXIMATELY 4.1 ha
CONSTRUCTION LAYDOWN AREA
K-REP SUBSTATION ABOVE Q200
K-REP SITE OPERATION COMPOUND AND STORAGE
CLEARANCE
CLEARANCE
5m EMERGENCY ACCESS ROAD AROUND SUBSTATION PERIMETER
CLEARANCE FOR POWERLINK LANDING BEAM AND GROUND WORKS
SECURITY GATE AND PRIMARY ACCESS
INFORMAL EGRESS TO EXISTING TRACK
REFER INSERT ABOVE FOR DETAIL.
SECURITY GATE AND EGRESS
INTERNAL SEALED ROAD FOR HEAVY VEHICLE ACCESS TO SUBSTATION
EXTERNAL PUBLIC ROAD CONSTRUCTION FROM RESERVE ROAD FOR POWERLINK AND CONSTRUCTION HEAVY VEHICLE ACCESS
JOIN LINE
FOR CONTINUATION REFER DRAWING C0003

ROADWAY KEY

- MAJOR ROAD - SEALED
- MINOR ROAD - UNSEALED
- INFORMAL ROAD - NATURAL LANDSCAPE

ELEMENTS KEY

- FENCE/SECURITY LINE EXTENT
- LAND CLEARING EXTENT
- INDICATIVE LOCATION OF DRAINAGE BASIN (REFER DRAINAGE REPORT FOR LOCATION AND VOLUME)

LEGEND

- APPROXIMATE EXTENT OF MAIN EARTHWORKS
- APPROXIMATE EXTENT OF MINOR EARTHWORKS

REVISION	DATE	ISSUE DETAILS	DESIGN	DRAWN	CHECK
1	06.07.21	CONCEPT LAYOUT	BB	VVB	

STATUS: **INFORMATION ONLY**
NOT FOR CONSTRUCTION

SCALE: 0 100000 200000 300000 400000
SCALE: 1:5000

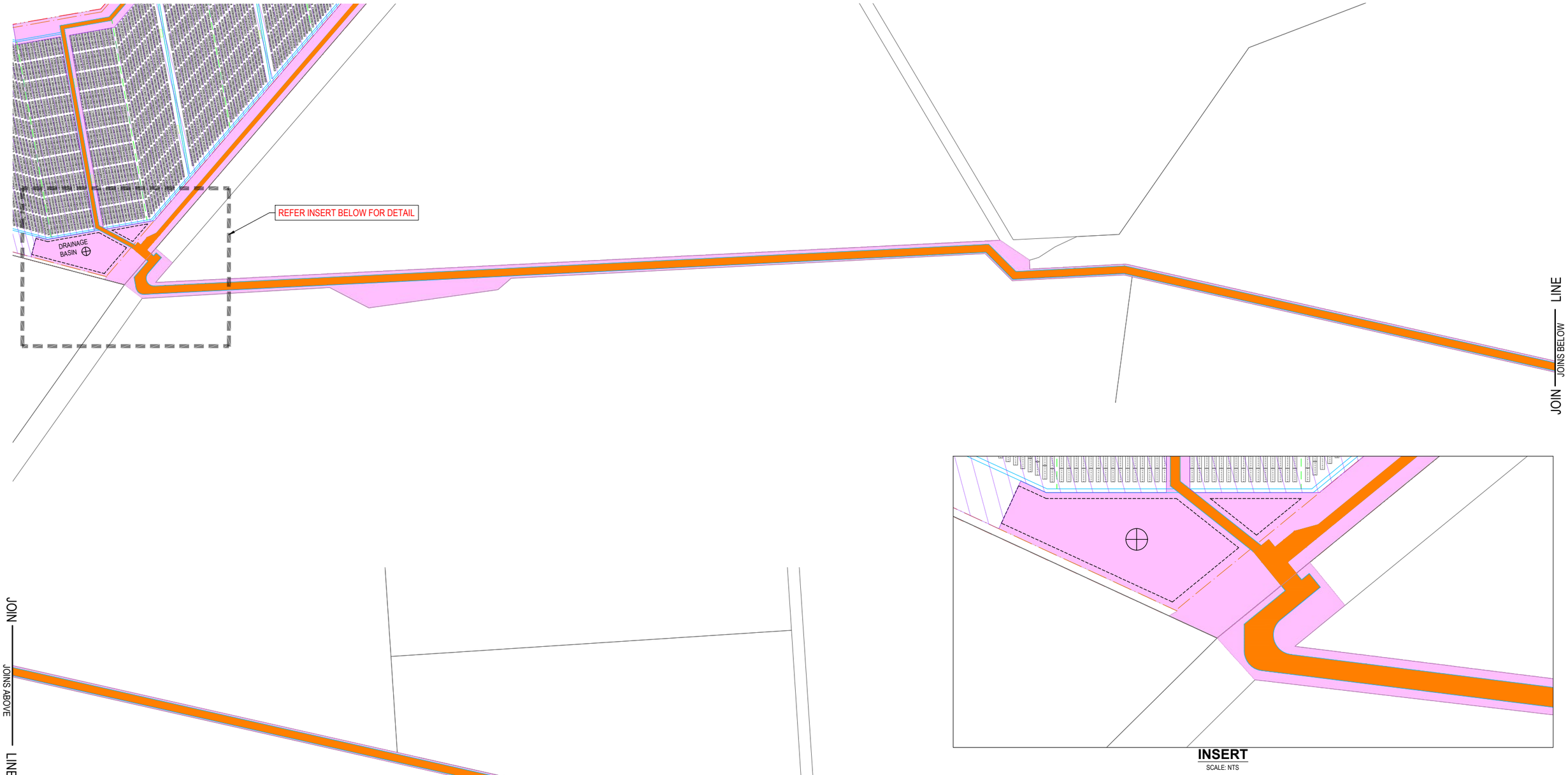
CLIENT: KOMIPO KOREA MIDLAND POWER CO.,LTD. elecseed

PROJECT: **KUMBARILLA RENEWABLE ENERGY PARK (K-REP)**
KUMBARILLA, QLD 4405

DRAWING TITLE: **SITE LAYOUT - EXPECTED EXTENT OF EARTHWORKS**

PROJECT No.	DRAWING No.	REVISION
CCIP19018	C0002	1

A1



INSERT
SCALE: NTS

LEGEND

- APPROXIMATE EXTENT OF MAIN EARTHWORKS
- APPROXIMATE EXTENT OF MINOR EARTHWORKS

ROADWAY KEY

- MAJOR ROAD - SEALED
- MINOR ROAD - UNSEALED
- INFORMAL ROAD - NATURAL LANDSCAPE

ELEMENTS KEY

- FENCE/SECURITY LINE EXTENT
- LAND CLEARING EXTENT
- INDICATIVE LOCATION OF DRAINAGE BASIN (REFER DRAINAGE REPORT FOR LOCATION AND VOLUME)

REVISION	DATE	ISSUE DETAILS	DESIGN	DRAWN	CHECK
1	06.07.21	CONCEPT LAYOUT	BB	VVB	

STATUS: **INFORMATION ONLY**
NOT FOR CONSTRUCTION

SCALE: 0 100000 200000 300000 400000
SCALE: 1:5000

CLIENT: KOMIPO KOREA MIDLAND POWER CO.,LTD. elecseed

 calibre calibregroup.com

PROJECT: **KUMBARILLA RENEWABLE ENERGY PARK (K-REP)**

KUMBARILLA, QLD 4405

DRAWING TITLE: **SITE LAYOUT - EXPECTED EXTENT OF ROAD EARTHWORKS**

PROJECT No.	DRAWING No.	REVISION
CCIP19018	C0003	1

A1

Appendix D Material Change of Use Approval (030.2020.120.001)

Customer Contact
1300 COUNCIL (1300 268 624)
07 4679 4000

www.**wdrc.qld.gov.au**

OUR COMMUNITIES | **OUR FUTURE**

Address all correspondence
to the Chief Executive Officer
PO Box 551, DALBY, QLD 4405

info@wdrc.qld.gov.au

DECISION NOTICE - APPROVAL

Given under Section 282 of the Planning Act 2016 for a Decision Notice (Approval) under Section 63(2) of the Planning Act 2016

Approval Number:	030.2020.120.001
File References:	A41987 and LG7.6.1 JKM:JKM
Council Contact:	[redacted] PLANNING OFFICER DEVELOPMENT ASSESSMENT
Officer's Contact Details:	Ph: (07) [redacted] Email: [redacted]@wdrc.qld.gov.au
Date of Decision Notice:	1 October 2020
Applicant's Name:	Elecseed Pty Ltd
Applicant's Postal Address:	C/- Calibre Professional Services Pty Ltd ATTENTION: [redacted] Level 2 50 St Georges Terrace PERTH WA 6000
Applicant's Email Address:	[redacted]@calibregroup.com

Dear Madam

RE: DEVELOPMENT APPLICATION FOR MATERIAL CHANGE OF USE TO ESTABLISH A RENEWABLE ENERGY FACILITY (SOLAR FARM) ON LAND DESCRIBED AS LOT 4 ON DY457 AND EASEMENT B ON SP107382 AND SITUATED AT KUMBARILLA LANE, KUMBARILLA

I advise that on 29 September 2020 it was decided to issue a Development Permit for the above Development Application.

This application was approved in full, with conditions (refer to the conditions attached).

1. Further Development Permits

The following Development Permits are required to be obtained before the development can be carried out:

- Development Permit for Operational Work
- Development Permit for Building Work Assessable Against the Planning Scheme

2. Referral Agencies for the Application

The Referral Agencies for this application are:

For an application involving	Name of Agency	Status	Contact Details
INFRASTRUCTURE DESIGNATION			
Development application for development on premises that is the subject of a designation made by the Minister, if - (a) the development is assessable development under a local categorising instrument; and (b) the infrastructure the subject of the designation is to be supplied by a public sector entity; and (c) the premises is not owned by or for the State; and (d) the development is for a purpose other than the designated purpose; and (e) the development will not be carried out by or for the State. Schedule 10, Part 9, Division 1, Table 1, Item 1	State Assessment and Referral Agency	Concurrence Agency	Ph: (07) 4616 7307 Email: toowoombasara@dsdmip.qld.gov.au Post: Queensland Treasury PO Box 825 **TOOWOOMBA QLD 4350**
CLEARING NATIVE VEGETATION			
Development application for a Material Change of Use that is assessable development under a local categorising instrument and relates to a lot that is 5ha or larger, if - (a) the application - (i) is for a preliminary approval that includes a variation request; and (ii) relates to a lot that contains native vegetation shown on the regulated vegetation management map as a Category A Area or Category B Area; and (iii) is for a Material Change of Use, other than a non-referrable Material Change of Use. (b) the application is not stated in paragraph (a) and all of the following apply - (i) the Material Change of Use does not involve prescribed clearing; (ii) accepted Operational Work may be carried out because of the Material Change of Use, or the Material Change of Use involves Operational Work that is assessable development under Section 5;	State Assessment and Referral Agency	Concurrence Agency	Ph: (07) 4616 7307 Email: toowoombasara@dsdmip.qld.gov.au Post: Queensland Treasury PO Box 825 **TOOWOOMBA QLD 4350**

For an application involving	Name of Agency	Status	Contact Details
(iii) the accepted Operational Work or assessable Operational Work includes development other than the clearing of regulated regrowth vegetation on freehold land, indigenous land, land the subject of an occupation licence under the *Land Act*, or land the subject of a lease given under the *Land Act* for agricultural or grazing purposes. Schedule 10, Part 3, Division 4, Table 3			
ELECTRICITY INFRASTRUCTURE			
Material Change of Use if - (a) all or part of the premises is within 100m of a substation site; or (b) both of the following apply - (i) all of part of the premises is subject to an easement for the benefit of a distribution entity, or transmission entity, under the *Electricity Act*; (ii) the easement is for a transmission grid or supply network. Schedule 10, Part 9, Division 2, Table 2, Item 1	The Chief Executive of the distribution entity or transmission entity	Advice Agency	Ph: (07) 3860 2111 Email: property@powerlink.com.au Post: Property Services Advisor Powerlink Queensland Community and Delivery Service PO Box 1193 **VIRGINIA QLD 4014**

3. Approved Plans and Documents

The following Approved Plans and Documents for this development approval are attached:

Plan or Document No./Reference	Title and Details	Dated
BR-E5251, Revision D	Site Layout - General, prepared by Calibre	03.07.20
J000284 - Version 0.1	Bushfire Risk Assessment, prepared by Blackash Bushfire Consulting	8 June 2020
Issue 0	Response to WDRC Information Request Item 12 Stormwater and Drainage Report, prepared by Calibre	04/06/2020

4. Currency Period for the Approval (Section 85)

This development approval will lapse at the end of the period set out in Section 85 of the *Planning Act 2016:*

- For Material Change of Use -

  This approval lapses if the first change of use does not happen **within six (6) years** of the date of this Notice.

5. Appeal Rights

The rights of an applicant to appeal to a tribunal or the Planning and Environment Court against a decision about a development application are set out in Chapter 6, Part 1 of the *Planning Act 2016*.

For particular applications, there may also be a right to make an application for a declaration by a tribunal (refer Chapter 6, Part 2 of the *Planning Act 2016*).

The Appeal Rights are attached to this Decision Notice.

Should you have any queries regarding this matter, please contact Council's Planning Officer Development Assessment, [redacted] via email [redacted]@wdrc.qld.gov.au or telephone (07) [redacted]

Yours faithfully

[redacted]

PRINCIPAL PLANNER

Encls

C/c Queensland Treasury
PO Box 825
TOOWOOMBA QLD 4350

Copy forwarded for your information and records as Referral Agency to the application. (Your Ref: 2007-18034 SRA)

C/c Property Services Advisor
Powerlink Queensland
Community and Delivery Service
PO Box 1193
VIRGINIA QLD 4014

Copy forwarded for your information and records as Advice Agency to the application. (Your Ref: DA3783)

SCHEDULE OF CONDITIONS

APPROVED PLAN AND DOCUMENTS

1. The development shall be carried out generally in accordance with the Approved Plan and Documents listed below, subject to and modified by the conditions of this approval:

Plan or Document No./Reference	Title and Details	Dated
BR-E5251, Revision D	Site Layout - General, prepared by Calibre	03.07.20
J000284 - Version 0.1	Bushfire Risk Assessment, prepared by Blackash Bushfire Consulting	8 June 2020
Issue 0	Response to WDRC Information Request Item 12 Stormwater and Drainage Report, prepared by Calibre	04/06/2020

2. Where there is any conflict between the conditions of this development approval and the details shown on the Approved Plan and Documents, the conditions of this development approval must prevail.

3. The Approved Plan is to be amended in accordance with the conditions of this approval and as outlined below:

   3.1 Provide details on all proposed buildings to be located on-site for the life of the project within the K-REP Site Operation Compound and Storage area and/or other applicable area/s. Building floor plans and elevations must also be provided.

   Note: Infrastructure charges will be levied for the gross floor area of all administration and control buildings including storage sheds and site offices. Once detailed plans are provided, an Infrastructure Charges Notice will be issued.

4. All recommendations contained within the Approved Bushfire Risk Assessment J000284 - Version 0.1 prepared by Blackash Bushfire Consulting and dated 8 June 2020 shall be implemented.

5. The following further Development Permits must be obtained prior to commencement of any work associated with the process:

   5.1 Operational Work; and

   5.2 Building Works.

APPROVED DEVELOPMENT

6. The approved development is Material Change of Use for a Renewable Energy Facility (100MW Solar Farm) as shown on the Approved Plan and Documents.

TERM OF APPROVAL

7. The use of the land for the purpose of a Renewable Energy Facility (100MW Solar Farm) is approved for a period of thirty (30) years only, from commencement of the use.

COMPLIANCE, TIMING AND COSTS

8. All conditions of the approval shall be complied with prior to commencement of the use and whilst the use continues, unless otherwise noted within these conditions.

9. All costs associated with compliance with these conditions shall be the responsibility of the developer unless otherwise noted.

MAINTENANCE

10. The development (including landscaping, parking, driveways and other external spaces) shall be maintained in accordance with the Approved Plan subject to and modified by any conditions of this approval.

FEES AND CHARGES

11. All fees, rates, interest and other charges levied on the property, shall be paid in full, in accordance with the rate at the time of payment.

LANDSCAPING – MISCELLANEOUS

12. Apart from declared weeds and pests, trees, shrubs and landscaped areas currently existing on the subject land must be retained where possible and action taken to minimise disturbance during construction work.

13. Landscaped areas must be maintained, and the site must remain in a clean and tidy state at all times.

REHABILITATION AND EXIT PLAN

14. One (1) year prior to decommissioning, the Operator must submit to Council for endorsement, a Rehabilitation and Exit Plan prepared by a qualified person that, at a minimum:

    14.1 demonstrates that the site will be restored to a standard capable of the level of productivity that was available prior to the Material Change of Use upon decommissioning of the Solar Farm;

    14.2 identifies possible land use (eg grazing, cropping) following cessation of the approved use;

    14.3 clearly establishes the objectives of the Plan;

    14.4 shows adopted performance criteria for rehabilitation efforts;

    14.5 includes an Action Plan, with timing for remedial work such as structure removal, removal of imported materials such as gravel, any soil erosion, drainage, and vegetation cover work, along with weed and pest animal control activities required to meet the adopted rehabilitation performance criteria;

    14.6 outlines a program for monitoring rehabilitation success using appropriate indicators;

    14.7 post-operational rehabilitation of the site is to be carried out generally in accordance with the strategies identified in the Approved Rehabilitation and Exit Plan; and

    14.8 rehabilitation work must commence immediately upon cessation of the approved use and be carried out in accordance with the endorsed Rehabilitation and Exit Plan for the length of time included in the Action Plan.

ACOUSTIC AMENITY – NOISE LIMITS

15. Noise from activity associated with the use of the site must not exceed the Acoustic Quality Objectives listed in the *Environment Protection (Noise) Policy 2008* when measured at any sensitive place or commercial place.

ACOUSTIC AMENITY – MECHANICAL PLANT

16. All regulated devices as defined by the *Environmental Protection Act 1994* must be installed, operated and maintained to comply with the noise limits as specified within the *Environmental Protection Act 1994*.

AIR QUALITY AND AMENITY – AIR RELEASE LIMITS

17. Odours or airborne contaminants that are noxious or offensive to public amenity or safety, likely to cause environmental harm or environmental nuisance or exceed the Air Quality Objectives listed in the *Environmental Protection (Air) Policy 2008* as measured at any sensitive place or commercial place, must not be released into the atmosphere.

OUTDOOR LIGHTING IMPACT MITIGATION

18. Outdoor lighting associated with the use must be designed, sited, installed and tested to comply with Tables 2.1 and 2.2 of Australian Standard 4282-1997 Control of the Obtrusive Effects of Outdoor Lighting Using a Control Level of 1.

19. All lighting must be of a type that gives no upward component of light when mounted horizontally (ie a full cut-off luminaire).

VISUAL AND GENERAL AMENITY

20. Any graffiti on the buildings or structures must be immediately removed.

21. The buildings and the site must be maintained in a clean and tidy manner at all times.

WASTE MANAGEMENT

22. All waste generated from construction of the premises must be effectively controlled on-site before disposal. All waste must be disposed of in accordance with the *Waste Reduction and Recycling Act 2011*.

23. All waste generated on-site must be managed in accordance with the waste management hierarchy as detailed in the *Waste Reduction and Recycling Act 2011*.

OPERATING HOURS DURING CONSTRUCTION

24. Construction work shall occur only between the hours of 6:00am and 6:00pm Monday to Saturday.

25. Work on Sundays and Public Holidays shall be limited to safety inspections, testing, checks and environmental work involving a maximum of 10 workers on-site (unless approved otherwise by Council).

SETBACKS

26. All buildings and structures, including solar panels, must have a minimum setback of 20 metres from the primary road frontage.

27. All buildings and structures, including solar panels, must have a minimum side and rear boundary clearance of 15 metres.

REGIONAL INFRASTRUCTURE CORRIDOR - STOCK ROUTE

28. Any new access from a road servicing a Stock Route (Kumbarilla Lane) must include a gate or grid to prevent stock entry to premises.

29 Boundary fencing shall be maintained to the road boundary adjoining the Stock Route (Kumbarilla Lane).

ENGINEERING WORKS

30. Submit to Council, an Operational Work application for all civil works including earthworks, stormwater, roadworks, and access.

31. Undertake Engineering designs and construction in accordance with Council's Planning Scheme, Development Manual and Standard Drawings, and relevant Australian Standards and design manuals.

32. Be responsible for the full cost of any alterations necessary, to easements and/or other public utility installations in connection with the development.

MAINTENANCE

33. Maintain all work that will become Council infrastructure for a period of 24 months (maintenance period) from the date of on-maintenance. Any defective work must be rectified within the maintenance period.

34. Provide Council with a maintenance bond in an acceptable form equal to 5% of the value of Council's infrastructure prior to commencement of the maintenance period.

LOCATION, PROTECTION AND REPAIR OF DAMAGE TO COUNCIL AND PUBLIC UTILITY SERVICES INFRASTRUCTURE AND ASSETS

35. Be responsible for the location and protection of any Council and public utility services infrastructure and assets that may be impacted on during construction of the development.

36. Repair all damage incurred to Council and public utility services infrastructure and assets, as a result of the proposed development immediately should hazards exist for public health and safety or vehicular safety. Otherwise, repair all damage immediately upon completion of work associated with the development.

STORMWATER MANAGEMENT

37. Provide stormwater management generally in accordance with the Approved Stormwater and Drainage Report prepared by Calibre, Rev 0, dated 4 June 2020, subject to detailed design and except as altered by conditions of this development approval.

38. Design and construct stormwater drainage to ensure that there is no nuisance or interference to the current use or potential future use of all downstream properties including road reserves and the like, for design storms of ARI2, ARI5, ARI10, ARI20 and ARI50.

39. Provide overland flow paths that do not alter the characteristics of existing overland flows or create an increase in flood damage on other properties.

40. Ensure that adjoining properties and roadways are protected from ponding as a result of any site works undertaken.

WATER SUPPLY

41. Provide adequate on-site water storage for the development with a capacity suitable to meet the requirements of the development.

WATER SUPPLY - FIRE FIGHTING SUPPLY

42. Fire fighting equipment and materials for electrical and electronic equipment fires must be installed at appropriate locations.

43. The development shall be provided with a suitable permanent on-site water supply for fire fighting purposes, separate from any potable water supply.

44. Any water tank for fire fighting supply must be provided with a supply outlet with a 50mm male camlock fitting for fire fighting connection.

ON-SITE SEWERAGE

45. Connect the development to an on-site effluent disposal system, in accordance with AS1547:2012 and the Queensland Plumbing and Waste Water Code 2019.

46. Obtain a Development Permit for Plumbing Work for the on-site sewerage treatment system.

Note: Any on-site effluent disposal system servicing more than 21 Equivalent Persons (EP) requires an Environmentally Relevant Activity (ERA) 63 which, depending on the treatment and discharge method, will require a separate Material Change of Use approval. Alternatively, Council will consider a storage and pump-out solution for the construction phase only, with collection and disposal of wastewater by a licensed contractor.

PARKING AND ACCESS - GENERAL

47. Access to the site shall be via Forest Road only, as shown on the Approved Plan, unless otherwise approved by Council.

48. Provide a minimum of 160 on-site car parking spaces during the construction phase.

49. Provide 20 car parking spaces, including a minimum of one (1) person with disability (PWD) car parking space, and 1 parking space for a service vehicle during the operational phase.

50. Lay and maintain gravel in all access roads, parking and equipment storage areas and make provision for dust management.

51. Ensure access to car parking spaces, vehicle loading and manoeuvring areas and access roads remain unobstructed and available for their intended purpose during the hours of operation.

52. Ensure loading and unloading operations are conducted wholly within the site and vehicles enter and exit the site in a forward direction.

53. Provide signage that indicates the location of parking areas and the flow of traffic through the site.

PARKING AND ACCESS - SERVICING

54. Ensure loading and unloading operations are conducted wholly within the site and vehicles enter and exit the site in a forward direction.

VEHICLE ACCESS - TURNOUT

55. Design and construct a vehicle turnout in accordance with Council's Standard Drawing No. R-007, and designed to accommodate the largest expected vehicle.

APPROVED TRANSPORT ROUTE

Heavy Vehicle Access Route

56. The approved heavy vehicle route is from Dalby-Kogan Road, south along Kumbarilla Road, then right into Forest Road to the site access point, and vice versa.

57. No access is permitted to any other Council road for heavy vehicles unless approved in writing from Council.

Access Routes - General

58. The approved route for all other vehicles is Dalby-Kogan Road or Moonie Highway, Kumbarilla Road, then Forest Road to the site access point, and vice versa.

59. Access to the site is to be via approved transport routes only.

ROADWORKS

60. Upgrade the intersection of the Kumbarilla Lane/Forest 201 Road/Ducklo-Gulera Road intersection to include:

- a Basic Right Turn Treatment (BAR) for the right turn movement into Forest 201 Road; and
- formalisation of the 4-way intersection layout, including road alignment of Forest 201 Road and Ducklo-Gulera Road as required.

61. Construct Forest 201 Road to provide an all-weather 7 metre wide gravel pavement on an 8 metre formation (Rural Access 2), with a minimum gravel depth of 125mm, generally in accordance with Council's Standard Drawing R-002, Rev F.

62. Formalise the intersection at the western end of Forest 201 Road, with a T-intersection to the existing service road, and incorporate a suitable location for the site access.

63. Upon completion of the construction phase of the Solar Farm, the approved transport route (sealed and unsealed sections) shall be left in the same condition as the pre-construction standard, with a minimum gravel thickness of 125mm required on the Forest 201 Road section of the approved transport route.

64. The applicant is responsible for the carrying out, and cost of maintenance of the approved transport routes for the duration of the construction phase of the project.

65. A roadworks bond/bank guarantee of $200,000 for the maintenance of the unsealed section of the approved transport route shall be payable to Western Downs Regional Council prior to commencement of construction. In the event that road maintenance works are not carried out in accordance with Council's standards, Council reserves the right to use part or all of the bond money to carry out the necessary maintenance work.

66. The applicant is responsible for the carrying out and cost of maintenance, including dust suppression of unsealed sections of approved transport routes for the duration of the construction phase of the Solar Farm.

67. All road maintenance work must be conducted with prior approval from Council.

B-DOUBLE ROUTE

68. Kumbarilla Lane and Forest 201 Road are not currently approved B-Double Routes. Obtain an approval for these roads (if required) to be used by multi-combination vehicles, from the National Heavy Vehicle Regulator prior to allowing access for multi-combination vehicles via the above road section. Please refer to the following link for more information:
https://www.nhvr.gov.au/road-access/access-management/applications-and-forms

ELECTRICITY AND TELECOMMUNICATIONS

69. Connect the development to electricity and telecommunication services.

EARTHWORKS - GENERAL

70. Earthworks per site involving greater than 500m^3 of material requires an Operational Work application.

71. Undertake earthworks in accordance with the provisions of AS3798 Guidelines on Earthworks for Commercial and Residential Developments.

EARTHWORKS - RETAINING STRUCTURES AND BATTERS

72. Ensure any batters do not exceed a maximum slope of 25% (1 in 4).

73. Contain any batters wholly within the proposed development site. Fill cannot be placed on adjacent properties without providing Council with written permission from the respective property owner(s).

EROSION AND SEDIMENT CONTROL - GENERAL

74. Undertake erosion and sediment control during construction work in accordance with Council's Standard Drawing No's D-005 (Rev A), D-006 (Rev A) and D-007 (Rev A) as applicable.

75. Ensure that all reasonable action is taken to prevent sediment or sediment laden water from being transported to adjoining properties, roads and/or stormwater drainage systems.

76. Remove and clean-up sediment or other pollutants in the event that sediment or other pollutants are tracked/released onto adjoining streets or stormwater systems, at no cost to Council.

ENVIRONMENTAL HEALTH

77. Undertake operations and construction work associated with this development to the requirements of Council, including the following:

    77.1 do not cause nuisance to adjoining residents by the way of smoke, dust, stormwater discharge or siltation of drains, at any time, including non-working hours; and

    77.2 remove immediately, any material spilled or carried onto existing roads to avoid dust nuisance and ensure traffic safety.

78. Do not release contaminants or contaminated water directly or indirectly from the land subject to this approval, or to the ground or groundwater at the land subject to this approval, except for:

    78.1 uncontaminated overland stormwater flow; and

    78.2 uncontaminated stormwater to the stormwater system.

ADVISORY NOTES

NOTE 1 - Relevant Period

*"A part of a development approval lapses at the end of the following period (the **currency period**)—*

(a) for any part of the development approval relating to a material change of use—if the first change of use does not happen within—

(i) the period stated for that part of the approval; or
(ii) if no period is stated—6 years after the approval starts to have effect."

NOTE 2 - Aboriginal Cultural Heritage

It is advised that under Section 23 of the *Aboriginal Cultural Heritage Act 2003*, a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage (the "cultural heritage duty of care"). Maximum penalties for breaching the duty of care are listed in the Aboriginal cultural heritage legislation. The information on Aboriginal cultural heritage is available on the Department of Aboriginal and Torres Strait Islander and Partnerships' website www.datsip.qld.gov.au.

NOTE 3 - General Environmental Duty

General environmental duty under the *Environmental Protection Act 1994* prohibits unlawful environmental nuisance caused by noise, aerosols, particles, dust, ash, fumes, light, odour or smoke beyond the boundaries of the development site during all stages of the development including earthworks, construction and operation.

NOTE 4 - General Safety of Public During Construction

The *Work Health and Safety Act 2011* and *Manual of Uniform Traffic Control Devices* must be complied with in carrying out any construction works, and to ensure safe traffic control and safe public access in respect of works being constructed on a road.

NOTE 5 - Property Note (Audit of Conditions)

An inspection of the property to ascertain compliance with conditions will be undertaken three (3) months after the approval takes effect. If the works are completed prior to this time, please contact Council for an earlier inspection. A property note to this effect will be placed on Council's records.

NOTE 6 - Duty to Notify of Environmental Harm

If a person becomes aware that serious or material environmental harm is caused or threatened by an activity or an associated activity, that person has a duty to notify Western Downs Regional Council.

APPEAL RIGHTS

"Chapter 6 Dispute Resolution

Part 1 Appeal Rights

229 Appeals to Tribunal or P&E Court

(1) Schedule 1 states -

(a) matters that may be appealed to -

(i) either a tribunal or the P&E Court; or
(ii) only a tribunal; or
(iii) only the P&E Court; and

(b) the person -

*(i) who may appeal a matter (the **appellant**); and*
(ii) who is a respondent in an appeal of the matter; and
(iii) who is a co-respondent in an appeal of the matter; and
(iv) who may elect to be a co-respondent in an appeal of the matter.

(2) An appellant may start an appeal within the appeal period.

*(3) The **appeal period** is -*

(a) for an appeal by a building advisory agency - 10 business days after a Decision Notice for the decision is given to the Agency; or

(b) for an appeal against a deemed refusal - at any time after the deemed refusal happens; or

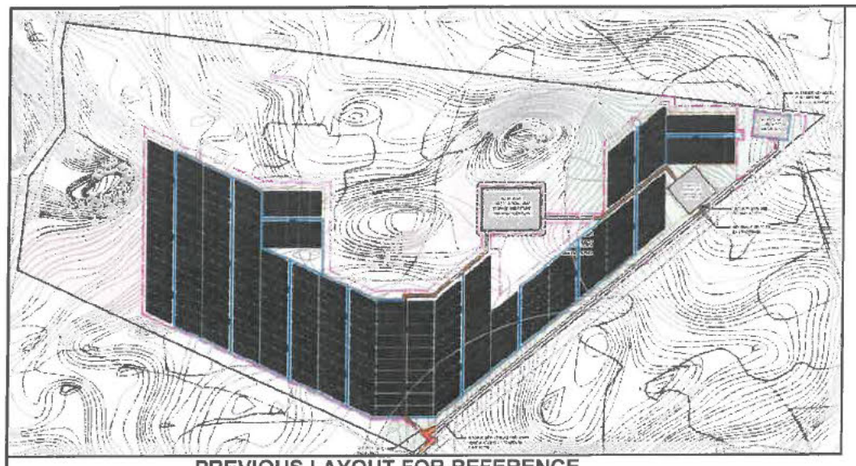
(c) for an appeal against a decision of the Minister, under Chapter 7, Part 4, to register premises or to renew the registration of premises - 20 business days after a Notice is published under Section 269(3)(a) or (4); or

(d) for an appeal against an Infrastructure Charges Notice - 20 business days after the Infrastructure Charges Notice is given to the person; or

(e) for an appeal about a deemed approval of a development application for which a Decision Notice has not been given - 30 business days after the applicant gives the Deemed Approval Notice to the Assessment Manager; or

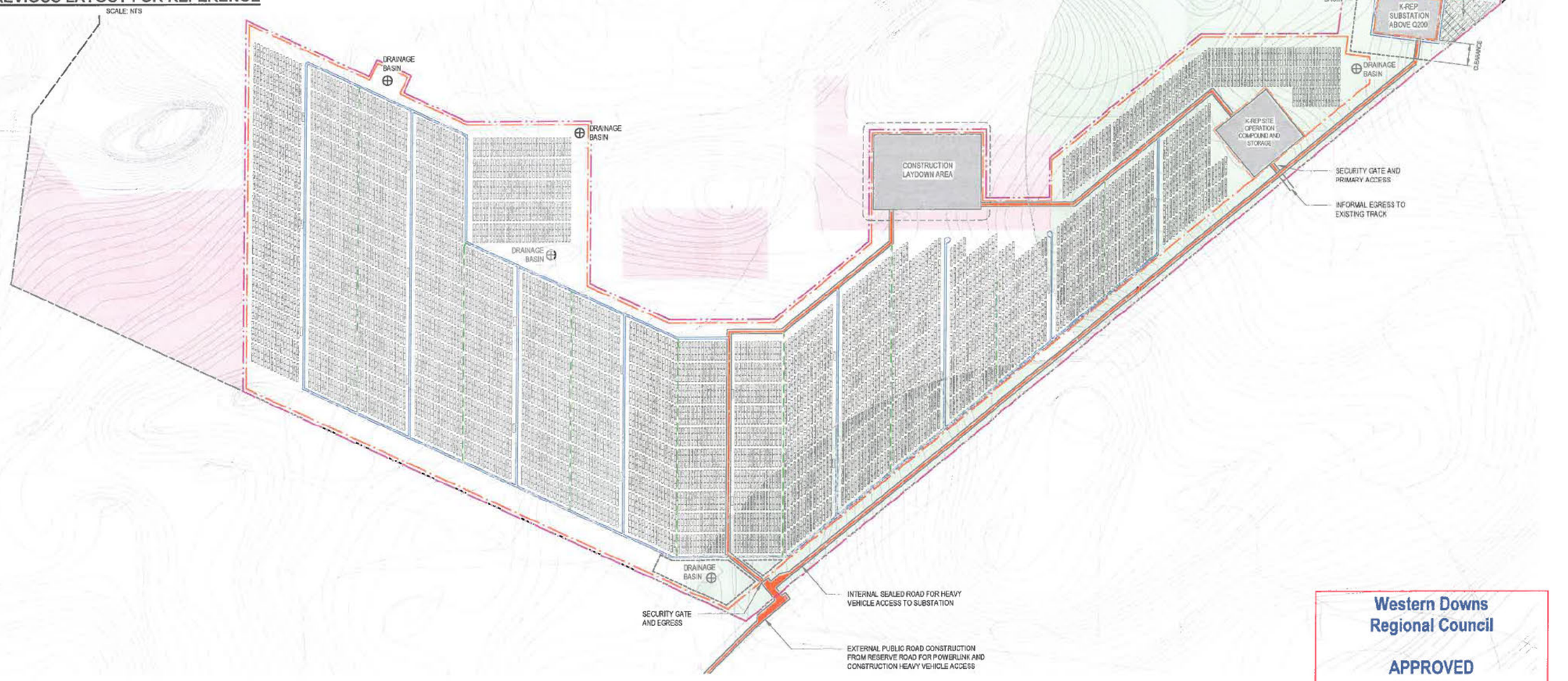
(f) for any other appeal - 20 business days after a Notice of the decision for the matter, including an Enforcement Notice, is given to the person.

Note - See the P&E Court Act for the Court's power to extend the appeal period."



PREVIOUS LAYOUT FOR REFERENCE

SCALE: NTS



SHADING KEY

- PV EXCLUSION ZONE DUE TO HORIZON SHADING
- MSES ESSENTIAL HABITAT ZONE FOR INVESTIGATION

ROADWAY KEY

- MAJOR ROAD - SEALED
- MINOR ROAD - UNSEALED
- INFORMAL ROAD - NATURAL LANDSCAPE

ELEMENTS KEY

- FENCE/SECURITY LINE EXTENT
- LAND CLEARING EXTENT
- ⊕ INDICATIVE LOCATION OF DRAINAGE BASIN (REFER DRAINAGE REPORT FOR LOCATION AND VOLUME)

Western Downs Regional Council

APPROVED
29/09/2020

Kate Swepson
PRINCIPAL PLANNER

REVISION	DATE	ISSUE DETAILS	DESIGN	DRAWN	CHECK
A	26.08.19	CONCEPT LAYOUT	JW	JC	
B	10.10.19	FS SUBMISSION	JW	JC	
C	01.07.20	MODIFIED TO CONSOLIDATE INTERNAL AREAS	JW	JW	
D	03.07.20	MODIFIED FOR DRAINAGE	JW	JW	

STATUS: **INFORMATION ONLY** NOT FOR CONSTRUCTION

SCALE: 0 100000 200000 300000 400000 SCALE: 1:5000

CLIENT: KOMIPO KOREA MIDLAND POWER CO.,LTD. elecsee

calibre calibregroup.com

PROJECT: KUMBARILLA RENEWABLE ENERGY PARK (K-REP)

KUMBARILLA, QLD 4405

DRAWING TITLE: SITE LAYOUT - GENERAL

PROJECT No	DRAWING No.	REVISION
19-000691	BR-E5251	D

A1

BLACKASH
BUSHFIRE CONSULTING

Bushfire Risk Assessment

Kumbarilla Renewable Energy Park

Lot 4 Plan DY457

Western Downs
Regional Council

APPROVED
29/09/2020

Kate Swepson
PRINCIPAL PLANNER

Prepared for

Calibre Group

BPAD
Bushfire
Planning & Design
Accredited Practitioner
Level 3

J000284 - Version 0.1

8 June 2020

Project Name:	**J000284 - Kumbarilla Renewable Energy Park**
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Version	Primary Author(s)	Description	Date Completed
0.1	Dan Pedersen	Draft for issue	10 March 2020
0.1	Dan Pedersen	FINAL	8 June 2020

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Contents

Executive Summary

Blackash have prepared this Bushfire Risk Assessment to inform the proponent (Calibre Group) the bushfire risk and mitigation considerations for a proposed ~200 ha photovoltaic (PV) solar farm on Lot 4 DY457 (freehold), approximately 40 km directly west of Dalby, in the rural zone of the Western Downs Regional Council local government area, Queensland.

Under the Western Downs Planning Scheme 2017 a solar farm would be defined as a 'Renewable Energy Facility' to be assessed under a Standard 'Code Assessable' application with Western Downs Regional Council.

The 400 ha property is wholly vegetated with forest (various State and local mapping overlays, including the Bushfire Hazard Overlay OM-003 Bushfire), and an assessment of bushfire risk is required to satisfy Council approval process. The bushfire risk assessment has been prepared consistent with the QRFS Bushfire resilient communities technical document and State Planning Policy July 2017 (SPP) and associated State Planning Policy state interest guidance material –Natural hazards, risk and resilience – Bushfire.

The development is in an isolated location, and recommendation are focused on provision of managed setbacks from the hazard for the relatively resilient infrastructure type and safety during construction and into operation (emergency management provisions and accessibility). The proposed Kumbarilla Renewable Energy Park solar farm would apply bushfire mitigation measures and emergency planning provisions, such that the location and design would support an acceptable level of risk to life and property. The recommendations inherently serve to protect the surrounding environment from potential bushfire ignition and spread arising from the proposed development.

Table 1 is a summary of compliance with relevant documents and approaches to limit bushfire attack and meet the requirements of the Queensland planning framework for development in Bushfire Prone Areas.

Table 1 Summary

Proposed Development	Kumbarilla Renewable Energy Park 200 ha solar farm
Local Government Area	Western Downs Regional Council
Location	Lot 4 Plan DY457
Relevant Legislation or Scheme	Western Downs Planning Scheme 2017 • Renewable Energy Facility • Rural Zone Code • Standard 'Code Assessable' application
A development application is required to be submitted and approved by Council.	Identified as Assessable development - code assessment in Part 5.5 Categories of development and assessment - Material change of use.
Bushfire Hazard Overlay	Site located in predominantly Medium Bushfire Hazard and small areas of High Bushfire Hazard area
Bushfire mitigation and planning provisions	• Asset protection zones and landscaping • Access and fire trails • Emergency Management and Evacuation Planning • Water supplies
Does this development comply with the assessment methods and performance requirements SPP -Natural hazards, risk and resilience - Bushfire	YES

1. Introduction

The proponent Calibre Group has engaged Blackash Bushfire Consulting to complete a Bushfire Risk Assessment Report for a proposed ~200 ha photovoltaic (PV) solar farm on the rural property Lot 4 DY457 (freehold), approximately 40 km directly west of Dalby, Queensland (**Figure 1**).

The landholding is in the rural zone of the Western Downs Regional Council local government area. Under the planning scheme a solar farm would be defined as a 'Renewable Energy Facility', which is consistent development in the rural zone.

This assessment demonstrates how the proposed solar farm meets the development criteria for bushfire protection, specifically for the protection of life and safety, infrastructure and environmental values associated with the site.

1.1. Site Context

The locality around the proposed solar farm has existing and developing energy resource infrastructure. The north-eastern corner of the lot is traversed by a high-voltage electrical transmission easement and it is in proximity to the QGC Rugby Jo gas compression station (approx. 1 km east). Gas extraction pads and access roads directly to the east and state forests to the south and west.

The total property is approximately 400ha in area and is considered as bushfire prone area (**Figure 2**). The site proposed for development is wholly vegetated (**Figure 3**). The solar farm would occupy approximately half of the landholding. The development approval requires an assessment of the bushfire risk.

A preliminary layout for the proposed solar farm is shown in **Figure 4**. The preliminary layout shows panels and infrastructure predominately on the eastern and south-eastern portions of the property.

Figure 1 Site Location

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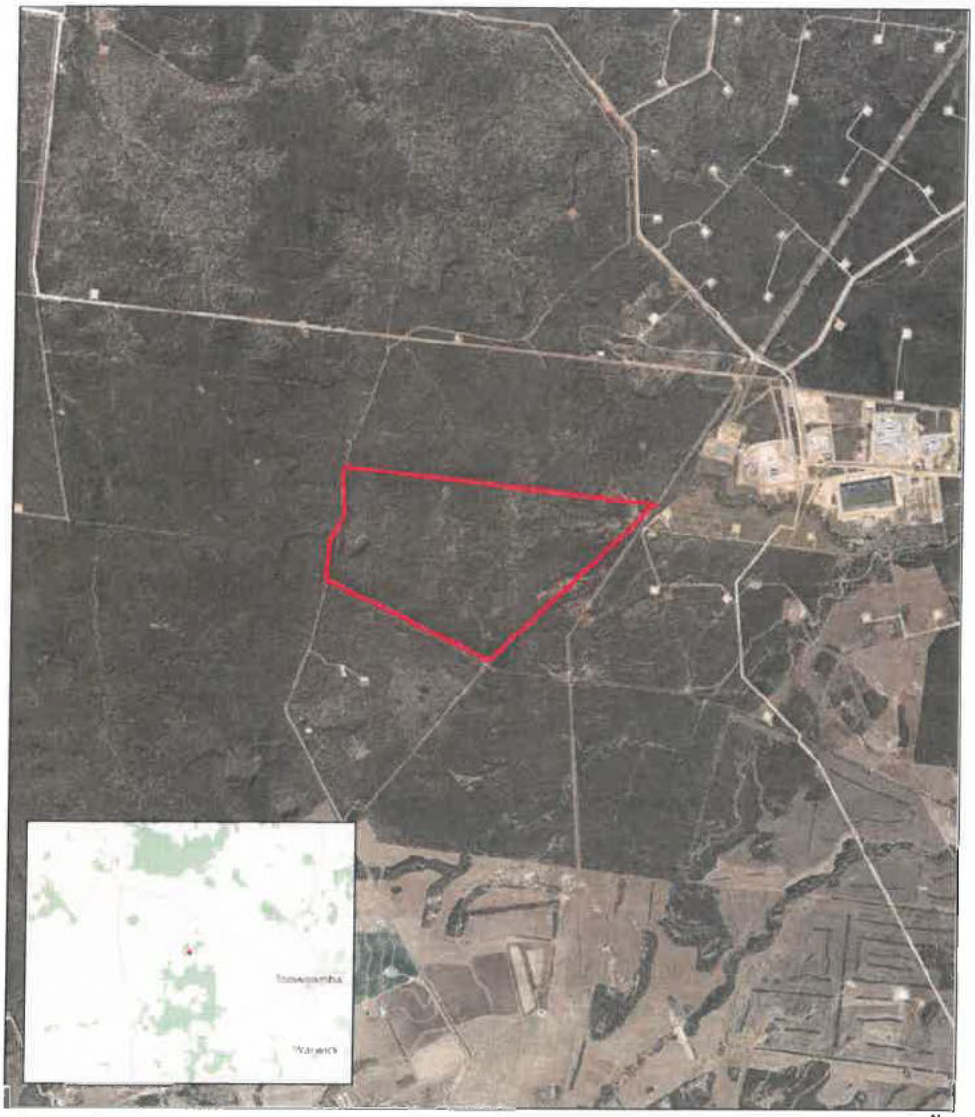
BUSHFIRE CONSULTING



Legend

Subject Land

N

DKGIS

Date: 26/03/2020

0 0.5 1 2 3

Kilometers

Coordinate System: GDA 1994 MGA Zone 56

Imagery © QLD Imagery

Figure 2 Bushfire Overlay Map

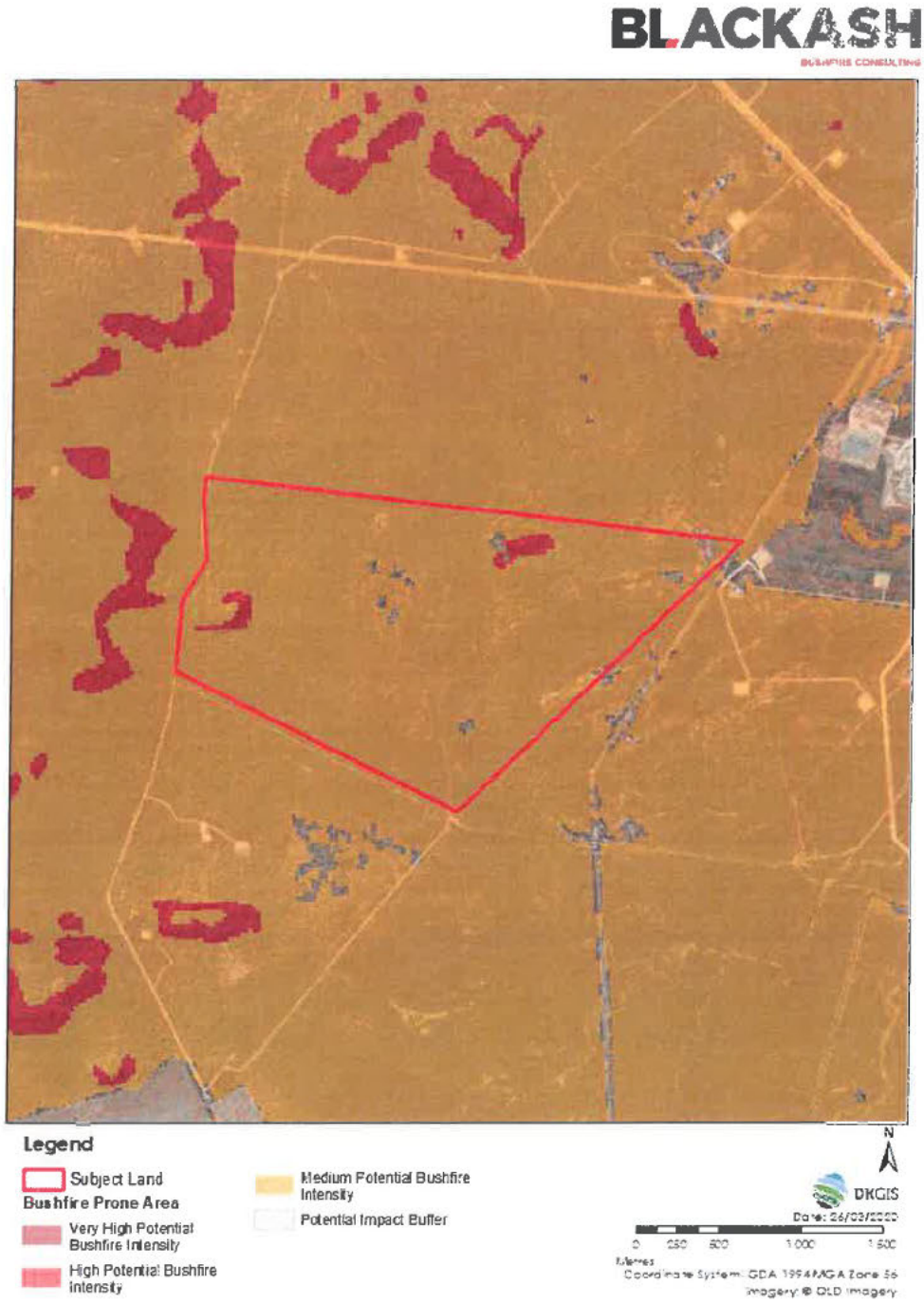
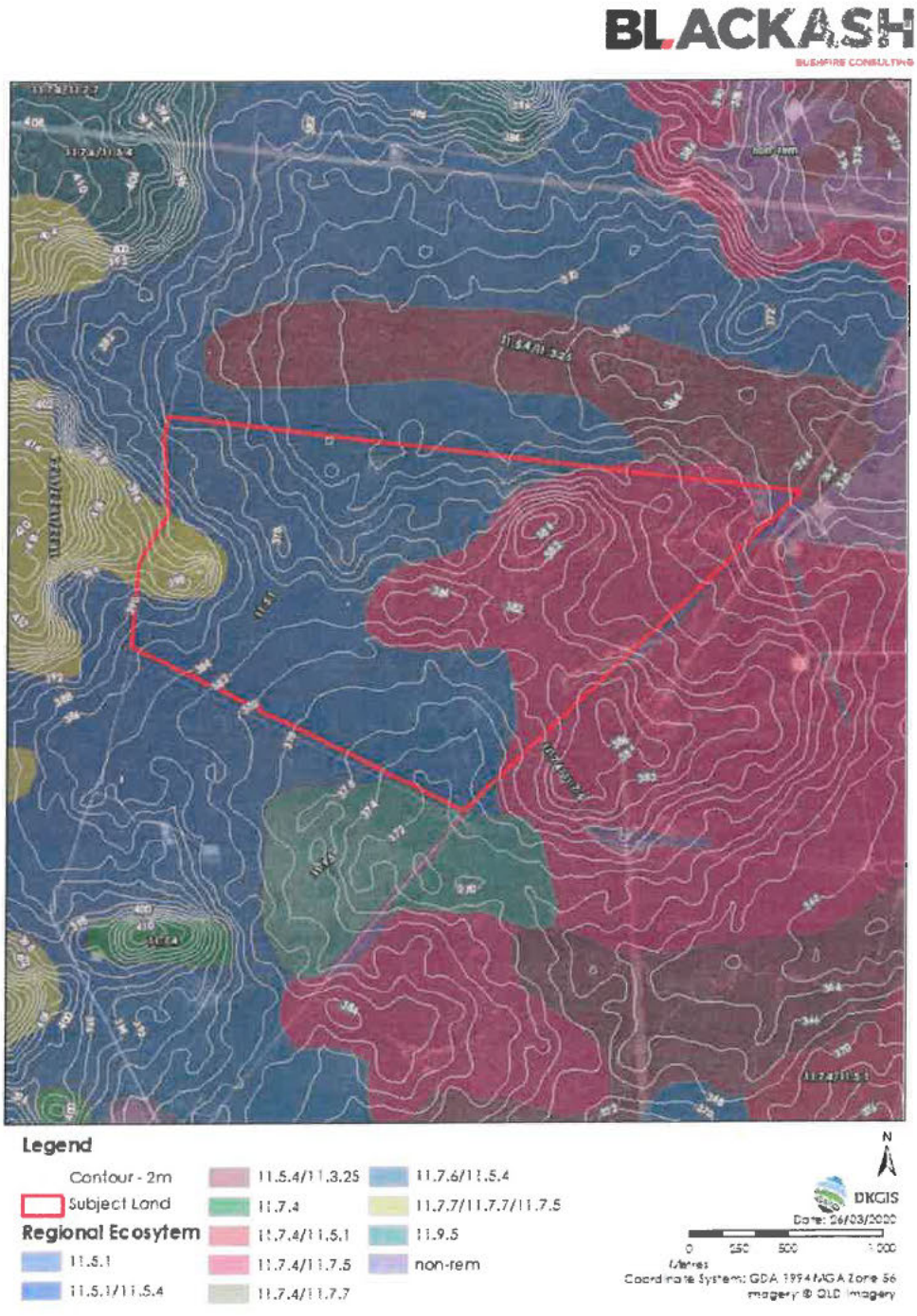


Figure 3 Vegetation type and contours



2. Legislative Framework

The Planning Regulation 2017 provides the terms that must be included in local government planning schemes. These use terms apply to the extent of any inconsistency with the planning scheme. Solar farm fall under the use term renewable energy facility', being:

a) the use of premises for the generation of electricity or energy from a renewable energy source, including, for example, sources of bioenergy, geothermal energy, hydropower, ocean energy, solar energy or wind energy; but
b) does not include the use of premises to generate electricity or energy to be used mainly on the premises.

The Western Downs Planning Scheme 2017 applies to all properties in the Western Downs region. It sets out the preferred land use for each property and identifies what areas should be protected.

The proposed solar farm is an industrial development on rural zones and the Rural Zone Code applies. The proposed land use (solar farm) will be a 'renewable energy facility', consistent with the rural zone.

In accord with the Rural Zone code table of assessment in the Western Downs Planning Scheme, the 'Renewable Energy Facility' application in is to be assessed under the standard code assessable development (i.e. not fast tracked).

3. Assessment Methodology

The assessment method to determine the bushfire risk to the proposed development has been derived from the Australian Standard AS 3959—2018: Construction of buildings in bushfire-prone areas (Simplified 1).

This method would identify the relevant fire danger index, slope and vegetation classification and determine specific setback (in metres) from the hazard to attain an acceptable bushfire attack level (BAL).

4. Bushfire Overlay Code

Code assessable development is to be assessed against all the bushfire planning assessment benchmarks identified in Planning Scheme Part 8.2.3 (Bushfire Hazard Overlay Code). This code applies to assessing material change of use development applications for development within the

High Bushfire Hazard Area or Medium Bushfire Hazard Area as shown on the Bushfire hazard overlay maps (OM-003). The purpose of the code is to manage development that is in bushfire hazard areas so as to ensure that the risk to life, property, community and the environment during bushfire events is minimised and to ensure that development does not increase the potential for bushfire damage.

The property is predominantly a Medium Bushfire Hazard Area (**Figure 2**).

5. Bushfire Hazard

The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the site and which determine the planning response. An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as setbacks from the hazard.

5.1. Fire Weather

The fire weather assumes a credible worst-case scenario and an absence of any other mitigating factors relating to aspect or prevailing winds.

Queensland has a designated Fire Danger Index (**FDI**) of **FDI 40** (as per Table 2.1 AS3959:2018).

5.2. Vegetation Structure

The vegetation on the site is classified as (**Figure 3**):

- RE 11.5.1: *Eucalyptus crebra* and/or *E. populnea*, *Callitris glaucophylla*, *Angophora leiocarpa*, *Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces

- RE 11.7.4/11.7.5: *Eucalyptus decorticans* and/or *Eucalyptus* spp., *Corymbia* spp., *Acacia* spp., *Lysicarpus angustifolius* woodland on Cainozoic lateritic duricrust

The property is predominantly a **woodland vegetation structure**.

5.3. Slopes Influencing Bushfire Behavior

The 'effective slope' influencing fire behaviour approaching the sites has been assessed in accordance with the methodology specified within AS3959:2018. This is conducted by measuring the

worst-case scenario slope where the vegetation occurs over a 100 m transect measured outwards from the development boundary or the existing/ proposed buildings.

The slope within the site are generally flat with low hills grading between **0-5 degrees**.

5.4. Setbacks from Hazard and Bushfire Attack Levels

The Bushfire Attack Level **(BAL)** is a means of measuring the severity of a building's or sites potential exposure to ember attack, radiant heat and direct flame contact. The BAL is used as the basis for establishing the requirements for separation and construction to improve protection of infrastructure elements.

The proposed solar farm development has inherent bushfire resilience in its structure and materials. Solar farms should be provided with adequate clearances to combustible vegetation and in this design should avoid modelled flame contact.

Woodland vegetation on 0-5 degree slopes require a minimum 6-8m to avoid flame contact (AS3959:2018, Table 2.7). The proposed development **will provide a minimum 10m setback** (protection zone) from the adjacent woodland hazard. This protection zone will be provided through the construction pad as a minimum mineral earth (e.g. gravel) clear of vegetation and will serve as construction and maintenance access for the life of the development.

6. Access

Design of access roads enables safe access and egress for people attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations.

The road design is capable of providing access for firefighting and other emergency vehicles, in accordance with SC6.2 – Western Downs Planning Scheme Policy 1 – Design and Construction Standards.

6.1. Public Road Access

Kumbarilla Road is the nearest public through road, east from the development site.

The proposed solar farm will provide access from the public road system. Forest Road in the southeast links through to Kumbarilla Road (east) and is considered the main access. This route is of significant

length (5.8km) and through bushfire prone areas associated with Weranga State Forest and requires a crossing over Moramby Creek. The road will be constructed to provide suitable access for heavy vehicles and subsequently will be suitable for emergency operations.

The main access road specifications will be:

- Minimum access road corridor width of 10 metres, in which all trees and shrubs are removed and any remaining ground level vegetation is maintained at a height of < 100mm;
- Minimum formed width of 6 metres (allows for passing opportunity);
- Minimum 40t vehicle capacity, including the Moramby Creek crossing;
- Constructed and maintained to prevent erosion and provide continuous access;
- Constructed with a stabilised gravel surface or sealed, have a gradient no greater than 10 degrees and cross-fall no greater than 10 degrees;
- Signs at each entrance and intersection.

The single access route is a significant risk associated with the isolation of the solar farm development site and surrounding bushfire prone vegetation. Subsequently am alternate route to public roads needs to be planned (in the event the main access is blocked).

It is recommended that the following alternate (emergency) access provisions are assessed (**Figure 4**), and at least one alternate access be planned and approved for the solar farm:

- an arrangement for an emergency egress road be provided to the northeast, into the Rugby Jo compressor facility and out to Kumbarilla Road (requires approvals from QGC); and/or
- Provision of emergency egress road be to the west (reserved road) and south to Martins Road.

Based on approval, the alternate egress road will meet the design specifications as per property access (Section 6.2).

6.2. Property Access

Best practice road design for developments within or adjacent to bushfire prone areas involves the construction of a perimeter road separating built structures from the adjacent hazard. The proposed solar farm would provide a perimeter road for both construction and maintenance.

The perimeter road will be designed and constructed to meet the following design standards:

- Minimum cleared width of 10 metres (i.e. 10m protection zone), in which all trees and shrubs are removed, and any remaining ground level vegetation is maintained at a height of < 100mm;
- Minimum formed width of 6 metres (allows for passing opportunity);
- Constructed and maintained to prevent erosion and provide continuous access for 4WD vehicles;
- Constructed with a stabilised gravel surface, have a gradient no greater than 10 degrees;
- Cross-fall no greater than 10 degrees;
- Signs at each entrance and intersection.

7. Water Storage Supply and Utilities

Adequate services of water are recommended for the protection of infrastructure during and after the passage of a bush fire. The proposed solar farm should have an independent water supply specific for this purpose.

At a minimum, it is recommended that a 50,000L water supply dedicated to fire protection be constructed on site, dedicated either via tanks or dam storage. The dedicated water supply should be positioned in a location that is protected from direct bushfire threat (allowing emergency personnel to draught water in a safe environment) and have open and clear vehicle access suitable for a fire tanker to approach, turn around and fill from the water source.

Alternate water supply arrangements can be assessed on merit as the design develops, such as multiple storage and potentially a reticulated system.

The electricity supply and turn and reticulated system that provides water for emergency operations

8. Emergency Management

The proposed development initially involves clearing and construction of the site, and then ongoing production and maintenance works. Throughout these stages, the development will consider the safety of staff and contractors, and any attending emergency service workers in the event that a bushfire impacts the site.

A Bushfire Emergency Response Plan should be prepared for the solar farm that provides the following:

- addresses foreseeable on-site and off-site fire events
- confirmation of acceptable access and emergency access provisions

- evacuation triggers and protocols (evacuate or shelter in place)
- confirmation of water supplies and accessibility and any other response/protection measures
- suppression response strategies and tactics, including aerial suppression options/management
- clearly state work health safety risks and procedures to be followed by fire-fighters, including
    - personal protective clothing
    - minimum level of respiratory protection
    - minimum evacuation zone distances
    - a safe method of shutting down and isolating the PV system (or noting if this is not possible for safe internal access)
    - any other risk control measures required to be followed by fire-fighters
- Identify stakeholders (emergency response agencies, contractors, neighbours)

Contact should be made by the site operator with the Local Emergency Management Committee to establish emergency management procedures with relevant authorities for the safety hazards presented by the site. The operator of the solar farm should brief the local volunteer fire brigades and neighbouring farmers at appropriate intervals, for example, at annual pre-season fire meetings, on safety issues and procedures.

Figure 4 Site Plan and Bushfire Mitigation Recommendations

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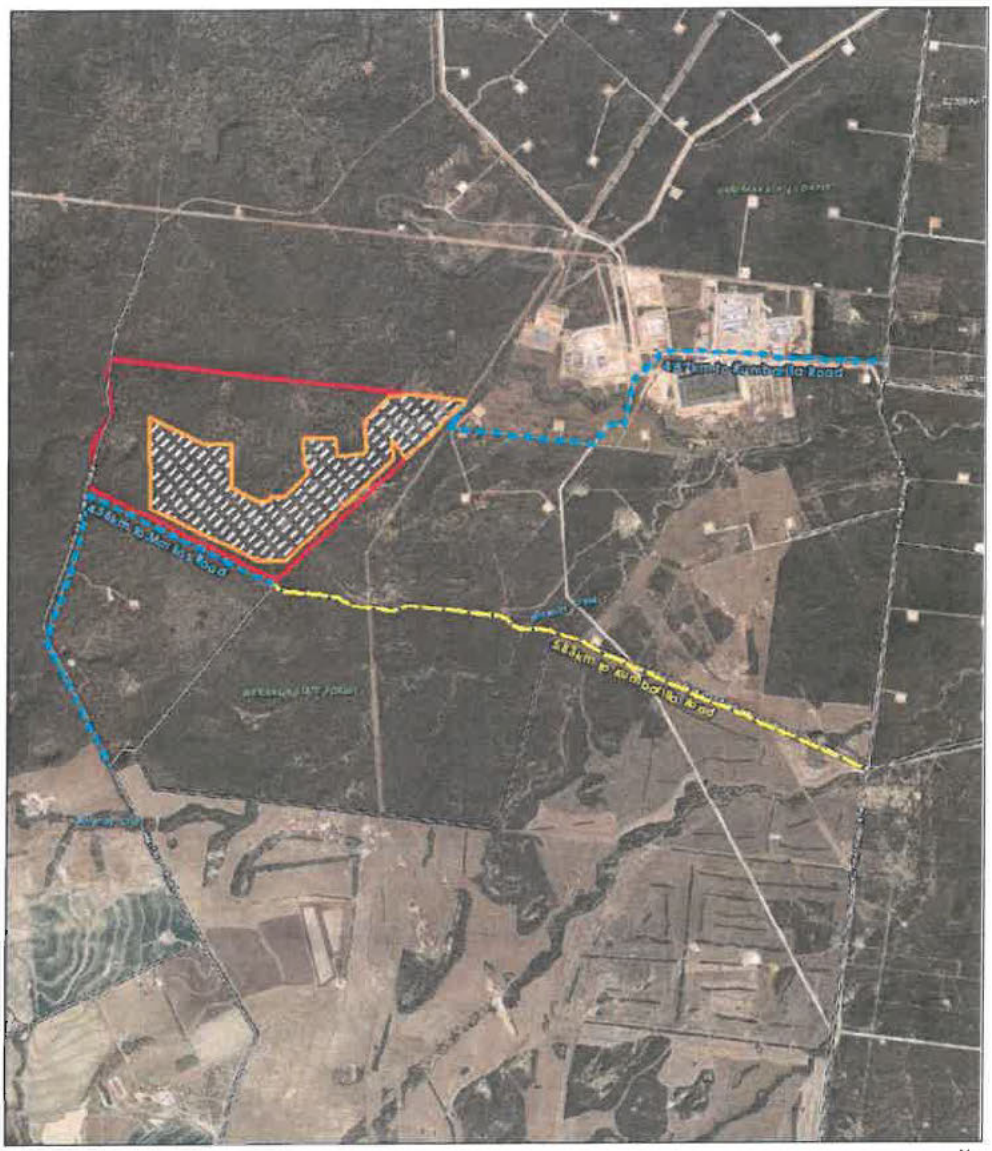
BUSHFIRE CONSULTING



9. Assessment Against the Bushfire Hazard Overlay Code Assessment Benchmarks

Bushfire Hazard Overlay Code Assessment benchmarks criteria for accepted and assessable development have been taken from Table 8.2.3.1 - Bushfire hazard overlay code. The proposed development meets the following performance outcomes:

Performance Outcome #1

Development does not increase the number of persons living or working on land subject to High Bushfire Hazard identified on **Bushfire hazard overlay maps (OM-003)** unless it is demonstrated that:

1. the subject land is a Medium Bushfire Hazard (or lesser); or
2. development is for community infrastructure and facilities are located and designed to minimise susceptibility to bushfire events; and
3. a Bushfire Emergency Management Plan is prepared by suitably qualified person(s) and appropriately mitigates risks to life and property.

This development is supported by an assessment of the bushfire impact and recommended mitigation actions as prepared by suitably qualified person (including the Bushfire Emergency Management Plan) that would minimise susceptibility to bushfire event.

Performance Outcome #2

In Medium Bushfire Hazard Areas as identified on **Bushfire hazard overlay maps (OM-003)**, vehicular access is designed to mitigate against bushfire hazard by:

1. ensuring adequate access for firefighting and other emergency vehicles;
2. ensuring adequate access for the evacuation of residents and emergency personnel in an emergency situation, including alternative safe access routes (should access in one direction be blocked in the event of a fire);
3. providing for the separation of developed areas and adjacent bushland.

This development design provides for alternate access provisions for firefighting and other emergency vehicles: ensuring adequate access for the evacuation of residents and emergency personnel in an emergency situation, including alternative safe access routes (should access in one direction be blocked in the event of a fire): and provides for the acceptable separation of developed areas and adjacent bushland.

10. Recommendations and Design Summary

The following recommendations are made for the proposed solar farm development application:

1. **Setback from vegetation**: At the commencement of construction works, the development site will be afforded a 10m bushfire separation distance between any infrastructure (other than perimeter roads and dams etc) and the woodland vegetation. This 10m separation will be managed and maintained as fuel free zone, being mineral earth/gravel foundation. The resulting bushfire attack level at 10m separation will ensure no flame contact and radiant heat will not exceed 40kW/m² (BAL40), being less than 29kW/m² (BAL29) for the majority of the interface development;
2. **Access:** Public road access will provide more than 1 access route (i.e. provide for an alternate access route for emergency events). Property access will provide for a perimeter road around the solar farm development site. The access specifications detailed in Section 6.1 and 6.2 is capable of providing access for firefighting and other emergency vehicles, in accordance with SC6.2 – Planning Scheme Policy 1 – Design and Construction Standards.
3. **Water**: At a minimum, it is recommended that a 50,000L water supply dedicated to fire protection be constructed on site, dedicated either via tanks or dam storage. The dedicated water supply should be positioned in a location that is protected from direct bushfire threat (allowing emergency personnel to draught water in a safe environment) and have open and clear vehicle access suitable for a fire tanker to approach, turn around and fill from the water source.
4. **Emergency Management Planning**: A Bushfire Emergency Response Plan should be prepared for the solar farm prior to clearing and construction stages and will continue in perpetuity through the solar farm operations and maintenance stage.

In summary, the proposed solar farm development can achieve the performance outcomes for bushfire protection. The development provides for the protection of:

A. Life and safety of staff, contractors and emergency services

B. Property and infrastructure, including through construction stage and in to operational and maintenance stages

C. Environment, minimising clearing requirements and providing inherent risk mitigation of construction and operations igniting and spreading into the surrounding vegetation areas.

Appendix 1 References

CDM Smith, 2019. Memorandum letter Statutory Approvals Review for Proposed Dalby Solar Farm, dated 30/08/2019

Councils of Standards Australia AS3959 (2018) – Australian Standard Construction of buildings in bushfire-prone areas

NSW Department of Planning and Environment, December 2018. Large-Scale Solar Energy Guideline for State Significant Development.

NSW Rural Fire Service (RFS). 2019. Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners. Australian Government Publishing Service, Canberra

QRFS Bushfire resilient communities technical document State of Queensland, October 2019. Published by Queensland Fire and Emergency Services.

Queensland planning framework for development in Bushfire Prone Areas.

Queensland State Planning Policy July 2017 (SPP)

Western Downs Planning Scheme 2017 https://www.wdrc.qld.gov.au/doing-business/western-downs-planning-scheme/

State of Queensland, December 2019. Natural hazards, risk and resilience – Bushfire. State Planning Policy – state interest guidance material December 2019. Published by the Department of State Development, Manufacturing, Infrastructure and Planning, 1 William Street, Brisbane Qld 4000, Australia.

Response to WDRC Information Request Item 12 Stormwater and Drainage Report

20-005_Response to 030.2020.120.001 Information Request

Revision 0

4 June 2020

Western Downs
Regional Council

APPROVED
29/09/2020

Kate Swepson
PRINCIPAL PLANNER

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED
0	04/06/2020	Tech Note Response to 030.2020.120.001 Item 12	N Adams	R Pizzino	N Adams

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1. Introduction

1.1 Purpose

This response has been prepared in response to the request for further information from Western Downs Regional Council (refer Appendix A). The department has advised that it requires the following information to determine if the proposed development and the additional hard surface (the solar panels, access tracks and buildings) impacts on the land.

1.2 Scope

The information requested is to provide a stormwater and drainage report on the impact thereof due to additional hard surface (the solar panels, access tracks and buildings) on the land

2. Response

Stormwater management for a ground-mounted solar farm will be affected by the following major site characteristics:

- Topography;
- Existing Site Conditions (native vegetation, agricultural etc) ;
- Proximity to watercourses, wetlands and seasonal flood levels;
- Soil type and depth to bedrock.

The existing site conditions for the proposed site have been discussed in Section 3.1 above.

Solar farm construction can significantly transform the volumes and flow rates of stormwater generated. Where clearing of large areas of existing vegetation is required, additional stormwater management during construction and until the site is revegetated may be required.

The construction process can significantly increase the post-development run-off rates. The following should be limited during the construction phase:

- Compaction of soils – may decrease infiltration, increase run-off and sediment transport
- Removal of topsoil – Bare sub-soil will be more susceptible to erosion and runoff, and be less nutrient rich, increasing time required for revegetation
- Vegetation removal – Phasing of construction should be considered to avoid removing vegetation from too large an area at once. Erosion and sediment control should be provided during construction phases.
- Revegetation should be undertaken as soon as is reasonably possible post construction.

2.1 Calculation Methodology

Flood modelling has been undertaken in consideration of the post-development site layout. The aims for stormwater management as presented below have been selected in consideration of advice for following with the following aims:

- Demonstrate appropriate management of the 10% AEP event; and
- Ensure no sheet-flow off site.

The Rational Method, as outlined in Section 1.5.5 of Australian Rainfall & Runoff 2003, for flood estimation has been used to estimate peak discharge values across the proposed site:

$$Q = CxAxI/360$$

Where Q = Peak Discharge (m^3/s)

C = Rational Method Runoff Coefficient (unitless)

A = Catchment Area (ha)

I = Rainfall Intensity (mm/hr)

The Intensity Frequency Duration table for Kumbarilla Lane Dalby, has been considered for rainfall intensity and is shown below.

Table 2.1 Bureau of Meteorology - Intensity Frequency Duration for Kumbarilla Lane, Dalby

	Annual Exceedance Probability (AEP) (mm/hr)						
Duration	63.20%	50%#	20%*	10%	5%	2%	1%
1 min	141	162	228	273	317	376	422
2 min	122	139	197	238	278	334	378
3 min	113	129	183	220	256	307	347
4 min	106	122	172	206	240	287	323
5 min	101	116	163	195	227	270	303
10 min	80.4	92.4	130	155	180	213	238
15 min	67.4	77.4	109	130	151	178	199
20 min	58.3	66.9	94.1	113	131	155	173
25 min	51.5	59.1	83.2	99.6	116	137	154
30 min	46.2	53.1	74.7	89.5	104	123	138
45 min	35.7	41	57.6	69.2	80.6	96.1	108
1 hour	29.3	33.6	47.3	56.9	66.4	79.4	89.6
1.5 hour	21.9	25.1	35.3	42.4	49.7	59.7	67.6
2 hour	17.7	20.2	28.4	34.2	40.1	48.3	54.8
3 hour	13	14.8	20.8	25.1	29.4	35.5	40.4
4.5 hour	9.56	10.9	15.2	18.3	21.5	26	29.6
6 hour	7.69	8.73	12.2	14.7	17.2	20.8	23.7
9 hour	5.67	6.43	8.95	10.8	12.6	15.2	17.3
12 hour	4.58	5.19	7.22	8.68	10.2	12.2	13.9
18 hour	3.4	3.86	5.36	6.44	7.55	9.05	10.2
24 hour	2.76	3.13	4.36	5.23	6.12	7.32	8.29
30 hour	2.35	2.67	3.71	4.45	5.2	6.22	7.03
36 hour	2.05	2.34	3.25	3.9	4.56	5.45	6.16
48 hour	1.66	1.89	2.64	3.16	3.69	4.41	4.98
72 hour	1.21	1.39	1.94	2.32	2.71	3.24	3.66
96 hour	0.962	1.1	1.53	1.84	2.14	2.57	2.91
120 hour	0.798	0.907	1.26	1.51	1.77	2.12	2.4
144 hour	0.676	0.769	1.07	1.28	1.49	1.79	2.03
168 hour	0.585	0.664	0.918	1.1	1.28	1.54	1.75

Values developed using the Rational Method are then utilised in Time-Area Method using Boyd's Formula to compute the on-site storage requirements.

$$Smax = V1(1 - \frac{Qp}{Ip})$$

Where Smax = Maximum volume of storage (m^3)

V1 = Volume of inflow flood (m^3)

Qp = Peak discharge of outflow hydrograph (m^3/s)

Ip = Peak discharge of outflow hydrograph (m^3/s)

2.2 Stormwater Collection and Management

Stormwater runoff will be conveyed via a series of open channels and culverts where required. Open channels shall be either V-Drains or Trapezoidal Drains, depending on flow rates, as outlined in Table 2.2 below. Open Channels shall include rock riffles at regular centres, to be determined by slope to detain flows and provide additional storage.

Table 2.2 Open Channel Type

Open Channel	Description
Type A	V - Drain
Type B1	Trap - Base Width 1200mm
Type B2	Trap - Base Width 2000mm
Type B3	Trap - Base Width 3000mm
Type B4	Trap - Base Width 5000mm

The open channel and pipe network will divert stormwater to central stormwater detention basins at 6 locations across the proposed site. Basin storage will be sized to maintain outflows at pre-development flow rates and will be sized to accommodate the 10% AEP event. Outflows from the basin will be via infiltration, evaporation and outflow at pre-development flow rates.

2.3 Soil Permeability and Infiltration Rates

There are several factors that affect a soil's infiltration rate, including the type of soil, which is determined by the portions of sand, silt and clay in a soil. As documented in the previous sections, clay, sand and sandy loam soils are expected to be encountered on this site.

Clay soils tend to have a high potential for runoff and a very slow rate of infiltration when thoroughly wetted. Typical values for the basic infiltration rate for clay are in the order of 1 to 5 millimeters per hour.

Sandy and sandy loam soils can experience a variety of infiltration speeds and will often be influenced by other conditions. Infiltration rate may be in the order of 12 to 25 millimeters per hour, however could be as high as 200 millimeters per hour.

It should be noted that without undertaking specific field testing the above values should be adopted with caution.

Other factors that have the potential to influence the infiltration rates include whether soils have a crust with sealed pores that restrict water entry; compacted soils will have lower infiltration; soils with strong aggregates (with granular or blocky structures) have a higher infiltration rate than soils with weak structures; and infiltration rates are usually higher when soil is dry and decrease with wetter soil. There is the possibility that permeability and drainage conditions may be reduced during earthworks due to compaction of in-situ and sands and that over compaction during earthworks can reduce soil permeability. Permeability testing will need to be carried out prior to earthworks to confirm parameters used during drainage design.

No insitu permeability tests have been undertaken during this phase of works. The anticipated soil profile indicates that poor drainage characteristics are likely to be able to be encountered at the site, with limited scope to remediate to increase permeability. As such, infiltration rates in line with hard clays have been adopted pending future investigation. However, the preliminary indication is that evaporation will exceed infiltration rates.

2.4 Evaporation

The average daily evaporation for Dalby is 6.2mm/day. This has been considered in the basin volume calculations. Given the very low infiltration rates that are likely to be encountered at the proposed site losses via evaporation are likely to exceed losses via infiltration.

2.5 Subsurface Water

It is not anticipated that the groundwater levels will need to be managed and no allowance has been made for any subsoil drainage system.

2.6 Drainage Basins

Locations for drainage basins have been proposed as shown in Appendix B.

The proposed drainage basins will need to have the drainage characteristics confirmed during insitu investigations. These basins have been sized to contain the anticipated 10% AEP rainfall. The basins are expected to be open, accessible and integrated into the landscape, with the sides of the basins graded at a maximum of 1 in 6 for unfenced basins. The sides may be steepened for fenced basins. An infiltration rate of 0.12m/day, and an evaporation rate of 6.2mm/day have been assumed in the storage calculations.

Groundwater is currently captured in an existing manually-excavated dam (see below):

Figure 1: Existing On site Dam

2.7 Anticipated Stormwater Flows

Basin requirements and calculations are shown in the tables below:

Table 2.3 Basin Summary

Basin Summary	Volume
Basin - BA01-A	28,128
Basin - BA01-B	1,055
Basin - BA02-A	2,323
Basin - BA02-B	1,001
Basin - BA03-A	6,456
Basin - BA03-B	494

Table 2.4 BA01-A Calculations

Basin - BA01-A

Catchment Area (A)	124.37	ha
Runoff Coeff (C10)	0.56	
Effective Catchment Area (EA)	69.79	ha
Basin Base Area	19872.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.02760	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00143	m^3/s
Pre-Dev Outflow	2.96000	m^3/s
Length of Swales	11386.04	m
Swale Storage	1138.60	m^3

Storm Duration	10% AEP	Ip	Qp	V1	Smax
(min/hr)	mm/hr	m^3/s	m^3/s	m^3	m^3
5	195	37.83	2.99	10202.15	9396.12031
10	155	30.07	2.99	16890.29	15211.4833
20	113	21.92	2.99	25148.69	21719.96315
30	89.5	17.36	2.99	30092.10	24912.14856
60	56.9	11.04	2.99	38571.50	28127.8926
120	34.2	6.64	2.99	46597.26	25606.39153
180	25.1	4.87	2.99	51412.72	19855.91579
360	14.7	2.85	2.99	60415.54	-2902.50634
720	8.68	1.68	2.99	71553.91	-55447.8752
1440	5.23	1.01	2.99	86460.90	-168230.479
2880	3.16	0.61	2.99	104717.78	-405821.911
4320	2.32	0.45	2.99	115437.41	-651137.795
	Required Basin Volume			28128	m^3

Table 2.5 BA01-B Calculations

Basin - BA01-B

Catchment Area (A)	3.54	ha
Runoff Coeff (C10)	0.70	
Effective Catchment Area (EA)	2.48	ha
Basin Base Area	720.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00100	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00005	m^3/s
Pre-Dev Outflow	0.09000	m^3/s
Length of Swales	349.72	m
Swale Storage	34.97	m^3

Storm Duration (min/hr)	10% AEP mm/hr	Ip m^3/s	Qp m^3/s	V1 m^3	Smax m^3
5	195	1.34	0.09	367.56	342.642545
10	155	1.07	0.09	604.96	553.354409
20	113	0.78	0.09	898.09	793.005353
30	89.5	0.62	0.09	1073.55	914.957282
60	56.9	0.39	0.09	1374.53	1055.1291
120	34.2	0.24	0.09	1659.40	1017.87128
180	25.1	0.17	0.09	1830.32	866.17245
360	14.7	0.10	0.09	2149.87	216.186201
720	8.68	0.06	0.09	2545.23	-1331.7887
1440	5.23	0.04	0.09	3074.35	-4697.8165
2880	3.16	0.02	0.09	3722.37	-11852.454
4320	2.32	0.02	0.09	4102.86	-19279.559

Required Basin Volume	1055	m^3

Table 2.6 BA02-A Calculations

Basin - BA02-A

Catchment Area (A)	9.52	ha
Runoff Coeff (C10)	0.60	
Effective Catchment Area (EA)	5.73	ha
Basin Base Area	1638.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00228	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00012	m^3/s
Pre-Dev Outflow	0.23000	m^3/s
Length of Swales	1347.22	m
Swale Storage	134.72	m^3

Storm Duration	10% AEP	Ip	Qp	V1	Smax
(min/hr)	mm/hr	m^3/s	m^3/s	m^3	m^3
5	195	3.11	0.23	796.14	736.563693
10	155	2.47	0.23	1345.12	1218.47533
20	113	1.80	0.23	2022.98	1761.7265
30	89.5	1.43	0.23	2428.74	2032.73247
60	56.9	0.91	0.23	3124.74	2323.34642
120	34.2	0.54	0.23	3783.51	2169.10166
180	25.1	0.40	0.23	4178.77	1749.25821
360	14.7	0.23	0.23	4917.73	35.8033868
720	8.68	0.14	0.23	5831.98	-3972.8543
1440	5.23	0.08	0.23	7055.57	-12631.191
2880	3.16	0.05	0.23	8554.12	-30949.064
4320	2.32	0.04	0.23	9434.00	-49906.586

Required Basin Volume	2323	m^3

Table 2.7 BA02-B Calculations

Basin - BA02-B

Catchment Area (A)	3.41	ha
Runoff Coeff (C10)	0.70	
Effective Catchment Area (EA)	2.39	ha
Basin Base Area	684.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00095	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00005	m^3/s
Pre-Dev Outflow	0.09000	m^3/s
Length of Swales	413.48	m
Swale Storage	41.35	m^3

Storm Duration	10% AEP	Ip	Qp	V1	Smax
(min/hr)	mm/hr	m^3/s	m^3/s	m^3	m^3
5	195	1.30	0.09	347.06	322.688192
10	155	1.03	0.09	576.12	525.222064
20	113	0.75	0.09	858.97	754.866357
30	89.5	0.59	0.09	1028.27	870.933293
60	56.9	0.38	0.09	1318.69	1001.30201
120	34.2	0.23	0.09	1593.56	955.447406
180	25.1	0.17	0.09	1758.48	799.040245
360	14.7	0.10	0.09	2066.82	141.334306
720	8.68	0.06	0.09	2448.30	-1414.4804
1440	5.23	0.03	0.09	2958.85	-4788.9147
2880	3.16	0.02	0.09	3584.13	-11948.747
4320	2.32	0.02	0.09	3951.27	-19372.765

Required Basin Volume	1001	m^3

Table 2.8 BA03-A Calculations

Basin - BA03-A

Catchment Area (A)	47.89	ha
Runoff Coeff (C10)	0.40	
Effective Catchment Area (EA)	18.95	ha
Basin Base Area	5400.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00750	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00039	m^3/s
Pre-Dev Outflow	1.14000	m^3/s
Length of Swales	3192.09	m
Swale Storage	319.21	m^3

Storm Duration	10% AEP	Ip	Qp	V1	Smax
(min/hr)	mm/hr	m^3/s	m^3/s	m^3	m^3
5	195	10.27	1.15	2760.03	2451.60593
10	155	8.17	1.15	4575.99	3932.67941
20	113	5.95	1.15	6818.30	5503.49169
30	89.5	4.71	1.15	8160.53	6173.70289
60	56.9	3.00	1.15	10462.85	6456.00438
120	34.2	1.80	1.15	12642.00	4587.20226
180	25.1	1.32	1.15	13949.49	1839.33744
360	14.7	0.77	1.15	16393.93	-7907.4419
720	8.68	0.46	1.15	19418.22	-29329.54
1440	5.23	0.28	1.15	23465.75	-74302.492
2880	3.16	0.17	1.15	28422.85	-167572.39
4320	2.32	0.12	1.15	31333.44	-262963.03

Required Basin Volume	6456	m^3

Table 2.9 BA03-B Calculations

Basin - BA03-B

Catchment Area (A)	3.97	ha
Runoff Coeff (C10)	0.39	
Effective Catchment Area (EA)	1.57	ha
Basin Base Area	450.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00063	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00003	m^3/s
Pre-Dev Outflow	0.10000	m^3/s
Length of Swales	615.81	m
Swale Storage	61.58	m^3

Storm Duration	10% AEP	Ip	Qp	V1	Smax
(min/hr)	mm/hr	m^3/s	m^3/s	m^3	m^3
5	195	0.85	0.10	193.39	170.503674
10	155	0.68	0.10	343.76	292.578504
20	113	0.49	0.10	529.43	421.31088
30	89.5	0.39	0.10	640.57	475.407798
60	56.9	0.25	0.10	831.21	494.105941
120	34.2	0.15	0.10	1011.65	329.046816
180	25.1	0.11	0.10	1119.91	90.2991208
360	14.7	0.06	0.10	1322.32	-753.46843
720	8.68	0.04	0.10	1572.74	-2608.4618
1440	5.23	0.02	0.10	1907.89	-6510.2352
2880	3.16	0.01	0.10	2318.35	-14611.621
4320	2.32	0.01	0.10	2559.36	-22897.629

Required Basin Volume	494	m^3

3. Conclusion

The conclusion of this report's findings is that is no adverse impact due to additional hard surface (the solar panels, access tracks and buildings) on the land.

Appendix A WDRC 030.2020.120.01 Information Request Email 27th May 2020

[redacted]

From: [redacted] <[redacted]@wdrc.qld.gov.au>
Sent: Wednesday, 27 May 2020 7:39 AM
To: [redacted]
Subject: Kumbarilla Lane Solar Farm 030.2020.120.001 Information Request

Follow Up Flag: Follow up
Flag Status: Flagged

Hi [redacted]

I refer to the development application for a Renewable Energy Facility (Solar Farm) at Lot 4 on DY457 located at Kumbarilla Lane, Kumbarilla.

It has been determined that additional information is required to assess the application. To assist with the timing of the assessment and to allow you to get prepared with compiling the additional information, please note the below items which will be included on an Information Request. Note that this is provided for information purposes only and does not prevent Council from issuing a formal Information Request requesting further information during the statutory Information Request process.

(1) Please provide details of the scale of the proposed Solar Farm (i.e how many megawatts of power will the area of solar panels equate to).

(2) Please provide an overview of how the proposed Solar Farm will be connected to the nearby substation and the various options open in terms of easements.

(3) Demonstrate how the development complies with the Western Downs Planning Scheme incorporating Amendment 1. This should include statements about how the development complies with the applicable Acceptable Outcomes of the following Codes:
- Rural Zone Code
- Biodiversity Areas Overlay Code
- Bushfire Hazard Overlay Code
- Infrastructure Overlay Code
- Regional Infrastructure Corridor – Stock Route Overlay Code
- Scenic Amenity Overlay Code
- Transport Access and Parking Code
- Infrastructure Services Overlay Code

(4) The proposed Site Plan includes a Temporary Construction Camp. Please provide details of the proposed Temporary Construction Camp.

Council does not support the establishment of temporary construction camps. The definition of a Renewable Energy Facility in the Western Downs Planning Scheme incorporating Amendment 1 does not allow for ancillary construction camps. The establishment of a temporary construction camp would require a separate approval for a Material Change of Use for a Non-Resident Workforce Accommodation which would require Impact Assessment.

(5) Please provide a Traffic Impact Assessment of the proposed haul route for all roads between the State Controlled road network and the site access. The report shall include, but not be limited to, information pertaining to:
- Expected number of vehicles, vehicle types, loadings for both the construction and operational phases of the project;
- Any upgrading or ongoing maintenance requirements during the construction period. For example a pre and post condition assessment must be carried out, and information provided as to how the road will be maintained during construction by the applicant, and how the road will be left after construction.

(6) Please provide a summary of your community consultation process, the issues neighbouring land-owners and community identified, and how you will address these.

As advised during pre-lodgement discussions, Council encourages all Renewable Energy Facility applicants to have informal information sessions / community meetings with the local communities, and neighbours prior to lodging an application.

(7) Please provide a desktop cultural assessment including possible impact on traditional artefacts and places.

(8) Please provide a short desktop analysis of how you will deal with potential glare from the panels and noise from the inverters (note, the solution can include landscaping).

(9) Please provide a desktop analysis of the vegetation on the land, details on how this will be retained or extent of clearing.

(10) Please provide a desktop analysis on the agricultural value of the land (if any) and how the Solar Farm will impact on this.

(11) Please provide a desktop analysis on the bushfire risk. It is acknowledged that the development is not a habitable project.

(12) Please provide a stormwater and drainage report on the impact thereof due to additional hard surface (the solar panels, access tracks and buildings) on the land.

Please contact me should you have any queries.

Regards

[redacted]
Planning Officer Development Assessment

WESTERN DOWNS REGIONAL COUNCIL
PO Box 551, Dalby, Qld 4405

Phone 07 [redacted] Fax 07 4679 4099
[redacted]**@wdrc.qld.gov.au**

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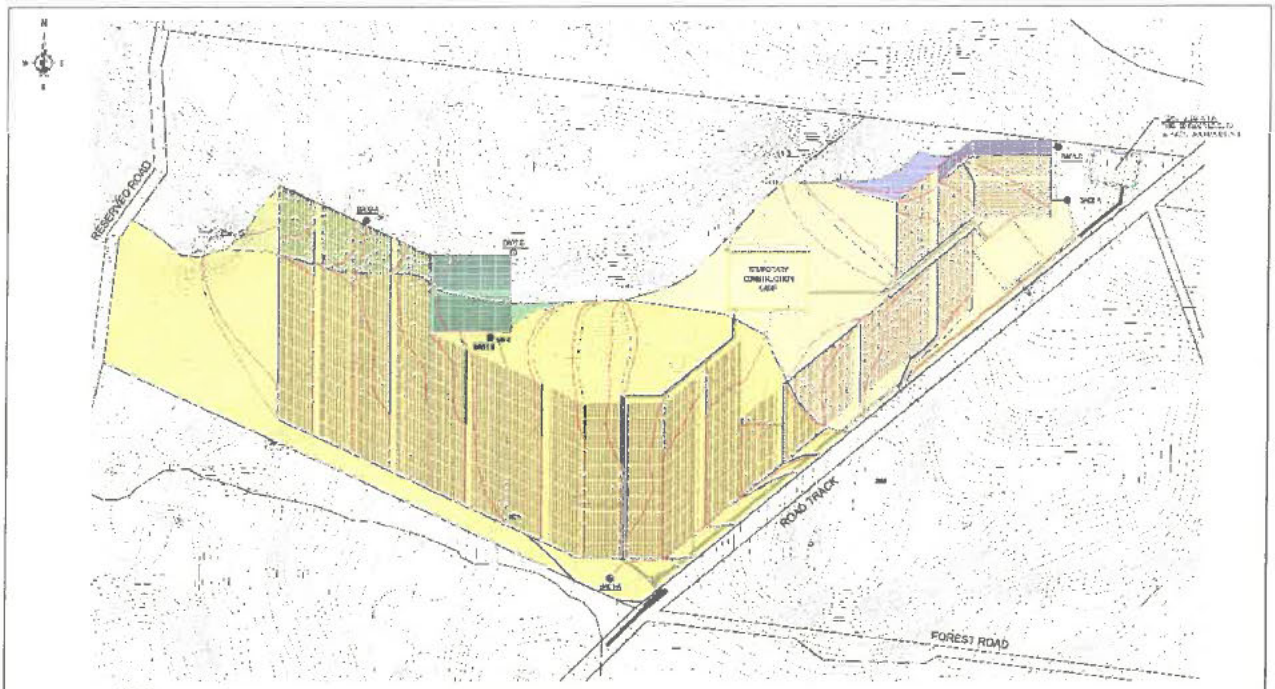
OUR COMMUNITIES | OUR FUTURE

Appendix B Drainage Layout Plan



NOTES

LEGEND

PRELIMINARY
NOT FOR CONSTRUCTION

KOMIPO
elecseed
calibre

Queensland Government

Queensland Treasury

SARA reference: 2007-18034 SRA
Council reference: 030.2020.120.001

16 September 2020

[redacted]
Chief Executive Officer
Western Downs Regional Council
PO Box 551
DALBY QLD 4405
Email: info@wdrc.qld.gov.au

Dear [redacted]

SARA response—Kumbarilla Solar Farm

(Referral agency response given under section 56 of the *Planning Act 2016*)

The development application described below was confirmed as properly referred by the State Assessment and Referral Agency on 6 August 2020.

Response

Outcome:	Referral agency response – with conditions.
Date of response:	16 September 2020
Conditions:	The conditions in **Attachment 1** must be attached to any development approval.
Advice:	Advice to the applicant is in **Attachment 2**.
Reasons:	The reasons for the referral agency response are in **Attachment 3**.

Development details

Description:	Development permit	Material change of use for Renewable Energy Facility (Solar Farm)
SARA role:	Referral Agency.	
SARA trigger:	Schedule 10, Part 3, Division 4, Table 3, Item 1 (Planning Regulation 2017) Material change of use that involves native vegetation clearing Schedule 10, Part 9, Division 1, Table 1, Item 1 (Planning Regulation 2017 Development on premises the subject of a designation made by the Minister	

DA Advisory Team (DAAT)
Level 13, 1 William Street, Brisbane
GPO Box 611, Brisbane QLD 4001

SARA reference:	2007-18034 SRA
Assessment Manager:	Western Downs Regional Council
Street address:	Daandine Kumbarilla Road, Kumbarilla
Real property description:	4DY457
Applicant name:	Elecseed Pty Ltd
Applicant contact details:	Level 2, 50 St Georges Terrace Perth WA 6000 [redacted]@calibregroup.com

Representations

An applicant may make representations to a concurrence agency, at any time before the application is decided, about changing a matter in the referral agency response (s.30 Development Assessment Rules) Copies of the relevant provisions are in **Attachment 4**.

A copy of this response has been sent to the applicant for their information.

For further information please contact [redacted] Principal Planner, on 34527180 or via email DAAT@dsdmip.qld.gov.au who will be pleased to assist.

Yours sincerely

[redacted]

[redacted]
State Planner

cc Elecseed Pty Ltd, [redacted]@calibregroup.com

enc Attachment 1 - Referral agency conditions
Attachment 2 - Advice to the applicant
Attachment 3 - Reasons for referral agency response
Attachment 4 – Change representations provisions
Attachment 5 - Approved plan and specifications

Attachment 1—Referral agency conditions

(Under section 56(1)(b)(i) of the *Planning Act 2016* the following conditions must be attached to any development approval relating to this application) (Copies of the plans and specifications referenced below are found at Attachment 5)

No.	Conditions	Condition timing
Material change of use		
Schedule 10, Part 3, Division 4, Table 3, Item 1, Material change of use that involves native vegetation clearing —The chief executive administering the *Planning Act 2016* nominates the Director-General of the Department of Natural Resources, Mines and Energy to be the enforcement authority for the development to which this development approval relates for the administration and enforcement of any matter relating to the following conditions:		
1.	Clearing a maximum of 128.65 hectares of native vegetation under this development approval is limited to the area identified as Area A (Part A^1- A^3) as shown on Technical Agency Response Plan, reference: TARP 2007-18034 SRA, Sheet 1 of 1, Date: 10/09/2020.	At all times
2.	Enter into an agreed delivery arrangement to deliver an environmental offset in accordance with the *Environmental Offsets Act 2014* to counterbalance the significant residual impacts on the matters of state environmental significance being: • 45.26 hectares of regional ecosystem 11.7.4 and 11.7.5 (essential habitat) • 1.56 hectares of regional ecosystem 11.5.1 (essential habitat).	Prior to commencing any works that impact on the essential habitat
3.	(a) Prepare a Salinity Management Plan (SMP) for Area A (Part A^1- A^3) as shown on the Technical Agency Response Plan, reference: TARP 2007-18034 SRA, Sheet 1 of 1, Date: 10/09/2020. The SMP is to be prepared by an appropriately qualified professional and address potential salinity impacts caused by clearing. (b) The SMP is to be informed by targeted soil sampling within Area A (Part A^1- A^3) as shown on the Technical Agency Response Plan, reference: TARP 2007-18034 SRA, Sheet 1 of 1, Date: 10/09/2020. The soil sampling is to include: i. a description of soils in accordance with the *Australian Soil and Land Survey Field Handbook (NCST 2009)* ii. mapping of Area A (Part A^1- A^3) in accordance with the *Guidelines for Surveying Soil and land Resources (McKenzie et al. 2009)* iii. an analysis of soil samples that complies with Australian Standard (AS) *AS ISO/IEC 17025-2005: General requirements for the competence of testing and calibration laboratories.* (c) The SMP is to recommend salinity management measures to ensure: i. salinity levels of the soil and surface or ground as a result of the changes in hydrology of the subject land are minimised ii. no increase in the incidence of waterlogging. (d) Submit a copy of the SMP mentioned at part (a) of this condition to:	(a) - (d) Prior to clearing commencing (e) Prior to clearing commencing and to be maintained

	Natural Resource Assessment Department of Natural Resources, Mines and Energy Email: vegetation@dnrme.qld.gov.au (e) Implement the salinity management measures identified within the SMP mentioned at part (a) of this condition. Note: Appropriately qualified professional means a person or persons who has professional qualifications, training, skills and experience relevant to soil chemistry or salinity management and can give authoritative assessment, advice and analysis in relation salinity management using the relevant protocols, standards, methods or literature. Note: Accreditation of the soil sampling analysis provided by the National Association of Testing Authorities (NATA) can provide evidence that compliance with *AS ISO/IEC 17025-2005* is achieved.	
4.	(a) Prepare an Erosion and Sediment Control Plan (ESCP) for Area A (Part A^1- A^3) as shown on the Technical Agency Response Plan, reference: TARP 2007-18034 SRA, Sheet 1 of 1, Date: 10/09/2020. The ESCP is to be prepared by an appropriately qualified professional and address potential impacts caused by clearing on the site. (b) The ESCP is to be informed by targeted soil sampling within Area A (Part A^1- A^3) as shown on the Technical Agency Response Plan, reference: TARP 2007-18034 SRA, Sheet 1 of 1, Date: 10/09/2020. The soil sampling is to include: i. a description of soils in accordance with the *Australian Soil and Land Survey Field Handbook (NCST 2009)* ii. mapping of Area A (Part A^1- A^3) in accordance with the *Guidelines for Surveying Soil and land Resources (McKenzie et al. 2009)* iii. an analysis of soil samples that complies with Australian Standard (AS) *AS ISO/IEC 17025-2005: General requirements for the competence of testing and calibration laboratories*. (c) The ESCP must be prepared in accordance with the *Best Practice Erosion and Sediment Control (BPESC) guidelines for Australia (International Erosion Control Association)*. (d) The ESCP is to recommend measures to: i. prevent accelerated soil erosion ii. where prevention is not possible, minimise accelerated soil erosion. (e) Submit a copy of the ESCP mentioned in part (a) of this condition to: Natural Resource Assessment Department of Natural Resources, Mines and Energy Email: vegetation@dnrme.qld.gov.au. (f) Implement the erosion and sediment control measures identified within the ESCP as mentioned at part (a) of this condition. Note: Appropriately qualified professional means a person or persons who has professional qualifications, training, skills and	(a) - (e) Prior to clearing commencing (f) Prior to clearing commencing and to be maintained

	experience relevant to erosion control, soil chemistry and/or salinity management chemistry and can give authoritative assessment, advice and analysis in relation erosion and sediment control using the relevant protocols, standards, methods or literature. Note: Accreditation of the soil sampling analysis provided by the National Association of Testing Authorities (NATA) can provide evidence that compliance with *AS ISO/IEC 17025-2005* is achieved.	

Attachment 2—Advice to the applicant

General advice	
1.	Terms and phrases used in this document are defined in the *Planning Act 2016* its regulation or the State Development Assessment Provisions (SDAP) [v2.6]. If a word remains undefined it has its ordinary meaning.
2.	Clearing vegetation to the extent the clearing is within an area mapped as a category C area or category R area on the regulated vegetation management map is not a relevant purpose under the *Vegetation Management Act 1999*. Accordingly, clearing of vegetation in these areas cannot be approved under a development approval. The clearing within an area mapped as a category C area or category R area can only be undertaken if it is exempt clearing work or in accordance with an Accepted Development Vegetation Clearing Code (ADVCC). Clearing vegetation in any category C area or category R area that is not exempt or in accordance with an ADVCC is prohibited development. Information on exempt clearing work or ADVCCs is available online at www.qld.gov.au (search 'exempt clearing work' or 'accepted development vegetation clearing codes').

Attachment 3—Reasons for referral agency response

(Given under section 56(7) of the *Planning Act 2016*)

The reasons for the department's decision are:

- The development complies with the State Development Assessment Provisions, version 2.6 and the following State code:
  - State code 16: Native vegetation clearing
- The impacts of native vegetation clearing on salinity and erosion are mitigated by conditions.
- The significant residual impact on the matter of state environmental significance is counterbalanced with the requirement to enter into an environment offset for removed essential habitat.

Material used in the assessment of the application:

- The development application material and submitted plans
- *Planning Act 2016*
- Planning Regulation 2017
- The *State Development Assessment Provisions* (version [2.6]), as published by the department
- The Development Assessment Rules
- SARA DA Mapping system.

Attachment 4—Change representation provisions

(page left intentionally blank)

Attachment 5—Approved plan and specifications

(page left intentionally blank)

Development Assessment Rules—Representations about a referral agency response

The following provisions are those set out in sections 28 and 30 of the Development Assessment Rules[1] regarding **representations about a referral agency response**

Part 6: Changes to the application and referral agency responses

28 Concurrence agency changes its response or gives a late response

28.1. Despite part 2, a concurrence agency may, after its referral agency assessment period and any further period agreed ends, change its referral agency response or give a late referral agency response before the application is decided, subject to section 28.2 and 28.3.

28.2. A concurrence agency may change its referral agency response at any time before the application is decided if—

(a) the change is in response to a change which the assessment manager is satisfied is a change under section 26.1; or

(b) the Minister has given the concurrence agency a direction under section 99 of the Act; or

(c) the applicant has given written agreement to the change to the referral agency response.[2]

28.3. A concurrence agency may give a late referral agency response before the application is decided, if the applicant has given written agreement to the late referral agency response.

28.4. If a concurrence agency proposes to change its referral agency response under section 28.2(a), the concurrence agency must—

(a) give notice of its intention to change its referral agency response to the assessment manager and a copy to the applicant within 5 days of receiving notice of the change under section 25.1; and

(b) the concurrence agency has 10 days from the day of giving notice under paragraph (a), or a further period agreed between the applicant and the concurrence agency, to give an amended referral agency response to the assessment manager and a copy to the applicant.

---

1 Pursuant to Section 68 of the *Planning Act 2016*

2 In the instance an applicant has made representations to the concurrence agency under section 30, and the concurrence agency agrees to make the change included in the representations, section 28.2(c) is taken to have been satisfied.

Part 7: Miscellaneous

30 Representations about a referral agency response

30.1. An applicant may make representations to a concurrence agency at any time before the application is decided, about changing a matter in the referral agency response.[3]

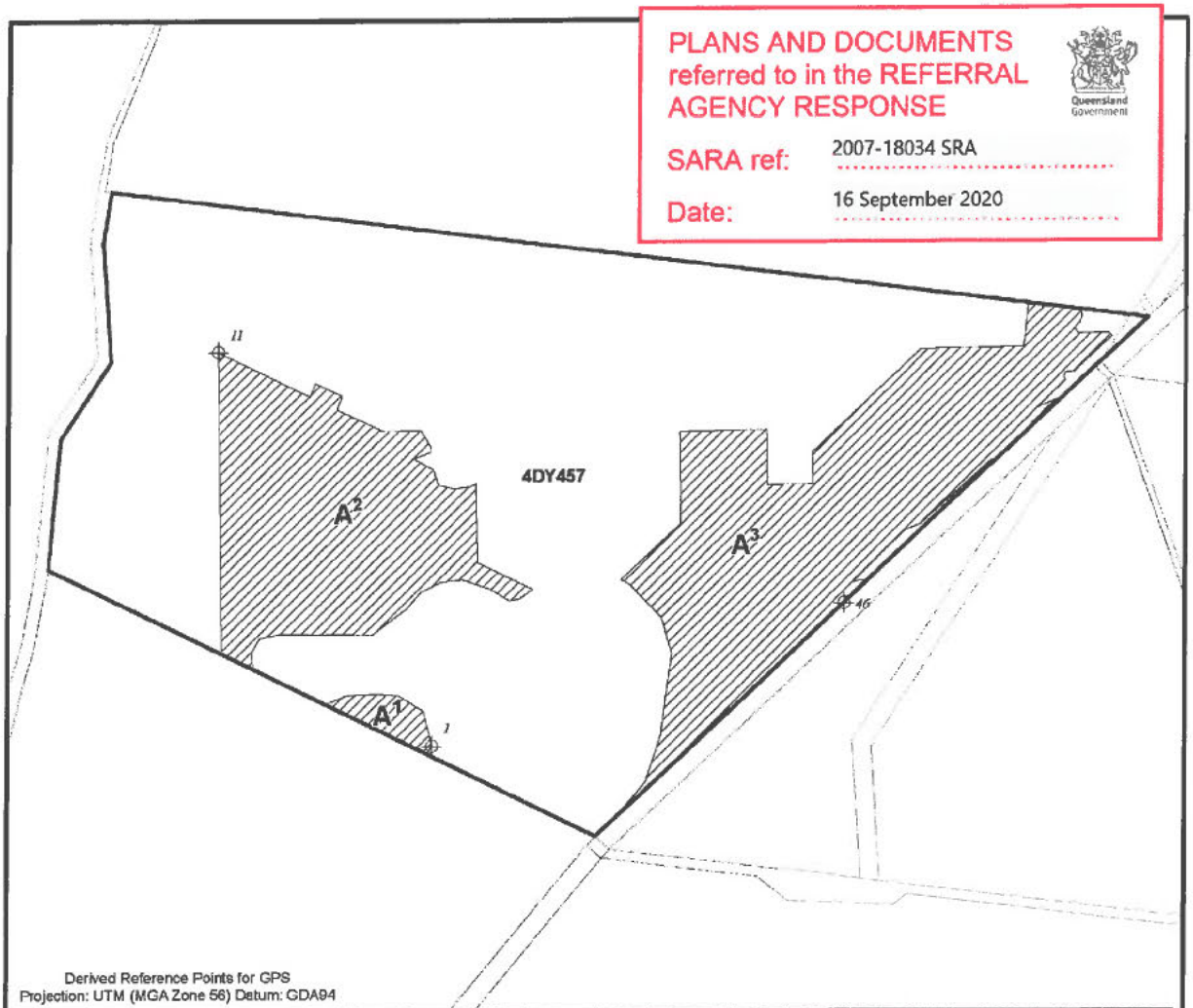
[3] An applicant may elect, under section 32, to stop the assessment manager's decision period in which to take this action. If a concurrence agency wishes to amend their response in relation to representations made under this section, they must do so in accordance with section 28.

PLANS AND DOCUMENTS referred to in the REFERRAL AGENCY RESPONSE

Queensland Government

SARA ref: 2007-18034 SRA

Date: 16 September 2020



Derived Reference Points for GPS
Projection: UTM (MGA Zone 56) Datum: GDA94

Point	Easting	Northing	Point	Easting	Northing	Point	Easting	Northing	Point	Easting	Northing	Point	Easting	Northing	Point	Easting	Northing
1	284310	6984263	21	284251	6985152	41	283750	6984554	61	285346	6985239	81	286356	6985534	101	285615	6984764
2	284296	6984237	22	284254	6985151	42	283750	6984552	62	285348	6985067	82	286365	6985534	102	285636	6984771
3	283980	6984392	23	284312	6985118	43	283756	6984501	63	285414	6985068	83	286406	6985535	103	285656	6984771
4	284031	6984413	24	284326	6985080	44	283657	6984550	64	285461	6985068	84	286418	6985525	104	285663	6984771
5	284046	6984420	25	284329	6985070	45	283648	6985493	65	285492	6985069	85	286403	6985511	105	285600	6984712
6	284140	6984423	26	284377	6985059	46	285588	6984701	66	285489	6985167	86	286379	6985488	106	285588	6984701
7	284204	6984420	27	284428	6985065	47	285533	6984649	67	285827	6985487	87	286302	6985416			
8	284284	6984370	28	284446	6985074	48	284893	6984049	68	286144	6985494	88	286302	6985416			
9	284307	6984277	29	284451	6984830	49	284975	6984150	69	286158	6985629	89	286302	6985416			
10	284310	6984263	30	284625	6984746	50	284979	6984162	70	286310	6985610	90	286271	6985412			
11	283644	6985483	31	284582	6984717	51	285021	6984295	71	286316	6985605	91	286271	6985395			
12	283917	6985345	32	284552	6984711	52	285038	6984434	72	286322	6985602	92	286274	6985389			
13	283945	6985386	33	284493	6984746	53	285054	6984542	73	286323	6985597	93	286188	6985305			
14	284027	6985347	34	284404	6984777	54	285054	6984545	74	286325	6985593	94	286262	6985337			
15	284012	6985305	35	284338	6984769	55	285043	6984584	75	286324	6985583	95	286274	6985345			
16	284155	6985237	36	284274	6984738	56	285022	6984659	76	286319	6985568	96	286053	6985138			
17	284273	6985239	37	284230	6984687	57	284921	6984763	77	286304	6985555	97	286047	6985144			
18	284305	6985189	38	284123	6984607	58	284897	6984775	78	286304	6985546	98	285830	6984946			
19	284303	6985171	39	283838	6984611	59	285081	6984949	79	296313	6985533	99	285790	6984930			
20	284253	6985153	40	283774	6984596	60	285078	6985233	80	296330	6985533	100	285780	6984926			

1:13,000 @ A3 size

0 200 400 600 800 1,000 1,200 m

Projection: UTM (MGA Zone 56) Datum: GDA94

Note: Derived Reference Points are provided to assist in the location of area boundaries. Responsibility for locating these boundaries lies solely with the landholder and delegated contractor(s).

The property boundaries shown on this plan are APPROXIMATE ONLY. They are NOT an accurate representation of the legal boundaries.

Legend

- Derived Reference Start Points
- Property Boundary
- Area A (Part A^1- A^3) - Clearing permitted

Technical Agency Response Plan

N

Queensland Government

Date: 10/09/2020

reference: TARP 2007-18034 SRA

Sheet 1 of 1

10 September 2020 (reissue)

Our Ref: DA3783

Western Downs Regional Council
PO Box 551
DALBY QLD 4405

Attention: [redacted]
Email: [redacted]@wdrc.qld.gov.au
Application: 030.2020.120.001

Elecseed Pty Ltd
C/- Calibre Professional Services Pty Ltd
Level 2, 50 Geroges Terrace
PERTH WA 6000

Attention: [redacted]
Email: [redacted]@calibregroup.com

Dear Sir/Madam,

Referral Agency Response (Advice)
(Given under section 9.2 of the Development Assessment Rules)

Transmission Infrastructure Impacted	
Transmission Corridor	Queensland – New South Wales Interconnector (330kv) Corridor
Easement ID	Easement B on SP107382 (Dealing No. 703051105)
Location Details	
Street address	Kumbarilla Lane, Kumbarilla
Real property description	Lot 4 on DY457
Local government area	Western Downs Regional Council
Application Details	
Proposed development:	Material Change of Use Renewable Energy Facility (Solar Farm)
Approval sought	Development Permit

We refer to the above referenced development application which has been referred to Powerlink Queensland in accordance with Section 54 *of the Planning Act 2016.*

In accordance with its jurisdiction under Schedule 10 Part 9 Division 2 of the *Planning Regulation 2016,* Powerlink Queensland is a **Referral Agency (Advice)** for the above development application.

Specifically, the application has been triggered for assessment by Powerlink Queensland because:

1. For **material change of use** – all or part of the premises are subject to a transmission entity easement which is part of the transmission supply network (Table 2 1b)

PLANS AND REPORTS ASSESSED

The following plans and reports have been reviewed by Powerlink Queensland and form the basis of our assessment. Any variation to these plans and reports may require amendment of our advice.

33 Harold Street, Virginia
PO Box 1193, Virginia, Queensland 4014, Australia
Telephone: (07) 3860 2111 Facsimile: (07) 3860 2100
www.powerlink.com.au

Table 1: Plans and Reports upon which the assessment is based

Drawing / Report Title	Prepared by	Dated	Reference No.	Version / Issue
Kumbarilla Renewable Energy Park Site Layout – General	Calibre Group	3/07/2020	BR-E5251	D

Powerlink Queensland, acting as a Referral Agency (Advice) under the Planning Regulation 2017 provides its response to the application as attached **(Attachment 1)**.

Please treat this response as a properly made submission for the purposes of Powerlink being an eligible advice agency in accordance with the *Planning Act 2016*.

For further information please contact our Property Services Team via email property@powerlink.com.au who will be pleased to assist.

Yours sincerely

[redacted]

for [redacted]

MANAGER PROPERTY

ATTACHMENT 1 – REFERRAL AGENCY (ADVICE) RESPONSE

Powerlink Queensland **supports** this application subject to the inclusion of the following conditions in the Assessment Manager's Decision Notice.

No.	Condition	Timing	Reason
1	The development must be carried out generally in accordance with the reviewed plans detailed in Table 1.	At all times.	To ensure that the development is carried out generally in accordance with the plans of development submitted with the application.
2	The statutory clearances set out in the *Electrical Safety Regulation 2013* must be maintained during construction and operation. No encroachment within the statutory clearances is permitted.	At all times.	To ensure that the purpose of the *Electrical Safety Act 2002* is achieved and electrical safety requirements are met.
3	Compliance with the terms and conditions of the easement dealing no. shown in the heading of this letter.	At all times.	To ensure that the existing rights contained in the registered easement dealings are maintained.
4	Compliance with the generic requirements in respect to proposed works in the vicinity of Powerlink Queensland infrastructure as detailed in the enclosed Annexure "A".	At all times.	To ensure that the purpose of *the Electrical Safety Act 2002* is achieved and electrical safety requirements are met. To ensure the integrity of the easement is maintained.

Advice to Council and the Applicant

1. **Powerlink and Elecseed Pty Ltd are currently negotiating network connection of the solar farm to the transmission grid via a new transmission line from the site to Kumbarilla substation. This correspondence does not constitute approval for connection which remains the subject of ongoing technical assessment and commercial negotiations.**
2. This response does not constitute an approval to commence any works within the easement. Prior written approval is required from Powerlink Queensland before any work is undertaken within the easement areas. All works on easement (including but not limited to earthworks, drainage and detention basins; road construction; underground and overhead service installation) require detailed submissions, assessments and consent (or otherwise) by Powerlink.
3. In order for Powerlink to maintain and operate a safe and reliable supply of electricity, we require unrestricted 24-hour access to our corridors and infrastructure.

   We will require practical access (typically by 4WD vehicle – but to standard no less than existing) to the Powerlink structures.

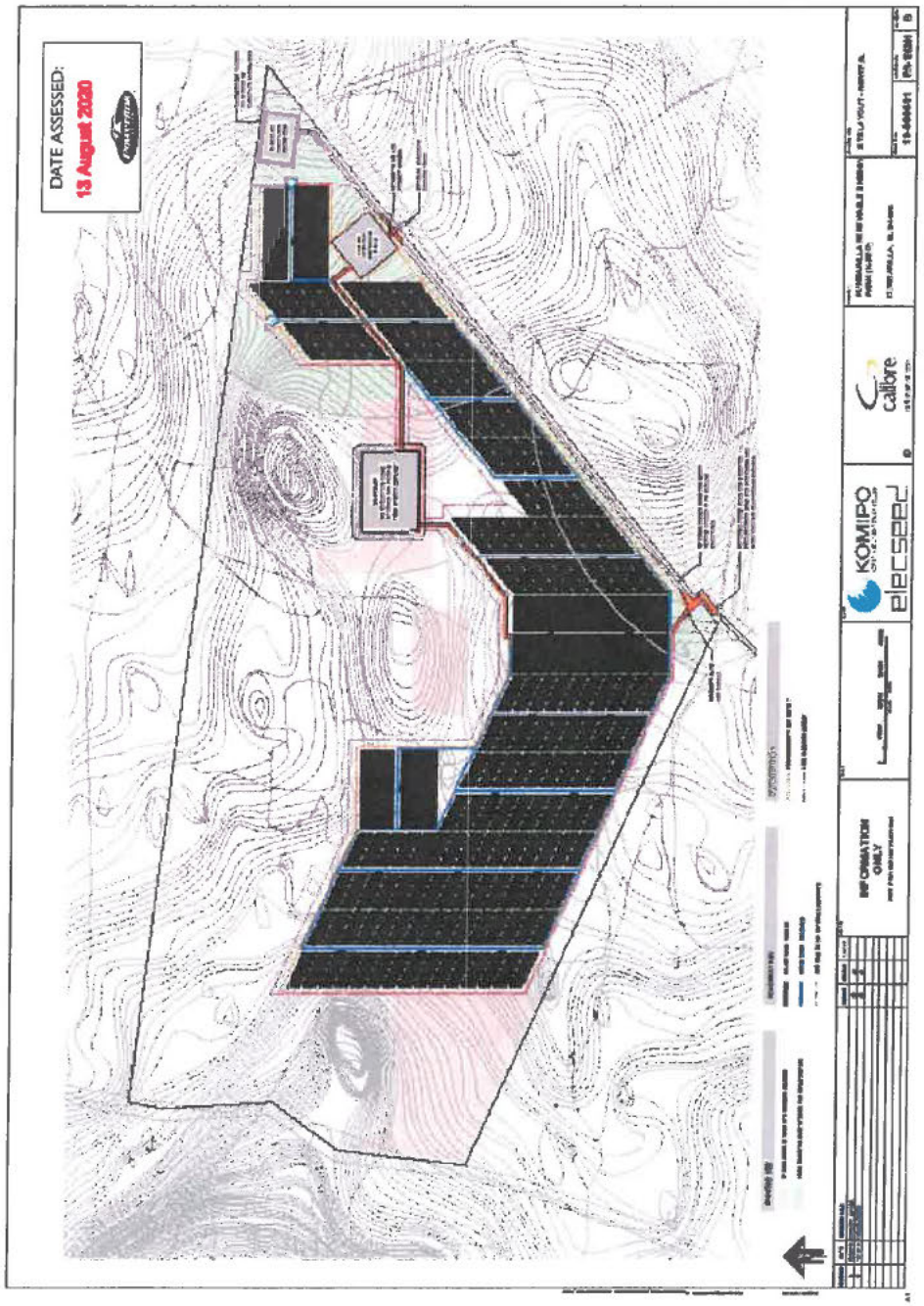
   If it is envisaged that there will be any interference or alteration to our current access arrangements prior, during or after the completion of your works, we require that the applicant contacts our Senior Easement Officer ([redacted]) to formalise unrestricted 24-hour access arrangements.

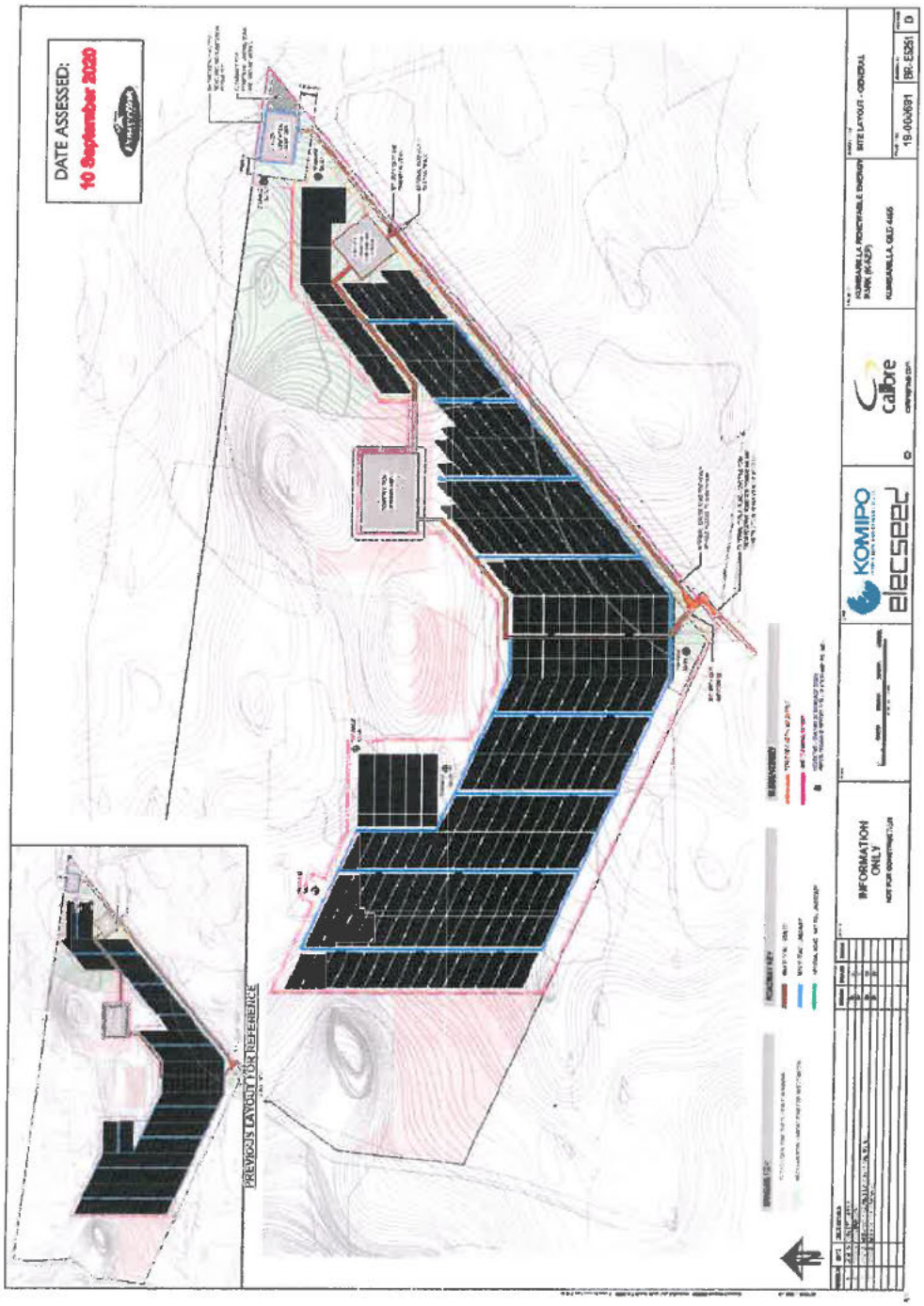
4. We draw your attention to the obligations and requirements of the Electrical Safety Act 2002 ("the Act") including any Code of Practice under the Act and the Electrical Safety Regulation 2013 ("the Regulation") including any safety exclusion zones defined in the Regulation.

   In respect to this application the exclusion zone for untrained persons and for operating plant operated by untrained persons is **six (6) metres** from the **330,000-volt** wires and exposed electrical parts.

   Should any doubt exist in maintaining the prescribed clearance to the conductors and electrical infrastructure, then the applicant is obliged under the Act to seek advice from Powerlink.

ATTACHMENT 2 – ASSESSED PLANS




DATE ASSESSED:
10 September 2020
PREVIOUS LAYOUT FOR REFERENCE
INFORMATION ONLY
NOT FOR CONSTRUCTION
KOMIPO
elecsee
calibre
KUMBARILLA RENEWABLE ENERGY PARK (K-REP)
KUMBARILLA QLD 4405
SITE LAYOUT - GENERAL
19.0003691
DR: EB251
D

ANNEXURE A – GENERIC REQUIREMENTS

The conditions contained in this Annexure have been compiled to assist persons (the applicant) intending to undertake work within the vicinity of high-voltage electrical installations and infrastructure owned or operated by Powerlink. The conditions are supplementary to the provisions of the Electrical Safety Act 2002, Electrical Safety Regulation 2013 and the Terms and Conditions of Registered Easements and other forms of Occupational Agreements hereinafter collectively referred to as the "Easement". Where any inconsistency exists between this Annexure and the Easement, the Easement shall take precedence.

1. **POWERLINK INFRASTRUCTURE**
   You may not do any act or thing which jeopardises the foundations, ground anchorages, supports, towers or poles, including (without limitation) inundate or place, excavate or remove any soil, sand or gravel within a distance of twenty (20) metres surrounding the base of any tower, pole, foundation, ground anchorage or support.

2. **STRUCTURES**
   No structures should be placed within twenty (20) metres of any part of a tower or structure foundation or within 5m of the conductor shadow area. Any structures on the easement require prior written consent from Powerlink.

3. **EXCLUSION ZONES**
   Exclusion zones for operating plant are defined in Schedule 2 of the Electrical Safety Regulation 2013 for Untrained Persons. All Powerlink infrastructure should be regarded as "electrically live" and therefore potentially dangerous at all times.

   In particular your attention is drawn to Schedule 2 of the Electrical Safety Regulation 2013 which defines exclusion zones for untrained persons in charge of operating plant or equipment in the vicinity of electrical facilities. If any doubt exists in meeting the prescribed clearance distances from the conductors, the applicant is obliged under this Act to seek advice from Powerlink.

4. **ACCESS AND EGRESS**
   Powerlink shall at all times retain the right to unobstructed access to and egress from its infrastructure. Typically, access shall be by 4WD vehicle.

5. **APPROVALS (ADDITIONAL)**
   Powerlink's consent to the proposal does not relieve the applicant from obtaining statutory, landowner or shire/local authority approvals.

6. **MACHINERY**
   All mechanical equipment proposed for use within the easement must not infringe the exclusion zones prescribed in Schedule 2 of the Electrical Safety Regulation 2013. All operators of machinery, plant or equipment within the easement must be made aware of the presence of live high-voltage overhead wires. It is recommended that all persons entering the Easement be advised of the presence of the conductors as part of on site workplace safety inductions. The use of warning signs is also recommended.

7. EASEMENTS

All terms and conditions of the easement are to be observed. Note that the easement takes precedence over all subsequent registered easement documents. Copies of the easement together with the plan of the Easement can be purchased from the Department of Environment & Resource Management.

8. EXPENDITURE AND COST RECOVERY

Should Powerlink incur costs as a result of the applicant's proposal, all costs shall be recovered from the applicant.

Where Powerlink expects such costs to be in excess of $10 000.00, advanced payments may be requested.

9. EXPLOSIVES

Blasting within the vicinity (500 metres) of Powerlink infrastructure must comply with AS 2187. Proposed blasting within 100 metres of Powerlink infrastructure must be referred to Powerlink for a detailed assessment.

10. BURNING OFF OR THE LIGHTING OF FIRES

We strongly recommend that fires not be lit or permitted to burn within the transmission line corridor and in the vicinity of any electrical infrastructure placed on the land. Due to safety risks Powerlink's written approval should be sort.

11. GROUND LEVEL VARIATIONS

Overhead Conductors

Changes in ground level must not reduce statutory ground to conductor clearance distances as prescribed by the Electrical Safety Act 2002 and the Electrical Safety Regulation 2013.

Underground Cables

Any change to the ground level above installed underground cable is not permitted without express written agreement of Powerlink.

12. VEGETATION

Vegetation planted within an easement must not exceed 3.5 metres in height when fully matured. Powerlink reserves the right to remove vegetation to ensure the safe operation of the transmission line and, where necessary, to maintain access to infrastructure.

13. INDEMNITY

Any use of the Easement by the applicant in a way which is not permitted under the easement and which is not strictly in accordance with Powerlink's prior written approval is an unauthorised use. Powerlink is not liable for personal injury or death or for property loss or damage resulting from unauthorized use. If other parties make damage claims against Powerlink as a result of unauthorized use then Powerlink reserves the right to recover those damages from the applicant.

14. INTERFERENCE

The applicant's attention is drawn to s.230 of the Electricity Act 1994 (the "Act"), which provides that a person must not wilfully, and unlawfully interfere with an electricity entity's works. "Works" are defined in s.12 (1) of the Act. The maximum penalty for breach of s.230 of the Act is a fine equal to 40 penalty units or up to 6 months imprisonment.

15. REMEDIAL ACTION

Should remedial action be necessary by Powerlink as a result of the proposal, the applicant will be liable for all costs incurred.

16. OWNERS USE OF LAND

The owner may use the easement land for any lawful purpose consistent with the terms of the registered easement; the conditions contained herein, the Electrical Safety Act 2002 and the Electrical Safety Regulation 2013.

17. ELECTRIC AND MAGNETIC FIELDS

Electric and Magnetic Fields (EMF) occur everywhere electricity is used (e.g. in homes and offices) as well as where electricity is transported (electricity networks).

Powerlink recognises that there is community interest about Electric and Magnetic Fields. We rely on expert advice on this matter from recognised health authorities in Australia and around the world. In Australia, the Federal Government agency charged with responsibility for regulation of EMFs is the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). ARPANSA's *Fact Sheet – Magnetic and Electric Fields from Power Lines*, concludes:

"On balance, the scientific evidence does not indicate that exposure to 50Hz EMF's found around the home, the office or near powerlines is a hazard to human health."

Whilst there is no scientifically proven causal link between EMF and human health, Powerlink nevertheless follows an approach of "*prudent avoidance*" in the design and siting of new powerlines. This includes seeking to locate new powerline easements away from houses, schools and other buildings, where it is practical to do so and the added cost is modest.

The level of EMF decreases rapidly with distance from the source. EMF readings at the edge of a typical Powerlink easement are generally similar to those encountered by people in their daily activities at home or at work. And in the case of most Powerlink lines, at about 100 metres from the line, the EMF level is so small that it cannot be measured.

Powerlink is a member of the ENA's EMF Committee that monitors and compiles up-to-date information about EMF on behalf of all electricity network businesses in Australia. This includes subscribing to an international monitoring service that keeps the industry informed about any new developments regarding EMF such as new research studies, literature and research reviews, publications, and conferences.

We encourage community members with an interest in EMF to visit ARPANSA's website: www.arpansa.gov.au Information on EMF is also available on the ENA's website: www.ena.asn.au

Customer Contact 1300 COUNCIL (1300 268 624)
07 4679 4000
www.wdrc.qld.gov.au
info@wdrc.qld.gov.au

WESTERN DOWNS REGIONAL COUNCIL

NOTICE OF INTENTION TO COMMENCE USE

Planning Approval	030.2020.120.001
Date of Approval	29 September 2020
Approved Development	Material Change of Use to establish a Renewable Energy Facility (Solar Farm)
Location	Kumbarilla Lane, Kumbarilla
Real Property Description	Lot 4 on DY457 and Easement B on SP107382

I am hereby notifying you of my intention to commence the approved use on

_____ (insert date)

I have read the conditions of the above Decision Notice and believe that all the applicable conditions have been complied with.

Applicant: _____

Address: _____

_____

_____

_____

Contact Details: _____

_____

SIGNATURE OF APPLICANT

Date: _____

Appendix E Protected Matters Search Results

Australian Government

Department of Agriculture, Water and the Environment

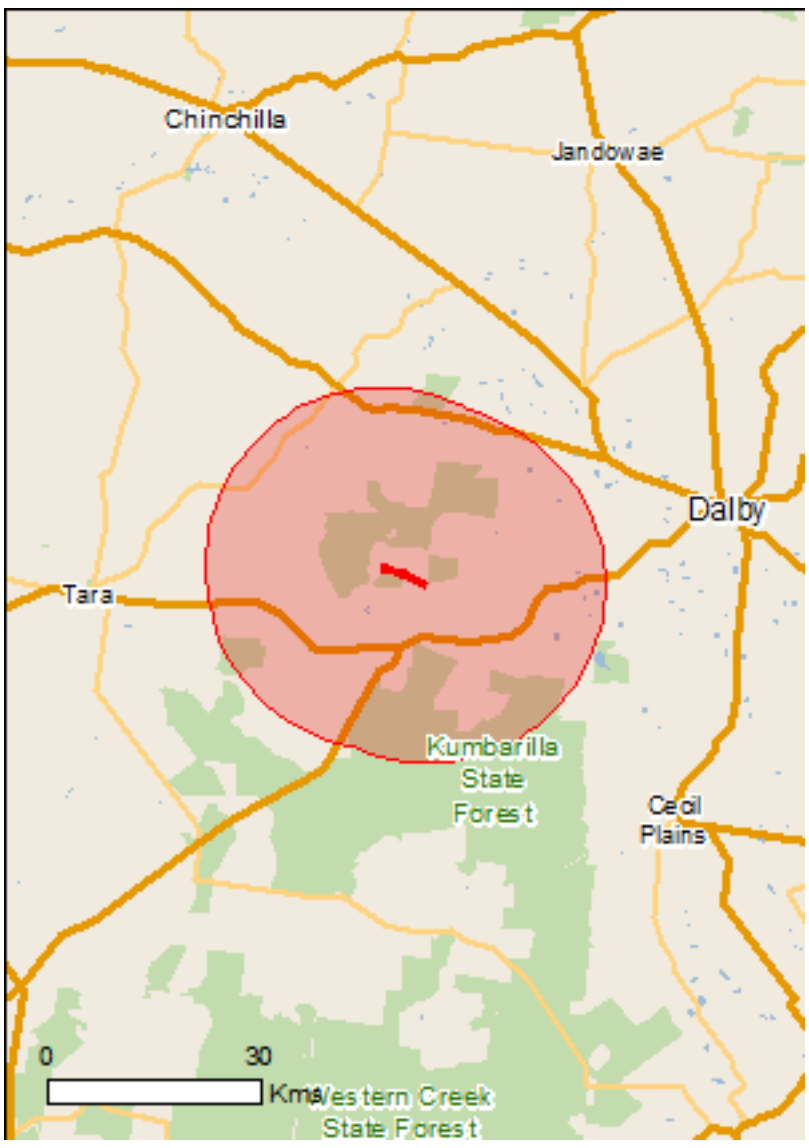
EPBC Act Protected Matters Report

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

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

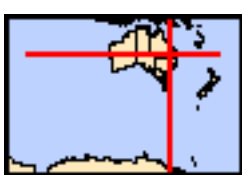
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 29/06/21 08:38:45



Coordinates

Buffer: 25.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	15
Listed Threatened Species:	32
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

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

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

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	26
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	1200 - 1300km
Narran lake nature reserve	400 - 500km upstream
Riverland	1100 - 1200km
The coorong, and lakes alexandrina and albert wetland	1300 - 1400km

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area

Name	Status	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Roosting known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Other		
Adclarkia cameroni Brigalow Woodland Snail [83886]	Endangered	Species or species habitat likely to occur within area
Adclarkia dulacca Dulacca Woodland Snail [83885]	Endangered	Species or species habitat likely to occur within area
Plants		

Name	Status	Type of Presence
Acacia lauta Tara Wattle [4165]	Vulnerable	Species or species habitat known to occur within area
Cadellia pentastylis Ooline [9828]	Vulnerable	Species or species habitat may occur within area
Dichanthium queenslandicum King Blue-grass [5481]	Endangered	Species or species habitat may occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Homopholis belsonii Belson's Panic [2406]	Vulnerable	Species or species habitat may occur within area
Lepidium monoplocoides Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area
Rhaponticum australe Austral Cornflower, Native Thistle [22647]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Tylophora linearis [55231]	Endangered	Species or species habitat may occur within area
Xerothamnella herbacea [4146]	Endangered	Species or species habitat may occur within area
Reptiles		
Anomalopus mackayi Five-clawed Worm-skink, Long-legged Worm-skink [25934]	Vulnerable	Species or species habitat likely to occur within area
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat likely to occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Roosting known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Roosting known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Lake Broadwater	QLD

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Lake Broadwater	QLD

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-27.24425 150.82591,-27.25059 150.82711,-27.25355 150.84966,-27.25434 150.85006,-27.25467 150.85231,-27.26647 150.88126

Acknowledgements

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

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

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

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

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

Appendix F Wildlife Online Database search

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: -27.2400
Longitude: 150.8233
Distance: 25
Email: churchc@cdmsmith.com
Date submitted: Monday 11 May 2020 05:26:27
Date extracted: Monday 11 May 2020 05:30:02

The number of records retrieved = 784

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			7
animals	amphibians	Hylidae	*Litoria chloris*	orange eyed treefrog		C		1
animals	amphibians	Hylidae	*Litoria dentata*	bleating treefrog		C		1
animals	amphibians	Hylidae	*Litoria peronii*	emerald spotted treefrog		C		11
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		60/1
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		72
animals	amphibians	Hylidae	*Cyclorana brevipes*	superb collared frog		C		16/3
animals	amphibians	Hylidae	*Cyclorana cultripes*	grassland collared frog		C		5
animals	amphibians	Hylidae	*Cyclorana verrucosa*	rough collared frog		C		10/2
animals	amphibians	Hylidae	*Litoria latopalmata*	broad palmed rocketfrog		C		51
animals	amphibians	Hylidae	*Cyclorana alboguttata*	greenstripe frog		C		26
animals	amphibians	Hylidae	*Cyclorana platycephala*	water holding frog		C		2/1
animals	amphibians	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog		C		22/1
animals	amphibians	Hylidae	*Litoria sp.*					6
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		8
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		103
animals	amphibians	Limnodynastidae	*Limnodynastes terraereginae*	scarlet sided pobblebonk		C		61
animals	amphibians	Limnodynastidae	*Limnodynastes fletcheri*	barking frog		C		2
animals	amphibians	Limnodynastidae	*Limnodynastes dumerilii*	grey bellied pobblebonk		C		2
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		367/1
animals	amphibians	Limnodynastidae	*Neobatrachus sudellae*	meeowing frog		C		11/1
animals	amphibians	Limnodynastidae	*Limnodynastes sp.*					3
animals	amphibians	Limnodynastidae	*Notaden bennettii*	holy cross frog		C		9/1
animals	amphibians	Limnodynastidae	*Limnodynastes peronii*	striped marshfrog		C		1
animals	amphibians	Limnodynastidae	*Limnodynastes salmini*	salmon striped frog		C		60
animals	amphibians	Myobatrachidae	*Crinia parinsignifera*	beeping froglet		C		19
animals	amphibians	Myobatrachidae	*Uperoleia laevigata*	eastern gungan		C		4
animals	amphibians	Myobatrachidae	*Pseudophryne major*	great brown broodfrog		C		4/1
animals	amphibians	Myobatrachidae	*Uperoleia rugosa*	chubby gungan		C		81/3
animals	amphibians	Myobatrachidae	*Crinia signifera*	clicking froglet		C		2
animals	amphibians	Myobatrachidae	*Crinia sp.*					1
animals	birds	Acanthizidae	*Acanthiza uropygialis*	chestnut-rumped thornbill		C		8
animals	birds	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill		C		24
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		1
animals	birds	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill		C		15
animals	birds	Acanthizidae	*Acanthiza apicalis*	inland thornbill		C		26
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		46
animals	birds	Acanthizidae	*Aphelocephala leucopsis*	southern whiteface		C		2
animals	birds	Acanthizidae	*Acanthiza lineata*	striated thornbill		C		4
animals	birds	Acanthizidae	*Gerygone fusca*	western gerygone		C		4
animals	birds	Acanthizidae	*Acanthiza nana*	yellow thornbill		C		47
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		93
animals	birds	Acanthizidae	*Pyrrholaemus sagittatus*	speckled warbler		C		39
animals	birds	Acanthizidae	*Acanthiza pusilla*	brown thornbill		C		6
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		5
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		2
animals	birds	Accipitridae	*Lophoictinia isura*	square-tailed kite		C		3
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		5
animals	birds	Accipitridae	*Circus assimilis*	spotted harrier		C		1
animals	birds	Accipitridae	*Haliastur indus*	brahminy kite		C		1
animals	birds	Accipitridae	*Elanus scriptus*	letter-winged kite		C		1
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		33
animals	birds	Accipitridae	*Hieraaetus morphnoides*	little eagle		C		2
animals	birds	Accipitridae	*Accipiter novaehollandiae*	grey goshawk		C		1
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		7
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		C		1
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		6
animals	birds	Alaudidae	*Mirafra javanica*	Horsfield's bushlark		C		3
animals	birds	Alcedinidae	*Ceyx azureus*	azure kingfisher		C		2
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		14
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		1
animals	birds	Anatidae	*Aythya australis*	hardhead		C		5
animals	birds	Anatidae	*Oxyura australis*	blue-billed duck		C		1
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		29
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		28
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		5
animals	birds	Anatidae	*Malacorhynchus membranaceus*	pink-eared duck		C		3
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		13
animals	birds	Anseranatidae	*Anseranas semipalmata*	magpie goose		C		2
animals	birds	Apodidae	*Apus pacificus*	fork-tailed swift		SL		3
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		V	V	6
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		19
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		3
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		4
animals	birds	Ardeidae	*Ixobrychus flavicollis*	black bittern		C		1
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		2
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		10
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		7
animals	birds	Artamidae	*Artamus personatus*	masked woodswallow		C		2
animals	birds	Artamidae	*Gymnorhina tibicen*	Australian magpie		C		73
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		78
animals	birds	Artamidae	*Artamus cyanopterus*	dusky woodswallow		C		9
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		78
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		9
animals	birds	Artamidae	*Artamus superciliosus*	white-browed woodswallow		C		4
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		58
animals	birds	Artamidae	*Artamus minor*	little woodswallow		C		4
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		3
animals	birds	Cacatuidae	*Calyptorhynchus funereus*	yellow-tailed black-cockatoo		C		14
animals	birds	Cacatuidae	*Cacatua sanguinea*	little corella		C		21

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		103
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		26
animals	birds	Cacatuidae	*Calyptorhynchus banksii*	red-tailed black-cockatoo		C		2
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V		10
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		117
animals	birds	Cacatuidae	*Calyptorhynchus lathami*	glossy black-cockatoo		V		1
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		50
animals	birds	Campephagidae	*Coracina tenuirostris*	cicadabird		C		11
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		19
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		6
animals	birds	Campephagidae	*Coracina maxima*	ground cuckoo-shrike		C		2
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		16
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		6
animals	birds	Charadriidae	*Vanellus miles novaehollandiae*	masked lapwing (southern subspecies)		C		5
animals	birds	Charadriidae	*Erythrogonys cinctus*	red-kneed dotterel		C		2
animals	birds	Charadriidae	*Vanellus tricolor*	banded lapwing		C		1
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		12
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		3
animals	birds	Climacteridae	*Cormobates leucophaea*	white-throated treecreeper		C		18
animals	birds	Climacteridae	*Climacteris picumnus*	brown treecreeper		C		3
animals	birds	Climacteridae	*Cormobates leucophaea metastasis*	white-throated treecreeper (southern)		C		25
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		76
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		31
animals	birds	Columbidae	*Ptilinopus regina*	rose-crowned fruit-dove		C		1
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		32
animals	birds	Columbidae	*Macropygia amboinensis*	brown cuckoo-dove		C		1
animals	birds	Columbidae	*Streptopelia chinensis*	spotted dove	Y			2
animals	birds	Columbidae	*Leucosarcia melanoleuca*	wonga pigeon		C		1
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	8
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		75
animals	birds	Columbidae	*Columba livia*	rock dove	Y			3
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		1
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		33
animals	birds	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough		C		28
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		54
animals	birds	Corvidae	*Corvus sp.*					2
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		128
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		33
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		4
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		4
animals	birds	Cuculidae	*Cacomantis variolosus*	brush cuckoo		C		5
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		6
animals	birds	Cuculidae	*Chalcites minutillus barnardi*	Eastern little bronze-cuckoo		C		1
animals	birds	Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo		C		3
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		1
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cuculidae	*Cacomantis pallidus*	pallid cuckoo		C		3
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		4
animals	birds	Estrildidae	*Neochmia temporalis*	red-browed finch		C		2
animals	birds	Estrildidae	*Neochmia modesta*	plum-headed finch		C		1
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		58
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		6
animals	birds	Estrildidae	*Stagonopleura guttata*	diamond firetail		C		3
animals	birds	Eurostopodidae	*Eurostopodus mystacalis*	white-throated nightjar		C		5
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		5
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		1
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		13
animals	birds	Falconidae	*Falco subniger*	black falcon		C		2
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		84
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		52
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		5
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		10
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		4
animals	birds	Laridae	*Chlidonias hybrida*	whiskered tern		C		2
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		2
animals	birds	Maluridae	*Malurus leucopterus*	white-winged fairy-wren		C		2
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		14
animals	birds	Maluridae	*Malurus cyaneus*	superb fairy-wren		C		89
animals	birds	Megaluridae	*Cincloramphus mathewsi*	rufous songlark		C		7
animals	birds	Megaluridae	*Cincloramphus cruralis*	brown songlark		C		1
animals	birds	Meliphagidae	*Gavicalis virescens*	singing honeyeater		C		4
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		40
animals	birds	Meliphagidae	*Melithreptus gularis*	black-chinned honeyeater		C		1
animals	birds	Meliphagidae	*Melithreptus lunatus*	white-naped honeyeater		C		1
animals	birds	Meliphagidae	*Nesoptilotis leucotis*	white-eared honeyeater		C		49
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		100
animals	birds	Meliphagidae	*Ptilotula penicillata*	white-plumed honeyeater		C		43
animals	birds	Meliphagidae	*Lichenostomus melanops*	yellow-tufted honeyeater		C		6
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		107
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		6
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		41
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		39
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		2
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		74
animals	birds	Meliphagidae	*Melithreptus brevirostris*	brown-headed honeyeater		C		27
animals	birds	Meliphagidae	*Acanthorhynchus tenuirostris*	eastern spinebill		C		1
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		10
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		51
animals	birds	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater		C		92
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		6
animals	birds	Meliphagidae	*Grantiella picta*	painted honeyeater		V	V	1
animals	birds	Meliphagidae	*Sugomel niger*	black honeyeater		C		1

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animals	birds	Meliphagidae	*Ptilotula fusca*	fuscous honeyeater		C		12
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		41
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		20
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		29
animals	birds	Monarchidae	*Myiagra cyanoleuca*	satin flycatcher		SL		4
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		91
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		9
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		60
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		16
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		19
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		3
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		1
animals	birds	Pachycephalidae	*Pachycephala pectoralis*	golden whistler		C		20
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		101
animals	birds	Pachycephalidae	*Falcunculus frontatus*	crested shrike-tit		C		1
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		58
animals	birds	Paradisaeidae	*Ptiloris paradiseus*	paradise riflebird		C		1
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		66
animals	birds	Pardalotidae	*Pardalotus punctatus*	spotted pardalote		C		22
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			1
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		4
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		52
animals	birds	Petroicidae	*Eopsaltria australis*	eastern yellow robin		C		61
animals	birds	Petroicidae	*Petroica goodenovii*	red-capped robin		C		17
animals	birds	Petroicidae	*Tregellasia capito*	pale-yellow robin		C		1
animals	birds	Petroicidae	*Petroica phoenicea*	flame robin		C		1
animals	birds	Petroicidae	*Petroica rosea*	rose robin		C		6
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		8
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		12
animals	birds	Phasianidae	*Coturnix pectoralis*	stubble quail		C		1
animals	birds	Phasianidae	*Coturnix sp.*					1
animals	birds	Phasianidae	*Coturnix ypsilophora*	brown quail		C		3
animals	birds	Pittidae	*Pitta versicolor*	noisy pitta		C		3
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		17
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		13
animals	birds	Podicipedidae	*Poliocephalus poliocephalus*	hoary-headed grebe		C		1
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		79
animals	birds	Psittacidae	*Psephotus haematonotus*	red-rumped parrot		C		13
animals	birds	Psittacidae	*Melopsittacus undulatus*	budgerigar		C		2
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		67
animals	birds	Psittacidae	*Alisterus scapularis*	Australian king-parrot		C		18
animals	birds	Psittacidae	*Platycercus eximius*	eastern rosella		C		2
animals	birds	Psittacidae	*Platycercus elegans*	crimson rosella		C		1
animals	birds	Psittacidae	*Parvipsitta pusilla*	little lorikeet		C		17
animals	birds	Psittacidae	*Neophema pulchella*	turquoise parrot		C		1
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		43

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animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		40
animals	birds	Psittacidae	*Northiella haematogaster*	blue bonnet		C		2
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		4
animals	birds	Psittacidae	*Platycercus adscitus palliceps*	pale-headed rosella (southern form)		C		1
animals	birds	Ptilonorhynchidae	*Ailuroedus crassirostris*	green catbird		C		1
animals	birds	Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird		C		1
animals	birds	Ptilonorhynchidae	*Ptilonorhynchus violaceus*	satin bowerbird		C		1
animals	birds	Ptilonorhynchidae	*Sericulus chrysocephalus*	regent bowerbird		C		1
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		1
animals	birds	Rallidae	*Tribonyx ventralis*	black-tailed native-hen		C		1
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		2
animals	birds	Rallidae	*Porphyrio melanotus*	purple swamphen		C		1
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		3
animals	birds	Rhipiduridae	*Rhipidura rufifrons*	rufous fantail		SL		3
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		81
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		99
animals	birds	Scolopacidae	*Tringa nebularia*	common greenshank		SL		1
animals	birds	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper		SL		2
animals	birds	Scolopacidae	*Tringa stagnatilis*	marsh sandpiper		SL		1
animals	birds	Scolopacidae	*Gallinago hardwickii*	Latham's snipe		SL		1
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		10
animals	birds	Strigidae	*Ninox connivens*	barking owl		C		2
animals	birds	Sturnidae	*Sturnus vulgaris*	common starling	Y			1
animals	birds	Sturnidae	*Acridotheres tristis*	common myna	Y			8
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		2
animals	birds	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		C		5
animals	birds	Threskiornithidae	*Plegadis falcinellus*	glossy ibis		SL		2
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		4
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		10
animals	birds	Timaliidae	*Zosterops lateralis*	silvereye		C		15
animals	birds	Turnicidae	*Turnix velox*	little button-quail		C		1
animals	birds	Turnicidae	*Turnix varius*	painted button-quail		C		5
animals	birds	Turnicidae	*Turnix maculosus*	red-backed button-quail		C		1
animals	birds	Tytonidae	*Tyto delicatula*	eastern barn owl		C		1
animals	insects	Aeshnidae	*Anax papuensis*	Australian Emperor				1
animals	insects	Formicidae	*Iridomyrmex purpureus*					2
animals	insects	Hesperiidae	*Ocybadistes flavovittatus flavovittatus*	narrow-brand grass-dart				1
animals	insects	Libellulidae	*Pantala flavescens*	wandering glider				1
animals	insects	Libellulidae	*Diplacodes bipunctata*	wandering percher				1
animals	insects	Libellulidae	*Orthetrum caledonicum*	blue skimmer				5
animals	insects	Libellulidae	*Diplacodes haematodes*	scarlet percher				1
animals	insects	Lycaenidae	*Jalmenus eubulus*	pale imperial hairstreak		V		5
animals	insects	Lycaenidae	*Ogyris barnardi barnardi*	bright-purple azure				1
animals	insects	Lycaenidae	*Zizina otis labradus*	common grass-blue (Australian subspecies)				3
animals	insects	Nymphalidae	*Charaxes sempronius sempronius*	tailed emperor				1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	insects	Nymphalidae	*Danaus plexippus*	monarch	Y			2
animals	insects	Nymphalidae	*Vanessa kershawi*	Australian painted lady				1
animals	insects	Nymphalidae	*Hypocysta pseudirius*	grey ringlet				2
animals	insects	Nymphalidae	*Tirumala hamata hamata*	blue tiger				1
animals	insects	Nymphalidae	*Junonia villida villida*	meadow argus				15
animals	insects	Nymphalidae	*Hypolimnas bolina nerina*	varied eggfly				3
animals	insects	Nymphalidae	*Danaus petilia*	lesser wanderer				12
animals	insects	Nymphalidae	*Vanessa itea*	yellow admiral				1
animals	insects	Nymphalidae	*Acraea andromacha andromacha*	glasswing				3
animals	insects	Nymphalidae	*Euploea corinna*	common crow				6
animals	insects	Papilionidae	*Cressida cressida cressida*	clearwing swallowtail				1
animals	insects	Papilionidae	*Papilio demoleus sthenelus*	chequered swallowtail				2
animals	insects	Papilionidae	*Papilio aegeus aegeus*	orchard swallowtail (Australian subspecies)				3
animals	insects	Papilionidae	*Papilio anactus*	dainty swallowtail				2
animals	insects	Papilionidae	*Papilio aegeus*					4
animals	insects	Pieridae	*Eurema hecabe*	large grass-yellow				2
animals	insects	Pieridae	*Eurema smilax*	small grass-yellow				4
animals	insects	Pieridae	*Belenois java teutonia*	caper white				10
animals	insects	Pieridae	*Catopsilia pyranthe crokera*	white migrant				2
animals	insects	Pieridae	*Delias argenthona argenthona*	scarlet jezebel				1
animals	malacostracans	Parastacidae	*Cherax destructor*	common yabbie				1
animals	mammals	Acrobatidae	*Acrobates pygmaeus*	feathertail glider		C		1
animals	mammals	Bovidae	*Capra hircus*	goat	Y			1
animals	mammals	Canidae	*Canis sp.*		Y			1
animals	mammals	Canidae	*Vulpes vulpes*	red fox	Y			9
animals	mammals	Canidae	*Canis familiaris*	dog	Y			2
animals	mammals	Canidae	*Canis familiaris (dingo)*	dingo				4
animals	mammals	Dasyuridae	*Sminthopsis crassicaudata*	fat-tailed dunnart		C		2/1
animals	mammals	Dasyuridae	*Phascogale tapoatafa tapoatafa*	brush-tailed phascogale		C		1
animals	mammals	Dasyuridae	*Antechinus flavipes sensu lato*	yellow-footed antechinus		C		1
animals	mammals	Dasyuridae	*Antechinus flavipes flavipes*	yellow-footed antechinus (south-east Queensland)		C		9
animals	mammals	Dasyuridae	*Planigale tenuirostris*	narrow-nosed planigale		C		6/1
animals	mammals	Dasyuridae	*Sminthopsis macroura*	stripe-faced dunnart		C		9/1
animals	mammals	Dasyuridae	*Sminthopsis murina*	common dunnart		C		15
animals	mammals	Dasyuridae	*Planigale sp.*					2
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		21
animals	mammals	Felidae	*Felis catus*	cat	Y			6
animals	mammals	Leporidae	*Lepus europaeus*	European brown hare	Y			4
animals	mammals	Leporidae	*Oryctolagus cuniculus*	rabbit	Y			11
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		38
animals	mammals	Macropodidae	*Macropus parryi*	whiptail wallaby		C		2
animals	mammals	Macropodidae	*Macropus rufogriseus*	red-necked wallaby		C		14
animals	mammals	Macropodidae	*Macropus robustus*	common wallaroo		C		2
animals	mammals	Macropodidae	*Wallabia bicolor*	swamp wallaby		C		36

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	mammals	Macropodidae	*Macropus dorsalis*	black-striped wallaby		C		14
animals	mammals	Miniopteridae	*Miniopterus schreibersii oceanensis*	eastern bent-wing bat		C		1
animals	mammals	Miniopteridae	*Miniopterus australis*	little bent-wing bat		C		1
animals	mammals	Molossidae	*Mormopterus lumsdenae*	northern free-tailed bat		C		7
animals	mammals	Molossidae	*Tadarida australis*	white-striped freetail bat		C		14
animals	mammals	Molossidae	*Mormopterus ridei*	eastern free-tailed bat		C		13
animals	mammals	Molossidae	*Mormopterus sp.*					11/4
animals	mammals	Molossidae	*Mormopterus petersi*	inland free-tailed bat		C		12/1
animals	mammals	Muridae	*Mus musculus*	house mouse	Y			27
animals	mammals	Muridae	*Pseudomys delicatulus*	delicate mouse		C		5/1
animals	mammals	Muridae	*Melomys cervinipes*	fawn-footed melomys		C		1
animals	mammals	Muridae	*Rattus fuscipes*	bush rat		C		1
animals	mammals	Muridae	*Melomys burtoni*	grassland melomys		C		1
animals	mammals	Muridae	*Rattus rattus*	black rat	Y			1
animals	mammals	Peramelidae	*Isoodon macrourus*	northern brown bandicoot		C		1
animals	mammals	Petauridae	*Petaurus sp.*					2
animals	mammals	Petauridae	*Petaurus breviceps*	sugar glider		C		15
animals	mammals	Petauridae	*Petaurus norfolcensis*	squirrel glider		C		7
animals	mammals	Petauridae	*Petaurus australis australis*	yellow-bellied glider (southern subspecies)		C		5
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		17
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		V	V	24
animals	mammals	Potoroidae	*Aepyprymnus rufescens*	rufous bettong		C		1
animals	mammals	Pseudocheiridae	*Petauroides volans volans*	southern greater glider		V	V	11
animals	mammals	Pteropodidae	*Pteropus poliocephalus*	grey-headed flying-fox		C	V	1
animals	mammals	Pteropodidae	*Pteropus scapulatus*	little red flying-fox		C		5
animals	mammals	Suidae	*Sus scrofa*	pig	Y			16
animals	mammals	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna		SL		16
animals	mammals	Vespertilionidae	*Chalinolobus picatus*	little pied bat		C		11
animals	mammals	Vespertilionidae	*Scotorepens balstoni*	inland broad-nosed bat		C		8
animals	mammals	Vespertilionidae	*Vespadelus vulturnus*	little forest bat		C		39/3
animals	mammals	Vespertilionidae	*Nyctophilus geoffroyi*	lesser long-eared bat		C		9
animals	mammals	Vespertilionidae	*Chalinolobus nigrogriseus*	hoary wattled bat		C		1
animals	mammals	Vespertilionidae	*Chalinolobus gouldii*	Gould's wattled bat		C		36
animals	mammals	Vespertilionidae	*Vespadelus regulus*	southern forest bat		C		1
animals	mammals	Vespertilionidae	*Vespadelus pumilus*	eastern forest bat		C		1
animals	mammals	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat		C		43/7
animals	mammals	Vespertilionidae	*Nyctophilus gouldi*	Gould's long-eared bat		C		21/3
animals	mammals	Vespertilionidae	*Scotorepens sp. (Parnaby)*	central-eastern broad-nosed bat		C		12/2
animals	mammals	Vespertilionidae	*Scotorepens sp.*					8/1
animals	mammals	Vespertilionidae	*Nyctophilus sp.*					6
animals	mammals	Vespertilionidae	*Chalinolobus morio*	chocolate wattled bat		C		3
animals	ray-finned fishes	Atherinidae	*Craterocephalus stercusmuscarum*	flyspecked hardyhead				1/1
animals	ray-finned fishes	Cyprinidae	*Cyprinus carpio*	European carp	Y			1
animals	ray-finned fishes	Eleotridae	*Hypseleotris species 1*	Midgley's carp gudgeon				1/1
animals	ray-finned fishes	Plotosidae	*Tandanus tandanus*	freshwater catfish				1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	ray-finned fishes	Terapontidae	*Leiopotherapon unicolor*	spangled perch				1/1
animals	reptiles	Agamidae	*Amphibolurus muricatus*	jacky lizard		C		13
animals	reptiles	Agamidae	*Intellagama lesueurii*	eastern water dragon		C		2
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		1
animals	reptiles	Agamidae	*Amphibolurus burnsi*	Burns's dragon		C		18
animals	reptiles	Agamidae	*Diporiphora nobbi*	nobbi		C		6
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		85
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		9
animals	reptiles	Carphodactylidae	*Underwoodisaurus milii*	thick-tailed gecko		C		2
animals	reptiles	Chelidae	*Chelodina expansa*	broad-shelled river turtle		C		1
animals	reptiles	Chelidae	*Chelodina longicollis*	eastern snake-necked turtle		C		5
animals	reptiles	Chelidae	*Emydura macquarii macquarii*	Murray turtle		C		1
animals	reptiles	Colubridae	*Dendrelaphis punctulatus*	green tree snake		C		5
animals	reptiles	Colubridae	*Boiga irregularis*	brown tree snake		C		2
animals	reptiles	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko		C		10/1
animals	reptiles	Diplodactylidae	*Diplodactylus vittatus*	wood gecko		C		26
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		90/2
animals	reptiles	Diplodactylidae	*Nebulifera robusta*	robust velvet gecko		C		78
animals	reptiles	Diplodactylidae	*Amalosia rhombifer*	zig-zag gecko		C		2
animals	reptiles	Diplodactylidae	*Oedura sp.*					3
animals	reptiles	Diplodactylidae	*Amalosia jacovae*	clouded gecko		C		1
animals	reptiles	Diplodactylidae	*Oedura tryoni*	southern spotted velvet gecko		C		1
animals	reptiles	Elapidae	*Hoplocephalus bitorquatus*	pale-headed snake		C		33
animals	reptiles	Elapidae	*Pseudechis porphyriacus*	red-bellied black snake		C		9
animals	reptiles	Elapidae	*Brachyurophis australis*	coral snake		C		9
animals	reptiles	Elapidae	*Vermicella annulata*	bandy-bandy		C		8
animals	reptiles	Elapidae	*Pseudonaja textilis*	eastern brown snake		C		6
animals	reptiles	Elapidae	*Pseudechis guttatus*	spotted black snake		C		12
animals	reptiles	Elapidae	*Demansia psammophis*	yellow-faced whipsnake		C		6
animals	reptiles	Elapidae	*Hemiaspis damelii*	grey snake		E		7
animals	reptiles	Elapidae	*Denisonia devisi*	De Vis' banded snake		C		13
animals	reptiles	Elapidae	*Parasuta dwyeri*	Dwyer's snake		C		14
animals	reptiles	Elapidae	*Suta suta*	myall snake		C		3
animals	reptiles	Elapidae	*Furina diadema*	red-naped snake		C		28/1
animals	reptiles	Elapidae	*Pseudechis sp.*					1
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		135
animals	reptiles	Gekkonidae	*Gehyra sp.*					14
animals	reptiles	Gekkonidae	*Gehyra dubia*	dubious dtella		C		583/1
animals	reptiles	Gekkonidae	*Gehyra catenata*	chain-backed dtella		C		9
animals	reptiles	Gekkonidae	*Gehyra versicolor*			C		36
animals	reptiles	Pygopodidae	*Paradelma orientalis*	brigalow scaly-foot		C		40
animals	reptiles	Pygopodidae	*Delma tincta*	excitable delma		C		3
animals	reptiles	Pygopodidae	*Delma plebeia*	common delma		C		12
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		33
animals	reptiles	Pygopodidae	*Pygopus schraderi*	eastern hooded scaly-foot		C		8
animals	reptiles	Scincidae	*Carlia sp.*					21

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Scincidae	*Lerista sp.*					2
animals	reptiles	Scincidae	*Carlia munda*	shaded-litter rainbow-skink		C		9
animals	reptiles	Scincidae	*Carlia vivax*	tussock rainbow-skink		C		18
animals	reptiles	Scincidae	*Ctenotus sp.*					5
animals	reptiles	Scincidae	*Morethia sp.*					1
animals	reptiles	Scincidae	*Carlia rubigo*	orange-flanked rainbow skink		C		4
animals	reptiles	Scincidae	*Anomalopus sp.*					4
animals	reptiles	Scincidae	*Egernia rugosa*	yakka skink		V	V	1
animals	reptiles	Scincidae	*Lerista timida*	timid slider		C		49
animals	reptiles	Scincidae	*Menetia greyii*	common dwarf skink		C		14
animals	reptiles	Scincidae	*Tiliqua rugosa*	shingle-back		C		13
animals	reptiles	Scincidae	*Ctenotus regius*	pale-rumped ctenotus		C		1
animals	reptiles	Scincidae	*Egernia mcpheei*	eastern crevice-skink		C		1
animals	reptiles	Scincidae	*Saiphos equalis*	three-toed skink		C		1
animals	reptiles	Scincidae	*Concinnia tenuis*	bar-sided skink		C		3
animals	reptiles	Scincidae	*Lampropholis sp.*			C		1
animals	reptiles	Scincidae	*Lerista fragilis*	eastern mulch slider		C		8
animals	reptiles	Scincidae	*Carlia pectoralis*	open-litter rainbow skink		C		34
animals	reptiles	Scincidae	*Concinnia martini*	dark bar-sided skink		C		1
animals	reptiles	Scincidae	*Egernia striolata*	tree skink		C		62
animals	reptiles	Scincidae	*Liopholis modesta*	eastern ranges rock-skink		C		15
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		54
animals	reptiles	Scincidae	*Ctenotus strauchii*	eastern barred wedgesnout ctenotus		C		1
animals	reptiles	Scincidae	*Tiliqua scincoides*	eastern blue-tongued lizard		C		18
animals	reptiles	Scincidae	*Cryptoblepharus sp.*					2
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		62
animals	reptiles	Scincidae	*Morethia boulengeri*	south-eastern morethia skink		C		53
animals	reptiles	Scincidae	*Anomalopus leuckartii*	two-clawed worm-skink		C		2
animals	reptiles	Scincidae	*Anomalopus verreauxii*	three-clawed worm-skink		C		1
animals	reptiles	Scincidae	*Lampropholis delicata*	dark-flecked garden sunskink		C		2
animals	reptiles	Scincidae	*Morethia taeniopleura*	fire-tailed skink		C		3
animals	reptiles	Scincidae	*Pygmaeascincus timlowi*	dwarf litter-skink		C		12/1
animals	reptiles	Scincidae	*Lerista punctatovittata*	eastern robust slider		C		15
animals	reptiles	Scincidae	*Cryptoblepharus pannosus*	ragged snake-eyed skink		C		2
animals	reptiles	Scincidae	*Cryptoblepharus virgatus*	striped snake-eyed skink		C		1
animals	reptiles	Scincidae	*Cyclodomorphus gerrardii*	pink-tongued lizard		C		3
animals	reptiles	Scincidae	*Cryptoblepharus australis*	inland snake-eyed skink		C		1
animals	reptiles	Scincidae	*Eremiascincus fasciolatus*	narrow-banded sand swimmer		C		14
animals	reptiles	Scincidae	*Eremiascincus richardsonii*	broad-banded sand swimmer		C		4
animals	reptiles	Scincidae	*Carlia pectoralis sensu lato*			C		13
animals	reptiles	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink		C		302
animals	reptiles	Typhlopidae	*Anilios ligatus*	robust blind snake		C		2
animals	reptiles	Typhlopidae	*Anilios wiedii*	brown-snouted blind snake		C		2
animals	reptiles	Typhlopidae	*Anilios sp.*					4/2
animals	reptiles	Typhlopidae	*Anilios proximus*	proximus blind snake		C		6/1
animals	reptiles	Varanidae	*Varanus tristis*	black-tailed monitor		C		24

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Varanidae	*Varanus gouldii*	sand monitor		C		20
animals	reptiles	Varanidae	*Varanus varius*	lace monitor		C		52
animals	reptiles	Varanidae	*Varanus sp.*	goanna				2
animals	reptiles	Varanidae	*Varanus panoptes*	yellow-spotted monitor		C		47
animals	uncertain	Indeterminate	*Indeterminate*	Unknown or Code Pending		C		175
fungi	Agaricomycetes	Hymenochaetaceae	*Phellinus badius*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Buellia*					4/4
fungi	lecanoromycetes	Caliciaceae	*Pyxine schmidtii*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Pyxine subcinerea*			C		2/2
fungi	lecanoromycetes	Cladoniaceae	*Cladia muelleri*			C		1/1
fungi	lecanoromycetes	Cladoniaceae	*Cladonia*					2/2
fungi	lecanoromycetes	Collemataceae	*Collema*					1/1
fungi	lecanoromycetes	Lecanoraceae	*Lecanora leproplaca*			C		1/1
fungi	lecanoromycetes	Lecanoraceae	*Lecanora*					1/1
fungi	lecanoromycetes	Lecanoraceae	*Lecanora oreinoides*			C		1/1
fungi	lecanoromycetes	Pannariaceae	*Physma ahtianum*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Flavoparmelia rutidota*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Austroparmelina pseudorelicina*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Usnea scabrida subsp. elegans*			C		3/3
fungi	lecanoromycetes	Parmeliaceae	*Punctelia pseudocoralloidea*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Xanthoparmelia semiviridis*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Xanthoparmelia scotophylla*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Austroparmelina conlabrosa*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Xanthoparmelia neorimalis*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Parmotrema parahypotropum*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Parmotrema austrosinense*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Xanthoparmelia reptans*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Usnea scabrida*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Punctelia subflava*			C		4/4
fungi	lecanoromycetes	Parmeliaceae	*Parmotrema subsumptum*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Xanthoparmelia murina*			C		1/1
fungi	lecanoromycetes	Pertusariaceae	*Pertusaria*					3/3
fungi	lecanoromycetes	Pertusariaceae	*Pertusaria xanthodes*			C		1/1
fungi	lecanoromycetes	Physciaceae	*Physcia*					1/1
fungi	lecanoromycetes	Physciaceae	*Physcia nubila*			C		1/1
fungi	lecanoromycetes	Physciaceae	*Heterodermia speciosa*			C		1/1
fungi	lecanoromycetes	Physciaceae	*Physcia undulata*			C		4/4
fungi	lecanoromycetes	Ramalinaceae	*Ramalina celastri*			C		1/1
fungi	lecanoromycetes	Teloschistaceae	*Caloplaca rexfilsonii*			C		1/1
fungi	lecanoromycetes	Teloschistaceae	*Caloplaca ferruginea*			C		1/1
fungi	lecanoromycetes	Teloschistaceae	*Teloschistes sieberianus*			C		1/1
fungi	lecanoromycetes	Teloschistaceae	*Caloplaca cerina*			C		2/2
plants	land plants	Acanthaceae	*Brunoniella australis*	blue trumpet		C		2
plants	land plants	Aizoaceae	*Trianthema triquetra*	red spinach		C		1/1
plants	land plants	Alismataceae	*Damasonium minus*	starfruit		C		1/1
plants	land plants	Amaranthaceae	*Ptilotus macrocephalus*	green pussytails		C		1

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plants	land plants	Amaranthaceae	*Ptilotus psilorhachis*			C		1/1
plants	land plants	Apiaceae	*Eryngium plantagineum*	long eryngium		C		1
plants	land plants	Apocynaceae	*Carissa ovata*	currantbush		C		1
plants	land plants	Apocynaceae	*Vincetoxicum lineare*			C		1/1
plants	land plants	Apocynaceae	*Parsonsia eucalyptophylla*	gargaloo		C		1/1
plants	land plants	Apocynaceae	*Parsonsia brisbanensis*	broad-leaved monkey vine		C		1/1
plants	land plants	Asteraceae	*Rhodanthe polyphylla*			C		1/1
plants	land plants	Asteraceae	*Brachyscome multifida*			C		3/3
plants	land plants	Asteraceae	*Hypochaeris albiflora*		Y			1
plants	land plants	Asteraceae	*Leiocarpa brevicompta*			C		1/1
plants	land plants	Asteraceae	*Rutidosis murchisonii*			C		3/3
plants	land plants	Asteraceae	*Brachyscome dalbyensis*			C		1/1
plants	land plants	Asteraceae	*Leiocarpa panaetioides*			C		1/1
plants	land plants	Asteraceae	*Ozothamnus diosmifolius*	white dogwood		C		2/2
plants	land plants	Asteraceae	*Chrysocephalum apiculatum*	yellow buttons		C		4/3
plants	land plants	Asteraceae	*Minuria integerrima*	smooth minuria		C		1/1
plants	land plants	Asteraceae	*Glossocardia bidens*	native cobbler's pegs		C		1
plants	land plants	Asteraceae	*Eclipta platyglossa*			C		1
plants	land plants	Asteraceae	*Calotis lappulacea*	yellow burr daisy		C		1
plants	land plants	Asteraceae	*Calotis cuneifolia*	burr daisy		C		1/1
plants	land plants	Asteraceae	*Picris barbarorum*			V		1/1
plants	land plants	Asteraceae	*Camptacra barbata*			C		1
plants	land plants	Asteraceae	*Cirsium vulgare*	spear thistle	Y			1
plants	land plants	Asteraceae	*Olearia canescens subsp. discolor*			C		1/1
plants	land plants	Asteraceae	*Calotis dentex*	white burr daisy		C		1/1
plants	land plants	Asteraceae	*Calotis cuneata*			C		2/2
plants	land plants	Bignoniaceae	*Pandorea pandorana*	wonga vine		C		2/1
plants	land plants	Boraginaceae	*Heliotropium amplexicaule*	blue heliotrope	Y			1/1
plants	land plants	Bryaceae	*Bryum argenteum*			C		1/1
plants	land plants	Byttneriaceae	*Seringia corollata*			C		1/1
plants	land plants	Cactaceae	*Opuntia*					2
plants	land plants	Cactaceae	*Harrisia*					4
plants	land plants	Cactaceae	*Opuntia stricta*		Y			2/1
plants	land plants	Cactaceae	*Harrisia martinii*		Y			1/1
plants	land plants	Cactaceae	*Opuntia tomentosa*	velvety tree pear	Y			10
plants	land plants	Cactaceae	*Opuntia aurantiaca*	tiger pear	Y			3
plants	land plants	Caesalpiniaceae	*Senna coronilloides*			C		1/1
plants	land plants	Caesalpiniaceae	*Senna artemisioides subsp. zygophylla*			C		1/1
plants	land plants	Caesalpiniaceae	*Senna aciphylla*	Australian senna		C		1/1
plants	land plants	Campanulaceae	*Wahlenbergia queenslandica*			C		1
plants	land plants	Campanulaceae	*Lobelia concolor*			C		1
plants	land plants	Capparaceae	*Capparis mitchellii*			C		1/1
plants	land plants	Caryophyllaceae	*Spergularia brevifolia*			C		1/1
plants	land plants	Casuarinaceae	*Allocasuarina inophloia*			C		8/7
plants	land plants	Casuarinaceae	*Allocasuarina littoralis*			C		1/1
plants	land plants	Casuarinaceae	*Allocasuarina luehmannii*	bull oak		C		1

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plants	land plants	Celastraceae	*Elaeodendron australe var. integrifolium*			C		1/1
plants	land plants	Centrolepidaceae	*Centrolepis exserta*			C		1/1
plants	land plants	Chenopodiaceae	*Sclerolaena anisacanthoides*	yellow burr		C		1/1
plants	land plants	Chenopodiaceae	*Dysphania valida*			C		2/2
plants	land plants	Chenopodiaceae	*Sclerolaena birchii*	galvanised burr		C		1/1
plants	land plants	Chenopodiaceae	*Enchylaena tomentosa*			C		1
plants	land plants	Convolvulaceae	*Dichondra repens*	kidney weed		C		2
plants	land plants	Convolvulaceae	*Evolvulus alsinoides*			C		1/1
plants	land plants	Convolvulaceae	*Polymeria pusilla*			C		1/1
plants	land plants	Crassulaceae	*Bryophyllum delagoense*		Y			6
plants	land plants	Cupressaceae	*Callitris glaucophylla*	white cypress pine		C		4
plants	land plants	Cupressaceae	*Callitris endlicheri*	black cypress pine		C		4/3
plants	land plants	Cyperaceae	*Cyperus fulvus*			C		5/4
plants	land plants	Cyperaceae	*Eleocharis plana*	ribbed spikerush		C		1/1
plants	land plants	Cyperaceae	*Cyperus flaccidus*			C		1/1
plants	land plants	Cyperaceae	*Scleria sphacelata*			C		1/1
plants	land plants	Cyperaceae	*Eleocharis blakeana*			C		1/1
plants	land plants	Cyperaceae	*Lepironia articulata*			C		1/1
plants	land plants	Cyperaceae	*Fimbristylis dichotoma*	common fringe-rush		C		1/1
plants	land plants	Cyperaceae	*Gahnia aspera*			C		1/1
plants	land plants	Cyperaceae	*Carex inversa*	knob sedge		C		2/1
plants	land plants	Cyperaceae	*Cyperus betchei subsp. betchei*			C		1/1
plants	land plants	Cyperaceae	*Cyperus gracilis*			C		1/1
plants	land plants	Dilleniaceae	*Hibbertia*					1/1
plants	land plants	Dilleniaceae	*Hibbertia linearis var. obtusifolia*			C		1/1
plants	land plants	Droseraceae	*Drosera lunata*			C		2/2
plants	land plants	Droseraceae	*Drosera hookeri*			C		1
plants	land plants	Ericaceae	*Leucopogon muticus*			C		2/2
plants	land plants	Ericaceae	*Brachyloma daphnoides*			C		1/1
plants	land plants	Ericaceae	*Lissanthe pluriloculata*			C		2/2
plants	land plants	Ericaceae	*Brachyloma daphnoides subsp. daphnoides*			C		1/1
plants	land plants	Ericaceae	*Melichrus sp. (Isla Gorge P.Sharpe+ 601)*			C		2/2
plants	land plants	Euphorbiaceae	*Beyeria viscosa*			C		2/2
plants	land plants	Euphorbiaceae	*Euphorbia drummondii*			C		1
plants	land plants	Euphorbiaceae	*Euphorbia hyssopifolia*		Y			1/1
plants	land plants	Fabaceae	*Daviesia genistifolia*	broom bitter pea		C		1/1
plants	land plants	Fabaceae	*Desmodium brachypodum*	large ticktrefoil		C		1/1
plants	land plants	Fabaceae	*Aotus subglauca var. filiformis*			C		1/1
plants	land plants	Fabaceae	*Daviesia filipes subsp. filipes*			C		1/1
plants	land plants	Fabaceae	*Hovea lanceolata*			C		1/1
plants	land plants	Fabaceae	*Chorizema parviflorum*	eastern flame pea		C		1/1
plants	land plants	Fabaceae	*Mirbelia aotoides*			C		1/1
plants	land plants	Fabaceae	*Glycine stenophita*			C		1/1
plants	land plants	Fabaceae	*Jacksonia scoparia*			C		1
plants	land plants	Fabaceae	*Pultenaea petiolaris*			C		1/1
plants	land plants	Fabaceae	*Hovea planifolia*			C		2/2

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plants	land plants	Goodeniaceae	*Goodenia glabra*			C		1/1
plants	land plants	Goodeniaceae	*Dampiera adpressa*			C		1/1
plants	land plants	Goodeniaceae	*Goodenia bellidifolia subsp. argentea*			C		2/2
plants	land plants	Goodeniaceae	*Scaevola spinescens*	prickly fan flower		C		1/1
plants	land plants	Goodeniaceae	*Goodenia delicata*			C		1
plants	land plants	Haloragaceae	*Haloragis aspera*	raspweed		C		1/1
plants	land plants	Haloragaceae	*Gonocarpus urceolatus*			C		3/3
plants	land plants	Hemerocallidaceae	*Dianella revoluta*			C		1/1
plants	land plants	Hemerocallidaceae	*Dianella revoluta var. revoluta*			C		1/1
plants	land plants	Juncaceae	*Juncus psammophilus*			C		1/1
plants	land plants	Juncaceae	*Juncus ochrocoleus*			C		1/1
plants	land plants	Lamiaceae	*Ajuga australis*	Australian bugle		C		2/2
plants	land plants	Lamiaceae	*Teucrium junceum*			C		1
plants	land plants	Lamiaceae	*Teucrium daucoides*			C		1/1
plants	land plants	Lamiaceae	*Westringia cheelii*			C		1/1
plants	land plants	Lamiaceae	*Prostanthera ringens*			C		1/1
plants	land plants	Lamiaceae	*Prostanthera sp. (Baking Board V.Hando 135)*			C		4/4
plants	land plants	Lamiaceae	*Prostanthera cryptandroides subsp. euphrasioides*			C		3/3
plants	land plants	Lamiaceae	*Prostanthera sp. (Moonie Highway K.A.Williams 89011)*			C		1/1
plants	land plants	Leucobryaceae	*Campylopus introflexus*			C		1/1
plants	land plants	Loranthaceae	*Muellerina bidwillii*			C		1
plants	land plants	Loranthaceae	*Amyema quandang var. quandang*			C		1/1
plants	land plants	Loranthaceae	*Lysiana exocarpi subsp. tenuis*			C		1/1
plants	land plants	Loranthaceae	*Amyema pendula subsp. longifolia*			C		1/1
plants	land plants	Loranthaceae	*Amyema linophylla subsp. orientalis*			C		1/1
plants	land plants	Macarthuriaceae	*Macarthuria neocambrica*			C		1/1
plants	land plants	Malvaceae	*Sida corrugata*			C		2
plants	land plants	Malvaceae	*Hibiscus sturtii*			C		1
plants	land plants	Malvaceae	*Abutilon oxycarpum*			C		1/1
plants	land plants	Malvaceae	*Malvastrum americanum var. americanum*		Y			1/1
plants	land plants	Malvaceae	*Sida sp. (Aramac E.J.Thompson+ JER192)*			C		1/1
plants	land plants	Malvaceae	*Sida sp. (Musselbrook M.B.Thomas+ MRS437)*			C		1/1
plants	land plants	Meliaceae	*Owenia acidula*	emu apple		C		1/1
plants	land plants	Mimosaceae	*Acacia conferta*			C		1
plants	land plants	Mimosaceae	*Acacia*					1/1
plants	land plants	Mimosaceae	*Acacia lauta*	Tara wattle		V	V	3/3
plants	land plants	Mimosaceae	*Acacia crassa*			C		1
plants	land plants	Mimosaceae	*Acacia deanei*			C		1
plants	land plants	Mimosaceae	*Acacia decora*	pretty wattle		C		1
plants	land plants	Mimosaceae	*Acacia rigens*	needle wattle		C		2/2
plants	land plants	Mimosaceae	*Acacia aprepta*	Miles mulga		C		1/1
plants	land plants	Mimosaceae	*Acacia debilis*			C		2/2
plants	land plants	Mimosaceae	*Acacia falcata*	sickle wattle		C		1/1
plants	land plants	Mimosaceae	*Acacia jucunda*			C		1/1
plants	land plants	Mimosaceae	*Acacia lineata*	streaked wattle		C		1/1

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plants	land plants	Mimosaceae	*Acacia burrowii*			C		2/2
plants	land plants	Mimosaceae	*Acacia caroleae*			C		3/3
plants	land plants	Mimosaceae	*Acacia penninervis var. penninervis*			C		4/4
plants	land plants	Mimosaceae	*Acacia salicina*	doolan		C		1
plants	land plants	Mimosaceae	*Acacia hakeoides*	hakea wattle		C		2/2
plants	land plants	Mimosaceae	*Acacia melvillei*			C		1/1
plants	land plants	Mimosaceae	*Acacia wardellii*			NT		1/1
plants	land plants	Mimosaceae	*Acacia ixiophylla*			C		1/1
plants	land plants	Mimosaceae	*Acacia juncifolia*			C		3/3
plants	land plants	Mimosaceae	*Acacia lithgowiae*			C		2/2
plants	land plants	Mimosaceae	*Acacia neriifolia*	pechey wattle		C		6/6
plants	land plants	Mimosaceae	*Acacia polybotrya*	western silver wattle		C		1/1
plants	land plants	Mimosaceae	*Acacia semilunata*	crescent-leaved wattle		C		1/1
plants	land plants	Mimosaceae	*Acacia harpophylla*	brigalow		C		1
plants	land plants	Mimosaceae	*Acacia muelleriana*			C		4/3
plants	land plants	Mimosaceae	*Acacia penninervis*			C		1
plants	land plants	Mimosaceae	*Acacia spectabilis*	pilliga wattle		C		1/1
plants	land plants	Mimosaceae	*Acacia bancroftiorum*			C		2/2
plants	land plants	Mimosaceae	*Vachellia farnesiana*		Y			18
plants	land plants	Mimosaceae	*Acacia chinchillensis*			C		14/14
plants	land plants	Mimosaceae	*Acacia crassa subsp. crassa*			C		6/6
plants	land plants	Mimosaceae	*Acacia excelsa subsp. angusta*			C		1/1
plants	land plants	Mimosaceae	*Acacia crassa subsp. longicoma*			C		1/1
plants	land plants	Mimosaceae	*Neptunia gracilis forma gracilis*			C		1
plants	land plants	Mimosaceae	*Acacia leiocalyx subsp. leiocalyx*			C		2/2
plants	land plants	Molluginaceae	*Glinus lotoides*	hairy carpet weed		C		1/1
plants	land plants	Myrtaceae	*Eucalyptus apothalassica*			C		2/2
plants	land plants	Myrtaceae	*Lysicarpus angustifolius*	budgeroo		C		4/4
plants	land plants	Myrtaceae	*Kunzea opposita var. opposita*			C		2/2
plants	land plants	Myrtaceae	*Eucalyptus fibrosa subsp. fibrosa*			C		1
plants	land plants	Myrtaceae	*Eucalyptus fibrosa subsp. nubilis*			C		2/2
plants	land plants	Myrtaceae	*Corymbia citriodora subsp. variegata*			C		4
plants	land plants	Myrtaceae	*Kardomia jucunda*			C		6/6
plants	land plants	Myrtaceae	*Melaleuca decora*			C		2/2
plants	land plants	Myrtaceae	*Eucalyptus bakeri*	Baker's mallee		C		2/2
plants	land plants	Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark		C		8/3
plants	land plants	Myrtaceae	*Calytrix tetragona*	fringe myrtle		C		2/2
plants	land plants	Myrtaceae	*Eucalyptus elegans*			C		1/1
plants	land plants	Myrtaceae	*Eucalyptus exserta*	Queensland peppermint		C		2/1
plants	land plants	Myrtaceae	*Eucalyptus viridis*			C		1/1
plants	land plants	Myrtaceae	*Melaleuca uncinata*			C		2/1
plants	land plants	Myrtaceae	*Angophora leiocarpa*	rusty gum		C		1
plants	land plants	Myrtaceae	*Corymbia intermedia*	pink bloodwood		C		1
plants	land plants	Myrtaceae	*Eucalyptus curtisii*	Plunkett mallee		NT		8/7
plants	land plants	Myrtaceae	*Eucalyptus populnea*	poplar box		C		2/1
plants	land plants	Myrtaceae	*Melaleuca pallescens*			C		1/1

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plants	land plants	Myrtaceae	*Corymbia clarksoniana*			C		1
plants	land plants	Myrtaceae	*Corymbia trachyphloia*			C		1
plants	land plants	Myrtaceae	*Eucalyptus acmenoides*			C		1
plants	land plants	Myrtaceae	*Eucalyptus woollsiana*			C		1/1
plants	land plants	Myrtaceae	*Eucalyptus chloroclada*	Baradine red gum		C		2/1
plants	land plants	Myrtaceae	*Eucalyptus decorticans*			C		1
plants	land plants	Myrtaceae	*Homalocalyx polyandrus*			C		9/8
plants	land plants	Myrtaceae	*Melaleuca squamophloia*			C		1/1
plants	land plants	Myrtaceae	*Thryptomene parviflora*			C		5/5
plants	land plants	Myrtaceae	*Eucalyptus tereticornis*			C		1
plants	land plants	Myrtaceae	*Leptospermum lamellatum*			C		1/1
plants	land plants	Oleaceae	*Notelaea microcarpa*			C		2/1
plants	land plants	Ophioglossaceae	*Ophioglossum gramineum*			C		1/1
plants	land plants	Orchidaceae	*Pterostylis rufa*			C		1/1
plants	land plants	Orchidaceae	*Diuris tricolor*			C		1/1
plants	land plants	Orchidaceae	*Cyanicula caerulea*			C		4/3
plants	land plants	Orchidaceae	*Pterostylis mutica*	midget greenhood		C		1/1
plants	land plants	Orchidaceae	*Pterostylis bicolor*			C		2/1
plants	land plants	Orchidaceae	*Acianthus fornicatus*	pixie caps		C		1/1
plants	land plants	Oxalidaceae	*Oxalis perennans*			C		1/1
plants	land plants	Phrymaceae	*Mimulus gracilis*	slender monkey flower		C		1
plants	land plants	Plantaginaceae	*Veronica plebeia*	trailing speedwell		C		1/1
plants	land plants	Poaceae	*Melinis repens*	red natal grass	Y			1/1
plants	land plants	Poaceae	*Panicum buncei*			C		1/1
plants	land plants	Poaceae	*Panicum effusum*			C		1/1
plants	land plants	Poaceae	*Setaria surgens*			C		1/1
plants	land plants	Poaceae	*Aristida obscura*			C		1/1
plants	land plants	Poaceae	*Eriochloa crebra*	spring grass		C		1/1
plants	land plants	Poaceae	*Leersia hexandra*	swamp rice grass		C		1/1
plants	land plants	Poaceae	*Sporobolus creber*			C		1/1
plants	land plants	Poaceae	*Austrostipa nodosa*			C		1/1
plants	land plants	Poaceae	*Echinochloa colona*	awnless barnyard grass	Y			1/1
plants	land plants	Poaceae	*Eragrostis curvula*		Y			1/1
plants	land plants	Poaceae	*Eragrostis sororia*			C		1/1
plants	land plants	Poaceae	*Setaria parviflora*	slender pigeon grass	Y			1/1
plants	land plants	Poaceae	*Enneapogon gracilis*	slender nineawn		C		1/1
plants	land plants	Poaceae	*Enteropogon ramosus*			C		1/1
plants	land plants	Poaceae	*Homopholis belsonii*			E	V	2/2
plants	land plants	Poaceae	*Paspalidium distans*	shotgrass		C		1/1
plants	land plants	Poaceae	*Digitaria longiflora*			C		1/1
plants	land plants	Poaceae	*Paspalidium*					1/1
plants	land plants	Poaceae	*Eragrostis*					1/1
plants	land plants	Poaceae	*Sporobolus elongatus*			C		1/1
plants	land plants	Poaceae	*Eriachne mucronata forma (Alpha C.E.Hubbard 7882)*			C		1/1
plants	land plants	Poaceae	*Panicum queenslandicum var. queenslandicum*			C		1/1
plants	land plants	Poaceae	*Panicum decompositum var. decompositum*			C		1/1

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plants	land plants	Poaceae	*Dichanthium sericeum subsp. sericeum*			C		1/1
plants	land plants	Poaceae	*Amphipogon caricinus var. caricinus*			C		1/1
plants	land plants	Poaceae	*Eriochloa pseudoacrotricha*			C		1/1
plants	land plants	Poaceae	*Walwhalleya subxerophila*			C		1/1
plants	land plants	Poaceae	*Eragrostis leptostachya*			C		1/1
plants	land plants	Poaceae	*Ancistrachne uncinulata*	hooky grass		C		1/1
plants	land plants	Poaceae	*Eragrostis trichophora*		Y			1/1
plants	land plants	Poaceae	*Eragrostis parviflora*	weeping lovegrass		C		1/1
plants	land plants	Polygalaceae	*Polygala triflora*			C		1/1
plants	land plants	Portulacaceae	*Sedopsis*					1/1
plants	land plants	Portulacaceae	*Portulaca pilosa*		Y			1/1
plants	land plants	Portulacaceae	*Portulaca filifolia*			C		2/2
plants	land plants	Portulacaceae	*Grahamia australiana*			C		1/1
plants	land plants	Proteaceae	*Grevillea floribunda subsp. floribunda*			C		1/1
plants	land plants	Proteaceae	*Hakea lorea subsp. lorea*			C		1/1
plants	land plants	Proteaceae	*Xylomelum cunninghamianum*			C		1/1
plants	land plants	Proteaceae	*Persoonia sericea*	silky geebung		C		2/2
plants	land plants	Pteridaceae	*Cheilanthes sieberi*			C		1
plants	land plants	Pteridaceae	*Platyzoma microphyllum*	braid fern		C		1/1
plants	land plants	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		3/1
plants	land plants	Rhamnaceae	*Cryptandra armata*			C		4/4
plants	land plants	Rhamnaceae	*Cryptandra amara*			C		1
plants	land plants	Rhamnaceae	*Pomaderris coomingalensis*			E		1/1
plants	land plants	Rubiaceae	*Oldenlandia mitrasacmoides subsp. trachymenoides*			C		2/2
plants	land plants	Rubiaceae	*Asperula conferta*			C		1
plants	land plants	Rubiaceae	*Psydrax oleifolia*			C		1/1
plants	land plants	Rubiaceae	*Psydrax odorata forma subnitida*			C		1/1
plants	land plants	Rutaceae	*Philotheca sporadica*			NT	V	2785/55
plants	land plants	Rutaceae	*Boronia occidentalis*			C		6/6
plants	land plants	Rutaceae	*Boronia splendida*			C		10/10
plants	land plants	Rutaceae	*Citrus glauca*			C		1
plants	land plants	Rutaceae	*Geijera parviflora*	wilga		C		2
plants	land plants	Santalaceae	*Thesium australe*	toadflax		V	V	1/1
plants	land plants	Sapindaceae	*Dodonaea peduncularis*			C		1/1
plants	land plants	Sapindaceae	*Dodonaea triangularis*			C		2/2
plants	land plants	Sapindaceae	*Alectryon diversifolius*	scrub boonaree		C		1/1
plants	land plants	Sapindaceae	*Dodonaea biloba*			C		3/3
plants	land plants	Sapindaceae	*Dodonaea macrossanii*			C		4/4
plants	land plants	Sapindaceae	*Dodonaea heteromorpha*			C		1/1
plants	land plants	Scrophulariaceae	*Eremophila mitchellii*			C		1/1
plants	land plants	Scrophulariaceae	*Myoporum acuminatum*	coastal boobialla		C		1/1
plants	land plants	Solanaceae	*Solanum esuriale*	quena		C		1/1
plants	land plants	Solanaceae	*Solanum nemophilum*			C		1/1
plants	land plants	Solanaceae	*Lycium ferocissimum*	African boxthorn	Y			1
plants	land plants	Solanaceae	*Solanum parvifolium*			C		1
plants	land plants	Solanaceae	*Solanum ferocissimum*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Solanaceae	*Solanum elaeagnifolium*	silverleaf nightshade	Y			1
plants	land plants	Sterculiaceae	*Brachychiton populneus subsp. populneus*			C		1
plants	land plants	Thymelaeaceae	*Pimelea trichostachya*	flaxweed		C		2/2
plants	land plants	Thymelaeaceae	*Pimelea neoanglica*	poison pimelea		C		1
plants	land plants	Verbenaceae	*Phyla nodiflora*	carpetweed		C		1
plants	land plants	Verbenaceae	*Glandularia aristigera*		Y			1
plants	land plants	Viscaceae	*Viscum whitei subsp. whitei*			C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Appendix G Survey Flora and Fauna Species Lists

PV Power Station - Fauna List

Family	Scientific Name	Common Name	EPBC Act	NC Act
Reptiles				
Agamidae	*Pogona barbata*	Eastern bearded dragon	-	-
Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		
Varanidae	*Varanus tristis*	Black-tailed monitor	-	-
Amphibians				
Hylidae	*Litoria latopalmata*	Broad-palmed frog	-	-
Hylidae	*Litoria rubella*	Desert tree frog	-	-
Hylidae	*Cyclorana alboguttata*	Striped burrowing frog		
Hylidae	*Cyclorana novaehollandiae*	Eastern snapping frog		
Limnodynastidae	*Platyplectrum ornatum*	Ornate burrowing frog		
Bufonidae	*Rhinella marina*	Cane toad	-	-
Mammals				
Macropodidae	*Wallabia bicolor*	Swamp wallaby	-	-
Macropodidae	*Macropus giganteus*	Eastern grey-kangaroo	-	-
Phascolarctidae	*Phascolarctos cinereus*	Koala (skull)	V	V
Vespertilioninae	*Chalinolobus gouldii*	Gould's wattled bat		
Vespertilioninae	*Chalinolobus picatus*	Little pied bat		
Vespertilioninae	*Nyctophilus sp.*		Potential - V	
Vespertilioninae	*Scotorepens greyii*	Little broad-nosed bat		
Vespertilioninae	*Vespadelus vulturnus*	Little forest bat		
Vespertilioninae	*Miniopterus orianae*	Australian bent-wing bat		
Vespertilioninae	*Austronomus australis*	White-Striped Freetail-Bat		
Vespertilioninae	*Ozimops lumsdenae*	Northern Free-Tailed Bat		
Vespertilioninae	*Ozimops planiceps*	South-Eastern Free-Tailed Bat		
Vespertilioninae	*Ozimops ridei*	Ride's Free-Tailed Bat		
Vespertilioninae	*Saccolaimus flaviventris*	Yellow-Bellied Sheathtail-Bat		
Suidae	*Sus scrofa*	Pig	-	-
Canidae	*Canis familiaris*	Feral dog	-	-
Birds				
Acanthizidae	*Smicrornis brevirostris*	Weebill	-	-
Accipitridae	*Aquila audax*	Wedge-tailed eagle	-	-
Alcedinidae	*Todiramphus macleayii*	Forest kingfisher	-	-
Artamidae	*Artamus personatus*	Masked woodswallow		
Artamidae	*Cracticus nigrogularis*	Pied butcherbird	-	-
Artamidae	*Cracticus torquatus*	Grey butcherbird	-	-
Artamidae	*Strepera graculina*	Pied currawong	-	-
Cacatuidae	*Cacatua galerita*	Sulphur-crested cockatoo	-	-
Cacatuidae	*Eolophus roseicapilla*	Galah		
Campephagidae	*Coracina novaehollandiae*	Black-faced cuckoo-shrike	-	-
Climacteridae	*Cormobates leucophaea metastasis*	White-throated treecreeper	-	-
Columbidae	*Geopelia humeralis*	Bar-shouldered dove	-	-
Columbidae	*Geopelia striata*	Peaceful dove	-	-
Corcoracidae	*Grallina cyanoleuca*	Magpie-lark	-	-
Corvidae	*Corvus orru*	Torresian crow	-	-
Halcyonidae	*Dacelo novaeguineae*	Laughing kookaburra	-	-
Hirundinidae	*Petrochelidon nigricans*	Tree martin	-	-
Maluridae	*Malurus lamberti*	Variegated fairy-wren	-	-
Meliphagidae	*Lichmera indistincta*	Brown honeyeater	-	-
Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater	-	-
Meliphagidae	*Philemon corniculatus*	Noisy friarbird	-	-
Monarchidae	*Myiagra inquieta*	Restless flycatcher	-	-
Neosittidae	*Daphoenositta chrysoptera*	Varied sittella		
Pachycephalidae	*Colluricincla harmonica*	Grey shrike-thrush	-	-
Pachycephalidae	*Pachycephala rufiventris*	Rufous whistler	-	-
Pardalotidae	*Pardalotus striatus*	Striated pardalote	-	-
Petroicidae	*Eopsaltria australis*	Eastern yellow robin	-	-
Petroicidae	*Petroica goodenovii*	Red-capped robin	-	-
Petroicidae	*Microeca fascinans*	Jacky winter	-	-
Rhipiduridae	*Rhipidura fuliginosa*	Grey fantail	-	-
Rhipiduridae	*Rhipidura leucophrys*	Willie wagtail	-	-

PBC Act: CE – Critically endangered, E – Endangered, V – Vulnerable, MM – Migratory Marine, MT – Migratory Terrestrial Species, [2] - MW – Migratory Wetland Species, LM – Listed Marine Species

NC Act - E – Endangered, V – Vulnerable, SLC – Special Least Concern, LC – Least Concern

Introduced species

Up to three Nyctophilus spp. potentially occur in the study area, including: N. corbeni (Vulnerable); N. geoffroyi; and N. gouldi.

PV Power Station - Flora List

Taxon nomenclature in accordance with Census of the Queensland Flora 2019. Brown GK & Bostock PD. 2019. Queensland Department of Environment and Science, Queensland Government.						
Group_Name	**Family**	**Taxon_Name**	**naturalised**	**NCA**	**Dalby solar Project Area on Lot 4 DY457 2020_05_6-8**	**Dalby solar dam on Lot4 DY457 2020_05_6-8**
Pteridophytes	Pteridaceae	Cheilanthes distans			x	
Pteridophytes	Pteridaceae	Cheilanthes sieberi subsp. sieberi			x	
Gymnosperms	Cupressaceae	Callitris glaucophylla			x	
Angiosperms	Acanthaceae	Brunoniella australis			x	
Angiosperms	Amaranthaceae	Alternanthera denticulata				x
Angiosperms	Amaranthaceae	Gomphrena celosioides	*		x	
Angiosperms	Apocynaceae	Parsonsia sp.			x	
Angiosperms	Asteraceae	Ambrosia psilostachya?	*			x
Angiosperms	Asteraceae	Centipeda minima subsp. minima				x
Angiosperms	Asteraceae	Cyanthillium cinereum			x	
Angiosperms	Asteraceae	Schkuhria pinnata	*		x	
Angiosperms	Asteraceae	Sigesbeckia orientalis			x	
Angiosperms	Asteraceae	Sonchus oleraceus	*		x	
Angiosperms	Byttneriaceae	Seringia corollata			x	
Angiosperms	Caesalpiniaceae	Senna artemisioides subsp. zygophylla			x	
Angiosperms	Campanulaceae	Wahlenbergia gracilis				x
Angiosperms	Casuarinaceae	Allocasuarina luehmannii			x	
Angiosperms	Chenopodiaceae	Dysphania carinata			x	
Angiosperms	Chenopodiaceae	Einadia polygonoides			x	
Angiosperms	Clusiaceae	Hypericum gramineum				x
Angiosperms	Commelinaceae	Commelina lanceolata			x	
Angiosperms	Convolvulaceae	Evolvulus alsinoides var. decumbens			x	
Angiosperms	Cyperaceae	Bulbostylis pyriformis				x
Angiosperms	Cyperaceae	Carex inversa			x	
Angiosperms	Cyperaceae	Cyperus difformis				x
Angiosperms	Cyperaceae	Cyperus flaccidus				x
Angiosperms	Cyperaceae	Cyperus fulvus			x	
Angiosperms	Cyperaceae	Cyperus gracilis			x	
Angiosperms	Cyperaceae	Cyperus isabellinus				x
Angiosperms	Cyperaceae	Cyperus squarrosus			x	x
Angiosperms	Cyperaceae	Eleocharis blakeana				x
Angiosperms	Cyperaceae	Fimbristylis depauperata			x	
Angiosperms	Cyperaceae	Fimbristylis velata				x
Angiosperms	Cyperaceae	Fuirena incrassata				x
Angiosperms	Cyperaceae	Gahnia aspera			x	
Angiosperms	Cyperaceae	Lipocarpha microcephala				x
Angiosperms	Fabaceae	Desmodium rhytidophyllum			x	
Angiosperms	Fabaceae	Glycine clandestina			x	
Angiosperms	Fabaceae	Glycine sp.			x	
Angiosperms	Goodeniaceae	Goodenia sp			x	
Angiosperms	Hemerocallidaceae	Dianella brevipedunculata			x	
Angiosperms	Lamiaceae	Coleus australis			x	
Angiosperms	Laxmanniaceae	Lomandra filiformis			x	
Angiosperms	Laxmanniaceae	Lomandra multiflora			x	
Angiosperms	Loranthaceae	Dendrophthoe sp.			x	
Angiosperms	Lythraceae	Ammannia multiflora				x
Angiosperms	Malvaceae	Abutilon oxycarpum			x	
Angiosperms	Malvaceae	Sida hackettiana			x	
Angiosperms	Mimosaceae	Acacia conferta			x	
Angiosperms	Mimosaceae	Acacia crassa			x	
Angiosperms	Mimosaceae	Acacia decora			x	
Angiosperms	Mimosaceae	Acacia melvillei			x	
Angiosperms	Mimosaceae	Acacia muelleriana			x	
Angiosperms	Mimosaceae	Acacia triptera			x	
Angiosperms	Molluginaceae	Glinus oppositifolius				x
Angiosperms	Myrtaceae	Angophora leiocarpa			x	
Angiosperms	Myrtaceae	Corymbia citriodora subsp. variegata			x	
Angiosperms	Myrtaceae	Corymbia trachyphloia			x	

Angiosperms	Myrtaceae	Eucalyptus crebra			x	
Angiosperms	Myrtaceae	Eucalyptus exserta			x	
Angiosperms	Myrtaceae	Eucalyptus populnea			x	
Angiosperms	Myrtaceae	Eucalyptus tereticornis			x	
Angiosperms	Orchidaceae	Cymbidium canaliculatum			x	
Angiosperms	Phyllanthaceae	Phyllanthus sp. (P. maderaspatensis?)			x	
Angiosperms	Phyllanthaceae	Phyllanthus virgatus			x	x
Angiosperms	Pittosporaceae	Pittosporum angustifolium			x	
Angiosperms	Plantaginaceae	Callitriche sonderi				x
Angiosperms	Plantaginaceae	Gratiola pedunculata				x
Angiosperms	Poaceae	Ancistrachne uncinulata			x	
Angiosperms	Poaceae	Aristida caput-medusae			x	
Angiosperms	Poaceae	Aristida jerichoensis				x
Angiosperms	Poaceae	Aristida obscura			x	
Angiosperms	Poaceae	Aristida ramosa			x	
Angiosperms	Poaceae	Aristida vagans			x	
Angiosperms	Poaceae	Cenchrus ciliaris	*		x	
Angiosperms	Poaceae	Chloris ventricosa			x	
Angiosperms	Poaceae	Chloris virgata	*		x	
Angiosperms	Poaceae	Chrysopogon fallax			x	
Angiosperms	Poaceae	Cleistochloa subjuncea			x	
Angiosperms	Poaceae	Cymbopogon refractus			x	
Angiosperms	Poaceae	Dactyloctenium radulans			x	
Angiosperms	Poaceae	Digitaria ammophila			x	
Angiosperms	Poaceae	Digitaria ciliaris	*		x	
Angiosperms	Poaceae	Digitaria ramularis			x	
Angiosperms	Poaceae	Digitaria sp. (D. diffusa?)				x
Angiosperms	Poaceae	Dinebra decipiens			x	
Angiosperms	Poaceae	Enneapogon sp.			x	
Angiosperms	Poaceae	Enteropogon acicularis			x	
Angiosperms	Poaceae	Eragrostis elongata			x	
Angiosperms	Poaceae	Eragrostis lacunaria			x	
Angiosperms	Poaceae	Eragrostis leptostachya			x	
Angiosperms	Poaceae	Eragrostis parviflora			x	
Angiosperms	Poaceae	Eragrostis sororia				x
Angiosperms	Poaceae	Eragrostis spartinoides			x	
Angiosperms	Poaceae	Eriochloa pseudoacrotricha			x	
Angiosperms	Poaceae	Eulalia aurea			x	
Angiosperms	Poaceae	Melinis repens	*		x	
Angiosperms	Poaceae	Panicum effusum			x	
Angiosperms	Poaceae	Panicum queenslandicum				x
Angiosperms	Poaceae	Paspalidium constrictum			x	
Angiosperms	Poaceae	Paspalidium gracile			x	x
Angiosperms	Poaceae	Sporobolus creber			x	
Angiosperms	Poaceae	Tragus australianus			x	
Angiosperms	Poaceae	Tripogon loliiformis			x	
Angiosperms	Polygonaceae	Persicaria lapathifolia				x
Angiosperms	Portulacaceae	Calandrinia pickeringii			x	
Angiosperms	Rhamnaceae	Alphitonia excelsa			x	
Angiosperms	Rubiaceae	Oldenlandia mitrasacmoides subsp. trachymenoides			x	
Angiosperms	Rutaceae	Geijera parviflora			x	
Angiosperms	Rutaceae	Philotheca sporadica		NT	x	
Angiosperms	Solanaceae	Solanum ellipticum			x	
Angiosperms	Sterculiaceae	Brachychiton populneus			x	
Angiosperms	Verbenaceae	Glandularia aristigera	*		x	

Access Corridor - Flora List

Genus	Species (* denotes non-native/weed)	Common Name	WONS Yes / No	Category under QLD *Biosecurity Act 2014* (if applicable)	Weed status (if applicable) under the Western Downs Regional Council Pest Management Plan
Abutilon	*oxycarpum*	Lantern Bush	No	N/A	N/A
Acacia	*leiocalyx subsp. leiocalyx*	Black wattle	No	N/A	N/A
Acacia	*muelleriana*	Mueller's wattle	No	N/A	N/A
Acacia	*crassa subsp. crassa*	Banana leaved wattle	No	NA	NA
Acacia	*conferta*	Crowded leaf wattle	No	N/A	N/A
Acacia	*triptera*	Spur-winged wattle	No	N/A	N/A
Acacia	*spectabilis*	Glory wattle	No	N/A	N/A
Allocasuarina	*luehmannii*	Bull oak	No	N/A	N/A
Allocasuarina	*inophloia*	Hairy oak	No	N/A	N/A
Alternanthera	*denticulata*	Lesser Joyweed	No	N/A	N/A
Angophora	*leiocarpa*	Smooth-barked apple	No	N/A	N/A
Angophora	*floribunda*	Rough-barked apple	No	N/A	N/A
Aristida	*jerichoensis*	Jericho wiregrass	No	N/A	N/A
Aristida	*calycina*	Dark wiregrass	No	N/A	N/A

Genus	Species (* denotes non-native/weed)	Common Name	WONS Yes / No	Category under QLD *Biosecurity Act 2014* (if applicable)	Weed status (if applicable) under the Western Downs Regional Council Pest Management Plan
Aristida	*caput-medusae*	Many-headed wiregrass	No	N/A	N/A
Aristida	*sp.*	Wiregrass	No	N/A	N/A
Arundinella	*nepalensis*	Reed grass	No	N/A	N/A
Bothriochloa	*bladhii subsp. bladhii*	Forest bluegrass	No	N/A	N/A
Bothriochloa	*decipiens var. decipiens*	Pitted bluegrass	No	N/A	N/A
Calandrinia	*pickeringii*	Pink purslane	No	N/A	N/A
Callitris	*endlicheri*	Black cypress pine	No	N/A	N/A
Callitris	*glaucophylla*	White cypress pine	No	N/A	N/A
Calotis	*dentex*	White burr daisy	No	N/A	N/A
Centipeda	*minima subsp. minima*	Spreading Sneezeweed	No	N/A	N/A
Cheilanthes	*distans*	Bristle cloak fern	No	N/A	N/A
Cheilanthes	*sieberi*	Brigalow fern	No	N/A	N/A
Chloris	*ventricosa*	Tall chloris	No	N/A	N/A
Cleistochloa	*subjuncea*		No	N/A	N/A
Corymbia	*trachyphloia*	Brown bloodwood	No	N/A	N/A

Genus	Species (* denotes non-native/weed)	Common Name	WONS Yes / No	Category under QLD *Biosecurity Act 2014* (if applicable)	Weed status (if applicable) under the Western Downs Regional Council Pest Management Plan
Cryptandra	*amara*	Prickly cryptandra	No	N/A	N/A
Cyanthillium	*cinereum*	Vernonia	No	N/A	N/A
Cymbidium	*canaliculatum*	Black orchid	No	N/A	N/A
Cymbopogon	*refractus*	Barbed wire grass	No	N/A	N/A
Cyperus	*bifax*	Downs Nutgrass	No	N/A	N/A
Cyperus	*betchei*		No	N/A	N/A
Cyperus	*fulvus*	Sticky sedge	No	N/A	N/A
Dianella	*brevipedunculata*	Blue flax-lily	No	N/A	N/A
Dianella	*caerulea*	Blue flax-lily	No	N/A	N/A
Dianella	*revoluta*	Blue flax-lily	No	N/A	N/A
Dichanthium	*sericeum.*	Queensland Blue Grass	No	N/A	N/A
Digitaria	*divaricatissima*	Umbrella grass	No	N/A	N/A
Digitaria	*ramularis*		No	NA	NA
Dinebra	*decipiens*	Slender canegrass	No	N/A	N/A
Diplachne	*fusca subsp. fusca*	Brown beetle grass	No	N/A	N/A
Drosera	*finlaysoniana*		No	N/A	N/A

Genus	Species (* denotes non-native/weed)	Common Name	WONS Yes / No	Category under QLD *Biosecurity Act 2014* (if applicable)	Weed status (if applicable) under the Western Downs Regional Council Pest Management Plan
Dysphania	*carinata*	Keeled goosefoot	No	N/A	N/A
Einadia	*polygonoides*	Knotweed goosefoot	No	N/A	N/A
Einadia	*nutans*	Climbing saltbush	No	N/A	N/A
Einadia	*hastata*	Berry saltbush	No	N/A	N/A
Eleocharis	*philippinensis*		No	N/A	N/A
Eleocharis	*blakeana*	Blake's spikerush	No	N/A	N/A
Enchylaena	*tomentosa*	Ruby saltbush	No	N/A	N/A
Enteropogon	*acicularis*	Curly Windmill Grass	No	N/A	N/A
Entolasia	*stricta*	Wiry panic	No	N/A	N/A
Eragrostis	*brownii*	Brown's lovegrass	No	N/A	N/A
Eragrostis	*leptostachya*	Paddock lovegrass	No	N/A	N/A
Eragrostis	*parviflora*	Weeping lovegrass	No	N/A	N/A
Eragrostis	*trichophora**	Hairy-flower lovegrass	No	N/A	N/A
Eragrostis	*sororia*	Forest lovegrass	No	N/A	N/A
Eragrostis	*curvula**	African lovegrass	No	N/A	Low priority
Eragrostis	*elongata*	Clustered lovegrass	No	N/A	N/A

Genus	Species (* denotes non-native/weed)	Common Name	WONS Yes / No	Category under QLD *Biosecurity Act 2014* (if applicable)	Weed status (if applicable) under the Western Downs Regional Council Pest Management Plan
Eremophila	*debilis*	Winter apple	No	N/A	N/A
Eriachne	*mucronata*	Wanderrie grass	No	N/A	N/A
Eriochloa	*pseudoacrotricha*	Cup Grass	No	N/A	N/A
Eucalyptus	*populnea*	Poplar box	No	N/A	N/A
Eucalyptus	*crebra*	Narrow-leaved ironbark	No	N/A	N/A
Eucalyptus	*crebra x populnea (hybrid)*		No	N/A	N/A
Eucalyptus	*exserta*	Queensland peppermint	No	N/A	N/A
Eucalyptus	*tereticornis subsp. tereticornis*	Queensland blue-gum	No	N/A	N/A
Eulalia	*aurea*	Brown silky top	No	N/A	N/A
Euphorbia	*drummondii*	Caustic spurge	No	N/A	N/A
Evolvulus	*alsinoides*	Tropical speedwell	No	N/A	N/A
Fimbristylis	*depauperata*		No	N/A	N/A
Fimbristylis	*dichotoma*	Common fringe-sedge	No	N/A	N/A
Geijera	*parviflora*	Australian Willow	No	N/A	N/A
Glandularia	*aristigera**	Mayne's Pest	No	N/A	N/A

Genus	Species (* denotes non-native/weed)	Common Name	WONS Yes / No	Category under QLD *Biosecurity Act 2014* (if applicable)	Weed status (if applicable) under the Western Downs Regional Council Pest Management Plan
Glycine	*clandestina*	Twining glycine	No	N/A	N/A
Gomphrena	*celosioides**	Gomphrena weed	No	N/A	N/A
Gonocarpus	*urceolatus*		No	N/A	N/A
Juncus	*usitatus*	A sedge	No	N/A	N/A
Leersia	*hexandra*	Southern cutgrass	No	N/A	N/A
Leptospermum	*polygalifolium*	Wild may	No	N/A	N/A
Lobelia	*purpurascens*	White root	No	N/A	N/A
Lomandra	*sp. (unnamed species affin. longifolia)*	Matt rush	No	N/A	N/A
Lysiana	*exocarpi subsp. tenuis*	Harlequin mistletoe	No	N/A	N/A
Lysicarpus	*angustifolius*	Budgeroo	No	N/A	N/A
Malvastrum	*americanum**	Spiked Malvastrum	No	N/A	N/A
Megathyrsus	*maximus**	Green panic	No	N/A	N/A
Melinis	*repens**	Red Natal grass	No	N/A	N/A
Opuntia	*stricta**	Common Prickly Pear	Yes	Category 3	Low priority
Opuntia	*tomentosa**	Velvety Tree Pear	Yes	Category 3	High priority
Oxalis	*sp.*	Soursob	No	N/A	N/A

Genus	Species (* denotes non-native/weed)	Common Name	WONS Yes / No	Category under QLD *Biosecurity Act 2014* (if applicable)	Weed status (if applicable) under the Western Downs Regional Council Pest Management Plan
Panicum	*simile*	Two colour panic	No	N/A	N/A
Parsonsia	*eucalyptophylla*	Gargaloo	No	N/A	N/A
Paspalidium	*sp.*	Shot grass	No	N/A	N/A
Paspalum	*dilatatum**	Paspalum	No	N/A	N/A
Pimelea	*neoanglica*	Bootlace Bush	No	NA	NA
Pittosporum	*angustifolium*	Gumbi gumbi	No	N/A	N/A
Pomax	*umbellata*	Pomax	No	N/A	N/A
Portulaca	*oleracea**	Red pigweed	No	NA	NA
Rostellularia	*adscendens*	Pink tongues	No	N/A	N/A
Solanum	*americanum**	American black nightshade	No	N/A	N/A
Solanum	*ellipticum*	Potato bush	No	N/A	N/A
Sporobolus	*creber*	Slender rats-tail grass	No	N/A	N/A
Synostemon	*hirtellus*		No	N/A	N/A
Walwhalleya	*subxerophila*	Brigalow canegrass	No	N/A	N/A

s

Appendix H Koala Technical Memorandum

Memorandum

Date: 2 August 2021

Subject: Kumbarilla Renewable Energy Park – Koala Habitat Assessment Tool

1 Introduction

CDM Smith Australia Pty Ltd (CDM Smith) has partnered with Fox & Co. Environmental Pty Ltd (Fox & Co), the specialist Koala Detection Team (KDT) from the University of the Sunshine Coast (USC), and Arcadian Ecology Pty Ltd (Arcadian Ecology) to undertake Koala surveys on the site of the proposed Kumbarilla Renewably Energy Park (K-REP) (herein referred to as the Project). The Project is situated on Lot 4DY457, which is located at the end of Forest Road, Kumbarilla, Queensland. Each specialist partner has provided information on Koala (*Phascolarctos cinereus*) presence and habitat quality on the Project site.

1.1 Purpose

The purpose of this memorandum is to synthesise the results of these and prepare a standalone habitat assessment using the Koala Habitat Assessment Tool (KHAT) in accordance with the 'EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)' (Commonwealth of Australia, 2014) (herein referred to as the Koala Referral Guidelines).

In summary:

- The KDT provided a stand-alone report (Koala survey using detection dogs, Dalby Solar Farm, University of the Sunshine Coast, 2021 (KDT, 2021)) outlining the results of a field assessment which included mapping of presence/ absence and the survey coverage area (Refer to **Appendix A**).
- Fox & Co. prepared an assessment of Koala habitat using the KHAT in accordance with the Koala Referral Guidelines.
- Arcadian Ecology later prepared an assessment of the Koala habitat using the KHAT following a more detailed BioCondition Assessment and associated Habitat Quality Assessment of the Project site in 24-27 May 2021.

2 Survey Findings

2.1 Preliminary Survey

Fox and Co. undertook a preliminary ecology survey of the Project over a 3-day / 2-night period between 6-8 May 2020. This survey identified potential Koala habitat and a Koala skull.

2.2 Koala Detection Team Survey

A subsequent survey was undertaken between 18-22 January 2021. This included a targeted Koala habitat survey. Fox & Co. partnered with the specialist KDT to assist with Koala surveys for the Project site. The detection dog covered an 18.9 km section during the survey (refer to Figure 4 in attached KDT report, **Appendix A**). Evidence of Koala presence was found only twice during the surveys:

- Scats age 4 (months old), of similar size and shape (likely from the same Koala) (refer Figure 5 in attached KDT report, **Appendix A**),
- Koala skull (refer Figure 6 in attached KDT report, **Appendix A**) (same skull identified in May 2020 by Fox and Co)

The results imply Koalas have been present on Lot 4 on DY457 several months prior to the survey. The same vegetation community (Regional Ecosystem (RE) 11.5.1) where the skull and scats were located is the predominant vegetation type on the property, including within the project footprint. The low density of Koala scats suggests low density of Koalas which could be attributed to several factors including:

- Natural low-density populations (however near Dalby (40 km away) they are not expected to be at the lowest densities on the Koala densities scale (KDT, 2021));
- Climate, especially heatwave / drought – the trees in some of the surveyed area did show sign of heat stress or were dead (KDT, 2021);
- Koala disease – there could have been an outbreak of chlamydia or Koala retrovirus, but without seeing Koalas and assessing their health it is impossible to confirm this as a potential cause (KDT, 2021); and
- Predation – during the survey a dingo was observed. Numerous wallaby bones are also scattered throughout the site, suggesting wild dogs are a significant threat to terrestrial fauna populations in the area.

2.3 BioCondition and Habitat Assessment Survey

A BioCondition and Habitat Assessment Survey ecological survey was undertaken between 24-27 May 2021 within the Project Area. The survey was conducted by Bruce McLennan (Principal Botanical Ecologist) and Ben Nottidge (Principal Fauna Ecologist). This was undertaken to ground-truth desktop information and identify any additional flora and fauna values.

A total of 10 BioCondition sites were recorded along with corresponding fauna habitat species including the Koala. Koala habitat was confirmed at all surveyed sites. Within the Project area the presence of the Koala was recorded on a number of occasions within BioCondition survey sites and within the wider area. Recordings included scats, scratches, and a Koala skull (additional to the Koala skull previously found), as per Figure 1.

The potential Koala habitat contributes to remnant linkages through existing remnant blocks including areas of state forest. Lot 4 DY457 is partially in a State-wide biodiversity corridor buffer area for terrestrial corridors; however, the Project disturbance footprint is outside this corridor buffer area. The corridor buffer area in vicinity to the Project area generally moves in a north-south direction. The lots surrounding the Project are generally undeveloped with the exception of some gas development infrastructure and roads. The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project, and the impact at a regional and local scale is expected to be minor.

The southern boundary of the lot does not include the Project area fence right up to the boundary. This provides a corridor to facilitate east-west movements within the Lot boundary. This is shown on the site plan and is approximately 100 m wide. The eastern section of the access road corridor, although largely running through cleared pasture country, does provide a usable fauna corridor from Daandine State Forrest (on the eastern side of Kumbarilla Road) to the west.

R	Details	Date
1	Final	29/07/21
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APPROVED	SM	DATE	29/07/21
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Scale @ A3 -1:20,000
GCS GDA 1994 MGA Zone 55

DISCLAIMER
CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Source Data
CDM Smith Modelling Data

DESIGNER
CDM Smith
cdmsmith.com

CLIENT
calibre

Figure 1

Known Habitat for Koala and Evidence of Koala

DRG Ref: FIG 7-6 Koala Habitat

C:\Users\DeannaBayliss\OneDrive - EcoGIS\Documents\EcoGIS\02_Projects\Arcadian_Ecology\098_Daiby_Solar_Farm\05_Data_GIS\02_Maps\EPBC Referral\FIG X-XX Koala Habitat.mxd

3 Koala Habitat Assessment Tool

The KHAT (Table 3-1) is used to determine the sensitivity, value, and quality of the lands potentially impacted under development proposals. The assessment tool is used to determine whether the lands may be considered 'critical to the survival of the Koala' and from a national recovery perspective, habitat that is considered to be important for the long-term survival and recovery of the species (Koala Referral Guidelines).

Table 3-1 provides the KHAT results in accordance with the Koala referral guidelines.

Table 3-1 Koala Habitat Assessment Tool

Attribute	Score	Inland	Assessment
Koala occurrence	+2 (high)	Evidence of one or more Koalas withinthe last 5 years.	**2** Two Koala skulls were found in the impact area. Koala scats also found within the impact site.
	+1 (medium)	Evidence of one or more Koalas within2 km of the edge of the impact area within the last 10 years.	-
	0 (low)	None of the above.	-
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or moreknown Koala food tree species, **OR** 1 food tree species that alone accountsfor >50% of the vegetation in the relevant strata.	**2** Vegetation contains *Eucalyptus crebra, Eucalyptus exserta, Eucalyptus populnea*
	+1 (medium)	Has forest, woodland or shrubland with only 1 species of known Koala food tree present.	-
	0 (low)	None of the above.	-
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	**2** Adjacent State Forests (FTY475 and201FTY1243 (>1.000ha). All sites part of a larger contiguous block of remnant vegetation >1000 h
	+1 (medium)	Area is part of a contiguous landscape < 1000 ha, but ≥ 500 ha.	-
	0 (low)	None of the above.	-
Key existing threats	+2 (high)	Little or no evidence of Koala mortalityfrom vehicle strike or dog attack at present in areas that score 1 or 2 for Koala occurrence. Areas which score 0 for Koala occurrence and have no dog or vehiclethreat present.	-

	+1 (medium)	Evidence of infrequent or irregular Koala mortality from vehicle strike or dog attack at present in areas thatscore 1 or 2 for Koala occurrence, **OR** Areas which score 0 for Koala occurrence and are likely to have some degree dog or vehicle threat present.	**1** Infrequent evidence of dog/vehicle threat. A juvenile Koala skull found. A dingo was observed during the KDT survey. The area is known to have a wild dog problem.
	0 (low)	Evidence of frequent or regular Koalamortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for Koala occurrence and have a significant dogor vehicle threat present.	-
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, asoutlined in Table 1 (Koala Referral Guidelines, 2014).	-
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlinedin Table 1 (Koala Referral Guidelines, 2014)	**1** The area is used by Koala periodically, but it is uncertain whether the habitat is important in achieving the interim recovery objectives.
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, asoutlined in Table 1 (Koala Referral Guidelines, 2014)	

TOTAL SCORE = 8

Assessment of the Project site proposed to be cleared scored eight (8) on the KHAT. Impact areas that score five or more using the habitat assessment tool for the Koala contain habitat critical to the survival of the Koala. Impact areas that score four or less using the KHAT do not contain habitat critical to the survival of the Koala.

Please refer to the Appendix B, which contains a flow chart (Figure 2) from the Koala Referral Guidelines (2014). This flow-chart helps to determine whether the habitat loss associated with the action is likely to adversely affect habitat critical to the survival of the Koala and so require referral to the Department of Agriculture, Water and Environment (DAWE). As per the flow chart, as the Project will clear ≥ 20 ha of habitat containing known Koala food trees in an area with a habitat score of ≥ 8, a referral is recommended. The flow chart refers the proponent to Section 8 of the Koala Referral Guidelines (2014) to considered other impacts.

4 Impact Mitigation

As per Section 8 of the Koala Referral Guidelines (2014), as the activity scored ≥ 5 using the KHAT, the habitat is considered critical to the survival of the Koala, and therefore mitigation of impacts have been considered.

On review of Table 5-9 of the Koala Referral Guidelines (2014) the following mitigation measures are proposed:

- Dog attack mitigation measures (Table 5 of the Koala Referral Guidelines (2014)):
  - The action is not likely to lead to an increase in dog attacks
  - No domestic pets will be allowed on site
- Vehicle strike mitigation measures (Table 6 of the Koala Referral Guidelines (2014)):
  - Koala proof fencing will be established along the solar farm area and will:
    - Be a minimum 1.8m high,
    - Be 3m from any retained trees or plantings and be clear of all overhanging branches,
    - Have a minimum 50cm wide scratch panelling installed along the length of the fence,
  - A fully-funded agreement will be put in place with a relevant organisation or authority for the maintenance and monitoring of the fencing in perpetuity,
  - Inclusion of escape mechanisms i.e. climbing poles along road corridor will be implemented
  - A 60 km/h speed limit on the access corridor at dawn and dusk with appropriate signage (see Plate 1) recommendation will be put forward to Council. As part of site inductions, staff will be reminded to adhere to this recommendation to not exceed 60 km/h.
  - Road signage to be used to alert drivers of potential Koala movement across the road (refer to Plate 1 as an example).
  - Guidelines will be added to the Project Operation and Maintenance Plan outlining procedures on recording sick, injured or dead Koalas located in the Project area, and reporting to DES on 1300 ANIMAL (1300 264 625).
- Introduction and spread of pathogens (Table 7 of the Koala Referral Guidelines (2014)):
  - Fauna spotter/catchers aware of appropriate quarantine and biosecurity procedures for koalas found to be affected by disease
  - Biosecurity procedures will be added to the Construction Environmental Management Plan and Operation and Maintenance Plan for all persons and vehicles entering the site that may carry vegetation pathogens known to affect koala food trees. These procedures will be enforced
  - Visual monitoring of adjacent habitat by site personnel to record and notify DES of any koalas and potential disease occurrence
- Barriers to dispersal and fragmentation (Table 8 of the Koala Referral Guidelines (2014)):
  - Koala food trees will be retained where possible along clearing boundaries
  - Vegetation clearing limits clearly marked to ensure no unnecessary clearing outside disturbance footprint (whereby minimising impacts to fauna habitat and movement around the site)
  - Fauna egress infrastructure installed along fencing to prevent entrapment. Fauna ramps and climbing poles shall be provided at regular intervals around the internal Project area boundary to allow fauna to exit the facility should they become trapped.

- Degradation of habitat critical to the survival of the Koala through hydrological change (Table 9 of the Koala Referral Guidelines (2014)):
  - A hydrology assessment has been undertaken which found there was no adverse impact as a result of the Project. The action is not likely to lead to a hydrological change (refer to the report which is appended to the referral documentation).

Plate 1 Wildlife Zone Signage Examples

5 Conclusion

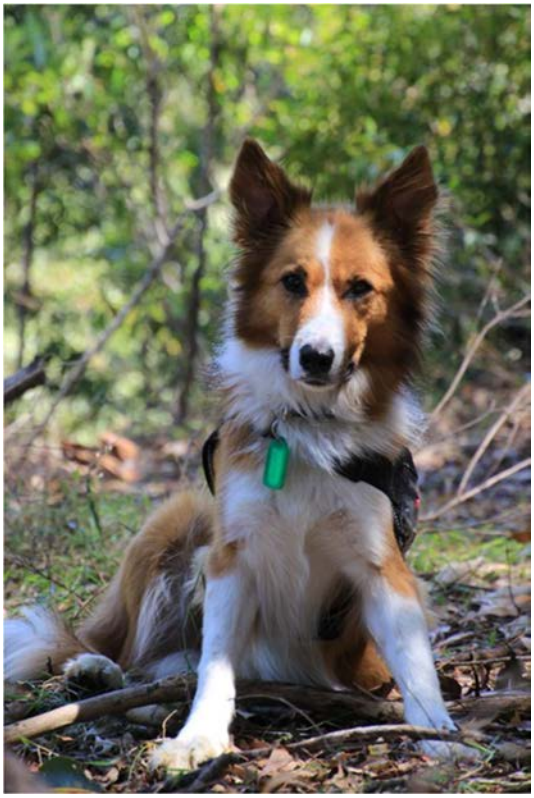
The Project footprint is approximately 213 ha. Assessment of the Project site proposed to be cleared scored eight (8) on the KHAT. Under the referral guidelines for Koala (DotE 2014) it is recommended that a project be referred where it is proposed to clear to 'clear ≥ 20 ha of habitat containing known Koala food trees in an area with a habitat score ≥ 8. The Project area will impact up to 206.9 ha of habitat containing known Koala food trees. It is considered that a referral to DAWE is required, and that a controlled action decision that confirms the Project is a controlled action, will likely include requirements (amongst other controlling provisions) to reduce or offset the impacts to koalas and their habitat by the clearing required for the Project.

Appendix A Koala Detection Team – Survey Findings

USC
Detection Dogs
for Conservation

Koala survey using detection dogs

Dalby Solar Farm



Prepared for Fox and Co Environmental

By Detection Dogs for Conservation, University of the Sunshine Coast

Dr Romane Cristescu, Russell Miller

February 2021

Disclaimer

This report was prepared in accordance with the scope of work agreed with Fox and Co Environmental and is subject to the specific time, cost and other constraints as defined by the scope of work.

To prepare this report, USC relied on information supplied by the Client, and does not accept responsibility for the accuracy or completeness of this information. USC also relied on information gathered at particular times and under particular conditions, and does not accept responsibility for any changes or variances to this information which may have subsequently occurred. Accordingly, the authors of the report provide no guarantee, warranty or representation in respect to the accuracy, adequacy or completeness of the information, whether generally or for use or reliance in specific circumstances. To the extent permitted by law, the authors exclude any liability, including any liability for negligence, for any loss, damage, injury, illness howsoever caused, including (with limitation) by the use of, or reliance upon, the information, and whether arising from errors or omissions or otherwise.

1- Introduction

1.1 Scope of works

The University of Sunshine Coast, Detection Dogs for Conservation (DDC) team was contracted by Fox and Co Environmental Pty Ltd to conduct koala surveys using detection dogs on a proposed solar farm development site at Lot 4 DY457 (the Project). The aim was to conduct casual surveys within the Project area to determine and map whether there are signs of koala presence, i.e. koala scats.

1.2 Project Area

The Project Area comprised privately owned land located south of Dalby

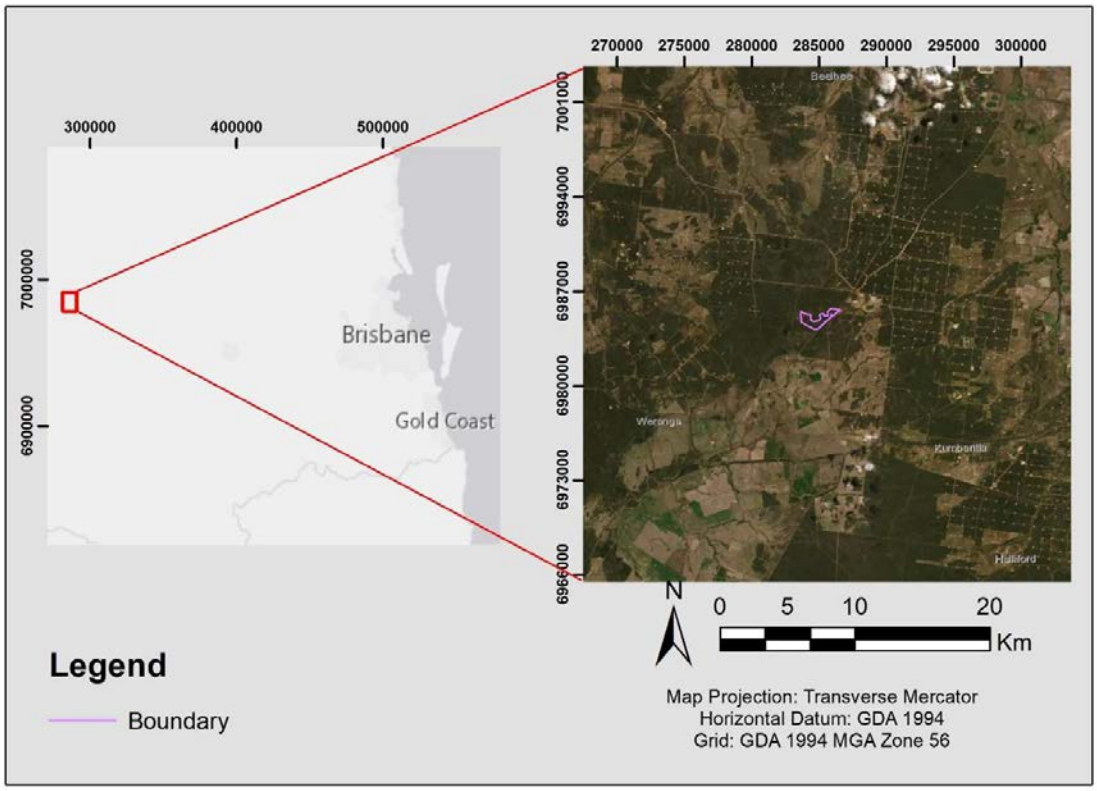


Figure 1 Location plan of the Project Area

2- Methodology

2.1 Detection dogs and casual surveys

Detection dogs are a powerful method to study koala presence / absence, having been showed to be more accurate and efficient than human surveys to locate koala scats (Cristescu et al. 2015). This

methodology can lead to more robust data, and therefore more supported management decisions, for koala (Cristescu et al. 2019). Detection dog surveys were conducted within the Project area on 19 and 20 January 2021 using the koala scat detection dog Baxter. Baxter has been tested for accuracy and has conducted more than 1,322 koala scat surveys in his deployment thus far.

Upon arrival at the survey sites, ecological characteristics that might influence the detectability and decay of scats were recorded (e.g. wet areas and fire will increase decay rates; therefore, scats will be detectable for a shorter amount of time (Cristescu et al. 2012)).

The casual survey technique was used for this Project. Casual surveys are the fastest way to determine whether koalas are present at a specific site. In a casual survey, the dog is not constrained by the handler, and can freely follow its nose. Handlers focused their searches in areas with tree cover to maximise targeting potential koala habitat.

The detection dog was fitted with a GPS collar to record the survey tracks and therefore record the search area. If a scat was found, age and size were recorded, and a GPS position taken. Age of koala scats is defined as per Table 1.

Table 1 Guide used to age koala scats in the field

Scat age categories	Age	Characteristics
1	One day old or less	Very fresh (covered in mucus, wet)
2	Couple of days old	Fresh (shine and smell)
3	Couple of weeks	Medium fresh (shine or smelly when broken)
4	Months old	Old (no shine, no smell)
5	More than a few months	Very old and discoloured

2.2 Scat Identification

Typical koala scats (Figure 2, Figure 3) have the following characteristics (Triggs 1996):

- symmetrical and bullet-shaped (not jelly-bean shaped);
- generally about 1.5 cm long by 0.5 cm wide (adult koala scat size);
- even-sized and especially fine particles;
- absence of insect parts (koalas do not eat insects); and
- very compact.

Figure 2 Typical koala scat shape found in the field

Figure 3 Example of different koala scat sizes (width)

2.3 Incidental records

The researcher conducting the surveys was on the lookout for opportunistic / incidental spotting of koalas, scats and other signs (skull).

2.4 Health and safety

The detection dogs work under strict Animal Ethics approvals (USC: ANA16113, ANA18123, ANS1752) and Queensland Government wildlife permits allowing the DDC to perform surveys using detection dogs and collect scats for genetic analysis (SPP WIF418590017, WISP18590117 and WITK18570117).

2.5 Limitations

The survey was limited to the Project area only, except for one survey, adjoining land parcels were not surveyed as part of this Project.

The rate at which scats decay may vary significantly between sites due to varying ground layer structure, composition, moisture, sunlight, local weather events and invertebrate activity. Decomposed scats may lose their unique scent mark and the dog may no longer detect it – however this has not been proven yet.

Failure to detect scats in an area does not necessarily indicate koalas are not using the area. Failure to detect koala scats may suggest either of the following:

- Koalas are not present in the area (i.e. true absence);
- Koalas occur in the area, however, scats were not detected (false negative) because:
    - scats were present at some stage but decayed and disappeared from the environment before the survey was conducted,
    - the dog did not detect the scat; and/or, the dog indicated the presence of a scat, but it was too decayed (fragments only, no scat) to be confirmed.
- Koalas may be present in adjoining land parcels.

3 - Results

The detection dog covered an 18.9 km section during the survey (refer to Figure 4). Evidence of koala presence was found only twice during the surveys:

- scats age 4 (months old), of similar size and shape (likely from the same koala) at 285539 / 6985459 (Figure 5),
- koala skull at 285340 / 6984586 (Figure 6).

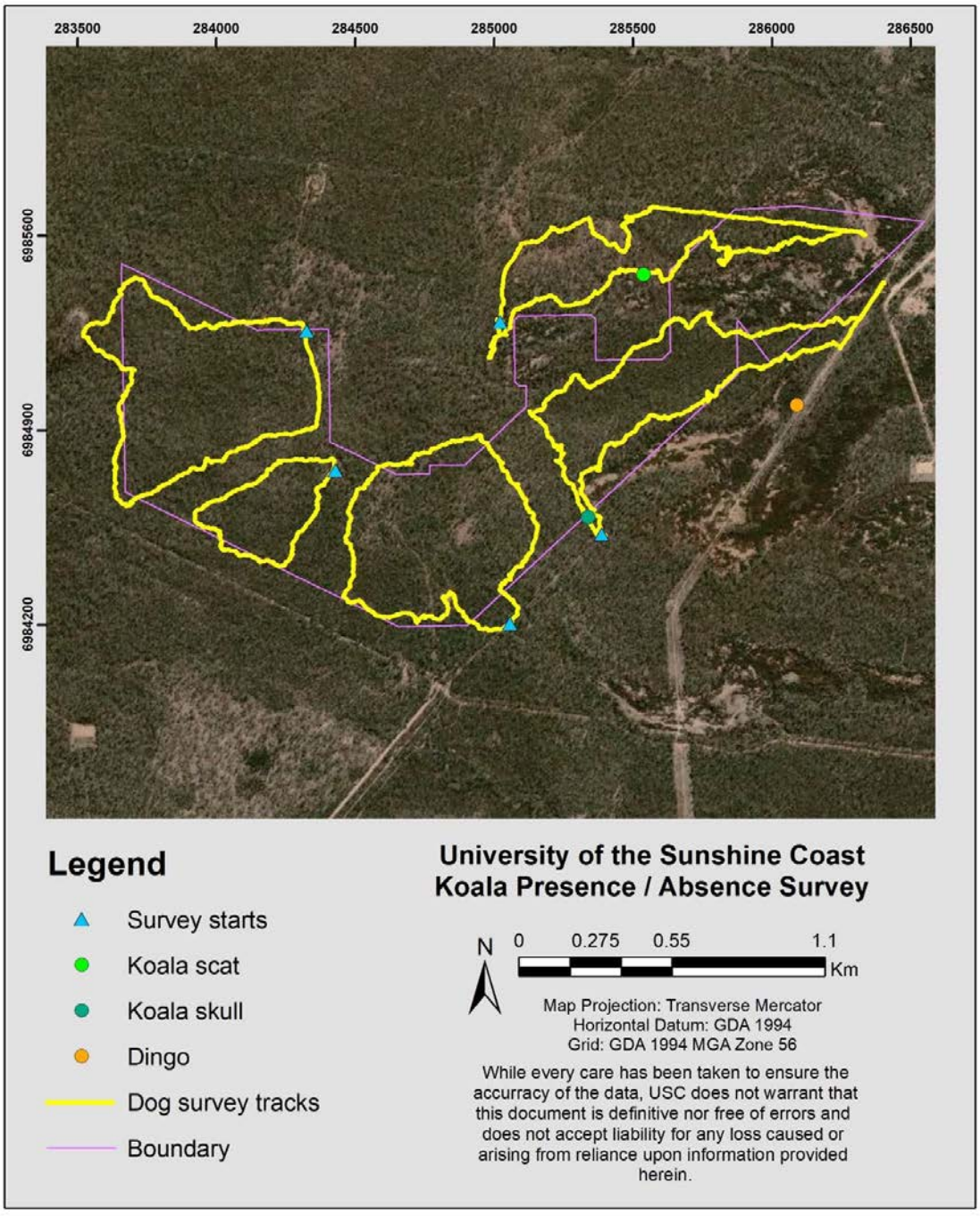


Figure 4 Koala scat survey using detection dogs

Figure 5 Koala scats collected on site

Figure 6 Koala skull found on site

4 - Discussion and Comments

Much of the habitat searched was open at ground level allowing good air flow for the detection dogs to search through (refer, Figure 7). These conditions are suitable for the detection of scats where they are present. However, part of the area surveyed had signs of fires which could increase scat decay and disappearance.

From the low density of koala scats, it is likely that koalas have been in the area surveyed several months prior to the survey. Note that the area was only surveyed on one occasion; therefore, the presence / absence results presented here provide a snapshot of the population during this period and in the recent months only.

Figure 7 Example of the vegetation at the survey area

The exact cause of the low density of koalas in the surveyed area is unknown and cannot be ascertained based on this survey, however one can explore the likelihood of some well documented causes of decline for koala populations elsewhere. Possible causes could include:

- Normal low-density populations – koalas are naturally found at low density in the western parts of their distribution (Sullivan et al. 2004), however near Dalby we would not expect to be at the lowest densities on the koala densities scale [population densities in QLD range from low e.g., 0.01/ha in central Queensland (Melzer and Lamb 1994) to moderate e.g., 1/ha in southeast Queensland (Dique et al. 2004)].
- Climate, especially heatwave / drought – the trees in some of the surveyed area did show sign of heat stress or were dead.
- Koala disease – there could have been an outbreak of chlamydia or koala retrovirus, but without seeing koalas and assessing their health it is impossible to confirm this as a potential cause.
- Predation – during the survey a dingo was observed. This could represent a threat in the area - dog predation can cause koala populations to decline (Beyer et al. 2018).

Further investigation would be needed to confirm the potential cause for the lack of koalas in the Project area. For example, camera traps could be deployed to assess dog activity. It has to be noted though that one dog can be responsible for high mortality and therefore dog predation is not always correlated to dog activity or density (Beyer et al. 2018, Gentle et al. 2019).

5 - References

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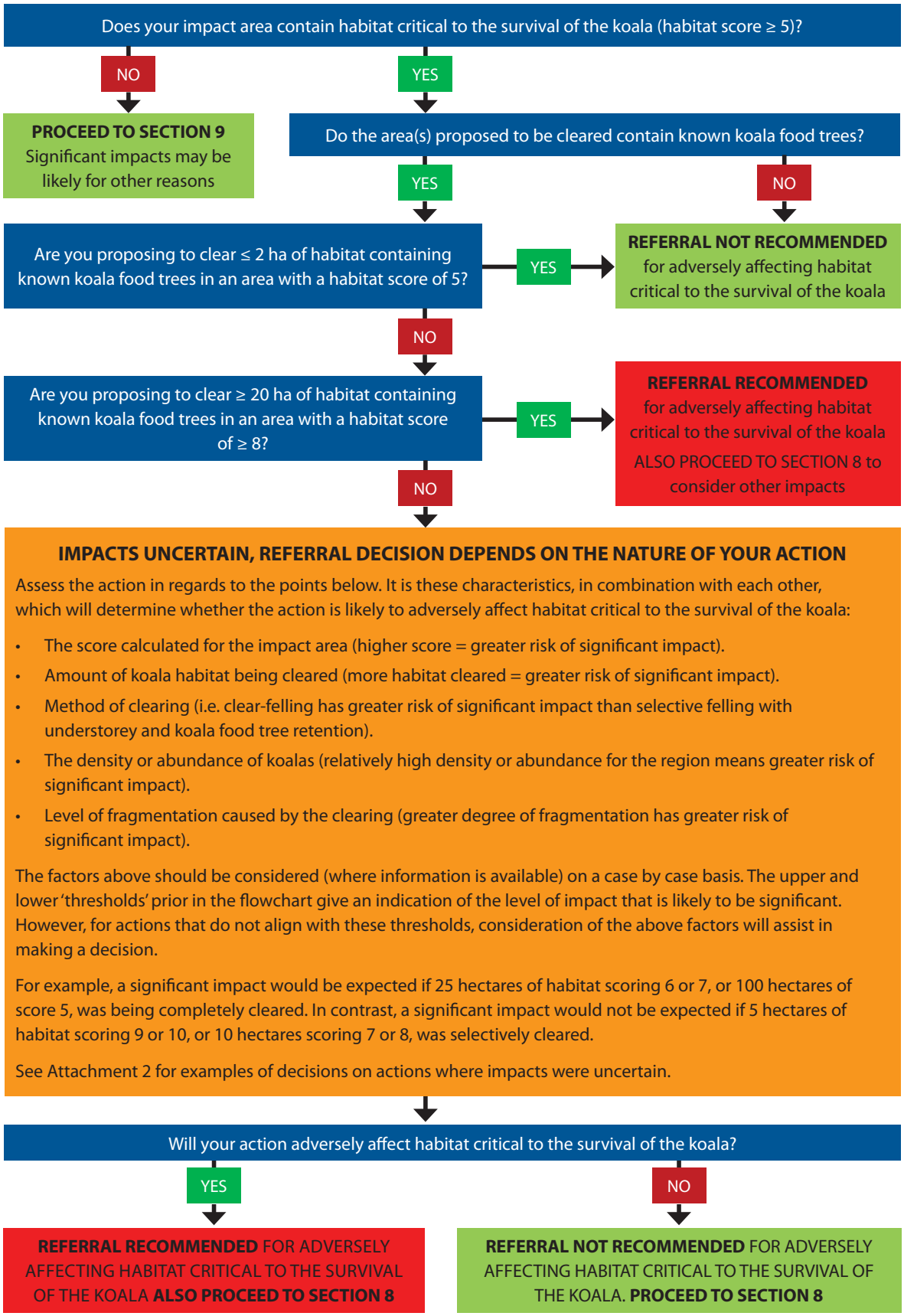
Appendix B Assessing Adverse Effects on Habitat Critical to the Survival of the Koala (Koala Referral Guidelines, 2014)

Figure 2: Assessing adverse effects on habitat critical to the survival of the koala



Appendix I Ecological Survey Field Sheets

PV Power Station - Quaternary Sites

Structure terms derived from Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S. and Butler, D.W. (2017) Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland.
Version 4.0. Updated May 2017. Queensland Herbarium, Queensland Department of Science, Information Technology and Innovation, Brisbane.
Taxon nomenclature in accordance with Census of the Queensland Flora 2019. Brown GK & Bostock PD. 2019. Queensland Department of Environment and Science, Queensland Government.

Way point	Layer	Estimated Canopy Cover	Estimated Canopy Height (metres)	Dominant or Codominant species	Subdominant species	Associated species	Structure
1280	T1	sparse	18-24	Eucalyptus crebra			woodland
	T2	very sparse	12-18	Eucalyptus crebra			
1281	T1	mid dense	18-24	Eucalyptus crebra		Angophora leiocarpa	open forest
	T2	sparse to mid dense	12-18	Eucalyptus crebra	Callitris glaucophylla	Allocasuarina luehmannii	
1282	Emergent		to 20m	Eucalyptus crebra			closed shrubland
	S1`	dense	1-2	Acacia triptera			
1284	T1	mid dense	14-18	Eucalyptus crebra		Angophora leiocarpa	open forest
	T2	sparse	8-12	Callitris glaucophylla, Allocasuarina luehmannii			
1289	T1	very sparse	12-18	Eucalyptus populneus, Eucalyptus crebra			open woodland
	T2	sparse to mid dense	8-12	Allocasuarina luehmannii	T1 species, Callitris glaucophylla		
222	T1	very sparse to sparse	18-24	Eucalyptus populneus, Eucalyptus crebra		Eucalyptus tereticornis	open woodland to woodland
	T2	sparse	12-18	Allocasuarina luehmannii	Callitris glaucophylla	T1 species	
1290	T1	very sparse	12-16	Eucalyptus crebra	Eucalyptus populneus		open woodland
	T2	mid dense	6-12	Allocasuarina luehmannii	Callitris glaucophylla	T1 species	
1291	T1	very sparse	14-18	Eucalyptus populneus			open woodland
	T2	sparse	8-12	Callitris glaucophylla		T1 species, Allocasuarina luehmannii	
1293	T1	sparse	12-18	Eucalyptus crebra		Callitris glaucophylla	woodland
	T2	sparse	6-12	T1 species, Allocasuarina luehmannii			
1294	T1	mid dense	10-16	Eucalyptus crebra			open forest
	T2	mid dense	6-10	Allocasuarina luehmannii		T1 species, Callitris glaucophylla	
1295	T1	sparse to mid dense	12-18	Eucalyptus crebra			woodland to open forest
	T2	mid dense	6-12	Allocasuarina luehmannii		T1 species, Callitris glaucophylla	
1296	T1	very sparse	14-20	Eucalyptus crebra	Angophora leiocarpa		open woodland
	T2	absent					
1297	T1	mid dense	18-26	Eucalyptus crebra			open forest
	T2	sparse	12-18	T1 species		Callitris glaucophylla	
1300	T1	very sparse	12-18	Eucalyptus crebra, Callitris glaucophylla			open woodland
	T2	mid dense	6-12	Callitris glaucophylla, Allocasuarina luehmannii		Eucalyptus crebra	
1301	T1	sparse	12-16	Eucalyptus populneus		Callitris glaucophylla, Allocasuarina luehmannii	woodland
	T2	sparse to mid dense	8-12	Callitris glaucophylla, Allocasuarina luehmannii	Eucalyptus populneus		
1302	T1	sparse	16-20	Angophora leiocarpa		Eucalyptus crebra	woodland
	T2	mid dense	10-16	Allocasuarina luehmannii	Angophora leiocarpa, Callitris glaucophylla		
1303	T1	sparse	18-26	Eucalyptus crebra			woodland
	T2	mid dense	12-18	Callitris glaucophylla	T1 species		
1306	T1	sparse	14-20	Eucalyptus crebra			woodland
	T2	sparse to mid dense	8-14	Callitris glaucophylla, Allocasuarina luehmannii		Eucalyptus crebra	
1307	T1	very sparse	10-14	Eucalyptus crebra, Callitris glaucophylla			open woodland
	T2	sparse	6-10	Callitris glaucophylla	Allocasuarina luehmannii	Eucalyptus crebra	
1308	T1	sparse	14-18	Eucalyptus crebra		Callitris glaucophylla	woodland
	T2	sparse to mid dense	8-14	T1 species		Allocasuarina luehmannii	

Access Corridor - Quaternary Sites

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2654°, 150.8785° (GDA 94)	
Date: 2021-05-24; 11:11	Assessor: BM
Site No: Q1	Survey type: quaternary survey
Slope: very gentle (1-2°)	Aspect: east
Landform: plains	Geology: fine Sedimentary
Soils	
Soil texture: clay,sand	Soil colour: pale,whitish
Disturbances	
Disturbance observed: roads	
Erosion (% site affected): None detected	
Fire scars: no	
Vegetation	
Mapped RE: non-remnant/non-remnant, (BD status: NC, VM status: non-remnant/non-remnant)	
Verified RE: narrow strip of RE 11.5.1 either side of road (BD status: NC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 1-10	Health: good
EDL Height (m): 16	EDL Cover (%): 20
Dominant T1 species: *Eucalyptus populnea* (A), *Eucalyptus crebra x Eucalyptus populnea* (O), *Callitris glaucophylla* (F)	
Dominant T2 species: *Allocasuarina luehmannii* (D)	
Dominant S1/S2 species: *Geijera parviflora* (F), *Callitris glaucophylla* (F), *Pittosporum angustifolium* (O)	
Dominant ground species: *Eriochloa pseudoacrotricha* (O), *Einadia polygonoides* (O), *Eragrostis leptostachya* , *Glandularia aristigera** (O), *Sporobolus creber* (O), *Chloris ventricosa* (O), *Paspalidium* sp. (F), *Cymbopogon refractus* (O), *Enteropogon acicularis* (F), *Dysphania carinata* (O), *Aristida jerichoensis* (O), *Dinebra decipiens* (F), *Solanum americanum** (O), *Solanum ellipticum* (F), *Bothriochloa decipiens var. decipiens* (O), *Megathyrsus maximus** (F), *Gomphrena celosioides** (O), *Eragrostis trichophora** (O), *Calandrinia pickeringii* (O), *Einadia nutans* (F), *Eremophila debilis* (O)	
Comments: Narrow strip either side of the road 11.5.1a	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.26160°, 150.8691° (GDA 94)	
Date: 2021-05-24; 11:52	Assessor: BM
Site No: Q2	Survey type: quaternary survey
Slope: very gentle (1-2°)	Aspect: east
Landform: plains	Geology: fine Sedimentary
Soils	
Soil texture: sand,clay	Soil colour: pale,brown
Disturbances	
Disturbance observed: roads	
Erosion (% site affected): None detected	
Fire scars: no	
Vegetation	
Mapped RE: non-remnant/non-remnant, (BD status: NC, VM status: non-remnant/non-remnant)	
Verified RE: narrow strip of RE 11.5.1 either side of road (BD status: NC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 1-10	Health: good
EDL Height (m): 18	EDL Cover (%): 20
Dominant T1 species: *Eucalyptus crebra* (D)	
Dominant T2 species: *Allocasuarina luehmannii* (D)	
Dominant S1/S2 species: *Allocasuarina luehmannii* (F), *Callitris glaucophylla* (O), *Lysiana exocarpi* subsp. *tenuis* (O)	
Dominant ground species: *Einadia hastata* (O), *Lomandra multiflora* (O), *Dianella revoluta* (F), *Enchylaena tomentosa* (O), *Melinis repens** (F), *Aristida jerichoensis* (O)	
Comments: Narrow strip either side of the road	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2580°, 150.8607° (GDA 94)	
Date: 2021-05-24; 12:12	Assessor: BM
Site No: Q3	Survey type: quaternary survey
Slope: gentle incline (3-6°)	Aspect: east
Landform: hillslope	Geology: fine Sedimentary
Soils	
Soil texture: loam,gravel	Soil colour: brown,red
Disturbances	
Disturbance observed: roads	
Erosion (% site affected): None detected	
Fire scars: no	
Vegetation	
Mapped RE: 11.7.4/11.5.1, (BD status: NC/NC, VM status: remnant least-concern)	
Verified RE: 11.7.4 (BD status: NC, VM status: NC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 1-10	Health: good
EDL Height (m): 20	EDL Cover (%): 35
Dominant T1 species: *Eucalyptus crebra* (D)*, Corymbia trachyphloia* (O)	
Dominant T2 species: *Eucalyptus exserta* (O)*, Callitris glaucophylla* (F)	
Dominant S1/S2 species: *Allocasuarina inophloia* (O)*, Acacia crassa* subsp. *crassa* (F)*, Acacia conferta* (O)	
Dominant ground species: *Entolasia stricta* (D)*, Digitaria ramularis* (F)*, Cheilanthes sieberi* (F)*, Einadia hastata* (F)*, Calotis dentex* (F)*, Aristida calycina* (O)*, Panicum simile* (O)	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2554°, 150.8541° (GDA 94)	
Date: 2021-05-24; 12:42	Assessor: BM
Site No: Q4	Survey type: quaternary survey
Slope: gentle incline (3-6°)	Aspect: west
Landform: plains	Geology: fine Sedimentary
Soils	
Soil texture: sand	Soil colour: pale,brown
Disturbances	
Disturbance observed: roads	
Erosion (% site affected): None detected	
Fire scars: no	
Vegetation	
Mapped RE: non-remnant/non-remnant, (BD status: NC, VM status: non-remnant/non-remnant)	
Verified RE: 11.5.1, (BD status: NC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 1-10	Health: good
EDL Height (m): 17	EDL Cover (%): 30
Dominant T1 species: *Eucalyptus crebra* (A)*, Eucalyptus populnea* (F)	
Dominant T2 species: *Allocasuarina luehmannii* (D)*, Callitris glaucophylla* (O)	
Dominant S1/S2 species: *Allocasuarina luehmannii* (D)	
Dominant ground species: *Calandrinia pickeringii* (A)*, Eragrostis sororia* (F)*, Panicum simile* (A)*, Lomandra* sp. (F)*, Paspalidium* sp. (F)*, Solanum ellipticum* (F)*, Aristida caput-medusae* (O)*, Fimbristylis dichotoma , Aristida* sp. (O)*, Eriochloa pseudoacrotricha* (O)*, Chloris ventricosa* (O)*, Eragrostis* sp. *, Cheilanthes sieberi* (O)*, Eremophila debilis* (O)*, Eragrostis curvula** (O)	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2549°, 150.8533° (GDA 94)	
Date: 2021-05-24; 13:03	Assessor: BM
Site No: Q5	Survey type: quaternary survey
Slope: very gentle (1-2°)	Aspect: south-west
Landform: stream	Geology: alluvial
Soils	
Soil texture: sand,silt	Soil colour: brown,pale
Disturbances	
Disturbance observed: roads	
Erosion (% site affected): None detected	
Fire scars: no	
Vegetation	
Mapped RE: non-remnant/non-remnant, (BD status: NC, VM status: non-remnant/non-remnant)	
Verified RE: 11.3.27, (BD status: OC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 11-25	Health: good
EDL Height (m): 20	EDL Cover (%): 50
Dominant T1 species: *Eucalyptus tereticornis* subsp. *tereticornis* (D), *Eucalyptus crebra* (O), *Angophora leiocarpa* (O)	
Dominant T2 species: *Angophora floribunda* (O)	
Dominant S1/S2 species: *Acacia crassa* subsp. *crassa* (O), *Acacia spectabilis* (O)	
Dominant ground species: *Eleocharis philippinensis* (O), *Eleocharis blakeana* (D), *Lobelia purpurascens* (F), *Cyperus betchei* (F), *Paspalum dilatatum** (O), *Walwhalleya subxerophila* (F), *Diplachne fusca var. fusca* (O), *Centipeda minima* subsp. *minima* (O), *Eragrostis elongata* (F)	
Comments: Small section on drainage approx 70 m wide	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2544°, 150.8506° (GDA 94)	
Date: 2021-05-24; 13:41	Assessor: BM
Site No: Q6	Survey type: quaternary survey
Slope: very gentle (1-2°)	Aspect: south
Landform: plains	Geology: fine Sedimentary
Soils	
Soil texture: sand,silt,loam	Soil colour: grey,brown,pale
Disturbances	
Disturbance observed: roads	
Erosion (% site affected): none detected	
Fire scars: no	
Vegetation	
Mapped RE: 11.5.4/11.3.25 (BD status: NC/OC, VM status: remnant least-concern)	
Verified RE: 11.5.4, (BD status: NC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 1-10	Health: good
EDL Height (m): 19	EDL Cover (%): 60
Dominant T1 species: *Callitris glaucophylla* (D), *Eucalyptus tereticornis* subsp. *tereticornis* (F), *Angophora leiocarpa* (O), *Angophora floribunda* (O)	
Dominant T2 species: *Allocasuarina luehmannii* (A)	
Dominant S1/S2 species: *Allocasuarina luehmannii* (A), *Acacia crassa* subsp. *crassa* (O), *Acacia spectabilis* (O), *Acacia leiocalyx* subsp. *leiocalyx* (O)	
Dominant ground species: *Cheilanthes distans* (F), *Cheilanthes sieberi* (A), *Eragrostis sororia* (A), *Dianella caerulea* (F), *Eragrostis brownii* (F), *Fimbristylis depauperata* (F), *Calandrinia pickeringii* (F), *Calotis dentex* (F), *Cyanthillium cinereum* (O), *Melinis repens** (F)	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2542°, 150.8493° (GDA 94)	
Date: 2021-05-24; 14:04	Assessor: BM
Site No: Q7	Survey type: quaternary survey
Slope: gentle incline (3-6°)	Aspect: north-east
Landform: stream	Geology: alluvial
Soils	
Soil texture: sand,gravel	Soil colour: brown
Disturbances	
Disturbance observed: road/track	
Erosion (% site affected): none detected	
Fire scars: no	
Vegetation	
Mapped RE: 11.5.4/11.3.25, (BD status: NC/OC, VM status: remnant least-concern)	
Verified RE: 11.3.25, (BD status: OC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 1-10	Health: average
EDL Height (m): 16	EDL Cover (%): 25
Dominant T1 species: *Eucalyptus tereticornis* subsp. *tereticornis* (A), *Angophora floribunda* (A), *Angophora leiocarpa* (O), *Callitris glaucophylla* (F)	
Dominant T2 species: *Allocasuarina luehmannii* (F), *Callitris endlicheri* (O)	
Dominant S1/S2 species: *Acacia leiocalyx* subsp. *leiocalyx* (O), *Leptospermum polygalifolium* (O), *Acacia conferta* (O)	
Dominant ground species: *Bothriochloa bladhii* subsp. *bladhii* (F), *Leersia hexandra* (F), *Megathyrsus maximus var. maximus** (F), *Arundinella nepalensis* (A)	
Comments: Scoured through to laterite	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2526°, 150.8428° (GDA 94)	
Date: 2021-05-24; 14:31	Assessor: BM
Site No: Q8	Survey type: quaternary survey
Slope: gentle incline (3-6°)	Aspect: east
Landform: plains	Geology: fine Sedimentary
Soils	
Soil texture: sand,loam	Soil colour: brown,pale
Disturbances	
Disturbance observed: road	
Erosion (% site affected): none detected	
Fire scars: no	
Vegetation	
Mapped RE: 11.7.4/11.7.5, (BD status: NC/NC, VM status: remnant least-concern)	
Verified RE: 11.5.1, (BD status: NC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: Remnant
Dieback (%): 1-10	Health: good
EDL Height (m): 17	EDL Cover (%): 25
Dominant T1 species: *Eucalyptus crebra* (D), *Angophora leiocarpa* (O)	
Dominant T2 species: *Callitris glaucophylla* (F), *Allocasuarina luehmannii* (D)	
Dominant S1/S2 species: *Acacia leiocalyx* subsp. *leiocalyx* (F), *Opuntia tomentosa** (O)	
Dominant ground species: *Fimbristylis depauperata* (F), *Cheilanthes distans* (F), *Cheilanthes sieberi* (F), *Panicum simile* (F), *Calandrinia pickeringii* (F), *Eriochloa pseudoacrotricha* (O), *Eragrostis sororia* (A), *Eragrostis parviflora* (F), *Cyanthillium cinereum* (O), *Eragrostis leptocarpa* , *Dianella revoluta* (O), *Aristida calycina* (F), *Digitaria ramularis* (F), *Eulalia aurea* (O), *Cyperus fulvus* (F), *Sporobolus creber* (O), *Enteropogon acicularis* (O), *Chloris ventricosa* (O), *Dinebra decipiens var. decipiens* (O), *Solanum ellipticum* (O), *Synostemon hirtellus* (O)	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2518°, 150.8373° (GDA 94)	
Date: 2021-05-24; 14:52	Assessor: BM
Site No: Q9	Survey type: quaternary survey
Slope: very gentle (1-2°)	Aspect: east
Landform: hillslope	Geology: fine Sedimentary
Soils	
Soil texture: loam	Soil colour: brown
Disturbances	
Disturbance observed: road	
Erosion (% site affected): none detected	
Fire scars: no	
Vegetation	
Mapped RE: 11.7.4/11.7.5, (BD status: NC/NC, VM status: remnant least-concern)	
Verified RE: 11.7.5, (BD status: NC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 11-25	Health: good
EDL Height (m): 9	EDL Cover (%): 25
Dominant T1 species: *Eucalyptus exserta* (F), *Eucalyptus crebra* (O)	
Dominant S1/S2 species: *Acacia triptera* (D)	
Dominant ground species: *Digitaria ramularis* (D), *Eragrostis sororia* (F), *Cheilanthes sieberi* (A), *Gonocarpus urceolatus* (A), *Eragrostis brownii* (F), *Drosera finlaysoniana* (F)	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2509°, 150.8287° (GDA 94)	
Date: 2021-05-24; 15:24	Assessor: BM
Site No: Q10	Survey type: quaternary survey
Slope: very gentle (1-2°)	Aspect: south-east
Landform: plains	Geology: fine Sedimentary
Soils	
Soil texture: sand,loam	Soil colour: pale,brown
Disturbances	
Disturbance observed:	
Erosion (% site affected): none detected	
Fire scars: yes, fire scar age: not recent, fire scar abundance: , fire scar height (m): 3	
Vegetation	
Mapped RE: 11.9.5, (BD status: E, VM status: remnant endangered)	
Verified RE: 11.5.1, (BD status: NC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 1-10	Health: good
EDL Height (m): 17	EDL Cover (%): 35
Dominant T1 species: *Eucalyptus crebra* (A), *Callitris glaucophylla* (A)	
Dominant T2 species: *Allocasuarina luehmannii* (D), *Callitris glaucophylla* (F)	
Dominant S1/S2 species: *Acacia leiocalyx* subsp. *leiocalyx* (F), *Allocasuarina luehmannii* (F)	
Dominant ground species: *Eragrostis brownii* (A), *Eragrostis sororia* (A), *Aristida calycina* (F), *Aristida jerichoensis* (F), *Eragrostis trichophora** (F), *Melinis repens** (F), *Cheilanthes distans* (F), *Cyanthillium cinereum* (O), *Euphorbia drummondii* (O), *Cheilanthes sieberi* (F), *Bothriochloa decipiens var. decipiens* (O), *Cymbopogon refractus* (O), *Evolvulus alsinoides* (O), *Enteropogon acicularis* (O), *Cyperus fulvus* (O), *Sporobolus creber* (O), *Solanum ellipticum* (F), *Dianella brevipedunculata* (O), *Chloris ventricosa* (O), *Digitaria divaricatissima* (O), *Melinis repens** (O), *Eragrostis leptostachya* (O), *Glycine clandestina* (O), *Rostellularia adscendens* (O), *Dianella caerulea* (O)	

North

East

South

West

FLORA SURVEY ASSESSMENT	
Project: Dalby Solar Farm	
Coordinates: -27.2569°, 150.8576° (GDA 94)	
Date: 2021-05-27; 09:07	Assessor: BM
Site No: Q11	Survey type: quaternary survey
Slope: gentle incline (3-6°)	Aspect: west
Landform: hillslope	Geology: fine Sedimentary
Soils	
Soil texture: loam,gravel	Soil colour: grey,brown
Disturbances	
Disturbance observed: roads	
Erosion (% site affected): none detected	
Fire scars: no	
Vegetation	
Mapped RE: 11.7.4/11.5.1 (BD status: NC/NC, VM status: remnant least-concern)	
Verified RE: 11.7.4, (BD status: NC, VM status: LC)	
Verified TEC: Not a TEC	
Dominant stratum: tree	Vegetation status: remnant
Dieback (%): 1-10	Health: good
EDL Height (m): 15	EDL Cover (%): 30
Dominant T1 species: *Eucalyptus crebra* (F), *Callitris glaucophylla* (F)	
Dominant T2 species: *Lysicarpus angustifolius* (F), *Allocasuarina inophloia* (F)	
Dominant S1/S2 species: *Acacia triptera* (F), *Cryptandra amara* (O), *Acacia crassa* subsp. *crassa* (A), *Acacia conferta* (F)	
Dominant ground species: *Cleistochloa subjuncea* (D), *Cheilanthes sieberi* (A), *Calotis dentex* (F), *Eriachne mucronata* (O), *Solanum ellipticum* (F), *Pomax umbellata* (O)	

North

East

South

West

PV Power Station - Fauna Habitat Asessment

FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2448°, 150.8321° (GDA 94)	
Date: 2021-05-25, 07:31	Assessor: Bn
Site No: FH10	Survey type: fauna habitat
Comments: Edge of small ironstone jump up with scald on top. Potential/likely yakka habitat. Rocky area with large fallen trees. Some burrows under large rocks present.	
Fauna habitat within 1 ha	
Hollows	mostly dead
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): ocassional (6-10)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): abundant (>20)
No. termite mounds	arboreal: rare (1-2) ground: occasional (3-5)
Burrows	common (4-5)
Rock crevices	occasional (11-25 %)
Basking areas	occasional (11-25 %)
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	common (26-50 %)
Grassy tussocks	common (26-50 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	common (51-75 %)
Boulders (61 cm-2 m)	common (51-75 %)
Large boulders (>2 m)	common (51-75 %)
Seeding native grass cover	occasional (11-25 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	occasional (11-25 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes,	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Notes: Inadequate density of large HBTs	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

East

South

West

FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2376°, 150.8397° (GDA 94)	
Date: 2021-05-25, 09:26	Assessor: Bn
Site No: FH11	Survey type: fauna habitat
Comments: Acacia shrub land with emergent crebra and exerta	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): not detected small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): ocassional (6-10)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	rare (1-10 %)
Exfoliating bark	rare (1-10 %)
Cliffs/outcrops	not detected
Grassy tussocks	rare (1-10 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): rare (1-10 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	rare (1-10 %)
Fleshy fruiting plants	not detected
Shrub density (cover)	abundant (>50 %)
Nectar abundance	common (26-50 %)
Koala habitat assessment	
Koala feed trees: yes,	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height? yes	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): absent	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? no	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? marginal	

North

East

South

West

FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2398°, 150.8362° (GDA 94)	
Date: 2021-05-25, 10:38	Assessor: Bn
Site No: FH12	Survey type: fauna habitat
Comments: *E. crebra* forest with scattered *E. tereticornis* and *C. clarksoniana* with dense buloke and callitris.	
Fauna habitat within 1 ha	
Hollows	mixture
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): not detected small (<50 cm): abundant (>20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	rare (1)
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	common (26-75 %)
Cliffs/outcrops	not detected
Grassy tussocks	rare (1-10 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	rare (1-10 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	common (26-50 %)
Nectar abundance	common (26-50 %)
Koala habitat assessment	
Koala feed trees: yes, forest red gum (E. tereticornis) – primary (TRC & SRC)	
Koala evidence:	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

East

South

West

FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2442°, 150.8296° (GDA 94)	
Date: 2021-05-25, 12:48	Assessor: Bn
Site No: FH13	Survey type: fauna habitat
Comments: Poplar and crebra forest with scattered callitris and buloke	
Fauna habitat within 1 ha	
Hollows	mostly dead
No. of hollows	large (>20 cm): not detected medium (11-20 cm): not detected small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): not detected small (<50 cm): common (11-20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	not detected
Grassy tussocks	abundant (>50 %), height (m): 20
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	occasional (11-25 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, poplar box (E. populnea) - secondary,narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): absent	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? marginal	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2414°, 150.8304° (GDA 94)	
Date: 2021-05-25, 14:50	Assessor: Bn
Site No: FH14	Survey type: fauna habitat
Comments: E. crebra and E populnea forest with callitris and buloke	
Fauna habitat within 1 ha	
Hollows	mixture
No. of hollows	large (>20 cm): not detected medium (11-20 cm): not detected small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): abundant (>20)
No. termite mounds	arboreal: not detected ground: rare (1-2)
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	not detected
Grassy tussocks	rare (1-10 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): common (51-75 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	occasional (11-25 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, poplar box (E. populnea) - secondary,narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): absent	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? marginal	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

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Access Corridor - Fauna Habitat Assessment

FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2654°, 150.8785° (GDA 94)	
Date: 2021-05-24, 11:10	Assessor: Bn
Site No: FH1	Survey type: fauna habitat
Comments: Poplar box forest with buloke in understory	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): common (11-20) small (<11 cm): abundant (>20)
No. of logs	large (>50 cm): not detected small (<50 cm): common (11-20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	common (26-75 %)
Cliffs/outcrops	not detected
Grassy tussocks	occasional (11-25 %), height (m): 40
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): common (51-75 %) Coarse (2-10 cm diameter): common (51-75 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, poplar box (E. populnea) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Suitable greater glider habitat? marginal	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? marginal	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2616°, 150.8691° (GDA 94)	
Date: 2021-05-24, 11:53	Assessor: Bn
Site No: FH2	Survey type: fauna habitat
Comments: *E. crebra* forest with buloke in understory	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): not detected small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): not detected small (<50 cm): abundant (>20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	rare (1-10 %)
Cliffs/outcrops	not detected
Grassy tussocks	not detected, height (m):
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	not detected
Shrub density (cover)	not detected
Nectar abundance	common (26-50 %)
Koala habitat assessment	
Koala feed trees: yes, narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): absent	
Notes: Narrow strips either side of road. No suitable HBTs present.	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? marginal	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? marginal	

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2581°, 150.8607° (GDA 94)	
Date: 2021-05-24, 12:14	Assessor: Bn
Site No: FH3	Survey type: fauna habitat
Comments: E. crebra forest with scattered E. exerta and Callitris in understory	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): common (11-20)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): common (11-20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	not detected
Grassy tussocks	common (26-50 %), height (m): 20
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	not detected
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, narrow -leaved ironbark (E. crebra) - secondary,Queensland peppermint (E. exserta) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Notes: Inadequate large hollow bearing trees	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? no	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? marginal	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2553°, 150.8542° (GDA 94)	
Date: 2021-05-24, 12:46	Assessor: Bn
Site No: FH4	Survey type: fauna habitat
Comments: *E. populnea* and *E.crebra* forest with callitris and buloke in understory	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): common (11-20)
No. of logs	large (>50 cm): not detected small (<50 cm): abundant (>20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	not detected
Grassy tussocks	not detected, height (m):
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	rare (1-10 %)
Fleshy fruiting plants	not detected
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, poplar box (E. populnea) - secondary,narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Notes: Low density if present	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? marginal	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2551°, 150.8535° (GDA 94)	
Date: 2021-05-24, 13:14	Assessor: Bn
Site No: FH5	Survey type: fauna habitat
Comments: E. tereticornis forest with ephemeral shallow swamp	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): ocassional (6-10)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): common (11-20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	rare (1-10 %)
Cliffs/outcrops	not detected
Grassy tussocks	rare (1-10 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): common (51-75 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	rare (1-10 %)
Fleshy fruiting plants	not detected
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, forest red gum (E. tereticornis) - primary,narrow - leaved ironbark (E. crebra) - secondary	
Koala evidence: scratches,scats	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: high (2), vegetation composition: medium(1), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 9 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? marginal	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2543°, 150.8507° (GDA 94)	
Date: 2021-05-24, 13:37	Assessor: Bn
Site No: FH6	Survey type: fauna habitat
Comments: Blue gum, Rough and smoothed barked apple with callitris and buloke in understory	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): ocassional (6-10)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): common (11-20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	not detected
Grassy tussocks	not detected
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	rare (1-5)
Fleshy fruiting plants	not detected
Shrub density (cover)	common (26-50 %)
Nectar abundance	common (26-50 %)
Koala habitat assessment	
Koala feed trees: yes, forest red gum (E. tereticornis) - primary	
Koala evidence: scratches,scats	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Suitable greater glider habitat? no	
Squatter pigeon habitat assessment	
Patch dominated by eucalyptus, corymbia, acacia or callitris species?	
Ground layer consists of patchy, native, perennial tussock grasses (or with a mix of shrubs and forbs)?	
Ground layer vegetation cover is less than 33 %?	
Suitable Squatter Pigeon habitat?	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2527°, 150.8428° (GDA 94)	
Date: 2021-05-24, 14:33	Assessor: Bn
Site No: FH7	Survey type: fauna habitat
Comments: Ironbark and smoothed barked apple forest wish callitris and buloke in understory	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): not detected small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): not detected small (<50 cm): common (11-20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	common (26-75 %)
Cliffs/outcrops	not detected
Grassy tussocks	rare (1-10 %), height (m): 20
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	rare (1-10 %)
Fleshy fruiting plants	not detected
Shrub density (cover)	common (26-50 %)
Nectar abundance	common (26-50 %)
Koala habitat assessment	
Koala feed trees: yes, narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): absent	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2524°, 150.8373° (GDA 94)	
Date: 2021-05-24, 15:00	Assessor: Bn
Site No: FH8	Survey type: fauna habitat
Fauna habitat within 1 ha	
Hollows	mixture
No. of hollows	large (>20 cm): rare (1-5) medium (11-20 cm): ocassional (6-10) small (<11 cm): abundant (>20)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): common (11-20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	occasional (2-3)
Rock crevices	not detected
Basking areas	rare (1-10 %)
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	not detected
Grassy tussocks	common (26-50 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	ocassional (11-50 %)
Boulders (61 cm-2 m)	rare (1-10 %)
Large boulders (>2 m)	not detected
Seeding native grass cover	occasional (11-25 %)
Fleshy fruiting plants	not detected
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, Queensland peppermint (E. exserta) - secondary,narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): ocassional (6-10)	
Suitable greater glider habitat? marginal	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2509°, 150.8288° (GDA 94)	
Date: 2021-05-24, 15:25	Assessor: Bn
Site No: FH9	Survey type: fauna habitat
Comments: *E. crebra* with buloke and callitris in understory	
Fauna habitat within 1 ha	
Hollows	mostly dead
No. of hollows	large (>20 cm): not detected medium (11-20 cm): not detected small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): not detected small (<50 cm): ocassional (6-10)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	common (26-75 %)
Cliffs/outcrops	not detected
Grassy tussocks	common (26-50 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	occasional (11-25 %)
Fleshy fruiting plants	not detected
Shrub density (cover)	common (26-50 %)
Nectar abundance	common (26-50 %)
Koala habitat assessment	
Koala feed trees: yes, poplar box (E. populnea) – secondary (TRC & SRC),forest red gum (E. tereticornis) – primary (TRC & SRC)	
Koala evidence: scratches,scats	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Notes: Not enough large HBTs	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

East

South

West

FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2454°, 150.8224° (GDA 94)	
Date: 2021-05-26, 07:14	Assessor: Bn
Site No: FH15	Survey type: fauna habitat
Comments: E. crebra and E. populnea forest with scattered E. tereticornis with callitris and buloke.	
Fauna habitat within 1 ha	
Hollows	mixture
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): abundant (>20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	rare (1-10 %)
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	not detected
Grassy tussocks	abundant (>50 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): common (51-75 %) Coarse (2-10 cm diameter): common (51-75 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	occasional (11-25 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, forest red gum (E. tereticornis) - primary,poplar box (E. populnea) - secondary,narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: scratches,scats	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Notes: Three food trees present. Scats and scratches on nearby blue gums.	
Koala habitat score: koala occurrence: high (2), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 10 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? marginal	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2469°, 150.8269° (GDA 94)	
Date: 2021-05-26, 09:35	Assessor: Bn
Site No: FH16	Survey type: fauna habitat
Comments: E. crebra, E. populnea and E. tereticornis forest with buloke and callitris in understory.	
Fauna habitat within 1 ha	
Hollows	mostly alive
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): not detected small (<50 cm): ocassional (6-10)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	occasional (11-25 %)
Cliffs/outcrops	not detected
Grassy tussocks	common (26-50 %), height (m): 0.2
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): ocassional (11-50 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, forest red gum (E. tereticornis) - primary,poplar box (E. populnea) - secondary,narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: scratches,scats	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Notes: Scratches and scats at nearby blue gums	
Koala habitat score: koala occurrence: high (2), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 10 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? marginal	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? marginal	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2401°, 150.8171° (GDA 94)	
Date: 2021-05-26, 11:53	Assessor: Bn
Site No: FH17	Survey type: fauna habitat
Comments: E. crebra forest with callitris and buloke	
Fauna habitat within 1 ha	
Hollows	mostly dead
No. of hollows	large (>20 cm): not detected medium (11-20 cm): not detected small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): abundant (>20)
No. termite mounds	arboreal: not detected ground: rare (1-2)
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	common (26-75 %)
Cliffs/outcrops	not detected
Grassy tussocks	not detected, height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): common (51-75 %) Coarse (2-10 cm diameter): common (51-75 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): absent	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2437°, 150.8168° (GDA 94)	
Date: 2021-05-26, 13:37	Assessor: Bn
Site No: FH18	Survey type: fauna habitat
Comments: E. crebra forest with buloke and callitris	
Fauna habitat within 1 ha	
Hollows	mostly dead
No. of hollows	large (>20 cm): not detected medium (11-20 cm): rare (1-5) small (<11 cm): rare (1-5)
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): abundant (>20)
No. termite mounds	arboreal: rare (1-2) ground: rare (1-2)
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	common (26-75 %)
Cliffs/outcrops	not detected
Grassy tussocks	common (26-50 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): common (51-75 %) Coarse (2-10 cm diameter): common (51-75 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	common (26-50 %)
Nectar abundance	abundant (>50 %)
Koala habitat assessment	
Koala feed trees: yes, poplar box (E. populnea) - secondary,narrow -leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): rare (1-5)	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? yes	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? yes	

North

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FAUNA HABITAT ASSESSMENT

Project: Dalby Solar Farm	
Coordinates: -27.2393°, 150.8226° (GDA 94)	
Date: 2021-05-27, 07:43	Assessor: Bn
Site No: FH19	Survey type: fauna habitat
Comments: Regrowth E. crebra and E. poplar forest with callitris and buloke.	
Fauna habitat within 1 ha	
Hollows	not detected
No. of hollows	large (>20 cm): medium (11-20 cm): small (<11 cm):
No. of logs	large (>50 cm): rare (1-5) small (<50 cm): common (11-20)
No. termite mounds	arboreal: not detected ground: not detected
Burrows	not detected
Rock crevices	not detected
Basking areas	not detected
Exfoliating bark	rare (1-10 %)
Cliffs/outcrops	not detected
Grassy tussocks	abundant (>50 %), height (m): 30
Cracking clays	not detected
Leaf litter	Fine (<2 cm diameter): rare (1-10 %) Coarse (2-10 cm diameter): ocassional (11-50 %)
Stones (20-60 cm)	not detected
Boulders (61 cm-2 m)	not detected
Large boulders (>2 m)	not detected
Seeding native grass cover	common (26-50 %)
Fleshy fruiting plants	rare (1-10 %)
Shrub density (cover)	occasional (11-25 %)
Nectar abundance	common (26-50 %)
Koala habitat assessment	
Koala feed trees: yes, poplar box (E. populnea) - secondary,narrow - leaved ironbark (E. crebra) - secondary	
Koala evidence: none detected	
Height of tallest stratum > 5 m? yes	
If a shrubland, are emergent food trees > 5 m in height?	
Notes: Technically yes but given the height and exposed nature of the habitat due to past clearing/the veg being regrowth, there's habitat areas of greater value elsewhere on the site.	
Koala habitat score: koala occurrence: low (0), vegetation composition: high(2), habitat connectivity: high (2), key existing threats: high (2), recovery value: high (2), overall score: 8 = **critical habitat**	
Greater glider habitat assessment	
Eucalypt trees present? yes	
Abundance of greater glider suitable hollows (>10 cm): absent	
Suitable greater glider habitat? no	
Glossy black cockatoo habitat assessment	
Suitable glossy black-cockatoo habitat? no	
Grey Snake habitat assessment	
Suitable grey Snake habitat? no	
Golden-tailed gecko habitat assessment	
Suitable golden-tailed gecko habitat? marginal	

North

East

South

West

PV Power Station - BioCondition Assessment

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-26, 11:37 | **Assessor:** BM | **Site No:** BC1

Coordinates: 0 m: -27.2399, 150.8171; **50 m:** -27.2401, 150.8168

Mapped RE: 11.5.1 (VM status: LC, BD status: NC)
Verified RE: 11.5.1 (VM status: LC, BD status: NC)

Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	100%	100%
	Emergent height	-	-
	Canopy height	18 m	20 m
	Sub-canopy height	9 m	9 m
	Number of large eucalypt trees (Threshold: 44 cm/dbh)	2	7
	Number of large non-eucalypt trees (Threshold: 24 cm /DBH)	2	1
	Native tree species richness	3	5
	Tree species: *Eucalyptus crebra, Allocasuarina luehmannii, Callitris glaucophylla*		
50 X 10 m area	**Non-native cover**	1%	0%
	Native shrub species richness	7	5
	Shrub species: *Acacia leiocalyx subsp. leiocalyx, Allocasuarina luehmannii, Solanum nemophilum, Eucalyptus crebra, Dodonaea triangularis, Opuntia tomentosa*, Acacia conferta, Denhamia cunninghamii*		
	Native grass species richness	18	8
	Grass species: *Eragrostis leptostachya, Entolasia stricta, Panicum effusum, Eragrostis sororia, Enteropogon acicularis, Digitaria ramularis, Aristida leichhardtiana, Paspalidium sp., Dinebra decipiens, Rytidosperma bipartitum, Walwhalleya proluta, Sporobolus creber, Chloris ventricosa, Aristida calycina, Aristida sp., Eriochloa pseudoacrotricha, Aristida caput-medusae, Eulalia aurea*		
	Native forb and other species richness	22	10
	Forb species: *Cyperus fulvus, Fimbristylis depauperata, Cheilanthes sieberi, Calandrinia pickeringii, Brunoniella australis, Cyperus gracilis, Goodenia sp., Einadia nutans, Cyanthillium cinereum, Dianella caerulea, Solanum ellipticum, Goodenia glabra, Lomandra sp., Calotis dentex, Evolvulus alsinoides, Einadia trigonos subsp. stellulata, Cheilanthes distans, Phyllanthus virgatus, Synostemon sp., Gahnia aspera, Scleria mackaviensis, Calotis cuneifolia*		
Plot attributes (actual)	**Emergent cover**	-	-
	Canopy cover	20.8%	25%
	Sub-canopy cover	31.9%	20%
	Shrub cover	15.6%	6%
	Average perennial grass cover	33%	23%
	Average organic litter cover	43%	45%
	Total coarse woody debris (m/ ha):	69.00 (x10) = 690	135

^ Benchmark^ (if available) /hectare

North photo

East photo

South photo

West photo

Spot photos

Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	15	10
	(b) Tree canopy height	5	5
	Emergent height: -		
	Canopy height: 5		
	Subcanopy height: 5		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	5
	Emergent cover: -		
	Canopy cover: 5		
	Subcanopy cover: 5		
	(e) Shrub layer cover	5	3
	(f) Coarse woody debris	5	5
	(g) Native plant species richness	20	18
	Tree species richness: 3		
	Shrub species richness: 5		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	5
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^

= (71) +(20) / 80 + 20

= .91

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC1 (11.5.1) is 9.1

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-26, 12:59 | **Assessor:** BM | **Site No:** BC2

Coordinates: 0 m: -27.2435, 150.8169; **50 m:** -27.2438, 150.8165

Mapped RE: 11.5.1 (VM status: LC, BD status: NC)
Verified RE: 11.5.1 (VM status: LC, BD status: NC)

Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	60%	100%
	Emergent height	-	-
	Canopy height	18 m	20 m
	Sub-canopy height	14 m	9 m
	Number of large eucalypt trees (Threshold: 44 cm/dbh)	1	7
	Number of large non-eucalypt trees (Threshold: 24 cm /DBH)	4	1
	Native tree species richness	5	5
	Tree species: *Eucalyptus crebra, Callitris glaucophylla, Allocasuarina luehmannii, Eucalyptus populnea, Corymbia clarksoniana*		
	Non-native cover	1%	0%
	Native shrub species richness	7	5
	Shrub species: *Allocasuarina luehmannii, Acacia leiocalyx subsp. leiocalyx, Eucalyptus crebra, Solanum nemophilum, Sida hackettiana, Myoporum acuminatum, Abutilon oxycarpum*		
	Native grass species richness	14	8
50 X 10 m area	**Grass species:** *Sporobolus creber, Enteropogon acicularis, Eragrostis spartinoides, Dinebra decipiens, Eragrostis sororia, Aristida calycina, Eragrostis brownii, Paspalidium distans, Cymbopogon refractus, Eragrostis leptostachya, Chloris ventricosa, Paspalidium sp., Ancistrachne uncinulata, Cenchrus ciliaris*, Melinis repens**		
	Native forb and other species richness	21	10
	Forb species: *Fimbristylis depauperata, Cheilanthes sieberi, Calotis cuneifolia, Sphaeromorphaea australis, Cyanthillium cinereum, Calotis dentex, Solanum ellipticum, Einadia nutans, Cheilanthes distans, Einadia polygonoides, Calandrinia pickeringii, Evolvulus alsinoides, Glossocardia bidens, Glycine sp., Vittadinia sulcata, Oxalis sp., Cyperus fulvus, Nyssanthes diffusa, Glycine tomentella, Gahnia aspera, Cyperus difformis, Gomphrena celosioides**		
Plot attributes (actual)	**Emergent cover**	-	-
	Canopy cover	10.9%	25%
	Sub-canopy cover	36.8%	20%
	Shrub cover	8.5%	6%
	Average perennial grass cover	83%	23%
	Average organic litter cover	10%	45%
	Total coarse woody debris (m/ ha):	51.00 (x10) = 510	135

^ Benchmark^ (if available) /hectare

North photo

East photo

South photo

West photo

Spot photos

Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	15	10
	(b) Tree canopy height	5	5
	Emergent height: -		
	Canopy height: 5		
	Subcanopy height: 5		
	(c) Recruitment	5	3
	(d) Tree canopy cover (%)	5	4
	Emergent cover:		
	Canopy cover: 3		
	Subcanopy cover: 5		
	(e) Shrub layer cover	5	5
	(f) Coarse woody debris	5	5
	(g) Native plant species richness	20	20
	Tree species richness: 5		
	Shrub species richness: 5		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	3
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^

= (70) +(20) / 80 + 20

= .9

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC2 (11.5.1) is 9

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-25, 10:25 | **Assessor:** BM | **Site No:** BC5

Coordinates: 0 m: -27.2400, 150.8357; **50 m:** -27.2398, 150.8361

Mapped RE: 11.7.4/11.7.5 (90/10) (VM status: LC, BD status: NC)
Verified RE: 11.7.4 (VM status: LC, BD status: NC)

Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	100%	100%
	Emergent height	-	-
	Canopy height	17 m	18 m
	Sub-canopy height	10 m	9 m
	Number of large eucalypt trees (Threshold: 46 cm/dbh)	2	14
	Number of large non-eucalypt trees (Threshold: 26 cm /DBH)	7	7
	Native tree species richness	6	4
	Tree species: *Eucalyptus crebra, Callitris glaucophylla, Corymbia clarksoniana, Allocasuarina luehmannii, Angophora leiocarpa, Eucalyptus tereticornis subsp. tereticornis*		
50 X 10 m area	**Non-native cover**	1%	0%
	Native shrub species richness	5	6
	Shrub species: *Allocasuarina luehmannii, Acacia leiocalyx subsp. leiocalyx, Acacia muelleriana, Solanum nemophilum, Opuntia tomentosa*, Acacia conferta*		
	Native grass species richness	12	7
	Grass species: *Panicum effusum, Eragrostis sororia, Eragrostis spartinoides, Aristida calycina, Eragrostis brownii, Paspalidium distans, Aristida leichhardtiana, Sporobolus creber, Digitaria ramularis, Eragrostis sp., Aristida caput-medusae, Aristida jerichoensis*		
	Native forb and other species richness	25	9
	Forb species: *Calandrinia pickeringii, Dysphania carinata, Gahnia aspera, Cheilanthes sieberi, Lomandra sp., Cheilanthes distans, Cyperus gracilis, Solanum ellipticum, Cyperus fulvus, Euphorbia drummondii, Lomandra multiflora, Sigesbeckia orientalis, Cyanthillium cinereum, Evolvulus alsinoides, Crassula sp., Lomandra filiformis, Cyperus pygmaeus, Fimbristylis dichotoma, Dianella caerulea, Vittadinia sp., Dianella revoluta, Laxmannia gracilis, Sonchus oleraceus*, Calotis dentex, Brunoniella australis, Lysiana exocarpi subsp. tenuis*		
Plot attributes (actual)	**Emergent cover**	-	-
	Canopy cover	21.8%	29%
	Sub-canopy cover	55.6%	8%
	Shrub cover	10%	7%
	Average perennial grass cover	13%	12%
	Average organic litter cover	38.6%	50%
	Total coarse woody debris (m/ ha):	68.00 (x10) = 680	320

^ Benchmark^ (if available) /hectare

North photo

East photo

South photo

West photo

Spot photos

Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	15	5
	(b) Tree canopy height	5	5
	Emergent height: -		
	Canopy height: 5		
	Subcanopy height: 5		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	4
	Emergent cover: -		
	Canopy cover: 5		
	Subcanopy cover: 3		
	(e) Shrub layer cover	5	5
	(f) Coarse woody debris	5	5
	(g) Native plant species richness	20	18
	Tree species richness: 5		
	Shrub species richness: 3		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	5
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^

= (67) +(20) / 80 + 20

= .87

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC5 (11.7.4) is 8.7

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-25, 14:12 | **Assessor:** BM | **Site No:** BC7

Coordinates: 0 m: -27.2411, 150.8303; **50 m:** -27.2415, 150.8305

Mapped RE: 11.7.4/11.7.5 (90/10) (VM status: LC, BD status: NC).
Verified RE: 11.7.4 (VM status: LC, BD status: NC)

Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	100%	100%
	Emergent height	-	-
	Canopy height	19 m	18 m
	Sub-canopy height	11 m	9 m
	Number of large eucalypt trees (Threshold: 46 cm/dbh)	0	14
	Number of large non-eucalypt trees (Threshold: 26 cm /DBH)	1	7
	Native tree species richness	3	4
	Tree species: *Eucalyptus crebra, Callitris glaucophylla, Allocasuarina luehmannii*		
	Non-native cover	1%	0%
	Native shrub species richness	6	6
	Shrub species: *Hakea leucoptera, Denhamia cunninghamii, Allocasuarina luehmannii, Acacia leiocalyx subsp. leiocalyx, Hakea lorea subsp. lorea, Opuntia tomentosa*, Opuntia stricta*, Abutilon oxycarpum*		
50 X 10 m area	**Native grass species richness**	13	7
	Grass species: *Panicum effusum, Sporobolus creber, Eragrostis spartinoides, Eragrostis leptostachya, Eragrostis sororia, Ancistrachne uncinulata, Bothriochloa decipiens var. decipiens, Aristida caput-medusae, Eriochloa pseudoacrotricha, Aristida jerichoensis, Paspalidium sp., Enteropogon acicularis, Melinis repens*, Eragrostis brownii*		
	Native forb and other species richness	22	9
	Forb species: *Calandrinia pickeringii, Cyperus gracilis, Nyssanthes diffusa, Phyllanthus virgatus, Solanum ellipticum, Fimbristylis dichotoma, Calotis cuneifolia, Cyanthillium cinereum, Cyperus difformis, Alternanthera nana, Brunoniella australis, Einadia hastata, Cheilanthes sieberi, Gahnia aspera, Glossocardia bidens, Dysphania carinata, Hibiscus sturtii, Rostellularia adscendens, Lomandra sp., Goodenia glabra, Einadia trigonos subsp. stellulata, Cyperus fulvus*		
Plot attributes (actual)	**Emergent cover**	-	-
	Canopy cover	43.8%	29%
	Sub-canopy cover	19.4%	8%
	Shrub cover	8.8%	7%
	Average perennial grass cover	9.2%	12%
	Average organic litter cover	71%	50%
	Total coarse woody debris (m/ ha):	10.00 (x10) = 100	320

^ Benchmark^ (if available) /hectare

North photo

East photo

South photo

West photo

Spot photos

Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	15	5
	(b) Tree canopy height	5	5
	Emergent height: -		
	Canopy height: 5		
	Subcanopy height: 5		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	4
	Emergent cover: -		
	Canopy cover: 5		
	Subcanopy cover: 3		
	(e) Shrub layer cover	5	5
	(f) Coarse woody debris	5	2
	(g) Native plant species richness	20	18
	Tree species richness: 3		
	Shrub species richness: 5		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	3
	(J) Litter cover	5	5
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^

= (62) +(20) / 80 + 20

= .82

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC7 (11.7.4) is 8.2

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-25, 12:37 | **Assessor:** BM | **Site No:** BC6

Coordinates: 0 m: -27.2446, 150.8298; **50 m:** -27.2443, 150.8295

Mapped RE: 11.7.4/11.7.5 (90/10) (VM status: LC, BD status: NC).
Verified RE: 11.7.4 (VM status: LC, BD status: NC)

Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	80%	100%
	Emergent height	-	-
	Canopy height	17 m	18 m
	Sub-canopy height	9 m	9 m
	Number of large eucalypt trees (Threshold: 46 cm/dbh)		14
	Number of large non-eucalypt trees (Threshold: 26 cm /DBH)	1	7
	Native tree species richness	5	4
	Tree species: *Eucalyptus crebra, Callitris glaucophylla, Eucalyptus populnea, Allocasuarina luehmannii, Eucalyptus crebra x Eucalyptus populnea*		
50 X 10 m area	**Non-native cover**	1%	0%
	Native shrub species richness	3	6
	Shrub species: *Acacia leiocalyx subsp. leiocalyx, Callitris glaucophylla, Pittosporum angustifolium*		
	Native grass species richness	15	7
	Grass species: *Dinebra decipiens, Panicum effusum, Paspalidium sp., Paspalidium distans, Eragrostis sororia, Aristida jerichoensis, Chloris ventricosa, Sporobolus creber, Eragrostis spartinoides, Melinis repens*, Bothriochloa decipiens var. decipiens, Eriochloa pseudoacrotricha, Aristida calycina, Enteropogon acicularis, Aristida queenslandica var. queenslandica, Aristida caput-medusae*		
	Native forb and other species richness	24	9
	Forb species: *Calotis cuneifolia, Euphorbia drummondii, Evolvulus alsinoides, Glycine clandestina, Malvastrum americanum var. americanum*, Cheilanthes sieberi, Cyperus gracilis, Cyperus fulvus, Plantago debilis, Calandrinia pickeringii, Solanum ellipticum, Brunoniella australis, Eremophila debilis, Fimbristylis depauperata, Lobelia purpurascens, Gomphrena celosioides*, Gahnia aspera, Nyssanthes diffusa, Einadia hastata, Vittadinia sulcata, Sida sp., Sphaeromorphaea australis, Glandularia aristigera*, Calotis dentex, Cyperus sp., Synostemon sp., Lomandra multiflora*		
Plot attributes (actual)	**Emergent cover**	-	-
	Canopy cover	35.6%	29%
	Sub-canopy cover	13.3%	8%
	Shrub cover	5.8%	7%
	Average perennial grass cover	57%	12%
	Average organic litter cover	14.4%	50%
	Total coarse woody debris (m/ ha):	64.00 (x10) = 640	320

^ Benchmark^ (if available) /hectare

North photo

East photo

South photo

West photo

Spot photos

Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	15	5
	(b) Tree canopy height	5	5
	Emergent height: -		
	Canopy height: 5		
	Subcanopy height: 5		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	5
	Emergent cover: -		
	Canopy cover: 5		
	Subcanopy cover: 5		
	(e) Shrub layer cover	5	5
	(f) Coarse woody debris	5	5
	(g) Native plant species richness	20	18
	Tree species richness: 5		
	Shrub species richness: 3		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	3
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^

= (66) +(20) / 80 + 20

= .86

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC6 (11.7.4) is 8.6

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-25, 08:40 | **Assessor:** BM | **Site No:** BC8

Coordinates: 0 m: -27.2373, 150.8400; **50 m:** -27.2376, 150.8397

Mapped RE: 11.7.4/11.7.5 (90/10) (VM status: LC, BD status: NC).
Verified RE: 11.7.5 (VM status: LC, BD status: NC)

Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	100%	100%
	Emergent height	11 m	9 m
	Canopy height	2 m	-
	Sub-canopy height	-	-
	Number of large eucalypt trees	-	-
	Number of large non-eucalypt trees	-	-
	Native tree species richness	3	2
	Tree species: *Eucalyptus crebra, Eucalyptus exserta, Angophora leiocarpa*		
	Non-native cover	1%	0%
50 X 10 m area	**Native shrub species richness**	6	12
	Shrub species: *Melichrus urceolatus, Acacia triptera, Eucalyptus crebra, Tephrosia sp., Solanum nemophilum, Eucalyptus exserta*		
	Native grass species richness	17	3
	Grass species: *Eragrostis spartinoides, Panicum simile, Eragrostis sororia, Digitaria brownii, Eragrostis brownii, Aristida calycina, Aristida jerichoensis, Sporobolus creber, Bothriochloa decipiens var. decipiens, Paspalidium sp., Eulalia aurea, Panicum effusum, Aristida caput-medusae, Tripogon loliiformis, Austrostipa scabra, Digitaria ramularis, Thyridolepis mitchelliana*		
	Native forb and other species richness	17	4
	Forb species: *Cheilanthes sieberi, Sida cunninghamii, Evolvulus alsinoides, Brunoniella australis, Oxalis sp., Fimbristylis dichotoma, Solanum ellipticum, Gonocarpus urceolatus, Centella asiatica, Cyperus sp., Calandrinia pickeringii, Vittadinia sulcata, Calotis dentex, Cyanthillium cinereum, Euphorbia drummondii, Gahnia aspera, Portulaca bicolor*		
Plot attributes (actual)	**Emergent cover**	5.3%	10%
	Canopy cover	8.3%	-
	Sub-canopy cover	-	-
	Shrub cover	16.9%	46%
	Average perennial grass cover	21%	3%
	Average organic litter cover	13%	19%
	Total coarse woody debris (m/ ha):	26.00 (x10) = 260	-

^ Benchmark^ (if available) /hectare

East photo

South photo

West photo

North photo

Spot photos





Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	NA	
	(b) Tree canopy height	5	5
	Emergent height: 5		
	Canopy height: -		
	Subcanopy height: -		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	5
	Emergent cover: 5		
	Canopy cover: -		
	Subcanopy cover: -		
	(e) Shrub layer cover	5	3
	(f) Coarse woody debris	NA	
	(g) Native plant species richness	20	18
	Tree species richness: 5		
	Shrub species richness: 3		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	5
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^

= (56) +(20) / 60 + 20

= .95

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC8 (11.7.5) is 9.5

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-25, 07:11 | **Assessor:** BM | **Site No:** BC9

Coordinates: 0 m: -27.2433, 150.8336; **50 m:** -27.2431, 150.8341

Mapped RE: 11.7.4/11.7.5 (90/10) (VM status: LC, BD status: NC).
Verified RE: 11.7.5 (VM status: LC, BD status: NC)

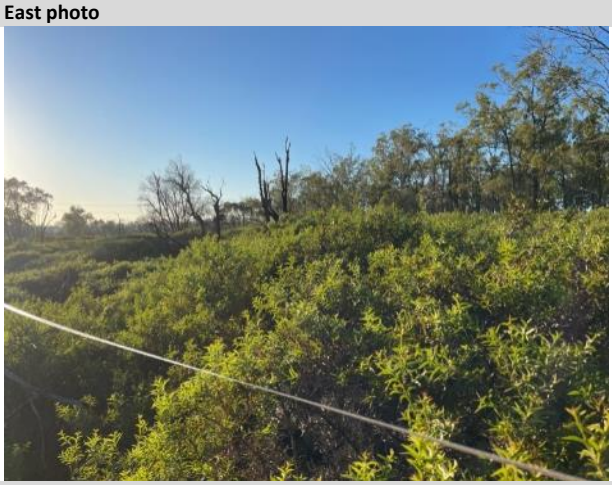
Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	100%	100%
	Emergent height	5 m	9 m
	Canopy height	1.5 m	-
	Sub-canopy height	-	-
	Number of large eucalypt trees	-	-
	Number of large non-eucalypt trees	-	-
	Native tree species richness	1	2
	Tree species: *Eucalyptus exserta*		
	Non-native cover	1%	0%
50 X 10 m area	**Native shrub species richness**	3	12
	Shrub species: *Acacia triptera, Boronia bipinnata, Eucalyptus exserta*		
	Native grass species richness	8	3
	Grass species: *Cleistochloa subjuncea, Digitaria ramularis, Eragrostis brownii, Thyridolepis mitchelliana, Tripogon loliiformis, Aristida caput-medusae, Aristida queenslandica var. queenslandica, Eragrostis lacunaria*		
	Native forb and other species richness	4	4
	Forb species: *Cheilanthes sieberi, Fimbristylis depauperata, Calotis dentex, Cyperus sp., Ambrosia sp.*		
Plot attributes (actual)	**Emergent cover**	0%	10%
	Canopy cover	0%	na%
	Sub-canopy cover	0%	na%
	Shrub cover	37%	46%
	Average perennial grass cover	16%	3%
	Average organic litter cover	41%	19%
	Total coarse woody debris (m/ ha):	-	na

^ Benchmark^ (if available) /hectare

North photo

East photo



South photo

West photo

Spot photos

Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	NA	
	(b) Tree canopy height	5	3
	Emergent height: 3		
	Canopy height: -		
	Subcanopy height: -		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	0
	Emergent cover: 0		
	Canopy cover: -		
	Subcanopy cover: -		
	(e) Shrub layer cover	5	5
	(f) Coarse woody debris	NA	
	(g) Native plant species richness	20	16
	Tree species richness: 3		
	Shrub species richness: 3		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	3
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^

= (47) +(20) / 60 + 20

= .84

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC9 (11.7.5) is 8.4

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-26, 07:08	**Assessor:** BM	**Site No:** BC3

Coordinates: 0 m: -27.2447, 150.8222; **50 m:** -27.2452, 150.8223

Mapped RE: 11.5.1 (VM status: LC (HVR), BD status: NC (HVR))
Verified RE: 11.5.1 advanced regrowth (VM status: LC (HVR), BD status: NC (HVR))

Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	80%	100%
	Emergent height	-	-
	Canopy height	14 m	20 m
	Sub-canopy height	9 m	9 m
	Number of large eucalypt trees (Threshold: 44 cm/dbh)	1	7
	Number of large non-eucalypt trees (Threshold: 24 cm /DBH)	5	1
	Native tree species richness	5	5
	Tree species: *Eucalyptus crebra, Eucalyptus populnea, Callitris glaucophylla, Allocasuarina luehmannii, Eucalyptus tereticornis subsp. tereticornis*		
50 X 10 m area	**Non-native cover**	1%	0%
	Native shrub species richness	6	5
	Shrub species: *Acacia leiocalyx subsp. leiocalyx, Allocasuarina luehmannii, Pimelea neoanglica, Solanum nemophilum, Callitris glaucophylla, Eucalyptus populnea*		
	Native grass species richness	14	8
	Grass species: *Eragrostis sororia, Panicum effusum, Eragrostis leptostachya, Paspalidium sp., Melinis repens*, Aristida calycina, Sporobolus creber, Cenchrus ciliaris*, Paspalidium distans, Bothriochloa decipiens var. decipiens, Eulalia aurea, Aristida jerichoensis, Cymbopogon refractus, Chloris ventricosa, Enteropogon acicularis, Eragrostis brownii, Chloris gayana**		
	Native forb and other species richness	24	10
	Forb species: *Murdannia graminea, Cheilanthes sieberi, Brunoniella australis, Cyperus bifax, Calandrinia pickeringii, Solanum ellipticum, Nyssanthes diffusa, Cyperus gracilis, Einadia hastata, Gomphrena celosioides*, Cyperus fulvus, Cyanthillium cinereum, Phyllanthus virgatus, Dianella caerulea, Dianella brevipedunculata, Calotis cuneifolia, Lomandra multiflora, Alternanthera denticulata, Fimbristylis depauperata, Sigesbeckia orientalis, Commelina lanceolata, Crassula sp., Sonchus oleraceus*, Cyperus pygmaeus, Synostemon sp., Oxalis sp.*		
Plot attributes (actual)	**Emergent cover**	-	-
	Canopy cover	22.4%	25%
	Sub-canopy cover	10%	20%
	Shrub cover	17.7%	6%
	Average perennial grass cover	72%	23%
	Average organic litter cover	17%	45%
	Total coarse woody debris (m/ ha):	54.00 (x10) = 540	135

^ Benchmark^ (if available) /hectare

North photo

East photo

South photo

West photo

Spot photos

	Attribute Scoring	Weighting	Patch score
1. Site-based attributes	**(a) Large trees**	15	10
	(b) Tree canopy height	5	5
	Emergent height: -		
	Canopy height: 5		
	Subcanopy height: 5		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	5
	Emergent cover: -		
	Canopy cover: 5		
	Subcanopy cover: 5		
	(e) Shrub layer cover	5	3
	(f) Coarse woody debris	5	5
	(g) Native plant species richness	20	20
	Tree species richness: 5		
	Shrub species richness: 5		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	3
2. Landscape attributes	**(k) Patch size =** ≥100 – 200 ha remnant OR >200 ha remnant and regrowth OR >200 ha regrowth	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^
= (71) +(20) / 80 + 20
= .91

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC3 (11.5.1 advanced regrowth) is 9.1

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-26, 09:02	**Assessor:** BM	**Site No:** BC4

Coordinates: 0 m: -27.2468, 150.8268; **50 m:** -27.2464, 150.8271

Mapped RE: 11.5.1 (VM status: LC (HVR), BD status: NC (HVR))
Verified RE: 11.5.1 advanced regrowth (VM status: LC (HVR), BD status: NC (HVR))

Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	100%	100%
	Emergent height	-	-
	Canopy height	18 m	20 m
	Sub-canopy height	10 m	9 m
	Number of large eucalypt trees (Threshold: 44 cm/dbh)	3	7
	Number of large non-eucalypt trees (Threshold: 24 cm /DBH)	5	1
	Native tree species richness	4	5
	Tree species: *Eucalyptus populnea, Callitris glaucophylla, Allocasuarina luehmannii, Eucalyptus crebra*		
50 X 10 m area	**Non-native cover**	1%	0%
	Native shrub species richness	5	5
	Shrub species: *Allocasuarina luehmannii, Acacia leiocalyx subsp. leiocalyx, Eucalyptus populnea, Geijera parviflora, Opuntia tomentosa*, Eucalyptus tereticornis subsp. tereticornis*		
	Native grass species richness	15	8
	Grass species: *Sporobolus creber, Eragrostis sororia, Panicum effusum, Eragrostis leptostachya, Aristida queenslandica var. queenslandica, Enteropogon acicularis, Chloris ventricosa, Paspalidium distans, Eragrostis spartinoides, Aristida jerichoensis, Eragrostis brownii, Eulalia aurea, Aristida calycina, Bothriochloa decipiens var. decipiens, Melinis repens*, Dinebra decipiens*		
	Native forb and other species richness	28	10
	Forb species: *Solanum ellipticum, Cheilanthes sieberi, Evolvulus alsinoides, Cyperus fulvus, Portulaca filifolia, Calandrinia pickeringii, Glycine tomentella, Dianella brevipedunculata, Cyperus gracilis, Fimbristylis depauperata, Sphaeromorphaea australis, Lomandra multiflora, Calotis cuneifolia, Cheilanthes distans, Rostellularia adscendens, Nyssanthes diffusa, Glycine clandestina, Einadia polygonoides, Centella asiatica, Cymbidium canaliculatum, Gomphrena celosioides*, Brunoniella australis, Alternanthera denticulata, Calotis dentex, Chrysocephalum apiculatum, Synostemon sp., Phyllanthus virgatus, Einadia nutans, Commelina lanceolata*		
Plot attributes (actual)	**Emergent cover**	-	-
	Canopy cover	17%	25%
	Sub-canopy cover	19%	20%
	Shrub cover	25%	6%
	Average perennial grass cover	61%	23%
	Average organic litter cover	26%	45%
	Total coarse woody debris (m/ ha):	50.00 (x10) = 500	135

^ Benchmark^ (if available) /hectare

North photo

East photo

South photo

West photo

Spot photos

Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	15	15
	(b) Tree canopy height	5	5
	Emergent height: -		
	Canopy height: 5		
	Subcanopy height: 5		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	5
	Emergent cover: -		
	Canopy cover: 5		
	Subcanopy cover: 5		
	(e) Shrub layer cover	5	3
	(f) Coarse woody debris	5	5
	(g) Native plant species richness	20	18
	Tree species richness: 3		
	Shrub species richness: 5		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	5
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^

= (76) +(20) / 80 + 20

= .96

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC4 (11.5.1 advanced regrowth) is 9.6

Dalby Solar Farm BioCondition Assessment

Date: 2021-05-27, 07:10	**Assessor:** BM	**Site No:** BC10

Coordinates: 0 m: -27.2389, 150.8224; **50 m:** -27.2393, 150.8225

Mapped RE: 11.5.1 (VM status: LC (HVR), BD status: NC (HVR))
Verified RE: 11.7.4 regrowth (VM status: LC (HVR), BD status: NC (HVR))

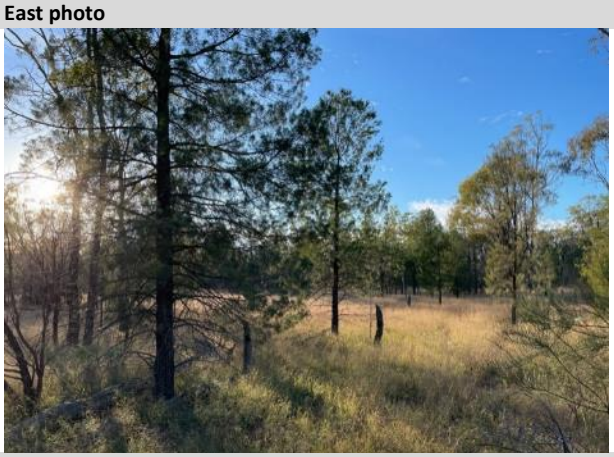
Benchmark available? yes

		Measured	Benchmark^
100 x 50 m area (0.5 ha)	**Recruitment:**	75%	100%
	Emergent height	-	-
	Canopy height	15 m	18 m
	Sub-canopy height	9 m	9 m
	Number of large eucalypt trees (Threshold: 46 cm/dbh)	1	14
	Number of large non-eucalypt trees (Threshold: 26 cm /DBH)	0	7
	Native tree species richness	4	4
	Tree species: *Eucalyptus crebra, Callitris glaucophylla, Brachychiton populneus subsp. populneus, Allocasuarina luehmannii*		
	Non-native cover	1%	0%
50 X 10 m area	**Native shrub species richness**	6	6
	Shrub species: *Allocasuarina luehmannii, Callitris glaucophylla, Acacia leiocalyx subsp. leiocalyx, Psydrax oleifolia, Eucalyptus crebra, Sida hackettiana, Opuntia tomentosa**		
	Native grass species richness	20	7
	Grass species: *Panicum effusum, Dichanthium sericeum, Eragrostis leptostachya, Aristida caput-medusae, Aristida queenslandica var. queenslandica, Aristida jerichoensis, Eragrostis sororia, Enteropogon acicularis, Cymbopogon refractus, Paspalidium sp., Eragrostis brownii, Aristida calycina var. calycina, Eulalia aurea, Eriochloa pseudoacrotricha, Chloris ventricosa, Eragrostis sp., Bothriochloa decipiens var. decipiens, Panicum sp., Eragrostis trichophora*, Digitaria divaricatissima, Eragrostis elongata*		
	Native forb and other species richness	24	9
	Forb species: *Calotis lappulacea, Sphaeromorphaea australis, Glandularia aristigera*, Portulaca filifolia, Evolvulus alsinoides, Fimbristylis depauperata, Vittadinia sulcata, Solanum ellipticum, Goodenia glabra, Cheilanthes sieberi, Chrysocephalum apiculatum, Oldenlandia sp., Hibiscus sturtii, Brunoniella australis, Zornia dyctiocarpa, Calandrinia pickeringii, Malvastrum americanum var. americanum*, Glossocardia bidens, Cyanthillium cinereum, Eremophila debilis, Cyperus fulvus, Einadia hastata, Glycine clandestina, Sonchus oleraceus*, Gomphrena celosioides*, Alternanthera nana, Centella asiatica, Calotis dentex*		
Plot attributes (actual)	**Emergent cover**	-	-
	Canopy cover	18.6%	29%
	Sub-canopy cover	9%	8%
	Shrub cover	5.8%	7%
	Average perennial grass cover	69%	12%
	Average organic litter cover	7%	50%
	Total coarse woody debris (m/ ha):	64.00 (x10) = 640	320

^ Benchmark^ (if available) /hectare

North photo

East photo



South photo

West photo

Spot photos





Attribute Scoring		Weighting	Patch score
1. Site-based attributes	(a) Large trees	15	5
	(b) Tree canopy height	5	5
	Emergent height: -		
	Canopy height: 5		
	Subcanopy height: 5		
	(c) Recruitment	5	5
	(d) Tree canopy cover (%)	5	5
	Emergent cover: -		
	Canopy cover: 5		
	Subcanopy cover: 5		
	(e) Shrub layer cover	5	5
	(f) Coarse woody debris	5	5
	(g) Native plant species richness	20	20
	Tree species richness: 5		
	Shrub species richness: 5		
	Grass species richness: 5		
	Forb species richness: 5		
	(h) Non-native plant cover	10	10
	(i) Native perennial grass cover	5	5
	(J) Litter cover	5	3
2. Landscape attributes	(k) Patch size =	10	10
	(l) Connectedness =	5	5
	(m) Context =	5	5

BioCondition score = (a + b + c + d + e + f + g + h + I + j) + (k + l + m) / y^ + z^
= (68) +(20) / 80 + 20
= .88

^ y = total weighting for site-based attributes, z = total weighting for landscape attributes.

Total BioCondition score for Site BC10 (11.7.4 regrowth) is 8.8

PV Power Station - Waterway Assessment

Project: K-REPWaterway Assessment	
Assessor/Field Staff: Bruce McLennan	Date: 26/5/21
Site: Unnamed gully SO1	Survey: Watercourse
Landform: stream	Coordinates: -27.249548, 150.825705
Weather Condition: Fine and mild	Type of Work being carried out: Waterway assessment
Site Access: Forest Road	Comments: the site is in the original channel with dam embankment approximately 100 m downstream
Waterway Features	
Condition: good	Recent Rainfall: 29 mm in previous two weeks
Waterway type: natural	Flow Condition: not flowing
Likely Flow Permanence: seasonal/ephemeral	Habitat Types in 100 m Reach, centred on site: Eucalyptus tereticornis/Eucalyptus crebra woodland
Artificial or Natural Waterway (e.g. channelization): natural	Well Defined Bed and Banks (Y/N): yes
Bank Soil/Sediment Type: clay, sand	Slope Along Reach: low 11-30^{o}
Bed Sediment Composition (%): - Bedrock: - Boulder (>256 mm): - Cobble (64-256 mm): - Pebble (4-64 mm): - Gravel (2-4 mm): - Sand (0.05-2 mm): - Silt/Clay (<0.05 mm): 100	Bankfull Height: 1m Bankfull Width: 10m
Maximum Water Depth Observed: 0.3m	Low-flow Channel Width: 3m
Bank Slope: Low 11-30^{o}	Continuous Bank/Bed Up/Downstream: continuous
Broken/Continuous section of Bank/Bed: Continuous	Suggested Definition: watercourse
Channels Upstream/Downstream: continuous	Bank/Bed Erosion Extent and Type: minimal, gully
Connectivity to other Waterbodies: feeds into Moramby Creek, to Wilkie Creek which feeds Condamine River	Fish Habitat Upstream: Fringing non-woody, fringing woody, shallow (<0.5m) pool, earth bank, sandy bank
Freshwater or tidally Influenced: freshwater	Fish Habitat Downstream: Fringing non-woody, fringing woody, shallow (<0.5m) pool, earth bank, sandy bank, detritus 1-10%, sticks 1-10%, branches 1-10%, logs 1-10%
Potential for Fish Habitat at Site: Ephemeral watercourse with earth dam approx 100 m downstream. Will be dry as dam contracts. No detritus or woody debris.	Mapped Risk of Impact to Fish Passage: Low
Wetland Indicator Plants: Fringing of sedges and rushes.	Fish Species Opportunistically Detected: none detected

Project: K-REPWaterway Assessment	
Photos	
Upstream	**Downstream**
	
Comments: **Suggested Definition: Watercourse**	

Project: K-REPWaterway Assessment	
Assessor/Field Staff: Bruce McLennan	Date: 26/5/21
Site: Unnamed gully SO1	Survey: Watercourse
Landform: stream	Coordinates: -27.2487, 150.8236
Weather Condition: Fine and mild	Type of Work being carried out: Waterway assessment
Site Access: Forest Road	Comments: meandering gully
Waterway Features	
Condition: good	Recent Rainfall: 29 mm in previous two weeks
Waterway type: natural	Flow Condition: not flowing
Likely Flow Permanence: ephemeral	Habitat Types in 100 m Reach, centred on site: Eucalyptus crebra/Allocasuarina luehmannii woodland
Artificial or Natural Waterway (e.g. channelization): natural	Well Defined Bed and Banks (Y/N): no
Bank Soil/Sediment Type: clay/sand	Slope Along Reach: flat 0-10^{o}
Bed Sediment Composition (%): - Bedrock: - Boulder (>256 mm): - Cobble (64-256 mm): - Pebble (4-64 mm): - Gravel (2-4 mm): - Sand (0.05-2 mm): - Silt/Clay (<0.05 mm): 100	Bankfull Height: NA Bankfull Width: NA
Maximum Water Depth Observed: 0.3m	Low-flow Channel Width: 3m
Bank Slope: poorly defined bank	Continuous Bank/Bed Up/Downstream: continuous
Broken/Continuous section of Bank/Bed: broken	Suggested Definition: watercourse
Channels Upstream/Downstream: broken	Bank/Bed Erosion Extent and Type: minor, gully
Connectivity to other Waterbodies: feeds into Moramby Creek, to Wilkie Creek which feeds Condamine River	Fish Habitat Upstream: Fringing non-woody, fringing woody, shallow (<0.3m) pool, earth bank, sandy bank
Freshwater or tidally Influenced: freshwater	Fish Habitat Downstream: nonexistent, overland flow through woodland till banks reform
Potential for Fish Habitat at Site: Minimal fish habitat at site, waterhole upstream is free draining and very short term.	Mapped Risk of Impact to Fish Passage: Low
Wetland Indicator Plants: Fringing of sedges and rushes.	Fish Species Opportunistically Detected: none detected
Photos	

Project: K-REPWaterway Assessment	
Upstream	**Downstream**
	
Comments: **Suggested Definition: Natural drainage**	

Access Corridor - Waterway Assess,emt

Project: K-REPWaterway Assessment	
Assessor/Field Staff: Ben Nottidge	Date: 24/5/21
Site: Moramby Creek SO2	Survey: Watercourse
Landform: stream	Coordinates: -27.2541, 150.8493
Weather Condition: Fine and mild	Type of Work being carried out: Waterway assessment
Site Access: Forest Road crossing	Comments:
Waterway Features	
Condition: average	Recent Rainfall: 29 mm in previous two weeks
Waterway type: natural	Flow Condition: trickle
Likely Flow Permanence: seasonal	Habitat Types in 100 m Reach, centred on site: open to closed Callitris/Eucalypt forest
Artificial or Natural Waterway (e.g. channelization): natural	Well Defined Bed and Banks (Y/N): yes
Bank Soil/Sediment Type: silt/loam	Slope Along Reach: flat <10^{o}
Bed Sediment Composition (%): - Bedrock: 90% - Boulder (>256 mm): - Cobble (64-256 mm): - Pebble (4-64 mm): - Gravel (2-4 mm): 5% - Sand (0.05-2 mm): 5% - Silt/Clay (<0.05 mm):	Bankfull Height: 0.6m Bankfull Width: 12m
Maximum Water Depth Observed: 0.6m	Low-flow Channel Width: 3m
Bank Slope: Low 11-30^{o}	Continuous Bank/Bed Up/Downstream: continuous
Broken/Continuous section of Bank/Bed: Continuous	Suggested Definition: watercourse
Channels Upstream/Downstream: continuous	Bank/Bed Erosion Extent and Type: minimal gully
Connectivity to other Waterbodies: feeds into Wilkie Creek which feeds Condamine River	Fish Habitat Upstream: Fringing non-woody, fringing woody, shallow (<0.5m) pool, undercut bank, rocky banks, earth bank
Freshwater or tidally Influenced: freshwater	Fish Habitat Downstream: Fringing non-woody, fringing woody, shallow (<0.5m) pool, undercut bank, 1-10% detritus, 1-10% sticks, earth banks, rocky banks
Potential for Fish Habitat at Site: occasional waterholes that may contain fish for full season, fringing non-woody, fringing woody, shallow (<0.5m) pool, undercut bank, 1-10% sticks, earth banks, rocky banks	Mapped Risk of Impact to Fish Passage: Moderate (Amber)
Wetland Indicator Plants: limited due to bedrock nature of site. Fringing vegetation is sparse.	Fish Species Opportunistically Detected: none detected

Project: K-REPWaterway Assessment	
Photos	
Upstream	**Downstream**
	
Comments: **Suggested Definition: Watercourse**	

Appendix J Stormwater and Drainage Report

Response to WDRC Information Request Item 12 Stormwater and Drainage Report

20-005_Response to 030.2020.120.001 Information Request Revision 0

4 June 2020

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED
0	04/06/2020	Tech Note Response to 030.2020.120.001 Item 12	N Adams	R Pizzino	N Adams

Contents

Tables

Figures

Appendices

1. Introduction

1.1 Purpose

This response has been prepared in response to the request for further information from Western Downs Regional Council (refer Appendix A). The department has advised that it requires the following information to determine if the proposed development and the additional hard surface (the solar panels, access tracks and buildings) impacts on the land.

1.2 Scope

The information requested is to provide a stormwater and drainage report on the impact thereof due to additional hard surface (the solar panels, access tracks and buildings) on the land

2. Response

Stormwater management for a ground-mounted solar farm will be affected by the following major site characteristics:

- Topography;
- Existing Site Conditions (native vegetation, agricultural etc) ;
- Proximity to watercourses, wetlands and seasonal flood levels;
- Soil type and depth to bedrock.

The existing site conditions for the proposed site have been discussed in Section 3.1 above.

Solar farm construction can significantly transform the volumes and flow rates of stormwater generated. Where clearing of large areas of existing vegetation is required, additional stormwater management during construction and until the site is revegetated may be required.

The construction process can significantly increase the post-development run-off rates. The following should be limited during the construction phase:

- Compaction of soils – may decrease infiltration, increase run-off and sediment transport
- Removal of topsoil – Bare sub-soil will be more susceptible to erosion and runoff, and be less nutrient rich, increasing time required for revegetation
- Vegetation removal – Phasing of construction should be considered to avoid removing vegetation from too large an area at once. Erosion and sediment control should be provided during construction phases.
- Revegetation should be undertaken as soon as is reasonably possible post construction.

2.1 Calculation Methodology

Flood modelling has been undertaken in consideration of the post-development site layout. The aims for stormwater management as presented below have been selected in consideration of advice for following with the following aims:

- Demonstrate appropriate management of the 10% AEP event; and
- Ensure no sheet-flow off site.

The Rational Method, as outlined in Section 1.5.5 of Australian Rainfall & Runoff 2003, for flood estimation has been used to estimate peak discharge values across the proposed site:

$$Q = CxAxI/360$$

Where Q = Peak Discharge (m^3/s)

C = Rational Method Runoff Coefficient (unitless)

A = Catchment Area (ha)

I = Rainfall Intensity (mm/hr)

The Intensity Frequency Duration table for Kumbarilla Lane Dalby, has been considered for rainfall intensity and is shown below.

Table 2.1 Bureau of Meteorology - Intensity Frequency Duration for Kumbarilla Lane, Dalby

	Annual Exceedance Probability (AEP) (mm/hr)						
Duration	63.20%	50%#	20%*	10%	5%	2%	1%
1 min	141	162	228	273	317	376	422
2 min	122	139	197	238	278	334	378
3 min	113	129	183	220	256	307	347
4 min	106	122	172	206	240	287	323
5 min	101	116	163	195	227	270	303
10 min	80.4	92.4	130	155	180	213	238
15 min	67.4	77.4	109	130	151	178	199
20 min	58.3	66.9	94.1	113	131	155	173
25 min	51.5	59.1	83.2	99.6	116	137	154
30 min	46.2	53.1	74.7	89.5	104	123	138
45 min	35.7	41	57.6	69.2	80.6	96.1	108
1 hour	29.3	33.6	47.3	56.9	66.4	79.4	89.6
1.5 hour	21.9	25.1	35.3	42.4	49.7	59.7	67.6
2 hour	17.7	20.2	28.4	34.2	40.1	48.3	54.8
3 hour	13	14.8	20.8	25.1	29.4	35.5	40.4
4.5 hour	9.56	10.9	15.2	18.3	21.5	26	29.6
6 hour	7.69	8.73	12.2	14.7	17.2	20.8	23.7
9 hour	5.67	6.43	8.95	10 8	12.6	15.2	17.3
12 hour	4.58	5.19	7.22	8.68	10.2	12.2	13.9
18 hour	3.4	3.86	5.36	6.44	7.55	9.05	10.2
24 hour	2.76	3.13	4.36	5.23	6.12	7.32	8.29
30 hour	2.35	2.67	3.71	4.45	5.2	6.22	7.03
36 hour	2.05	2.34	3.25	3.9	4.56	5.45	6.16
48 hour	1.66	1.89	2.64	3.16	3.69	4.41	4.98
72 hour	1.21	1.39	1.94	2.32	2.71	3.24	3.66
96 hour	0.962	1.1	1.53	1.84	2.14	2.57	2.91
120 hour	0.796	0.907	1.26	1.51	1.77	2.12	2.4
144 hour	0.676	0.769	1.07	1.28	1.49	1.79	2.03
168 hour	0.585	0.664	0.918	1.1	1.28	1.54	1.75

Values developed using the Rational Method are then utilised in Time-Area Method using Boyd's Formula to compute the on-site storage requirements.

$$Smax = V1(1 - \frac{Qp}{Ip})$$

Where Smax = Maximum volume of storage (m^3)

V1 = Volume of inflow flood (m^3)

Qp = Peak discharge of outflow hydrograph (m^3/s)

Ip = Peak discharge of outflow hydrograph (m^3/s)

2.2 Stormwater Collection and Management

Stormwater runoff will be conveyed via a series of open channels and culverts where required. Open channels shall be either V-Drains or Trapezoidal Drains, depending on flow rates, as outlined in Table 2.2 below. Open Channels shall include rock riffles at regular centres, to be determined by slope to detain flows and provide additional storage.

Table 2.2 Open Channel Type

Open Channel	Description
Type A	V - Drain
Type B1	Trap - Base Width 1200mm
Type B2	Trap - Base Width 2000mm
Type B3	Trap - Base Width 3000mm
Type B4	Trap - Base Width 5000mm

The open channel and pipe network will divert stormwater to central stormwater detention basins at 6 locations across the proposed site. Basin storage will be sized to maintain outflows at pre-development flow rates and will be sized to accommodate the 10% AEP event. Outflows from the basin will be via infiltration, evaporation and outflow at pre-development flow rates.

2.3 Soil Permeability and Infiltration Rates

There are several factors that affect a soil's infiltration rate, including the type of soil, which is determined by the portions of sand, silt and clay in a soil. As documented in the previous sections, clay, sand and sandy loam soils are expected to be encountered on this site.

Clay soils tend to have a high potential for runoff and a very slow rate of infiltration when thoroughly wetted. Typical values for the basic infiltration rate for clay are in the order of 1 to 5 millimeters per hour.

Sandy and sandy loam soils can experience a variety of infiltration speeds and will often be influenced by other conditions. Infiltration rate may be in the order of 12 to 25 millimeters per hour, however could be as high as 200 millimeters per hour.

It should be noted that without undertaking specific field testing the above values should be adopted with caution.

Other factors that have the potential to influence the infiltration rates include whether soils have a crust with sealed pores that restrict water entry; compacted soils will have lower infiltration; soils with strong aggregates (with granular or blocky structures) have a higher infiltration rate than soils with weak structures; and infiltration rates are usually higher when soil is dry and decrease with wetter soil. There is the possibility that permeability and drainage conditions may be reduced during earthworks due to compaction of in-situ and sands and that over compaction during earthworks can reduce soil permeability. Permeability testing will need to be carried out prior to earthworks to confirm parameters used during drainage design.

No insitu permeability tests have been undertaken during this phase of works. The anticipated soil profile indicates that poor drainage characteristics are likely to be able to be encountered at the site, with limited scope to remediate to increase permeability. As such, infiltration rates in line with hard clays have been adopted pending future investigation. However, the preliminary indication is that evaporation will exceed infiltration rates.

2.4 Evaporation

The average daily evaporation for Dalby is 6.2mm/day. This has been considered in the basin volume calculations. Given the very low infiltration rates that are likely to be encountered at the proposed site losses via evaporation are likely to exceed losses via infiltration.

2.5 Subsurface Water

It is not anticipated that the groundwater levels will need to be managed and no allowance has been made for any subsoil drainage system.

2.6 Drainage Basins

Locations for drainage basins have been proposed as shown in Appendix B.

The proposed drainage basins will need to have the drainage characteristics confirmed during insitu investigations. These basins have been sized to contain the anticipated 10% AEP rainfall. The basins are expected to be open, accessible and integrated into the landscape, with the sides of the basins graded at a maximum of 1 in 6 for unfenced basins. The sides may be steepened for fenced basins. An infiltration rate of 0.12m/day, and an evaporation rate of 6.2mm/day have been assumed in the storage calculations.

Groundwater is currently captured in an existing manually-excavated dam (see below):

Figure 1: Existing On site Dam

2.7 Anticipated Stormwater Flows

Basin requirements and calculations are shown in the tables below:

Table 2.3 Basin Summary

Basin Summary	Volume
Basin - BA01-A	28,128
Basin - BA01-B	1,055
Basin - BA02-A	2,323
Basin - BA02-B	1,001
Basin - BA03-A	6,456
Basin - BA03-B	494

Table 2.4 BA01-A Calculations

Basin - BA01-A

Catchment Area (A)	124.37	ha
Runoff Coeff (C10)	0.56	
Effective Catchment Area (EA)	69.79	ha
Basin Base Area	19872.00	m² Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.02760	m³/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00143	m³/s
Pre-Dev Outflow	2.96000	m³/s
Length of Swales	11386.04	m
Swale Storage	1138.60	m³

Storm Duration	10% AEP	Ip	Qp	V1	Smax
(min/hr)	mm/hr	m³/s	m³/s	m³	m³
5	195	37.83	2.99	10202.15	9396.12031
10	155	30.07	2.99	16890.29	15211.4833
20	113	21.92	2.99	25148.69	21719.96315
30	89.5	17.36	2.99	30092.10	24912.14856
60	56.9	11.04	2.99	38571.50	28127.8926
120	34.2	6.64	2.99	46597.26	25606.39153
180	25.1	4.87	2.99	51412.72	19855.91579
360	14.7	2.85	2.99	60415.54	-2902.50634
720	8.68	1.68	2.99	71553.91	-55447.8752
1440	5.23	1.01	2.99	86460.90	-168230.479
2880	3.16	0.61	2.99	104717.78	-405821.911
4320	2.32	0.45	2.99	115437.41	-651137.795
	Required Basin Volume			28128	m³

Table 2.5 BA01-B Calculations

Basin - BA01-B

Catchment Area (A)	3.54	ha
Runoff Coeff (C10)	0.70	
Effective Catchment Area (EA)	2.48	ha
Basin Base Area	720.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00100	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00005	m^3/s
Pre-Dev Outflow	0.09000	m^3/s
Length of Swales	349.72	m
Swale Storage	34.97	m^3

Storm Duration (min/hr)	10% AEP mm/hr	Ip m^3/s	Qp m^3/s	V1 m^3	Smax m^3
5	195	1.34	0.09	367.56	342.642545
10	155	1.07	0.09	604.96	553.354409
20	113	0.78	0.09	898.09	793.005353
30	89.5	0.62	0.09	1073.55	914.957282
60	56.9	0.39	0.09	1374.53	1055.1291
120	34.2	0.24	0.09	1659.40	1017.87128
180	25.1	0.17	0.09	1830.32	866.17245
360	14.7	0.10	0.09	2149.87	216.186201
720	8.68	0.06	0.09	2545.23	-1331.7887
1440	5.23	0.04	0.09	3074.35	-4697.8165
2880	3.16	0.02	0.09	3722.37	-11852.454
4320	2.32	0.02	0.09	4102.86	-19279.559

Required Basin Volume	1055	m^3

Table 2.6 BA02-A Calculations

Basin - BA02-A

Catchment Area (A)	9.52	ha
Runoff Coeff (C10)	0.60	
Effective Catchment Area (EA)	5.73	ha
Basin Base Area	1638.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00228	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00012	m^3/s
Pre-Dev Outflow	0.23000	m^3/s
Length of Swales	1347.22	m
Swale Storage	134.72	m^3

Storm Duration (min/hr)	10% AEP mm/hr	Ip m^3/s	Qp m^3/s	V1 m^3	Smax m^3
5	195	3.11	0.23	796.14	736.563693
10	155	2.47	0.23	1345.12	1218.47533
20	113	1.80	0.23	2022.98	1761.7265
30	89.5	1.43	0.23	2428.74	2032.73247
60	56.9	0.91	0.23	3124.74	2323.34642
120	34.2	0.54	0.23	3783.51	2169.10166
180	25.1	0.40	0.23	4178.77	1749.25821
360	14.7	0.23	0.23	4917.73	35.8033868
720	8.68	0.14	0.23	5831.98	-3972.8543
1440	5.23	0.08	0.23	7055.57	-12631.191
2880	3.16	0.05	0.23	8554.12	-30949.064
4320	2.32	0.04	0.23	9434.00	-49906.586

Required Basin Volume	2323	m^3

Table 2.7 BA02-B Calculations

Basin - BA02-B

Catchment Area (A)	3.41	ha
Runoff Coeff (C10)	0.70	
Effective Catchment Area (EA)	2.39	ha
Basin Base Area	684.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00095	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00005	m^3/s
Pre-Dev Outflow	0.09000	m^3/s
Length of Swales	413.48	m
Swale Storage	41.35	m^3

Storm Duration (min/hr)	10% AEP mm/hr	Ip m^3/s	Qp m^3/s	V1 m^3	Smax m^3
5	195	1.30	0.09	347.06	322.688192
10	155	1.03	0.09	576.12	525.222064
20	113	0.75	0.09	858.97	754.866357
30	89.5	0.59	0.09	1028.27	870.933293
60	56.9	0.38	0.09	1318.69	1001.30201
120	34.2	0.23	0.09	1593.56	955.447406
180	25.1	0.17	0.09	1758.48	799.040245
360	14.7	0.10	0.09	2066.82	141.334306
720	8.68	0.06	0.09	2448.30	-1414.4804
1440	5.23	0.03	0.09	2958.85	-4788.9147
2880	3.16	0.02	0.09	3584.13	-11948.747
4320	2.32	0.02	0.09	3951.27	-19372.765

Required Basin Volume	1001	m^3

Table 2.8 BA03-A Calculations

Basin - BA03-A

Catchment Area (A)	47.89	ha
Runoff Coeff (C10)	0.40	
Effective Catchment Area (EA)	18.95	ha
Basin Base Area	5400.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00750	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00039	m^3/s
Pre-Dev Outflow	1.14000	m^3/s
Length of Swales	3192.09	m
Swale Storage	319.21	m^3

Storm Duration (min/hr)	10% AEP mm/hr	Ip m^3/s	Qp m^3/s	V1 m^3	Smax m^3
5	195	10.27	1.15	2760.03	2451.60593
10	155	8.17	1.15	4575.99	3932.67941
20	113	5.95	1.15	6818.30	5503.49169
30	89.5	4.71	1.15	8160.53	6173.70289
60	56.9	3.00	1.15	10462.85	6456.00438
120	34.2	1.80	1.15	12642.00	4587.20226
180	25.1	1.32	1.15	13949.49	1839.33744
360	14.7	0.77	1.15	16393.93	-7907.4419
720	8.68	0.46	1.15	19418.22	-29329.54
1440	5.23	0.28	1.15	23465.75	-74302.492
2880	3.16	0.17	1.15	28422.85	-167572.39
4320	2.32	0.12	1.15	31333.44	-262963.03

Required Basin Volume	6456	m^3

Table 2.9 BA03-B Calculations

Basin - BA03-B

Catchment Area (A)	3.97	ha
Runoff Coeff (C10)	0.39	
Effective Catchment Area (EA)	1.57	ha
Basin Base Area	450.00	m^2 Assumed
Infiltration	0.12	m/day
Outflow (Infiltration)	0.00063	m^3/s
Evaporation	0.0062	m/day
Outflow (Evaporation)	0.00003	m^3/s
Pre-Dev Outflow	0.10000	m^3/s
Length of Swales	615.81	m
Swale Storage	61.58	m^3

Storm Duration (min/hr)	10% AEP mm/hr	Ip m^3/s	Qp m^3/s	V1 m^3	Smax m^3
5	195	0.85	0.10	193.39	170.503674
10	155	0.68	0.10	343.76	292.578504
20	113	0.49	0.10	529.43	421.31088
30	89.5	0.39	0.10	640.57	475.407798
60	56.9	0.25	0.10	831.21	494.105941
120	34.2	0.15	0.10	1011.65	329.046816
180	25.1	0.11	0.10	1119.91	90.2991208
360	14.7	0.06	0.10	1322.32	-753.46843
720	8.68	0.04	0.10	1572.74	-2608.4618
1440	5.23	0.02	0.10	1907.89	-6510.2352
2880	3.16	0.01	0.10	2318.35	-14611.621
4320	2.32	0.01	0.10	2559.36	-22897.629

Required Basin Volume	494	m^3

3. Conclusion

The conclusion of this report's findings is that is no adverse impact due to additional hard surface (the solar panels, access tracks and buildings) on the land.

Appendix A WDRC 030.2020.120.01 Information Request Email 27th May 2020

[redacted]

From: [redacted]@wdrc.qld.gov.au>
Sent: Wednesday, 27 May 2020 7:39 AM
To: [redacted]
Subject: Kumbarilla Lane Solar Farm 030.2020.120.001 Information Request

Follow Up Flag: Follow up
Flag Status: Flagged

Hi [redacted],

I refer to the development application for a Renewable Energy Facility (Solar Farm) at Lot 4 on DY457 located at Kumbarilla Lane, Kumbarilla.

It has been determined that additional information is required to assess the application. To assist with the timing of the assessment and to allow you to get prepared with compiling the additional information, please note the below items which will be included on an Information Request. Note that this is provided for information purposes only and does not prevent Council from issuing a formal Information Request requesting further information during the statutory Information Request process.

(1) Please provide details of the scale of the proposed Solar Farm (i.e how many megawatts of power will the area of solar panels equate to).

(2) Please provide an overview of how the proposed Solar Farm will be connected to the nearby substation and the various options open in terms of easements.

(3) Demonstrate how the development complies with the Western Downs Planning Scheme incorporating Amendment 1. This should include statements about how the development complies with the applicable Acceptable Outcomes of the following Codes:
- Rural Zone Code
- Biodiversity Areas Overlay Code
- Bushfire Hazard Overlay Code
- Infrastructure Overlay Code
- Regional Infrastructure Corridor – Stock Route Overlay Code
- Scenic Amenity Overlay Code
- Transport Access and Parking Code
- Infrastructure Services Overlay Code

(4) The proposed Site Plan includes a Temporary Construction Camp. Please provide details of the proposed Temporary Construction Camp.

Council does not support the establishment of temporary construction camps. The definition of a Renewable Energy Facility in the Western Downs Planning Scheme incorporating Amendment 1 does not allow for ancillary construction camps. The establishment of a temporary construction camp would require a separate approval for a Material Change of Use for a Non-Resident Workforce Accommodation which would require Impact Assessment.

(5) Please provide a Traffic Impact Assessment of the proposed haul route for all roads between the State Controlled road network and the site access. The report shall include, but not be limited to, information pertaining to:
- Expected number of vehicles, vehicle types, loadings for both the construction and operational phases of the project;
- Any upgrading or ongoing maintenance requirements during the construction period. For example a pre and post condition assessment must be carried out, and information provided as to how the road will be maintained during construction by the applicant, and how the road will be left after construction.

(6) Please provide a summary of your community consultation process, the issues neighbouring land-owners and community identified, and how you will address these.

As advised during pre-lodgement discussions, Council encourages all Renewable Energy Facility applicants to have informal information sessions / community meetings with the local communities, and neighbours prior to lodging an application.

(7) Please provide a desktop cultural assessment including possible impact on traditional artefacts and places.

(8) Please provide a short desktop analysis of how you will deal with potential glare from the panels and noise from the inverters (note, the solution can include landscaping).

(9) Please provide a desktop analysis of the vegetation on the land, details on how this will be retained or extent of clearing.

(10) Please provide a desktop analysis on the agricultural value of the land (if any) and how the Solar Farm will impact on this.

(11) Please provide a desktop analysis on the bushfire risk. It is acknowledged that the development is not a habitable project.

(12) Please provide a stormwater and drainage report on the impact thereof due to additional hard surface (the solar panels, access tracks and buildings) on the land.

Please contact me should you have any queries.

Regards

[redacted]
Planning Officer Development Assessment

WESTERN DOWNS REGIONAL COUNCIL
PO Box 551, Dalby, Qld 4405

Phone [redacted] Fax 07 4679 4099
[redacted]**@wdrc.qld.gov.au**

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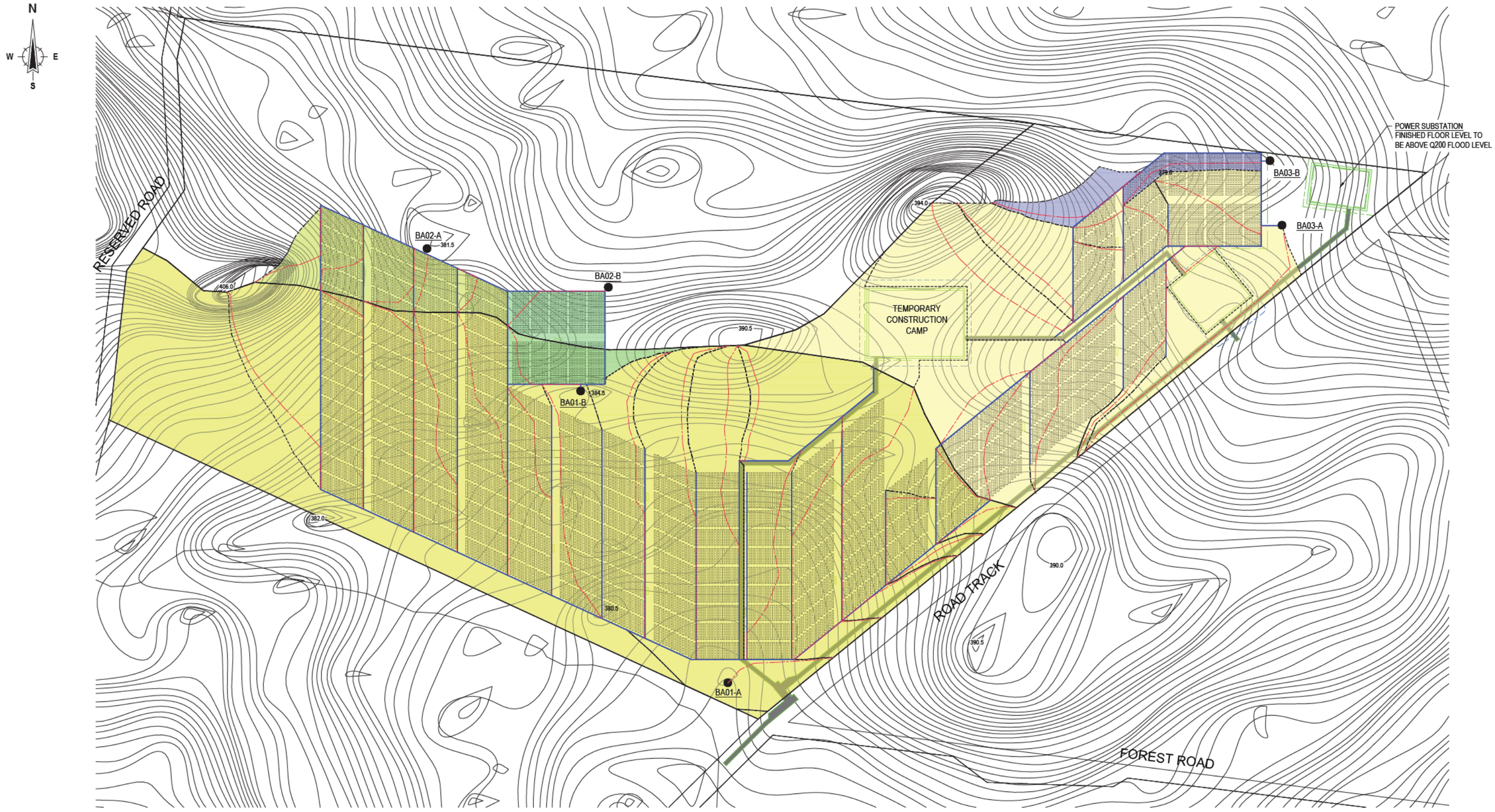
Appendix B Drainage Layout Plan



NOTES

1. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE SPECIFICATION AND REQUIREMENTS OF THE WESTERN DOWNS REGIONAL COUNCIL.
2. THE CONTRACTOR SHALL LIAISE WITH ALL RELEVANT AUTHORITIES TO LOCATE ALL EXISTING SERVICES WITHIN THE CONTRACT AREA PRIOR TO THE COMMENCEMENT OF WORK. THE CONTRACTOR SHALL CONTACT THE DIAL BEFORE YOU DIG SERVICE AND SHALL POTHOLE AND LOCATE ALL SERVICES IN CONJUNCTION WITH THE SERVICE BODIES PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION. WHERE EXISTING AND PROPOSED WORKS INTERSECT, LEVELS ARE TO BE TAKEN AND SUPPLIED TO THE SUPERINTENDENT.
3. THE CONTRACTOR SHALL LOCATE ALL LEVELS FROM ESTABLISHED BENCH MARKS.
4. ALL BENCH MARKS ARE TO BE PROTECTED AND PRESERVED.
5. THE CONTRACTOR SHALL LIAISE WITH ALL SERVICE AUTHORITIES TO ALLOW INSTALLATION OF ROAD CROSSINGS PRIOR TO PAVEMENT CONSTRUCTION.
6. ALL CONSTRUCTION SHALL MAKE SMOOTH CONNECTION TO EXISTING WORK.
7. STORMWATER CULVERTS ARE TO BE REINFORCED CONCRETE (CLASS '4') UNLESS OTHERWISE SHOWN.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUPPORT OF ALL EXISTING SERVICES.
9. EXCESS SPOIL FROM EARTHWORKS SHALL BE PLACED ON SITES DIRECTED BY THE SUPERINTENDENT.
10. WHERE CONNECTING INTO EXISTING DRAINAGE, THE CONTRACTOR IS TO PICK UP UPSTREAM AND DOWNSTREAM INVERT LEVELS OF EXISTING DRAINAGE SYSTEM IMMEDIATELY DOWNSTREAM OF PROPOSED CONNECTION. THE CONTRACTOR TO SUPPLY THIS SURVEY INFORMATION TO THE SUPERINTENDENT PRIOR TO THE COMMENCEMENT OF ANY DRAINAGE CONSTRUCTION. THE CONTRACTOR TO THEN AWAIT NOTIFICATION FROM THE SUPERINTENDENT THAT DRAINAGE CONSTRUCTION MAY COMMENCE. SUPERINTENDENT.

LEGEND

- STORAGE LOCATION
- MAJOR CATCHMENT BOUNDARY
- MINOR CATCHMENT BOUNDARY
- CATCHMENT STREAMLINE
- SWALE & CULVERT ALIGNMENT PROPOSED
- CATCHMENT BA01-A - BASIN VOLUME 28196m³
- CATCHMENT BA01-B - BASIN VOLUME 1058m³
- CATCHMENT BA02-A - BASIN VOLUME 2329m³
- CATCHMENT BA02-B - BASIN VOLUME 1004m³
- CATCHMENT BA03-A - BASIN VOLUME 6474m³
- CATCHMENT BA03-B - BASIN VOLUME 496m³

DIAL BEFORE YOU DIG www.1100.com.au

REV	DATE	ISSUE DESCRIPTION	DRAWN	DESIGN	CHECK
A	3/10/19	CONCEPT PLAN	P.W		N.A

STATUS: **PRELIMINARY** NOT FOR CONSTRUCTION

SCALE: 0 50 100 150 200 250 — SCALE 1:5000

CLIENT: KOMIPO KOREA MIDLAND POWER CO.,LTD. elecseed

calibre © calibregroup.com

PROJECT: KUMBARILLA RENEWABLE ENERGY PARK (K-REP)

KUMBARILLA, QLD 4405

DRAWING TITLE: DRA NAGE LAYOUT PLAN

PROJECT No.	DRAWING No.	REVISION
CCIP19018	C5302	A

Appendix K Disclaimer and Limitations

Disclaimer and Limitations

This report has been prepared by CDM Smith Australia Pty Ltd (CDM Smith) for the sole benefit of Calibre Professional Services Pty Ltd for the sole purpose of a supporting an EPBC Act referral.

This report should not be used or relied upon for any other purpose without CDM Smith's prior written consent. Neither CDM Smith, nor any officer or employee of CDM Smith, accepts responsibility or liability in any way whatsoever for the use of or reliance on this report for any purpose other than that for which it has been prepared.

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a. has relied upon and presumed the accuracy of this information;

b. has not verified the accuracy or reliability of this information (other than as expressly stated in this report);

c. has not made any independent investigations or enquiries in respect of those matters of which it has no actual knowledge at the time of giving this report to Calibre Professional Services Pty Ltd; and

d. makes no warranty or guarantee, expressed or implied, as to the accuracy or reliability of this information.

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If further information becomes available, or additional assumptions need to be made, CDM Smith reserves its right to amend this report.