Origin Energy

# Darling Downs Solar Farm

# **Environment Protection and Biodiversity Conservation Act 1999 - Referral**

27 April 2016





# Referral of proposed action

Project title: Darling Downs Solar Farm

# 1 Summary of proposed action

## 1.1 Short description

Origin Energy (the proponent) is seeking to develop a Solar Photovoltaic Generation Facility (solar farm) on Lot 119 SP227731, with ancillary power connections planned on Lot 121 SP178856, Grahams Road at Kogan in Queensland (the proposed action). Figure 1 shows the location of the proposed action.

The development will consist of a number of panel areas, comprising arrays of solar panels connected to associated inverter stations (up to 200), which convert the low voltage DC current from approximately 1-2 ha of solar panels up to 33 Kilovolt (kV) medium voltage AC current. A high voltage internal electricity network will be used to collect the power from the inverter stations to the site's substation. The internal network will be up to 33 kV and will consist of both underground and above ground cabling. At the substation the 33 kV input power will be converted to a suitable voltage for connection to the National Electricity Grid via an existing connection point at the Darling Downs Power Station.

The potential development area (refer Figure 1) will contain all of the infrastructure for the solar farm including:

- → photovoltaic solar panels
- → internal access roads and tracks
- → high voltage substation
- → underground high voltage transmission lines
- → overhead high voltage transmission lines
- → administration building
- → maintenance and storage shed
- → vehicle car park
- → main gate crossover widening
- → pilot specific inclusions
- → miscellaneous infrastructure.

# 1.2 Latitude and longitude

ude The following points describe the site for the proposed action:

# Lot 119 on SP227731

LOCATION ID		LATITUDI	E		LONGITUE	θE
	DEGREE	MINUTES	SECONDS	DEGREE	MINUTES	SECONDS
1	-27	7	15.055216	150	52	10.3652112
2	-27	7	11.611981	150	52	5.7765144
3	-27	7	9.900383	150	52	6.7877328
4	-27	7	8.583982	150	52	7.4011836
5	-27	7	7.191808	150	52	8.0118948
6	-27	7	5.540426	150	52	8.9332068
7	-27	7	3.064051	150	52	9.3928296
8	-27	7	0.588050	150	52	8.9300964
9	-27	6	58.112370	150	52	8.0061276
10	-27	6	56.048893	150	52	8.0048388
11	-27	6	54.810544	150	52	8.465214
12	-27	6	53.572194	150	52	8.9255352
13	-27	6	52.747603	150	52	7.5415692
14	-27	6	51.922742	150	52	6.6186732
15	-27	6	50.684717	150	52	6.6178416
16	-27	6	49.447066	150	52	5.694762
17	-27	6	49.035186	150	52	4.3110624
18	-27	6	47.798230	150	52	2.4655944
19	-27	6	45.734915	150	52	2.0031816
20	-27	6	43.258298	150	52	2.9239032
21	-27	6	40.369075	150	52	3.3832596
22	-27	6	38.717478	150	52	4.7656704
23	-27	6	37.891008	150	52	6.6097416
24	-27	6	37.889964	150	52	8.454324
25	-27	6	36.650808	150	52	10.298154
26	-27	6	35.412113	150	52	11.219574
27	-27	6	32.935144	150	52	12.6014484
28	-27	6	31.284353	150	52	12.6003504
29	-27	6	29.633533	150	52	12.5993028
30	-27	6	27.569815	150	52	13.0591128
31	-27	6	25.506284	150	52	13.0576944
32	-27	6	23.854662	150	52	14.4400512

LOCATION ID		LATITUDI	E		LONGITUE	Ε
	DEGREE	MINUTES	SECONDS	DEGREE	MINUTES	SECONDS
33	-27	6	23.028354	150	52	15.8228904
34	-27	6	22.202770	150	52	16.283424
35	-27	6	20.551734	150	52	16.743558
36	-27	6	18.901480	150	52	15.8201544
37	-27	6	18.076324	150	52	15.3584364
38	-27	6	16.012552	150	52	15.818304
39	-27	6	15.394248	150	52	15.0128616
40	-27	6	13.920347	150	52	15.611718
41	-27	6	20.088086	150	53	4.7685912
42	-27	6	57.410597	150	53	26.42523
43	-27	6	56.683210	150	53	31.8019308
44	-27	7	10.840606	150	53	34.2097512
45	-27	7	13.933700	150	53	44.9722464
46	-27	7	26.668268	150	53	42.9793656

# Lot 121 on SP178856

LOCATION ID		LATITUD	E	LONGITUDE		
	DEGREE	MINUTES	SECONDS	DEGREE	MINUTES	SECONDS
1	-27	7	13.933700	150	53	44.9722464
2	-27	7	10.840606	150	53	34.2097512
3	-27	6	56.683210	150	53	31.8019308
4	-27	6	41.575936	150	53	29.2484148
5	-27	6	42.397121	150	53	49.9068672

## 1.3 Locality and property description

The site of the proposed action is located approximately 40 km west of Dalby, and 120 km north-west from Toowoomba. Access to the site is via Grahams Road, which connects to Dalby-Kogan Road (a State-controlled road). Braemar Creek forms the western boundary of the site.

The lot proposed for the solar panels (Lot 119 SP SP227731) consists of predominantly cleared mostly flat land, with dense clumps of vegetation comprising approximately 20% of the lot. This lot is currently used for cattle grazing and breeding. The current owner's residential dwelling is located at the western boundary towards the north of the lot.

This lot also contains:

- $\rightarrow~$  several active coal seam gas extraction wells and gathering pipelines, the network is owned by QGC PL
- → high pressure gas pipelines, one of which flows east to west and another north-south under an easement
- $\rightarrow$  a gas pressure reduction station at the end of the pipeline prior to the Darling Down Power Station
- $\rightarrow$  a high voltage power line under an easement, through the northern corner of the site
- → an unnamed drainage feature also crosses the property from the north western corner towards the centre of the lot.

The land to the east of the site (Lot 1 on SP227731, Lot 121 on SP178856, Lot 1 on SP107388) is utilised for the Darling Downs Power Station, owned and operated by Origin Energy. The power station is a 630 MW, combined cycle, gas fired power station. The solar farm will connect directly into the Darling Downs Power Station energy grid over Lot 121 on SP178856.

Other immediate land adjoining the north, south and west of the site are rural properties which are utilised for coal seam gas (CSG) activity and major power infrastructure (generation and transmission).

Origin Energy has a caveat registered on the property (no. 716736416). There are several other rights and encumbrances over the site of the proposed action including:

- → eight CSG wells
- → two easements (for transmission lines and LNG / CSG transmissions)
- $\rightarrow$  petroleum pipeline licence (PPL133)
- $\rightarrow$  petroleum lease (PL273)
- $\rightarrow$  exploration permit for coal (EPC867).

The layout of the solar farm has been designed to avoid these encumbrances on the lot. The location of these encumbrances are shown in the site layout plans in Appendix D of Attachment 2 – Town Planning Report. As noted in Section 8.2 of this referral documentation, there have been some slight amendments to the design of the solar farm since the preparation of the Town Planning Report in October 2015. In instances where discrepancies exist between the information presented in the Town Planning Report and this referral documentation, the information presented in the referral documentation should be considered the most current and up to date.

1.4	Size of the development footprint or work area (hectares)	The site of the proposed action (comprising Lot 119 SP227731 and Lot 121 SP178856) occupies approximately 441 ha of land of which approximately 291 ha will be affected by the anticipated development footprint (potential development area) of the proposed action (refer to Figure 1). The potential development area has been strategically positioned within the site of the proposed action to coincide with areas where the lowest level of ecological constraints occur.
1.5	Street address of the site	The street address of the site of the proposed action is 119 Grahams Road, Kogan.

#### 1.6 Lot description

The real property descriptions for the site of the proposed action is Lot 119 on SP227731 and Lot 121 on SP178856. Land details of the proposed lots comprising the site of the proposed action are outlined in Table 1.

Table 1 Land details

LOT/PLAN	TENURE	REGISTERED LANDHOLDER
Lot 119 on SP227731	Freehold	Kevin Ross Brooks (Senior)
		Christine Maree Brooks
Lot 121 on SP178856	Freehold	Sun Retail Pty Ltd

#### 1.7 Local Government Area and Council contact (if known)

The site of the proposed action is located entirely within the Western Downs Regional Council local government area. Details of the relevant council contact officer are:

Western Downs Regional Council Contact: Kym Bannerman Planning Officer Development Assessment PO Box 551, Dalby, Queensland 4405 <u>info@wdrc.qld.gov.au</u> (07) 4679 4348

## 1.8 Time frame

Construction of the proposed action is anticipated to start in January 2017 and take approximately 12 months, with operations anticipated to commence in January 2018.

1.9	Alternatives to proposed action	х	No alternatives to the proposed action are proposed.
			Yes, you must also complete section 2.2
1.10	Alternative time frames etc	Х	No, it is proposed to meet the Project timing outlined at section 1.8. While some specific components of the proposed action are not finalised (e.g. location of the proposed connection to the Darling Downs Power Station, they will occur within the potential development area (refer to Section 2.3).
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	State assessment	X	No. The proposed action is not subject to state environmental impact assessment. Approval for the proposed action has been via development approval under local government planning scheme. A Material Change of Use Development Application was submitted to Western Downs Regional Council in October 2015 under the Wambo Shire Planning Scheme 2005 (refer to Attachment 2). A Decision Notice granting a Development Permit for a Material Change of Use, subject to conditions of approval was provided by Western Downs Regional Council on 23 December 2015 (refer to Attachment 1).

			Yes, you must also complete Section 2.5
1.12	Component of larger action	Х	No, the proposed action is not a component of a larger action.
			Yes, you must also complete Section 2.7
1.13	Related actions/proposals	Х	No, the proposed action is not related to other actions or proposals in the region.
			Yes, provide details:
1.14	Australian Government funding		No
		Х	Yes. The proposed action is currently shortlisted under the Federal Government's ARENA Large Scale Solar Photovoltaics - Competitive Round, which is a \$100 million dollar funding program. A full application under the program is expected to be lodged on or prior to 15 June 2016. Should the application be successful, the proposed action will be part funded under this program in accordance with an agreed Funding Agreement with ARENA.
			No other Australian grant funding is currently being pursued.
1.15	Great Barrier Reef Marine Park	Х	No. The proposed action is not inside the Great Barrier Reef Marine Park.
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

# 2 Detailed description of proposed action

## 2.1 Description of proposed action

The proposed action seeks to develop a solar photovoltaic generation facility (solar farm) on Lot 119 SP227731 with ancillary power connections planned on Lot 121 SP178856, at Grahams Road, Kogan within the Western Downs local government area. The potential development area is approximately 291 ha. The potential development area has been strategically positioned within the site of the proposed action to coincide with areas where the lowest level of ecological constraints occur.

The development will consist of a number of panel areas, comprising arrays of solar panels connected to associated inverter stations (up to 200). The inverter stations convert low voltage DC current from approximately 1-2 ha of solar panels up to 33 kilovolt (kV) high voltage AC current. A local network of up to 33 kV power lines will transmit the power from the inverter stations to the site's high voltage substation. At the substation the 33 kV input power will be converted to a suitable voltage for connection to the Powerlink Substation via an existing connection point at the Darling Downs Power Station.

Additional project elements include proposed internal roads as well as a warehouse/maintenance, equipment and vehicle housing and administration building.

Elements of the proposed action are outlined in the following sections.

## **Photovoltaic Panel areas**

The layout of the solar panels has been designed to accommodate the existing coal seam gas infrastructure, remnant vegetation and internal access tracks as well as the unnamed east-west drainage feature and associated regrowth riparian vegetation. It is expected that between 630,000 and 2.3 million panels will be installed, depending on the type of technology used for the panels. This area of solar panels will equate to a potential peak power generation capacity of up to 200 MW depending on the current panel efficiencies.

The panels will be attached to mounting racks and connected through electrical panel wiring to connect with inverter stations. The panel wiring will either be installed underground in shallow insulated trenches or above ground at a height equal to or below the panels. Where below ground, excavation is not expected to be below 1 m in depth. The excavation will comply with the Soil and Erosion Sediment Control – Engineering Guidelines for Queensland Construction Sites. Any excavation areas will be rehabilitated with native grasses and are therefore temporary disturbances.

Examples of the solar panels above a grassland are depicted in Photo 1. As demonstrated in these photos, the installation of a solar farm is able to retain existing grassland vegetation and habitats in situ with a minimal level of ground disturbance.



Photo 1 Examples of a solar farm above grassland vegetation / habitat

The mounting racks will either be fixed tilt (module are fixed at a particular angle) or single axis tracking, where the modules rotate to track the sun. These mounting racks (including the panels) will not exceed 6 m in height.

## **Inverter stations**

The solar farm will include up to 200 inverter stations dispersed through the PV panel areas. The panels will connect vial panel wiring to the inverter stations. The stations will include switching, protection, DC to AC conversion equipment (inverter and electrical transformers). The inverter stations may be contained under a shelter for weather protection.

A total area of approximately 0.86 ha of grassland vegetation will be permanently cleared to allow for the installation of these inverter stations.

## Internal electrical network

A high voltage internal electricity network will be used to collect the power from the inverter stations to the site's substation. The internal network will be up to 33 kV and will consist of both underground and above ground cabling in compliance with relevant codes and standards. The installation of the electricity network will avoid potential impacts upon remnant vegetation. Provision of an overhead powerline, will however result in some minor structural modification of the riparian regrowth vegetation that is associated with an unnamed drainage feature that flows through the property from east to west. The indicative location of the overhead powerline is indicated on Figure 2). The actual final location of the overhead powerline may however vary in response to final design requirements, for which field assessment of structural modification of regrowth vegetation is a consideration. The power poles will be located outside of this riparian regrowth vegetation while the wires between the poles will be either strung across by helicopter or walked and pulled through at ground level. Origin have committed to having a minimal level of disturbance to this vegetation as possible and in doing so, avoid any need for vegetation clearing or ground disturbance.

The structural modification of this vegetation will involve the strategic removal of regrowth tree species (e.g. *Acacia* spp., *Eucalyptus* spp., *Corymbia* spp. etc.) to a nominal width of 30 m. Any trees greater than 10 m tall may require dismantling from top to bottom to minimise the level of disturbance to understorey vegetation and

habitats. Only understorey shrub species will be retained within this 30 m wide area. Regular maintenance will be applied to the retained understorey species to maintain a canopy height no greater than 3 m. Maintenance will also involve the ongoing removal and/or poisoning of regenerating trees species. The structural modification of this regrowth vegetation does not constitute a permanent residual impact.

Only temporary disturbances to grassland vegetation may result from the underground installation of cabling. Any excavation activities will be rehabilitated with native grasses and are therefore temporary disturbances. The excavation will comply with the Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites. Where above ground, vegetation clearance will comply with the design standards (AS7000) to ensure vegetation does not pose a risk to the powerlines.

#### Site substation and transmission electrical systems

A high voltage substation is also proposed for the development. This substation will have exiting power lines at a voltage of 275 kV, to be connected to the National Electricity Grid via existing overhead powerlines on Lot 121 SP178856.

The substation will provide switching and protection for feeders of the medium/high voltage electrical network. It will also provide electrical voltage transformation to the connection voltage. For safety reasons, the substation will be fenced separately to the rest of the plant to restrict access to the high voltage areas. Fencing will consist of a chain link and barbed wire strand. Vegetation maintenance will also be conducted to ensure vegetation does not pose any risk to the power lines.

Installation of the high voltage substation will permanently remove approximately 0.45 ha of grassland vegetation and habitats.

#### Maintenance and site administration

A site maintenance and administration area will be established close to the main site entrance to Grahams Road. Three buildings are proposed to be constructed:

- $\rightarrow$  Maintenance and storage shed
- → Administration building
- → Vehicle parking/shelters.

The proposed facility is in scale and appearance similar to a rural dwelling with an attached farm machinery shed.

## Maintenance / Storage Shed

The shed will comprise of steel clad, portal framed light industrial building with concrete slab floor and heavy vehicle / fork lift access doors. The proposed nominal height at the eaves of 6 m and 8.5 m at the ridge lines. Floor area will be up to 780 m<sup>2</sup> (0.08 ha). The building will provide open plan areas for storage racking for storage of consumables, spares and maintenance equipment, minor component repairs, delivery receipts and issues.

## Vehicle Storage / Parking

Vehicle storage and parking will comprise open sided vehicle shelters (carports) for site equipment and vehicles. This area will be used for undercover storage of site vehicles and equipment (tractors, trailers, medium truck, etc). Open parking bays are also proposed for permanent staff. Vehicle parking/shelters will occupy an area of approximately 607 m<sup>2</sup> (0.06 ha).

#### Administration Building

The administration building will have a total area of approximately  $260 \text{ m}^2$  (0.03 ha). The building will be a single storey brick or clad domestic scale building with a pitched steel or skillion roof. The architectural style will be that of a medium size local farm house. Office working accommodation will be provided for four personnel and include ablutions and amenities for a total of six on site staff. The building will comprise the following:

- $\rightarrow$  covered veranda / entry area
- $\rightarrow$  general office area, reproduction, reception area, open plan and work stations

- → server room / comms cabinet
- $\rightarrow$  lunch room / briefing room
- > kitchenette
- → first aid facility
- → ablutions: male and female, 2 pan, 2 showers, two wash basins
- $\rightarrow$  change facilities and lockers
- → external access from veranda
- $\rightarrow$  parking bays for visitors and workers vehicles (6) and visitors (4).

#### Site security

The site will be fenced with chain link fencing with barbed wire strand. Lockable gates with the same fence type will be placed at the main entrance, providing coal seam gas operator designated entry point and emergency egress locations.

#### **Operating hours and staffing**

The normal operating hours of the solar farm's permanent staff will be between the hours of 7:00 am to 6:00 pm. Normal construction activities are planned to occur during weekdays only, with day shifts likely for the bulk of the construction period. Origin Energy may consider the option of night or weekend work where required to accelerate the construction program.

During construction, activities will comply with the *Environmental Protection Act 1994* with respect to noise impacts from machinery.

#### Access and traffic

#### Access roads

Brisbane will be the main port of entry for much of the equipment, with the remainder being sourced locally or interstate. The primary haulage route will be via the Warrego Highway, connecting to Dalby-Kogan Road and then onto Grahams Road to the site.

The development will use the existing site entry point on the eastern boundary of the property along Grahams Road. The crossover from Grahams Road to the internal access road will be designed to accommodate B Double vehicles delivering construction material directly to construction staging and assembly areas on site.

#### Internal roads

The proposed development will include the construction of internal access roads which will connect with the site entry, inverter stations and PV panels around the site. These roads are expected to be unsealed, single to dual vehicle width and include areas for manoeuvring. The site currently contains existing internal roads, which support coal seam gas operations and farming activities. The development will attempt to utilise these roads to avoid unnecessary site impacts.

#### Car parking

Under Schedule 1, Division 2 of the Wambo Shire Planning Scheme 2005, there is no requirement prescribed for car parking for a Public Utility. However, given there will be up to 6 permanent staff during the operation of the plant as well as visitors, the development proposal includes up to 10 car park spaces to be located near the maintenance and administration building, this is close to the site entry along Grahams Road. These carparks will be constructed to Australian Standard for off-street parking facilities.

#### Delivery of goods

During construction, it is expected that up to 6 B Doubles a day (27 per week) will be delivering the premanufactured solar panels and associated site materials. To access the site, trucks will travel along Dalby-Kogan Road (a State-controlled road) which intersects with Grahams Road (an access road).

The associated traffic impacts during construction are detailed in the Construction Traffic Assessment Report provided as Appendix G to Attachment 2 – Town Planning Report.

#### Infrastructure and servicing

#### Wastewater

During operation, the permanent staff presence on the site will be approximately 6 personnel. A domestic scale package wastewater treatment plant and associated irrigation area is proposed to meet the operational needs on site.

#### Water supply

The roof area of the administration and support buildings will provide for the non-potable water use on site with existing dams providing water for firefighting and track maintenance. Potable water is proposed to be sourced from a connection to the Darling Downs Power Station water or a small package water treatment unit on site.

#### Water demand

Water will also be required for routine cleaning of panels and potentially for dust suppression on site. This activity is likely to be contracted out and a small mobile water tanker would likely service the requirement. Water consumption for this activity is expected to be lower than current agricultural activity on the site.

During construction, water will be trucked in and pump-out waste water services from a local service provider used.

#### Sewerage

Solid waste and putrescible waste disposal will be by the regular service of a licensed waste management contractor. Site storage of waste will be in approved waste containers provided by the contractor.

#### Stormwater management

No major earthworks are proposed for the proposed action that would significantly change the drainage regime of the site. Stormwater is proposed to be conveyed through the site in a network of culverts and open channels where necessary to maintain the existing drainage regime. The stormwater management provisions for the solar farm are designed in accordance with the Australian Rainfall and Runoff guidelines. A concept plan for site drainage and mitigation of any potential water quality or changes to the drainage regime is provided as Appendix F to Attachment 2 – Town Planning Report.

#### Maintenance

The panels may be cleaned using water trucks. The frequency of this will occur either periodically or when required.

Regular vegetation maintenance will occur within the potential development area throughout the operational phase to control re-emerging woody vegetation and weeds and to maintain low fuel loads to reduce risks associated with wildfire. Vegetation maintenance will involve the regular slashing of grasses in the areas to be covered by solar panels and surrounding the solar panels and the application of selective herbicides to control emerging woody vegetation and weeds to maintain a grassland environment. The grass will remain in place under solar panels and there will be no requirement to spray grasses with herbicides. Essentially, the majority of the modified pasture grassland habitats will remain within the potential development area post-construction.

#### Decommissioning

Upon decommissioning of the solar farm, the site will be subject to certain rehabilitation regimes to restore the land to a standard appropriate for rural use. Restoration of the site will include removal of all above ground structures and footings and capping of services.

2.2 Alternatives to taking the proposed action

There are no alternatives to the proposed action.

#### 2.3 Alternative locations, time frames or activities that form part of the referred action

Origin has been investigating potential solar project sites near to Darling Downs Power Station. The final site of the Darling Downs Solar Farm (proposed action) has resulted from the consideration of a number of local alternatives. The site of the proposed action (Lot 119 SP227731) is one of the few feasible low impact options present in the immediate area (subject to other constraints such as remnant vegetation and land tenure).

In developing the proposed development area, Origin have also considered alternatives with respect to the configuration of the proposed action on the site, particularly with respect to the impact on riparian and other vegetation. The proposed action is the result of considering the environmental values of the site, associated approval triggers and subsequently arriving at a proportionally low impact environmental footprint. Examples of this include:

- → retaining the majority of the existing riparian re-growth vegetation as potential habitat, a wildlife corridor and erosion and sedimentation mitigation
- $\rightarrow$  generally preserving the dams within the riparian corridor which may act as fauna water sources
- → selecting a low impact management strategy with respect to vegetation within panel areas constraining the areas of permanent residual impact areas so to preserve grass growth extend within panel areas
- → limiting the extent of the potential development area to not impinge on state-identified and field verified remnant vegetation areas.

All of these aspects informed the design strategy and thus the proposed action.

Given the presence of the neighbouring power infrastructure, the solar farm has a range of options for connection to the national electricity grid. A number of connection paths to the connection point on Lot 121 SP178856 were considered, including those that required overhead powerlines outside of the potential development area. However, those options that required removal of remnant vegetation were removed from the potential options, and while the final connection path has not been fully determined it will remain contained within the potential development area (except where within the existing gas fired power station areas). Therefore, the final line design will be selected in accordance with minimising unnecessary impacts due to the proposed action.

## 2.4 Context, planning framework and state/local government requirements

The solar farm is to be located within the State of Queensland. The proposed action is currently being assessed against the following planning instruments.

## Sustainable Planning Act 2009 and Wambo Shire Planning Scheme

Approval of the proposed action has been undertaken through the submission of a Development Application to the local government authority (Western Downs Regional Council) under the *Sustainable Planning Act 2009*.

The proposed action satisfies the definition of a Material Change of Use as defined under Section 10 of the *Sustainable Planning Act 2009.* This application has been assessable under the Wambo Shire Planning Scheme 2005 as at the date of lodging the development application, the Draft Western Downs Regional Planning Scheme 2015 had not yet come into effect. Furthermore under this planning scheme, the proposed action constitutes code accessible development as defined under Section 313 of the *Sustainable Planning Act 2009.* Code accessible development does not require public notification and are not open to third party submissions. A Construction Traffic Impact Assessment has been prepared to meet the requirements of the *Transport Infrastructure Act 1994* and any local government requirements (refer to Appendix G of Attachment 2).

A Material Change of Use Development Application was submitted to Western Downs Regional Council in October 2015 (refer to Attachment 2). A Decision Notice granting a Development Permit for a Material Change of Use, subject to conditions of approval was provided by Western Downs Regional Council on 23 December 2015. A copy of this Decision Notice is provided as Attachment 1.

The proposed action does not trigger State Planning Regulatory Provisions.

## Vegetation Management Act 1999

The Vegetation Management Act 1999 (VM Act) seeks to regulate the clearing of vegetation comprising native trees and plants, other than:

- → grass or non-woody herbage
- $\rightarrow$  a plant within a grassland regional ecosystem prescribed under a regulation
- → a mangrove.

The Regulated Vegetation Management Map delineates a range of vegetation category areas under the VM Act for specific land. The following vegetation category areas are identified for the site of the proposed action:

- → Category B area containing remnant vegetation comprising least concern regional ecosystem 11.5.1a/11.3.25
- → Category X area non-remnant.

Schedule 24 of the Sustainable Planning Regulation 2009 identifies activities for which clearing of native vegetation is considered 'not accessible development' and may be undertaken without development approval. For freehold land this includes:

- $\rightarrow$  Clearing within Category X areas
- → Clearing within Category B areas when undertaken in accordance with a self-assessable vegetation clearing code.

The proposed development area has been designed to avoid all field verified Category B vegetation. However, some inconsistencies exist between the areas of Category B vegetation presented on the Regulated Vegetation Management Map and the result of the ecological field survey, whereby land with the site of the proposed action is mapped as Category B but has been cleared and contains no native woody vegetation. A Property Map of Assessable Vegetation (PMAV) application has been prepared for submission to the regulating authority to seek to have the majority of these areas revised as Category X (refer to Figure 3).

The following exceptions however apply:

- → The Project includes a proposal to upgrade the existing vehicle access crossover from Lot 119 on SP227731 to Grahams Road at the south-eastern extent of the site of the proposed action and the adjoining entry road. A limited extent of clearing is likely to be required to facilitate the works. In relation to the clearing:
  - Within Lot 119 on SP227731, land subject to the clearing is expected to be amended to Category X via the abovementioned PMAV application and therefore, would not be subject to development approval. Alternatively, clearing for access roads may also occur without development approval where undertaken in accordance with the relevant self-assessable vegetation clearing code.
  - Within Grahams Road, vegetation clearing is the responsibility of the relevant local government who
    maintain an exemption in relation to clearing necessary for the establishment of reasonable access to
    adjoining land from the existing formed road to a maximum width of 10 m. In addition, Schedule 24 of
    the Sustainable Planning Regulation 2009 includes provisions relating to establishment of reasonable
    access from an existing formed road.
- An area of approximately 2.3 ha in the southern extent of Lot 119 on SP227731 mapped as Category B and devoid of vegetation is also highlighted on the Vegetation Management Supporting Map as 'Category B area under Section 20AH' of the VM Act. Engagement with DNRM has indicated that this land may have been unlawfully cleared and therefore, is technically considered to contain Category B (least concern) vegetation. Therefore, the abovementioned PMAV is not applicable within this location. Development within the highlighted section would trigger development approval for Operational Work (clearing native vegetation) except where in accordance with a relevant exemption (such as clearing by a resource authority holder for a resource activity).

## Nature Conservation Act 1992

#### Protected flora

The potential development area is partially located within an area mapped as 'high risk area' for protected plants under the *Nature Conservation Act 1992* (NC Act). A significant number of Kogan Waxflower (*Philotheca sporadica*) – listed as Vulnerable under the EPBC Act and Near Threatened under the NC Act – were identified within the 100 m flora survey buffer zone for the potential development area (refer Figure 5). A protected plants clearing permit is required to be approved by the Department of Environment and Heritage Protection (DEHP) for clearing to occur within the potential development area. In addition, an impact management plan is required to be developed to identify the measures proposed to be used to mitigate any indirect impacts to individuals or populations of Kogan Waxflower. A copy of this impact management plan is included as Appendix G to Attachment 3.

#### Protected fauna

The ecological field survey determined that the potential development area does not contain animal breeding places for Least Concern (colonial breeders), Special Least Concern or threatened fauna species (Endangered, Vulnerable or Near Threatened) listed under the NC Act. However it is likely that breeding places for Least Concern (non-colonial breeders) will be impacted during construction. These activities may only be undertaken in accordance with an approved Species Management Program (SMP). DEHP's generic SMP allows for tampering with Least Concern fauna species (non-colonial breeders) and Origin is in the process of becoming a signatory to this document.

#### **Environmental Offsets Act 2014**

Offsets under the *Environmental Offsets Act 2014* (Offsets Act) will apply to a project where each of the following conditions are met:

- → undertaking a prescribed activity (as listed in Schedule 1 of the Environmental Offsets Regulation 2014 (Offsets Regulation)) to which an authority (approval or other regulatory mechanism) will apply
- → involving a prescribed environmental matter (as listed under Schedule 2 of the Offsets Regulation), also known as matters of State environmental significance (MSES)
- → the activity will result in a significant residual impact (as described within supporting guidelines specific to State legislation within which the authority is based (i.e. NC Act, VM Act, SP Act etc).

An assessment of the proposed action against the above criteria is provided in Table 2.

#### Table 2High level assessment against offset criteria

CRITERIA	CRITERIA DETAILS	ECOLOGICAL FINDINGS
Prescribed activity to which an authority will apply	Taking a protected plant within the meaning of the NC Act under a protected plant clearing permit.	The project area contains protected plants (Kogan Waxflower) and a protected plant clearing permit will be required to undertake clearing within 100 m of these species.
Involving a prescribed environmental matter	Protected wildlife habitat includes an area identified as high risk which contains plants that are endangered or vulnerable wildlife.	Kogan Waxflower is identified as Near Threatened wildlife and therefore does not constitute a prescribed environmental matter for which offsets may be required. No further assessment is necessary.
Resulting in an significant residual impact	Not applicable	Not applicable

Although clearing to under the proposed action will require a protected plant permit to allow clearing within 100 m of protected plants (a prescribed activity), the species to which the permit will apply (*Philotheca sporadica*) is Near Threatened under the NC Act and is therefore, not a State prescribed environmental matter. The proposed action is unlikely to involve the undertaking of any other prescribed activities and therefore offsets are unlikely to apply to the proposed action under the Offsets Act.

Where the proposed action triggers development approval for Operational Work (clearing native vegetation) further consideration of the offset criteria would be required. However, due to the minimal extent of vegetation which would be involved and the types of regional ecosystems affected, offset requirements are considered unlikely to apply.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

The proposed action has not been subject to an environmental impact assessment under Commonwealth or state legislation.

2.6 Public consultation (including with Indigenous stakeholders)

Public consultation for the proposed action has included discussion with:

- → Western Downs Regional Council:
  - pre-lodgement meeting for Development Application (26 August 2015)
  - further discussions with Council occurred after the pre-lodgement meeting to confirm the drawing requirements relating to the location of a warehouse and administration building.
- → Landowners of Lot 119 SP227731 who are hosting the solar farm infrastructure (landowner consent is provided in Appendix C of Attachment 2 Town Planning Report).
- → Representatives of the Barrungam and Wakka Wakka Indigenous groups, in accordance with cultural heritage management plans currently held that govern the activity.

As the project progresses, Origin intend to undertake further consultation with regulatory agencies and key stakeholders.

2.7 A staged development or component of a larger project

The proposed action is not a component of a larger action.

# 3 Description of environment & likely impacts

# 3.1 Matters of national environmental significance

## 3.1 (a) World Heritage Properties

Description

The Protected Matters Search did not identify any World Heritage Properties within or in close proximity to the Project site.

Nature and extent of likely impact

The proposed action will not directly or indirectly impact on World Heritage values of any World Heritage property.

#### 3.1 (b) National Heritage Places

#### Description

The Protected Matters Search (refer Appendix A of Attachment 3) did not identify any National Heritage Places within or in close proximity to the Project site.

Nature and extent of likely impact

The proposed action will not directly or indirectly impact on National Heritage values of any National Heritage place.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

## Description

Four Wetlands of International Importance were returned from the Protected Matters Search (refer Appendix A of Attachment 3) being:

- → Banrock Station wetland complex (1,200 to 1,300 km from the site)
- → Narran Lake Nature Reserve (400 to 500 km upstream)
- → Riverland (1,200 to 1,300 km from the site)
- $\rightarrow$  The Coorong and Lakes Alexandria and Albert Wetland (1,400 to 1,500 km from the site).

#### Nature and extent of likely impact

Given the nature of the proposed action (solar farm with minimal ground disturbance) and the distance (in excess of 400 km) between the potential development area and these wetlands, it is highly unlikely that the proposed action will directly or indirectly impact on the ecological character of these Wetlands of International Importance.

#### 3.1 (d) Listed threatened species and ecological communities

#### Description

The Protected Matters Search Tool (refer Appendix A of Attachment 3) identified four threatened ecological communities and 20 threatened species that may occur in, or may relate to the proposed solar farm development area. These species, and their likelihood of occurrence within the site of the proposed action, are shown in Tables 3 and 4 below.

## Table 3 Threatened ecological communities identified from the Protected Matters Search Tool

COMMUNITY	CONSERVATION STATUS	LIKELIHOOD OF OCCURRENCE
Brigalow (Acacia harpophylla dominant and codominant)	Endangered	Not identified from Project area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Not identified from Project area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Not identified from Project area
Weeping Myall Woodlands	Endangered	Not identified from Project area

#### Table 4 Threatened species identified from the Protected Matters Search Tool

SPECIES NAME	COMMON NAME	CONSERVATION STATUS	LIKELIHOOD OF OCCURRENCE
Fauna			
Erythrotriorchis radiatus	Red Goshawk	V	Low
Geophaps scripta scripta	Squatter Pigeon (southern sub-species)	V	Moderate
Grantiella picta	Painted Honeyeater	V	Low
Lathamus discolor	Swift Parrot	E	Low
Rostratula australis (syn. R. benghalensis)	Australian Painted Snipe	E	Low
Chalinolobus dwyeri	Large-eared Pied Bat	V	Low
Dasyurus hallucatus	Northern Quoll	E	Low
Nyctophilus corbeni (syn. N. timoriensis)	South-eastern Long-eared Bat	V	Moderate
Phascolarctos cinereus	Koala	V	Moderate
Pteropus poliocephalus	Grey-headed Flying-fox	V	Moderate
Anomalopus mackayi	Five-clawed Worm-skink	V	Low
Delma torquata	Collared Delma	V	Low
Egernia rugosa	Yakka Skink	V	Moderate
Furina dunmalli	Dunmall's Snake	V	Moderate
Maccullochella peelii	Murray Cod	V	Low

SPECIES NAME	COMMON NAME	CONSERVATION STATUS	LIKELIHOOD OF OCCURRENCE
Flora			
Acacia lauta		V	Low
Cadellia pentastylis	Ooline	V	Low
Homopholis belsonii	Belson's Panic	V	Low
Philotheca sporadica	Kogan Waxflower	V	Known
Thesium australe	Austral Toadflax	V	Low

Conservation codes: E = Endangered; V = Vulnerable

Two flora and fauna field survey events were conducted across the site of the proposed action and immediate surrounds. The first was conducted in October 2015 for the purposes of identifying potential ecological constraints associated with the project area. The second was conducted in February 2016 for the purposes of:

- → identifying threatened fauna species and supporting habitat
- → identifying threatened flora species in accordance with the Flora Survey Guidelines Protected Plants Nature Conservation Act 1992 (Flora Survey Guidelines) (DEHP 2014)
- → preparation of a Property Map of Assessable Vegetation (PMAV) application.

The methods and results of these surveys are described in the Ecological Assessment Report (refer Attachment 3), with the main findings with respect to threatened ecological communities and threatened species summarised below.

Threatened ecological communities:

Four threatened ecological communities listed under the EPBC Act were identified using the Protected Matters Search Tool as having the potential to occur on the site of the proposed action. None of these threatened ecological communities were identified from within the Project area during field surveys.

# Fauna:

## Habitat assessment

The site of the proposed action was observed to contain a number of different habitat types including:

- → modified pasture grassland with sparsely scattered trees
- → open forest on sand plains
- → regrowth and remnant riparian forest
- → open forest shrubland on rocky jump-ups
- → farm dams (wetlands).

Each of these habitat types is described below.

## Modified pasture grassland with sparsely scattered trees

Approximately 268 ha of the 291 ha potential development area, is comprised of a modified pasture grassland with sparsely scattered relict and regrowth trees such as Queensland Blue Gum (*Eucalyptus tereticornis*), Narrow-leaved Ironbark (*E. crebra*) and *Acacia* spp. More specifically, the historical land clearing for agriculture has substantially changed the pre-European structural complexity of fauna habitats that would have occurred across the potential development area. The modified pasture grassland provides far less habitat value now than it did in the past. It now mainly supports introduced and native grazing mammals, mircobats and birds, and some reptile species that would be utilising the modified pasture grassland habitat as a foraging and basking (reptiles) resource. This habitat will be the only habitat type that will be subject to approximately 22.4 ha of permanent residual impacts.

# Open forest on sand plains

The open forest on sand plains occupies approximately 53 ha of the site of the proposed action and is in part associated with the unnamed drainage feature that flows through the property from east to west. This habitat has been subject to historical logging and under scrubbing activities to make way for improved pasture growth and livestock grazing. This has left this habitat in a degraded state with reduced species diversity and reduced habitat values for native fauna. It still supports some sheltering, nesting and breeding resources in the form of mature trees, some hollow bearing trees and stags, but possesses limited amounts of fallen woody debris and leaf litter. Foraging resources are limited to native flowering trees and shrubs and the insects they support, as well as native shrubs, grasses and forbs that are available for grazing mammals, which translates into potential prey species for predatory species. This habitat type is excluded from the potential development area and impacts upon this habitat will be avoided.

# Regrowth and remnant riparian forest

The regrowth riparian forest occupies approximately 15.3 ha of the site of the proposed action and is associated with the unnamed drainage feature that flows through the property from east to west. This habitat type has been subject to historical land clearing and is in a state of regeneration. As a result it possesses less habitat value than the remnant vegetation of the site of the proposed action and would therefore only be used periodically by native fauna species when moving between more favourable habitats or during times when foraging resources are becoming scarce (e.g. during droughts). The regrowth riparian forest has been strategically retained to maintain bank stability and reduce potential erosion hazards along the unnamed drainage feature. More importantly its retention will maintain a movement corridor for fauna species throughout the site of the proposed action. There will be some minor structural modification of the riparian regrowth vegetation for the provision of an overhead powerline. This structural modification does not constitute a permanent residual impact.

The remnant riparian forest occupies approximately 32.5 ha of the site of the proposed action and is associated with Braemar Creek. This habitat type was observed to be in much better condition than the regrowth riparian forest habitat. This was evidenced by a greater abundance of large mature trees, many of which are hollow bearing. There is also a greater abundance of fallen woody debris (flood debris), an increased cover of understorey and groundcover species and leaf litter. The remnant riparian forest is likely to provide a significant movement corridor for many native fauna species and provide an important habitat resource during periods of drought. This habitat type is excluded from the proposed development area and impacts upon this habitat will be avoided.

## Open forest shrubland on low rocky jump-ups

Of all the habitat types in the site of the proposed action, the open forest shrubland on low rocky jump-ups was observed to have the least amount of historical disturbance. It contains large mature trees and stags, many of which are hollow bearing and there is a greater level of structural diversity. It also has a greater abundance of fallen woody debris (flood debris), deep leaf litter, rocky outcrops and loose surface rock. Overall, this habitat provides sheltering, roosting, nesting, breeding and foraging habitat for all faunal groups that occur on the site of the proposed action and the wider study area. This important habitat is excluded from the potential development area and impacts upon this habitat will be avoided.

## Farm dams (artificial wetlands)

Even though the farm dams are anthropogenic, they are considered artificial wetlands as they provide wetland habitat values for native fauna requiring water and important foraging, sheltering and breeding habitat for frogs, and wetland birds. These artificial wetlands may however dry out during a prolonged drought. Apart from a small farm dam in the north-eastern corner of the site, all other artificial wetland habitats will not be impacted by the proposed action and will remain in situ.

## Threatened fauna species

A total of 15 fauna species listed under the EPBC Act were identified using the Protected Matters Search Tool (refer Appendix A of Attachment 3). Six of these species were determined to have a moderate likelihood of occurrence within or near the site of the proposed action. These species are discussed below. The remainder of the fauna species were listed as having a low likelihood of occurrence due to a deficiency or absence of suitable habitat, which has resulted from the degraded nature of the site of the proposed action.

# Squatter Pigeon (southern sub-species) (Geophaps scripta scripta)

The Squatter Pigeon is a medium-sized, ground-dwelling pigeon that measures approximately 30 cm in length. This highly mobile species is known to occur throughout eastern and central Queensland and northern New South Wales and is described as locally nomadic, but is not known to travel long distances (DoE 2016a).

Squatter Pigeons are typically associated with grassy woodland habitats where there is regular access to water. They are known to prefer short, sparser grasses over dense, longer grasses, as these areas allow ease of movement when feeding and provision of nesting habitat. The species is adaptable and often moves into adjacent natural grasslands and highly modified or degraded habitats, such as pastures, stockyards, road reserves, railway easements and settlements, to forage for seed on the ground, drink from stock troughs or dams with gently sloping banks, and dust-bathe on bare, dusty ground (DoE 2016a).

The extensive grazing land that occurs across the site of the proposed action and wider study area contains a mixture of habitat features described above. The bodies of water (dams) and water troughs that are associated with the current agricultural land use may also be enhancing local habitat values for the species.

The Squatter Pigeon is said to be capable of breeding throughout most of the year if conditions are good, however, optimal conditions for breeding success are likely to be regulated by the abundance of foraging resources. Therefore, the species' peak breeding period is not fixed, but is likely to coincide with the dry season (April to October), when their primary source of food, grass seed, is most abundant. The breeding habitat occurs on stony rises and within one kilometre of a permanent water body or watercourse (DoE 2016a). The Land Zone 7 low stony rises within the site of the proposed action and wider study area potentially provide potential breeding habitat that is within a desirable distance of permanent water.

Squatter Pigeons are known to access suitable water bodies or watercourses to drink on a daily basis. Suitable water bodies or watercourses are those with gently sloping banks and some bare ground occurring along the margins from which they prefer to drink. While patchy to moderate groundcover vegetation may occur on the banks of suitable water bodies or watercourses, small patches (<1 m<sup>2</sup>) of bare ground at the water's edge is all that the species requires. Suitable water bodies include artificial dams that have these characteristics (DoE 2016a). Proximity to water is a key to species persistence within an area of occupancy, especially throughout the prolonged dry season. The site of the proposed action provides permanent watering points for the species to access for drinking. These are in the form of water troughs and farm dams that provide the species with water throughout the dry season.

Although there have been noticeable disappearances of the Squatter Pigeon in southern Queensland and northern NSW in recent decades, the site of the proposed action occurs within the known distribution for this species (DoE 2016a). Whilst the species preferred habitat (dry open woodland areas with sparse grass cover near permanent water) is limited within the potential development area, potential foraging habitat is present in the form of a non-remnant modified pasture grassland with sparsely scattered trees. These habitats occur in close proximity to the ephemeral unnamed drainage feature, Braemar Creek and farm dams, which offer a reliable source of water for this species.

The Squatter Pigeon has not been recorded within the site of the proposed action during field surveys.

# South-eastern Long-eared Bat (Nyctophilus corbeni)

The South-eastern Long-eared Bat is a member of the Vespertilliondae family. It has a head and body length of approximately 50–75 mm, and a tail length of approximately 35–50 mm. The South-eastern Long-eared Bat was long considered to be a subspecies of the Greater Long-eared Bat (*Nyctophilus timoriensis*), however recent studies have indicated that the bats are different species, which are geographically separated (DoE 2016b).

South-eastern Long-eared Bats are distributed throughout south-eastern Australia, generally in and around the Murray-Darling Basin, with populations thought to be rare throughout this distribution. Despite its large area of distribution, there is limited knowledge of the species and its populations. In Queensland the South-eastern Long-eared Bat is most common in the Brigalow Belt South bioregion (DoE 2016b).

South-eastern Long-eared Bats can be found in a variety of inland woodland habitats where there is access to nearby water. They are known to inhabit woodland habitats including, Ironbark, Belah, Brigalow, River Red Gum, and Cypress Pine, as well as dry sclerophyll forests, Bonewood scrub and Semi-Evergreen Vine Thicket (SEVT). Inland Queensland habitats are known to be dominated by assorted eucalypt and bloodwood species, and various

types of tree mallee, with populations being most abundant in vegetated areas containing a dense shrub layer and distinct canopy (DoE 2016b). Some of these habitat types are consistent with those that occur across parts of the site of the proposed action and wider locality.

South-eastern Long-eared Bats are insectivorous and are known to feed actively either in-flight by gleaning vegetation, or by foraging on the ground. Typical food sources include nocturnally active flying insects such as beetles, mosquitoes, bugs and moths however they are also known to feed on spiders, ants, crickets and grasshoppers. Research indicates that feeding activity is focused around defined foraging areas, particularly containing patches of trees (DoE 2016b).

Female bats are thought to roost in colonies in large tree hollows during maternity periods (DoE 2016b). In reference to this assessment, eucalypt woodlands that contain large tree hollows provide important maternity sites (breeding habitat) for the species, and are therefore considered to be preferred habitat for the species in a local context.

The South-eastern Long-eared Bat has not been recorded within the site of the proposed action during field surveys.

## Koala (Phascolarctos cinereus)

The Koala is endemic to Australia and its natural range extends from north-eastern Queensland to the south-east corner of South Australia. In Queensland, the Koala's distribution extends inland from the east coast. In the southern part of Queensland its distribution extends from Southeast Queensland bioregion, through the Brigalow Belt to the Mulga Lands and Channel Country bioregions in the south-west of the state (DoE 2016c).

Koalas naturally inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by *Eucalyptus* species. The species habitat can be broadly defined as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. The distribution of this habitat is largely influenced by land elevation, annual temperature and rainfall patterns, soil types and the resultant soil moisture availability and fertility. Preferred food and shelter trees are naturally abundant on fertile clay soils. On the western slopes, tablelands and plains in Queensland, Koalas are found in sub-humid *Eucalyptus*-dominated forests and woodlands in riparian and non-riparian environments, and some *Acacia*-dominated forests and woodlands in non-riparian environments. Koalas are also known to occur in modified or regenerating native vegetation communities, as well as urban and rural landscapes where food trees or shelter trees may be highly scattered (DoE 2016c).

The Koala is a leaf-eating specialist that feeds primarily during dawn, dusk or nocturnally. Its diet is mainly restricted to foliage of *Eucalyptus* spp; however, it may also consume foliage of related genera, including *Corymbia* spp., *Angophora* spp. and *Lophostemon* spp. The Koala may, at times, supplement its diet with other species, including *Leptospermum* spp. and *Melaleuca* spp. The Koala is not territorial and the home ranges of individuals extensively overlap, and individuals tend to use the same set of trees, but generally not at the same time (DoE 2016c).

The site of the proposed action contains koala food and shelter trees, in particular within the mature remnant vegetation and parts of the non-remnant riparian regrowth vegetation. The Koala has not been recorded nor has any evidence of the species been observed within the site of the proposed action during field surveys.

## Grey-headed Flying-fox (Pteropus poliocephalus)

The Grey-headed Flying-fox is Australia's only endemic flying-fox and it occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. The Grey-headed Flying-fox selectively forages where food is available. As a result, patterns of occurrence and relative abundance within its distribution vary widely between seasons and between years. At a local scale, the species is generally present intermittently and irregularly, while at a regional scale, broad trends in the distribution of plants with similar flowering and fruiting times support regular annual cycles of migration (DoE 2016d).

The Grey-headed Flying-fox requires foraging resources and roosting sites. The primary food source is blossom from *Eucalyptus* and related genera but in some areas it also utilises a wide range of rainforest fruits. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, *Melaleuca* swamps and *Banksia* woodlands. It also feeds on commercial

fruit crops and on introduced tree species in urban areas (DoE 2016d). Very little of these favoured habitats occur in the locality.

None of the vegetation communities used by the Grey-headed Flying-fox produce continuous foraging resources throughout the year and the species has adopted complex migration traits in response to ephemeral and patchy food resources (DoE 2016d).

The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of *Melaleuca*, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban areas. The species can maintain fidelity to roost sites for extended periods, although new sites have been known to be colonised (DoE 2016d).

The Grey-headed Flying-fox was not recorded during field surveys, nor were any roosting sites or colonies identified in the site of the proposed action or wider locality.

# Yakka Skink (Egernia rugosa)

The known distribution of the Yakka Skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the southern Brigalow Belt, within which the site of the proposed action is situated (DoE 2016e).

The Yakka Skink is known to occur in open dry sclerophyll forest, woodland and scrub, while the core habitat of this species is within the Mulga Lands and Brigalow Belt South Bioregions. It occurs in a wide variety of vegetation types within Queensland Regional Ecosystem Land Zones, three of which occur in the site of the proposed action:

- → LZ 3 Alluvium (river and creek flats)
- → LZ 5 Old loamy and sandy plains
- $\rightarrow$  LZ 7 Ironstone jump-ups.

Common woodland and open forest types that support potential habitats for the Yakka Skink include:

- → Brigalow (Acacia harpophylla)
- $\rightarrow$  Mulga (A. aneura)
- $\rightarrow$  Bendee (A. catenulata)
- → Lancewood (A. shirleyi)
- → Belah (Casuarina cristata)
- → Poplar Box (Eucalyptus populnea)
- → Ironbark (*Eucalyptus* spp.)
- $\rightarrow$  White Cypress Pine (*Callitris glaucophylla*).

Belah, Ironbark and White Cypress Pine are present within the forest and woodland habitats on the site of the proposed action.

The Yakka Skink is commonly found in cavities under and between partly buried rocks, logs or tree stumps, root cavities and abandoned animal burrows. It often takes refuge in large hollow logs and has been known to excavate deep burrow systems, sometimes under dense ground vegetation, and is not generally found in trees or rocky habitats (DoE 2016e). The above habitat types are only available for the Yakka Skink within the remnant vegetation and non-remnant riparian regrowth vegetation of the site of the proposed action.

The Yakka Skink is omnivorous, consuming soft plant materials and fruits and a wide variety of invertebrates (beetles, grasshoppers and spiders) that venture into or near the burrow entrances. It is active during the morning, and from dusk through the early evening. It is known to exhibit high site-fidelity and are therefore limited in their capacity to disperse from a colony site (DoE 2016e).

The Yakka Skink has not been recorded within the site of the proposed action during field surveys.

## Dunmall's Snake (Furnia dunmalli)

The distribution of Dunmall's Snake extends from near the Queensland border throughout the Brigalow Belt South and Nandewar bioregions, as far south as Ashford in New South Wales. Dunmall's Snake occurs primarily in the Brigalow Belt region in the south-eastern interior of Queensland. Records indicate sites at elevations between

200–500 m above sea level. The snake is very rare or secretive with limited records existing. It has been recorded at Oakey, which is not too far from the site of the proposed action (DoE 2016f).

Dunmall's Snake has been found in a broad range of habitats, including 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, some of which occur in the site of the proposed action. Little is known about the ecological requirements of Dunmall's Snake, however, the species has been found sheltering under fallen timber and ground litter (DoE 2016f).

Little is known about the life cycle or reproduction behaviour of Dunmall's Snake and there is no information on the breeding season or clutch size of the species, although it is known that the species lays eggs rather than live young. The diet of Dunmall's Snake consists of small skinks and geckos (DoE 2016f).

Dunmall's Snake has not been recorded within the site of the proposed action during field surveys.

## Flora

A total of five flora species listed under the EPBC Act were identified using the Protected Matters Tool (Table 4). One of these species – *Philotheca sporadica* (Kogan Waxflower) - is known from the locality surrounding the site of the proposed action. The remaining species are considered to have a low likelihood of occurrence given the degraded nature of the majority of the site of the proposed action, history of agriculture and grazing means it is unlikely that these species occur within these areas of the site of the proposed action where solar farm infrastructure will be positioned.

# Kogan Waxflower (Philotheca sporadica)

Kogan Waxflower (*Philotheca sporadica*), Family Rutaceae, is a perennial, open to compact shrub to 150 cm high, with numerous branches. Each branch has many small, 1–4 mm long, hairless, club-shaped leaves along its length. The white flowers are solitary and occur on short stalks to 0.7 mm long at the end of branchlets. The longevity of individual plants is unknown. It is estimated that individual shrubs can live for 20 years (Threatened Species Scientific Committee 2008).

Kogan Waxflower is known from south-east Queensland just north of Tara to Kogan in the Darling Downs Pastoral District. In 1995, Queensland Herbarium had recorded 11 populations. Of the known populations the following land tenures of sites include:

- $\rightarrow$  seven on road verges (six of which extend onto freehold land)
- → one within Braemar State Forest (State Forest 4)
- → one in State Forest 155
- $\rightarrow$  one exclusively on freehold land
- → three on and near the grounds of the Braemar Power Station
- → Kogan Waxflower was encountered from east of Kogan Creek to west of the Braemar Power Station during surveys in 2004 in the Darling Downs region.

The Kogan Waxflower population found within the site of the proposed action, outside of the potential development area, is located in the habitat surrounding the Darling Downs Power Station and Grahams Road Reserve nearby to the Braemar Power Station to the south (refer Figure 5). Given the close proximity of these individuals to the Braemar Power Station it could be assumed that that individuals are part of the same smaller sub-population.

Kogan Waxflower is generally found on residual hills of laterised Cretaceous sandstones on shallow sandy loams to clay loams of extremely low fertility. It occurs primarily in low open forest of *Acacia burrowii, Eucalyptus exserta, E. crebra, E. fibrosa* subsp. *nubila* and *Callitris glaucophylla* (Threatened Species Scientific Committee 2008).

Individuals of Kogan Waxflower were found within and on the edge of patches of remnant shrubland with *Micromyrtus* spp., *Acacia* spp., and emergent *Eucalyptus* exserta on natural scalds (RE 11.7.5), and within nearby patches of mixed *E. crebra*, *E. fibrosa* subsp. *nubila* open forest (RE 11.7.7/11.7.4/11.7.5). A single Kogan Waxflower was recorded in the non-remnant vegetation with scattered Acacia spp. on the slope of the battered dam wall to the south of the Darling Downs Power Station (refer Figure 5).

Approximately 552 individual Kogan Waxflower were found within the habitat surrounding the site of the proposed action, however no individuals were found within the potential development area (refer Figure 5) and none will be

directly impacted by the proposed action. Some of the recorded Kogan Waxflower in the habitat surround the Darling Downs Power Station to the east had obviously been planted based on the presence of tree guards surrounding some individuals.

Nature and extent of likely impact

#### **Permanent residual impacts**

The potential permanent residual impacts of the proposed action is approximately 22.4 ha, all of which is proposed to occur in non-remnant vegetation that is mainly comprised of grassland vegetation and habitats. A relatively small area of riparian regrowth vegetation will be structurally modified for an overhead powerline. An undefinable amount (ha) of non-remnant vegetation will be temporarily disturbed by the proposed action and appropriately rehabilitated. Remnant vegetation and the majority of riparian regrowth vegetation associated with the unnamed east-west aligned drainage feature will be avoided and not impacted by the proposed action.

#### Threatened ecological communities

None of the threatened ecological communities were identified from the Project area, and no impact to these communities are anticipated as a result of the proposed action.

## Fauna

Habitat values within the site of the proposed action for the six threatened fauna species assessed as having a moderate likelihood of occurrence are summarised in Table 5.

SCIENTIFIC NAME	COMMON NAME	EPBC ACT STATUS	NC ACT STATUS	HABITAT VALUES IN SITE OF PROPOSED ACTION
Geophaps scripta scripta	Squatter Pigeon (southern sub- species)	V	V	Potential foraging habitat in the modified pasture grassland with sparsely scattered trees, open forest on sand plains and regrowth. Potential breeding habitat in the open shrubland on rocky jump-ups.
Nyctophilus corbeni (syn. N. timoriensis)	South-eastern Long-eared Bat	V	V	Potential foraging habitat in the open forest on sand plains and regrowth and remnant riparian forest and the open forest shrubland on rocky jump-ups. No potential breeding habitat is present.
Phascolarctos cinereus	Koala	V	V	Potential habitat in the open forest on sand plains and regrowth and remnant riparian forest and the open forest shrubland on rocky jump-ups.
Pteropus poliocephalus	Grey-headed Flying-fox	V	-	Potential foraging habitat in the open forest on sand plains and regrowth and remnant riparian forest and the open forest shrubland on rocky jump-ups.
Egernia rugosa	Yakka Skink	V	V	Potential habitat in the open forest on sand plains and regrowth and remnant riparian forest and the open forest shrubland on rocky jump-ups.
Furina dunmalli	Dunmall's Snake	V	V	Potential habitat in the open forest on sand plains and regrowth and remnant riparian forest and the open forest shrubland on rocky jump-ups.

 Table 5
 Threatened fauna species requiring Significance Assessments and respective habitat values

Significant impact assessments in accordance with the Significant Impact Guideline have been completed for each of these six threatened fauna species. As defined in the Significant Impact Guidelines, an assessment of the significance of a residual impact is based against nine specific criteria for a species listed as Vulnerable under the EPBC Act:

- → lead to a long-term decrease in the size of an important population of a species
- $\rightarrow$  reduce the area of occupancy of an important population
- → fragment an existing important population into two or more
- $\rightarrow$  adversely affect habitat critical to the survival of a species

- $\rightarrow$  disrupt the breeding cycle of an important population
- → modify, destroy, remove or isolate or 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
- → introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species
- $\rightarrow$  interfere substantially with the recovery of the species.

The assessment for each threatened fauna species concluded that the proposed action would be unlikely to result in significant impacts as assessed against the criteria for threatened species provided in the Significant Impact Guidelines. A summary of the findings from these significant impact assessments is outlined below with the full assessments provided in Appendix F of Attachment 3.

# Squatter Pigeon (southern sub-species) (Geophaps scripta scripta)

The site of the proposed action and wider locality contains viable foraging, sheltering and breeding habitat that may be used periodically by a local population of Squatter Pigeon. A relatively small area of approximately 22.4 ha of Squatter Pigeon habitat will be permanently impacted by the proposed action. This impact is only to occur within potential foraging habitat associated with the non-remnant grassland vegetation, of which a large portion will remain in situ amongst the solar panel infrastructure and other ancillary infrastructure. The proposed solar farm development will avoid impacts upon areas of remnant vegetation and breeding habitat on Land Zone 7 low stony rises, as well as riparian regrowth vegetation along an unnamed drainage feature that runs east-west through the site of the proposed action. Existing farm dams and water troughs will also be retained. The proposed development will also be retaining the existing pasture grassland in non-remnant areas beneath the solar panels on the Land Zone 5 sandy plain.

In effect, the existing foraging, sheltering, breeding and dispersal habitats will in the most part remain in-situ. This will ensure that any local population of the Squatter Pigeon will be able to have continued access and use of these habitat resources, which are necessary for maintaining a local population and the species genetic diversity.

## South-eastern Long-eared Bat (Nyctophilus corbeni)

The site of the proposed action and wider locality contains potential foraging, roosting and breeding habitat that may be actively used by a local population of South-eastern Long-eared Bat, including open forests and riparian forests that contain large hollow bearing trees and understorey structure that is favoured by the species. This potential South-eastern Long-eared Bat habitat on the site will be avoided by the proposed action. Existing farm dams and water troughs that provide a watering point for the species will also be retained.

The South-eastern Long-eared Bat is a highly mobile species that has a relatively large home range and a known ability to utilise numerous roost sites within its home range. It is therefore, highly unlikely that the clearing of approximately 22.4 ha of non-remnant habitats, which is not favoured by the species, would result in a significant impact upon the species within the meaning of the Significant Impact Guidelines.

## Koala (Phascolarctos cinereus)

The Koala was not recorded nor was there any evidence (scats and scratches) of the Koala identified during the field survey within riparian forest habitat and more open forest habitats.

Although the site of the proposed action is not listed under the register of critical habitat, it does provide areas of potential foraging, breeding and sheltering habitat for the Koala, especially in association with the Braemar Creek riparian forest that contains numerous and favoured Koala feed trees (e.g. *Eucalyptus tereticornis*) that may be periodically used by a local population of Koala. The proposed action will be avoiding impacts upon remnant habitat and the structural modification of the riparian regrowth vegetation (habitat tree removal) for the powerline crossing is unlikely to substantially decrease the overall availability of important habitat resources within the site of the proposed action and wider locality.

## Grey-headed Flying-fox (Pteropus poliocephalus)

The field survey did not identify any individuals of the species, roosting sites or colonies. The site of the proposed action and wider locality however contains potential foraging and possibly roosting habitat that may be periodically used on a seasonal basis by a local Grey-headed Flying-fox population. The proposed action will be avoiding

impacts upon remnant habitat and the structural modification of the riparian regrowth habitat is unlikely to remove or substantially decrease the availability of potential foraging habitat for the Grey-headed Flying-fox. Therefore, the proposed action is unlikely to decrease the availability and quality of habitat within the locality and the local Grey-headed Flying-fox population is unlikely to decline as a result.

# Yakka Skink (Egernia rugosa)

The Yakka Skink has not been recorded from the site of the proposed action, however there is potential habitat in the site that could support a colony of the species. Important habitat is recognised by DoE as being a surrogate for an important population. Therefore, if a colony of Yakka Skink were to occur in the site of the project area, it would be recognised as an important population and if present such a population could be considered part of a key source population for breeding or dispersal and for maintaining the species genetic diversity. The proposed action will be avoiding potential Yakka Skink habitat that is primarily associated with remnant open forests and woodlands of the site and to a lesser degree the regrowth habitats. In addition, the structural modification of the riparian regrowth habitat is unlikely to impact important habitat for the species due to the procedures and measures that will be in place to avoid any ground disturbances. Therefore if an important population 'colony' of Yakka Skink were present, it would not be impacted by the proposed action.

# Dunmall's Snake (Furnia dunmalli)

Dunmall's Snake has not been recorded in the Project area, however potential foraging, sheltering and breeding habitat exists in the Project area that could support a population of the species, including open forests, woodlands and riparian forests that contain habitat features that are favoured by the species. This potential habitat in the site Project area will be avoided by the proposed action. The structural modification of the riparian regrowth habitat is unlikely to impact the species due to the procedures and measures that will be in place to avoid any ground disturbances.

# Flora

The ecological assessment for the proposed solar farm has determined that Kogan Waxflower listed as Vulnerable under the EPBC Act occurs within the site of the proposed action (refer to Figure 5). Habitat values within the site of the proposed action for Kogan Waxflower are identified in Table 6.

Table 6	Threatened flora	species requiring	n Significance	Assessments a	and respective	habitat values
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SCIENTIFIC	COMMON NAME	EPBC ACT	NC ACT	HABITAT VALUES IN SITE OF PROPOSED
NAME		STATUS	STATUS	ACTION
Philotheca sporadica	Kogan Waxflower	V	NT	Recorded from site of the proposed action. Remnant mixed <i>E. crebra</i> , <i>E. fibrosa</i> subsp. <i>nubulia</i> open forest (RE 11.7.7/11.7.4/11.7.5)

The proposed action will not directly impact on any individual Kogan Waxflower. There is however a risk that some individual Kogan Waxflower directly adjacent to the proposed development area may be indirectly impacted by the development of the Project. Potential indirect impacts may include:

- → impacts on plants from dust accumulation
- $\rightarrow$  impacts on plants as a result of sediment and erosion
- → impacts on plants as a result of construction activities
- $\rightarrow$  impacts on plants as a result of weed spread.

An impact management plan has been developed in accordance with the Protected Plant Assessment Guidelines to minimise and mitigate any indirect impacts to individual Kogan Waxflower. This impact management plan is included as Appendix G of Attachment 3 and includes:

- → measures to avoid all individuals within close proximity to the proposed development area prior to and during construction (i.e. demarcation and physical flagging of individuals and populations)
- → sediment and erosion measures
- → weed management actions
- → post construction monitoring of individuals within close proximity to the proposed development area.

A significant impact assessment has been undertaken for the Kogan Waxflower in accordance with the Significant Impact Guidelines (refer to Appendix F of Attachment 3). Based on the implementation of the impact management plan, including weed management actions and avoidance of direct and indirect impacts upon Kogan Waxflower and its habitat, it is considered unlikely that the proposed action will result in a significant impact to Kogan Waxflower within the meaning of the Significant Impact Guidelines.

3.1 (e) Listed migratory species

#### Description

The Protected Matters Search Tool identified 11 listed migratory species that may occur in, or may relate to the site of the proposed action. These species, and their likelihood of occurrence within the site of the proposed action, are shown in Table 7.

SPECIES NAME	COMMON NAME	CONSERVATION STATUS	LIKELIHOOD OF OCCURRENCE
Apus pacificus	Fork-tailed Swift	Mi (M)	Moderate
Ardea (Bulbulcus) ibis	Cattle Egret	Mi (W)	Moderate
Ardea (Casmerodius) modesta	Eastern Great Egret	Mi (W)	Moderate
Cuculus opatus (syn. Cuculus saturatus)	Oriental Cuckoo	Mi (T)	Low
Gallinago hardwickii	Latham's Snipe	Mi (W)	Moderate
Hirundapus caudacutus	White-throated Needletail	Mi (T)	Moderate – Potential to occur in areas containing farm dams
Merops ornatus	Rainbow Bee-eater	Mi (T)	Known
Motacilla flava	Yellow Wagtail	Mi (T)	Low
Myiagra cyanoleuca	Satin Flycatcher	Mi (T)	Low
Pandion cristatus (syn. P. haliaetus)	Eastern Osprey	Mi (W)	Low
Rhipidura rufifrons	Rufous Fantail	Mi (T)	Low
Rostratula australis (syn. R. benghalensis)*	Australian Painted Snipe	V/Mi	Low

#### Table 7 Migratory species identified from Protected Matters Search Tool

Conservation codes: E = Endangered; Mi (T) = Migratory Terrestrial; Mi (W) = Migratory Wetland; Mi (M) = Migratory Marine

Six of the 11 migratory species (note the Australian Painted Snipe (*Rostratula australis*) listed as Endangered under the EPBC Act is also listed as a migratory species and as such assessment of this species is dealt with under threatened species and not repeated here) identified in the Protected Matters Search have been determined as having potential (moderate or higher) to utilise the site of the proposed action. Each of these species are discussed below. The remainder of the migratory species were listed as having a low likelihood of occurrence due to a lack of supporting habitat.

## Fork-tailed Swift (Apus pacificus)

The Fork-tailed Swift, breeds in the northern hemisphere, wintering south to Australia. It is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground. It mostly occurs over inland plains but sometimes above foothills or in coastal areas over cliffs, beaches, islands and well out to sea. It also occurs over towns and cities. It mostly occurs over dry and/or open habitats, including riparian woodland and tea-tree swamps, low scrub,

heathland or saltmarsh, grassland, spinifex sandplains, farmland and sand-dunes. It sometimes occurs above forests. It probably roosts aerially, but has occasionally been observed to land (Higgins 1999).

# Cattle Egret (Ardea ibis)

The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands and very rarely in arid and semi-arid regions. High numbers may occur in moist, poorly drained pastures with high grass; it avoids low grass pastures but has been recorded on earthen dam walls and ploughed fields. It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer. It is known to follow earth-moving machinery and has been located at rubbish tips. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora (Marchant & Higgins 1990; Morton et al. 1989).

# Eastern Great Egret

Great Egrets occur throughout most of the world. They are common throughout Australia, with the exception of the most arid areas. Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. Great Egrets can be seen alone or in small flocks, often with other egret species, and roost at night in groups. In Australia, the breeding season of the Great Egret is normally October to December in the south and March to May in the north. This species breeds in colonies, and often in association with cormorants, ibises and other egrets (Australian Museum 2003).

# Latham's Snipe (Gallinago hardwickii)

Latham's Snipe is a Northern Hemisphere waterbird which breeds in Japan and eastern Russia, and migrates to eastern Australia during spring and summer. This listed migratory species is very nomadic during its time in Australia, and are widely and thinly distributed across south-eastern Australia, but are most commonly recorded from the wetter parts of eastern Australia. Latham's Snipe usually inhabit regions in low numbers, however there are records from a few locations in New South Wales and Victoria where birds gather in their hundreds (DoE 2016h). However, the occurrence of large flocks is irregular, and only occurs when sites provide suitable resources.

Latham's Snipe occurs in freshwater or brackish wetlands generally near protective vegetation cover. This species feeds on small invertebrates, seeds and vegetation (Garnett & Crowley 2000). They also use artificial wetlands, including highly degraded creeks and swamps, and wet areas among grasslands (DoE 2016h). Latham's Snipe feed mainly at night, spending most of their daylight hours roosting (DoE 2016h).

# White-throated Needletail (Hirundapus caudacutus)

The White-throated Needletail occurs in airspace over forests, woodlands, farmlands, plains, lakes, coasts and towns. The species breeds in the northern hemisphere and migrates to Australia in October-April.

# Rainbow Bee-eater (Merops ornatus)

The Rainbow Bee-eater is widely distributed throughout Australia and eastern Indonesia. The majority of the global population breeds in Australia. The Rainbow Bee-eater is not considered globally threatened (DoE 2016g).

The Rainbow Bee-eater is distributed across much of mainland Australia, and occurs on several near-shore islands. It is not found in Tasmania, and is thinly distributed in the most arid regions of central and Western Australia. The extent of occurrence, area of occupancy and the number of locations that the Rainbow Bee-eater occurs in Australia has not been estimated (DoE 2016g).

The total population size of the Rainbow Bee-eater in Australia has not been estimated, but based on reporting rates for the species, the population size is assumed to be reasonably large (i.e. the Atlas of Australian Birds has received more than 30,000 records of the Rainbow Bee-eater since 1998) (DoE 2016g). The Rainbow Bee-eater is relatively abundant in Australia. Several Rainbow Bee-eaters were recorded in the project area during the field survey.

The Rainbow Bee-eater occurs in open woodlands and shrublands, including mallee, and in open forests that are usually dominated by eucalypts. It also occurs in grasslands and, especially in arid or semi-arid areas, in riparian, floodplain or wetland vegetation assemblages, as well as in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water (DoE 2016g).

In Australia, the Rainbow Bee-eater's breeding season extends from August to January. The nest is located in an enlarged chamber at the end of long burrow or tunnel that is excavated, by both sexes, in flat or sloping ground, in the banks of rivers, creeks or dams, in roadside cuttings, in the walls of gravel pits or quarries, in mounds of gravel, or in cliff-faces (DoE 2016g).

The project area supports viable foraging habitat above and within the open forests and woodlands, and modified pasture grasslands, as well as viable breeding habitat in riparian forests on the alluvial terraces and streamside's of the unnamed drainage feature and Braemar Creek.

The only actual, identified threat to the Rainbow Bee-eater is the introduced Cane Toad (*Bufo marinus*). Cane Toads reduce the breeding success and productivity of the Rainbow Bee-eater by feeding on eggs and especially nestlings, and usurping and occupying nesting burrows (DoE 2016g).

A small population of Rainbow Bee-eater has been recorded within the site of the proposed action during field surveys.

#### Nature and extent of likely impact

Habitat values within the site of the proposed action for the six migratory fauna species assessed as having a moderate likelihood of occurrence are summarised in Table 8.

#### Table 8 Migratory species and respective habitat values

SCIENTIFIC NAME	COMMON NAME	EPBC ACT STATUS	NC ACT STATUS	HABITAT VALUES IN SITE OF PROPOSED ACTION
Apus pacificus	Fork-tailed Swift	Mi (M)		This species has a moderate likelihood of utilising the air space over the site of the proposed action on a seasonal basis, however does not have enough dependence on the habitats within the site of the proposed action, and the extent of impact upon these habitats are relatively insignificant to these highly mobile migratory species.
Ardea (Bulbulcus) ibis	Cattle Egret	Mi (W)		This species has the potential to occur within the site of the proposed action in cleared lands and dams on a seasonal basis, however the species does not have enough dependence on the habitats of the site, and the extent of impact upon these habitats are relatively insignificant to these highly mobile migratory species.
Ardea (Casmerodius) modesta	Eastern Great Egret	Mi (W)		Potential to occur in areas containing farm dams on ephemeral alluvial drainage lines (RE 11.3.25). This habitat is not impacted by the potential development area.
Gallinago hardwickii	Latham's Snipe	Mi (W)		Potential habitat occurred in the site of the proposed action, particularly around farm dams and ephemeral drainage line. While potential habitat is limited, the occurrence of this species would be influenced by seasonal conditions. This habitat is not impacted by the potential development area.
Hirundapus caudacutus	White-throated Needletail	Mi (T)		This species has a moderate likelihood of utilising the air space over the site of the proposed action on a seasonal basis, however the species does not have enough dependence on the habitats of the site, and the extent of impact upon these habitats are relatively insignificant to these highly mobile migratory species.
Merops ornatus	Rainbow Bee-eater	М	SLC	Recorded from the site of the proposed action. Foraging and breeding habitat associated with regrowth and remnant vegetation on Land Zone 3 and 5. Sandy alluvial soils in association with Braemar Creek and unnamed drainage feature provide viable nesting habitat.

Based on this habitat values assessment only the Rainbow Bee-eater was identified as requiring a significant impact assessment. For a species listed as migratory under the EPBC Act an assessment of the significance of a residual impact is based against three specific criteria:

- → substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory 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
- → seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

The results of this assessment are presented in Appendix F of Attachment 3. The proposed action will be permanently impacting approximately 22.4 ha of non-remnant habitats that may only be used occasionally by the local Rainbow Bee-eater population as a foraging resource. Preferred habitat for this species within the site of the proposed action is associated with the open forest on sand plains, regrowth and riparian forest, farm dams and the edges of the open forest shrubland on low rocky jump ups. It is reliant on these habitats for the majority of it foraging activities, while it has a stronger dependence on the regrowth and remnant riparian forests on alluvial terrace habitats for nesting and breeding. The structural modification of the riparian regrowth habitat is also unlikely to impact the potential breeding habitat, due to the procedures and measures that will be in place to avoid any ground disturbances. The assessment concluded that the proposed action is unlikely to result in a significant impact on this species within the meaning of the Significant Impact Guidelines.

#### 3.1 (f) Commonwealth marine area

#### Description

There are no listed Commonwealth marine areas on or near the site.

Nature and extent of likely impact

The proposed action will not impact on Commonwealth marine areas.

## 3.1 (g) Commonwealth land

#### Description

The site is not on or near any Commonwealth land.

Nature and extent of likely impact

The proposed action will not impact on Commonwealth land.

3.1 (h) The Great Barrier Reef Marine Park

#### Description

The site is not on or near the Great Barrier Reef Marine Park.

Nature and extent of likely impact

The proposed action will not result in direct or indirect impacts to the Great Barrier Reef Marine Park.

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

The proposed action is not a coal seam gas or large coal mining development.

Nature and extent of likely impact

Not applicable.

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	Is the proposed action a nuclear action?	Х	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (b)	Is the proposed action to be taken by the Commonwealth or a Commonwealth	Х	No
	agency?		Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (c)	Is the proposed action to be taken in a Commonwealth marine area?	Х	No		
			Yes (provide details below)		
	If yes, nature & extent of likely impact on	the who	le environment (in addition to 3.1(f))		
3.2 (d)	Is the proposed action to be taken on Commonwealth land?	Х	No		
			Yes (provide details below)		
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))				
3.2 (e)	Is the proposed action to be taken in the Great Barrier Reef Marine Park?	Х	No		
			Yes (provide details below)		

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))

# 3.3 Other important features of the environment

# 3.3 (a) Flora and fauna

In line with the long history of cattle grazing use of the site, the majority of the land is cleared comprising small shrubs and grass.

The fauna survey results (refer to Attachment 3) indicate a relatively low level of native fauna diversity, with mainly species typical of a rural landscape being recorded In total, 47 species were recorded including 36 birds, 2 frogs (including Cane Toad), 1 reptile and 8 mammals (including 5 introduced mammals). A species list is included as Appendix D in Attachment 3). The only species of note recorded from the site of the proposed action was the migratory Rainbow Bee-eater.

Flora field surveys confirmed the presence of approximately 552 Kogan Waxflower (*Philotheca sporadica*) – Vulnerable under the EPBC Act and Near Threatened under the NC Act in the site of the proposed action and the 100 m buffer zone applied to the potential development area. As discussed previously, none of these will be directly impacted by the proposed action. No other threatened flora species listed under the EPBC Act or NC Act were recorded or are considered likely to occur within the site of the proposed action or 100 m flora survey buffer zone. No pest plants declared as Class 1, 2 or 3 under the *Land Protection (Pest and Stock Route Management) Act 2002* were recorded within the site of the proposed action during the field survey.

# 3.3 (b) Hydrology, including water flows

The slope of the site of the proposed action falls slightly towards the north-west and the western boundary of the site runs parallel with Braemar Creek. The site of the proposed action is bisected by an ephemeral stream and several minor overland flow paths. The ephemeral stream is an unnamed tributary of Braemar Creek that is wholly contained within the lot boundary and follows the fall of the land. The flow of the ephemeral stream is interrupted by three agricultural dams that collect water from the catchment. Low contour bunds have been constructed in certain areas to reduce erosion of the catchment.

# 3.3 (c) Soil and Vegetation characteristics

Consistent with much of the surrounding area in the region, the site is mapped on the Queensland Government Mines Online Mapping as a key resource area for coal and gas. The site is not mapped under the Wambo Shire Planning Scheme 2005 as containing Good Agricultural Land. The geology of the site is alluvial soils overlaying sedimentary rock formations.

The site has limited vegetation that includes grasses and shrubs. Trees are located along the ephemeral stream vegetation corridor that varies in width from 50 m up to 200 m. The wider zones are located in areas adjacent to ponded water.

In line with the long history of cattle grazing use of the site, the majority of the land is cleared comprising small shrubs and grass. There are also several clusters of dense vegetation comprising approximately 88 ha. A search of the Department of Natural Resource and Mines' Regulated Vegetation Management Mapping (2014) identified that the site is subject to contain remnant vegetation and Essential Habitat. The remnant vegetation is categorised as 'of concern' and 'least concern' regional ecosystems. These regional ecosystems are discussed further in Section 3.3e.

## 3.3 (d) Outstanding natural features

The site is not located in proximity to any known outstanding natural features including caves. The proposed action will have no impact on outstanding natural features.

## 3.3 (e) Remnant native vegetation

Field verification of the 441 ha site of the proposed action identified the following vegetation communities and regional ecosystems (refer to Figure 4):

- → Approximately 283 ha (64%) is associated with non-remnant vegetation that is primarily a pasture grassland for livestock grazing. In parts this area also contains scattered trees at varying stages of maturity. There is very little to no understorey within the non-remnant vegetation.
- → Approximately 43 ha (10%) is associated with areas of previous disturbance, comprising the power station, farm dams and coal seam gas infrastructure (wells, pipeline easements and access tracks).
- → Approximately 115 ha (26%) of the site of the proposed action comprises remnant regional ecosystems.

No field verified remnant regional ecosystems and associated habitat will be cleared as a result of the proposed action. The field verified vegetation communities and associated habitats that will be cleared is limited to the non-remnant regrowth vegetation within the potential development area, as presented in Table 9.

Table 9
 Field verified vegetation communities with the site of the proposed action and potential development area

FIELD VERIFIED VEGETATION	VM ACT STATUS	DESCRIPTION	AREA (HA) IN PROJECT AREA	AREA (HA) IN POTENTIAL DEVELOPMENT AREA
RE 11.5.1	Least concern	11.5.1 - Eucalyptus crebra and/or E. populnea, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii woodland on Cainozoic sand plains and/or remnant surfaces	53	0
RE 11.5.1/ 11.3.25	Least concern	11.5.1 - Eucalyptus crebra and/or E. populnea, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii woodland on Cainozoic sand plains and/or remnant surfaces	32.5	0
		11.3.25 - Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines		
RE 11.7.6	Least concern	11.7.6 - Corymbia citriodora or Eucalyptus crebra woodland on Cainozoic lateritic duricrust	4.8	0
RE 11.7.7/11.7.4/ 11.7.5	Least concern	11.7.7 - Eucalyptus fibrosa subsp. nubila +/- Corymbia spp. +/- Eucalyptus spp. woodlands. on Cainozoic lateritic duricrust	24.7	0
		11.7.4 – Eucalyptus decorticans and/or Eucalyptus spp., Corymbia spp., Acacia spp., Lysicarpus angustifolius on Cainozoic lateritic duricrust		
		11.7.5 - Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks		
Non-remnant	n/a	Non-remnant cleared pasture grassland	218.4	217.1
Non-remnant	n/a	Non-rem E. tereticornis regrowth on alluvium	8.5	8.5
Non-remnant	n/a	Non-rem E. tereticornis regrowth on drainage line	15.3	0
Non-remnant	n/a	Non-remnant scattered Eucalyptus crebra woodland	39.3	38
Non-remnant	n/a	Farm dams on alluvium and ephemeral drainage lines	1.5	1.5
Non-remnant	n/a	Non remnant scattered <i>Acacia</i> spp. on dam wall batter	1.5	1.5
Totals			399.6	266.6

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

The site of the proposed action is located on predominately flat, highland ground at the 350 m Australian Height Datum (AHD) contour.

3.3 (g) Current state of the environment

The area of the proposed action is highly modified from its natural condition. It is used for agricultural purposes and accordingly the majority of the site has been cleared of native vegetation.

No pest plants declared as Class1, 2 or 3 under *the Land Protection (Pest and Stock Route. Management) Act 2002* (LP Act) were recoded within the project area during the field survey.

Pest animal species are those species that occur, as a result of human activities, beyond their accepted normal distribution and have naturalised into the local environment. Under the LP Act, a number of introduced animals are listed as Class 1, 2 or 3 declared pests. These animals are targeted for control as they represent a threat to primary industries, natural resources and the environment. No species listed as declared pest animal species

were identified within the project area during the field survey, however it is likely that declared pest animal species common in the greater area such as the Red Fox (*Vulpes vulpes*) and Pig (*Sus scrofa*) may periodically access and utilise habitat within the project area.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

There are no identified Commonwealth Heritage Places or other places recognised as having heritage values.

A search of the Australian Government Department of Defence Australian Heritage Register returned no record of any known Commonwealth listed Heritage sites.

#### 3.3 (i) Indigenous heritage values

A search of the Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA) database and register was conducted on 14 July 2015. The results show the presence of three Aboriginal sites within the vicinity of the site of the proposed action. These are located at the following locations:

- → Lot 118 on DY237 (-27.100943, 150.877054) Scarred/Carved Tree
- → Lot 125 on DY316 (-27.091622, 150.903002) Artefact Scatter
- → Lot 125 on DY316 (-27.090145, 150.902576) (not specified).

In addition, 9 Aboriginal sites (scarred trees) have been previously identified from Lot 121 on SP178856 outside of the construction zone boundary for the Darling Downs Power Station (Laing O'Rourke 2007).

Origin Energy has engaged a qualified archaeologist to undertake a cultural heritage survey of the site which is currently in progress. In accordance with the Queensland *Aboriginal Cultural Heritage Act 2003* and dependent on the findings, management actions may be recommended including agreements with relevant indigenous parties. These further steps will be carried out following completion of the archaeologist's studies.

#### 3.3 (j) Other important or unique values of the environment

There are no other important or unique values of the environment affected by the proposed action or in proximity to the proposed action.

## 3.3 (k) Tenure of the action area (eg freehold, leasehold)

The tenure of the site of the proposed action is freehold. Origin has secured landowners consent from the landowners of Lot 119 SP227731 for the construction of a solar farm on this property (refer Appendix C of Attachment 2 – Town Planning Report). Lot 121 SP178856 is owned by Origin and therefore landowner consent is not required.

## 3.3 (I) Existing land/marine uses of area

As noted previously the site of the proposed action (Lot 119 SP227731) is currently used for cattle grazing and breeding and the owner's residential dwelling is located at the western boundary toward the north of the lot. The site also contains the following:

- $\rightarrow$  several active coal seam gas extraction wells and gathering pipelines, the network is owned by QGC PL
- → high pressure gas pipelines, one of which flows east to west and another north-south under an easement
- $\rightarrow$  a gas pressure reduction station at the end of the pipeline prior to the Darling Down Power Station
- $\rightarrow$  a high voltage power line under an easement, through the northern corner of the site
- → an unnamed drainage feature also crosses the property from the north western corner towards the centre of the lot.

Lot 121 SP178856 is occupied by the Darling Downs Power Station. The solar farm will connect directly into the Darling Downs Power Station energy grid.

Other immediate land adjoining the north, south and west of the site are rural properties which are utilised for coal seam gas activity and major power infrastructure (generation and transmission).

## 3.3 (m) Any proposed land/marine uses of area

In the absence of the proposed solar farm it is expected that the existing use of the site for the proposed action for cattle grazing and coal seam gas and major power infrastructure will continue.

The layout of the solar farm has been designed to avoid any existing encumbrances on the site. The solar farm is compatible with adjoining land uses, being the Darling Downs Power Station. The character of the other adjoining rural properties is not compromised by the proposed development as they are utilised for cattle grazing and mining resource activities. The project avoids impact to these resource areas.

# **4** Environmental outcomes

Ecological assessments have been undertaken to assess any likely impacts to MNES from the proposed action. The assessment involved:

- → likelihood of occurrence assessment for MNES
- → a field visit to the site in February 2016 to conduct a survey for EPBC listed flora species and communities, including an up-to-date ground-truthing of vegetation mapping
- → assessment of the potential impacts on MNES
- → significance impact assessments for MNES.

These assessments concluded that the proposed action is unlikely to result in a significant impact upon any of the MNES (listed threatened or migratory species) assessed and therefore there will be no outcomes based conditions required to be addressed as a result of the proposed action.

# 5 Measures to avoid or reduce impacts

Proposed general mitigation measures to minimise impacts to ecological values within the site of the proposed action during detailed design and construction are outlined below.

## **Detailed design**

#### Fauna exclusion fencing

Due to the proposed solar farm being part of an electricity supply network, the proponent is required to establish chain mesh 'cyclone' fencing with a barb wire top so to exclude human access for safety and security reasons. This human exclusion fencing will also prevent medium to large ground dwelling fauna, such as koalas, wallabies, kangaroos and goannas, from accessing the solar farm where they could be placed at risk of injury or mortality. In respect to existing habitats around the solar farm, it is unlikely that these species would be wanting to access the solar farm for the purpose of foraging, sheltering or breeding.

#### Flora and fauna management plan

As part of the detailed design, and prior to commencement of construction, detailed mitigation measures for flora and fauna are to be developed and presented in the EMP (Construction). The plan should be developed to ensure that the Project complies with the principles outlined in the approved Species Management Program for least concern wildlife. Measures may include pre–clearing surveys and development of vegetation clearing protocols, including:

- → the use of a suitably qualified fauna spotter/catcher during clearing activities
- → timing of maintenance activities to avoid breeding seasons, where practical
- → pest animal control
- → directional felling of any trees into cleared areas and away from retained vegetation and habitats
- → clear objectives and actions for the Project to minimise human interferences to flora and fauna and minimise impact to threatened fauna habitat

## Delineation of vegetation clearing

The boundaries of areas to be cleared are to be clearly defined on–ground and 'no go zones' clearly signposted, delineated and fenced to prevent unauthorised clearing and vehicle and/or pedestrian traffic. Relevant construction plans are to be clearly labelled with the intent and exclusion conditions of these clearance zones. Exclusion conditions may include, but are not limited to:

- → no dumping of soil, organic or inorganic matter into surrounding vegetated areas (the creation of microhabitat (discussed below) would represent an exception to the dumping of organic matter)
- → no refuelling of machinery and equipment in the vicinity of water courses and sensitive vegetation
- $\rightarrow$  no unrestricted use of herbicide, particularly foliar application.

## **Construction phase**

General mitigation measures to be implemented during the construction phase of the Project are outlined below.

#### Kogan Waxflower impact management plan

An impact management plan has been developed to mitigate any indirect impacts to individual Kogan Waxflower as a result of the proposed action. This impact management plan has been prepared in accordance with Nature Conservation (Wildlife Management) Regulation 2006 – Protected Plant Assessment Guidelines and considers the following:

- → measures to avoid all individuals within close proximity to the proposed development area prior to and during construction (i.e. demarcation and physical flagging off individuals and populations)
- → sediment and erosion control measures (i.e. sediment fencing and rehabilitation)
- → weed management actions (i.e. weed hygiene practices and weed control to promote natural regeneration)
- → post construction monitoring of individuals within close proximity to the proposed development area to ensure ongoing survival of plants in the wild.

A copy of this impact management plan is included as Appendix G of Attachment 3.

#### Fauna spotter catcher

A registered and suitably qualified fauna spotter catcher/ecologist will be employed for the construction phase of the Project, to implement a protocol of best management practices. Significant habitat features will be flagged prior to clearing events and these areas supervised by an appropriately experienced ecologist. Identified within the clearing supervision protocol should be the flagging of hollow bearing trees followed by the removal of vegetation surrounding them. After 24 to 72 hours, these trees should then be removed. Trees must be directionally felled into open or already cleared areas.

The objective of this is to enable hollow dependent fauna an opportunity to move on their own accord as many species utilise multiple den/roost sites within a given home range. Certain areas would be identified and flagged as significant such as old–growth trees with hollow resources and on site identification to construction personnel will help reduce/avoid clearing. Where required, native fauna situated within areas to be cleared will be relocated to a secure area of similar habitat prior to the commencement of vegetation clearance works by a registered fauna spotter/catcher. Should any removal and relocation of nests be required, it is to be undertaken by suitably qualified and experienced persons and advice sought where necessary.

# 6 Conclusion on the likelihood of significant impacts

# 6.1 Do you THINK your proposed action is a controlled action?

X No, complete section 6.2

Yes, complete section 6.3

# 6.2 Proposed action IS NOT a controlled action.

The proposed action for the Darling Downs Solar Farm is not likely to have a significant impact on matters of National Environmental Significance, as defined by the EPBC Act and EPBC Act Policy Statement 1.1 – Significant Impact Guidelines in "Matters of National Environmental Significance". The assessment of potential impacts provided in Section 3 of this referral and summarised below indicates that significant impacts are unlikely. The Ecological Assessment Report (Parsons Brinckerhoff 2016) concluded that the proposed action is not likely to cause as significant impact to EPBC listed threatened or migratory species.

Specifically the proposed action is not:

- → An action involving the Commonwealth (sections 26 and 27A Protection of the environment from actions involving Commonwealth land)
- → A nuclear action (as per EPBC Act sections 21 and 22A Protection of the environment from nuclear actions)
- → In, or in close proximity to, a wetland of international importance (as per EPBC Act sections 16 and 17B Wetlands of International Importance)
- → In, or in close proximity to, a World Heritage Place (as per EPBC Act sections 12 and 15A World Heritage).

No EPBC listed species other than the Rainbow Bee-eater and Kogan Waxflower have been recorded from the site of the proposed action. No individuals of Kogan Waxflower are proposed to be cleared as a result of the proposed action. Habitat for the Kogan Waxflower is associated with regional ecosystem 11.7.7/11.7.4/11.7.5 that occurs on Cainozoic lateritic duricrust and natural scalds on deeply weathered coarse-grained sedimentary rock. Approximately 24.7 ha of this regional ecosystem occurs within the site of the proposed action, none of which is within the potential development area. Potential indirect impacts to the Kogan Waxflower will be managed through the implementation of measures outlined in the impact management plan prepared for this species (refer to Appendix G of Attachment 3).

A small population of Rainbow Bee-eater listed as migratory under the EPBC Act was recorded from within the site of the proposed action. Development of the solar farm has been assessed as unlikely to result in a significant impact to this species or any of the other threatened or migratory species assessed in section 3.1 (d) and 3.1 (e) as none of these species are likely to use the site of the proposed action as primary habitat, feeding, breeding or roosting areas.

Furthermore, Origin has sought to minimise environmental impacts through the appropriate siting of infrastructure in existing cleared and modified areas.

# 6.3 Proposed action IS a controlled action

Matters likely to be impacted
World Heritage values (sections 12 and 15A)
National Heritage places (sections 15B and 15C)
Wetlands of international importance (sections 16 and 17B)
Listed threatened species and communities (sections 18 and 18A)
Listed migratory species (sections 20 and 20A)
Protection of the environment from nuclear actions (sections 21 and 22A)
Commonwealth marine environment (sections 23 and 24A)
Great Barrier Reef Marine Park (sections 24B and 24C)
A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
Protection of the environment from Commonwealth actions (section 28)
Commonwealth Heritage places overseas (sections 27B and 27C)

# 7 Environmental record of the responsible party

_		Yes	No
7.1	Does the party taking the action have a satisfactory record of responsible environmental management?	х	
	Provide details		
	Origin believes that it has a satisfactory record of responsible environmental management. Origin's operations are subject to environmental regulation under Commonwealth, State and Territory legislation. Our activities, products and services have potential to impact the environment so these are managed to comply with applicable laws as well as in accordance with the company's integrated Health, Safety and Environment management system. Whenever there are environment-related incidents, these are recorded and follow-up action implemented commensurate with the actual and environment impacts associated with the incident.		
	By way of example, during the year ended 30 June 2015, the Company's Australian operations recorded a number of environmental incidents arising from Origin's activities including those where Origin was the operator of a joint venture. These incidents resulted in environmental impacts of a minor and/or temporary nature. Regulators were notified of reportable environmental incidents and there were no prosecutions or fines resulting from these reportable incidents. Appropriate remedial actions have been taken or are being undertaken in response to each notice and reportable environmental incident.		
7.2	Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources? No. Origin has not been subject to legal court proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources.		x
	If yes, provide details		

7.3	If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?	х	
	If yes, provide details of environmental policy and planning framework Yes, this action will be managed within the Company's our integrated Health, Safety and Environment management system (HSEMS). Origin operates its business in accordance with our HSEMS, with additional detailed controls specified in a suite of HSE and operational risk directives. Leading the HSEMS is the Company Health, Safety and Environment Policy which has an overriding aspiration to conduct our business in a way that causes no harm to the health and safety of people and has no unforeseen impacts to the environment. A copy of the HSE Policy can be found on Origin's website (www.originenergy.com.au/content/dam/origin/about/investors- media/health-safety-environment-policy.pdf).		
	The HSEMS is aligned with the requirements of company HSE Policy and recognised international and Australian standards including ISO 14001, OHSAS 18001, ISO 31000 and AS 4801 and supports the Company in its efforts to comply with legal obligations. The HSEMS includes a suite of environmental controls to reduce the risk of environmental harm through:		
	<ul> <li>→ exercising due care in complying with legal and other obligations</li> <li>→ identifying environmental hazards and managing the associated risks</li> <li>→ using energy and resources efficiently</li> <li>→ minimising wastes and emissions</li> <li>→ supporting business units achieve appropriate objectives and conduct ongoing monitoring and reporting.</li> </ul>		
	The HSEMS ensures we are all contributing to the delivery of a world class energy business through leading environmental practices to leave a positive environmental legacy.		
7.4	Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?	Х	
	Provide name of proposal and EPBC reference number (if known) Yes, Origin has previously referred or has been responsible for referring an action under the EPBC Act. The most significant referral was in relation to the Australia Pacific LNG project for the development, construction, operation and decommissioning of infrastructure associated with Origin's coal seam gas resources in south central Queensland. Origin is a joint venture partner with Australia Pacific LNG holding 37.5% interest in the project. The Commonwealth approved the project under the EPBC Act including approval for the development of the gas fields, construction of transmission pipelines and an LNG (liquefied natural gas) plant on Curtis Island.		
	Origin has submitted other referrals under the EPBC Act some of which were not deemed to be controlled actions. Previous referrals are presented in Table 10.		

REFERENCE NUMBER	TITLE OF REFERRAL	DATE RECEIVED
2015 / 7551	Origin Energy Resources Limited/Energy generation and supply (non-renewable)/Otway Basin/Vic/Halladale and Speculant Gas Pipeline Project, North of Port Campbell, Vic	2 September 2015
2012 / 6565	Origin Energy Resources Limited/Exploration (mineral, oil and gas - marine)/Otway Basin/VIC/The Enterprise 3D Seismic Acquisition Survey, Otway Basin, Vic	2 October 2012
2012 / 6545	Origin Energy Resources Limited/Exploration (mineral, oil and gas - marine)/Otway Basin/VIC/The Enterprise 3D Seismic Acquisition Survey, Otway Basin, Vic	11 September 2012 Withdrawn 28 September 2012
2011 / 6421	Origin Energy Resources Limited/Exploration (mineral, oil and gas – marine)/Otway Basin/Commonwealth Marine/Otway Astrolabe 3D Marine Seismic Survey, Otway Basin	7 June 2012
2011 / 6125	Origin Energy Resources Limited/Exploration (mineral, oil and gas – marine)/S of Vic, the Otway Basin, Southern Eastern Marine region/Commonwealth Marine/Otway Basin Exploration Drilling Campaign, Vic	22 September 2011
2011 / 6091	Origin Energy ATP Pty Limited/Mining/300km west of Brisbane /QLD/Ironbark Coal Seam Gas Project	25 August 2011 Withdrawn 4 April 2014
2011 / 6048	Origin Energy Resources Ltd/Exploration (mineral, oil and gas - marine)/100km northwest King Island/VIC/Astrolabe 3D Marine Seismic Survey	26 July 2011
2011 / 5879	Origin Energy Resources/Energy Generation and Supply (non-renewable)/Halladale and Black Watch/Victoria/Gas Fields Development	11 March 2011
2010 / 5702	Origin Energy Resources Ltd/Exploration (mineral, oil and gas - marine) /Exploration permit T/44P within the Bass Basin/Commonwealth Marine/Origin Energy Silvereye-1 Exploration Drilling Programme	22 October 2010
2010 / 5701	Origin Energy/Exploration (mineral, oil and gas - marine)/Bass Basin between Tasmania & Victoria/Tasmania/Aroo Chappell 3D seismic survey	21 October 2010
2010 / 5700	Origin Energy/Exploration (mineral, oil and gas - marine)/Offshore Otway Region of the Bass Strait/Commonwealth Marine/Undertake a three dimensional marine seismic survey	21 October 2010
2010 / 5558	Origin Energy Resources Ltd/Exploration (mineral, oil and gas - marine)/VIC/RL2, PEP168, PPL10, Otway region, 10km NW of Peterborough/VIC/Speculant 3D Transition Zone Seismic Survey	5 July 2010
2009 / 4913	Origin Energy Power Limited/Energy generation and supply (non-renewable)/Approx. 2.2 kms SE of Garvoc/VIC/Gas Pipeline Crossing at Mount Emu Creek	27 May 2009

2009 / 4776	Origin Energy Resources Ltd/Exploration (mineral, oil and gas - marine)/Approx 160kms North-West of Devonport/TAS/Rockhopper-1 and Trefoil-2 Exploration Drilling in Permit Area T/18P	3 March 2009	
2008 / 4456	Origin Energy CSG Limited/Mining/Condamine- Kogan Rd, Chinchilla/QLD/Proposed Coal Seam Gas Development & Associated Infrastructure	15 September 2008	
2007 / 3551	Origin Energy Resources Limited/Exploration (mineral, oil and gas - marine)/Bass Basin of Bass Strait/Commonwealth Marine/Silvereye 3D Seismic Survey	18 July 2007	
2007 / 3377	Origin Energy/Energy generation and supply (nonrenewable)/ Braemar/QLD/Darling Downs Power Station	28 March 2007	
2006 / 2881	Origin Energy Power Limited/Water transport /Mortlake/VIC/Water pipelines, Mortlake Power Station	21 June 2006	
2005 / 2180	Origin Energy /Exploration (mineral, oil, gas)/Bass Strait/TAS/Shearwater 2D and 3D marine seismic survey	21 June 2005	
2005 / 1995	Origin Energy Power Ltd/Energy generation and supply/Spring Gully/QLD/Construction and operation of a gas fired power station	10 February 2005	
2005 / 1984	Origin Energy Power Limited/Energy generation and supply/Port Campbell-Mortlake/VIC/Victorian Generator Project	3 February 2005	
2005 / 1942	Origin Energy Retail Ltd/Energy generation and supply/Poolaijelo to Penola/VIC & SA/SESA Pipeline	10 January 2005	
2004 / 1924	Origin Energy Limited/Energy generation and supply/Spring Gully/QLD/Spring Gully Gas Field (Stage 2)	21 December 2004	
2004 / 1644	Origin Energy CSG Limited/Exploration (mineral, oil, gas)/Spring Gully/QLD/Spring Gully gas field development (Stage 1) within petroleum leases PL195, PL204, PL200 and PL203	15 July 2004	
2004 / 1611	Origin Energy/Energy generation and supply/Yankalilla/SA/Kemmiss Hill Road Wind Farm	25 June 2004	
2003 / 1058	Origin Energy Resources Limited/Exploration (mineral, oil, gas)/Bass Strait/Commonwealth Marine/Exploration Drilling Well Trefoil-1	8 May 2003	

# 8 Information sources and attachments

# 8.1 References

Reference in bold are available to the public.

- → Australian Museum (2003). Great Egret factsheet, Australian Museum.
- → Department of Environment and Heritage Protection (DEHP) (2014). Flora Survey Guidelines Protected Plants Nature Conservation Act 1992. Brisbane, Queensland
- Department of the Environment (DoE) (2016a). Geophaps scripta scripta Squatter Pigeon (southern sub-species) in Species Profile and Threats Database. DoE, Canberra. Available from: http://www.environment.gov.au/sprat Accessed 22 February January 2016.
- Department of the Environment (DoE) (2016b). Nyctophilus corbeni South-eastern Long-eared Bat in Species Profile and Threats Database. Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat Accessed 22 February January 2016.
- Department of the Environment (DoE) (2016c). *Phascolarctos cinereus* Koala (Qld, NSW and the ACT) in Species Profile and Threats Database. DoE, Canberra. Available from: http://www.environment.gov.au/sprat Accessed 22 February January 2016.
- Department of the Environment (DoE) (2016d). *Pteropus poliocephalus* Grey-headed Flying-fox in Species Profile and Threats Database. DoE, Canberra. Available from: http://www.environment.gov.au/sprat Accessed 22 February January 2016.
- Department of the Environment (DoE) (2016e). *Egernia rugosa* Yakka Skink in Species Profile and Threats Database. DoE, Canberra. Available from: http://www.environment.gov.au/sprat Accessed 22 February January 2016.
- Department of the Environment (DoE) (2016f). Furina dunmalli Dunmall's Snake in Species Profile and Threats Database. DoE, Canberra. Available from: http://www.environment.gov.au/sprat Accessed 22 February January 2016.
- Department of the Environment (DoE) (2016g). *Merops ornatus* Rainbow Bee-eater in Species Profile and Threats Database. DoE, Canberra. Available from: http://www.environment.gov.au/sprat Accessed 22 February January 2016.
- Department of the Environment (DoE) (2016h). Gallinago hardwickii Latham's Snipe, Japanese Snipe in Species Profile and Threats Database, Doe, Canberra, Available from: <u>http://www.environment.gov.au/sprat</u> Accessed 21 March 2016
- → Garnett, ST & Crowley, GM (2000). The Action Plan for Australian Birds, Environment Australia, Canberra.
- → Higgins, PJ (ed.) (1999). Handbook of Australian, New Zealand and Antarctic Birds Volume 4: Parrots to Dollarbirds. Oxford University Press, Melbourne.
- → Laing O'Rourke 2007, Project Aboriginal Cultural Heritage Management Plan (Construction Phase), report prepared for Origin Energy - Darling Downs Power Station, 27 October 2007
- → Marchant, S & Higgins, PJ (1990). Handbook of Australian, New Zealand and Antarctic Birds, vol. Volume One - Ratites to Ducks, Oxford University Press, Melbourne.
- Morton, SR, Brennan, KG & Armstrong, MD (1989). Distribution and Abundance of Waterbirds in the Alligator Rivers Region, Northern Territory.
- → Threatened Species Scientific Committee. (2008). Approved Conservation Advice *Philotheca sporadica*. Canberra: Australian Government.
- → WSP | Parsons Brinckerhoff (2015). Development Application for Material Change of Use at Grahams Road, Kogan (Lot 119 on SP227731): Town Planning Report. Report prepared for Origin Energy, 21 October 2015 (attached).

→ WSP | Parsons Brinckerhoff (2016). Darling Downs Solar Ecological Assessment Report. Report prepared for Origin Energy, 22 April 2016 (attached).

# 8.2 Reliability and date of information

An ecological field assessment was undertaken in October 2015 and February 2016 to determine likely impacts on matters of National Environmental Significance as a result of the proposed action. The information referred to in the above reports is considered reliable, and has been undertaken in accordance with relevant legislation, by credible experts, confirmed in ground-truthed survey and tested through a technical review process.

Please note that since preparation of the Town Planning Report in October 2015, the design of the solar farm has progress and some slight amendments have occurred. These include:

- $\rightarrow$  development of the solar farm is no longer being staged
- → slight modifications to the footprint of design elements
- → inclusion of a powerline across riparian vegetation associated with the east-west drainage channel across the site.

In instances where discrepancies exist between the information in the Town Planning Report and this referral documentation, the information presented here should be considered the correct information.

# 8.3 Attachments

		$\checkmark$	
		attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	$\checkmark$	Figure 1: DDSF potential development area and
	GIS file delineating the boundary of the referral area (section 1)	$\checkmark$	location
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)		Figure 2: Indicative location of overhead powerline above riparian regrowth vegetation Figure 3: Property Map of Assessable Vegetation (PMAV) Figure 4: Field verified vegetation communities and fauna habitats Figure 5: Kogan Waxflower records
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)	✓	Attachment 1 – Western Downs Regional Council DA Notice of Approval and Consent Conditions
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)	•	Attachment 2 – (Parsons Brinckerhoff 2015) Development Application for Material Change of Use at Grahams Road, Kogan (Lot 119 on SP227731) Town Planning Report

-	copies of any flora and fauna investigations and surveys (section 3)	✓	Attachment 3 – (Parsons Brinckerhoff 2016) Darling Downs Solar Ecological Assessment Report
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)	✓	As above
-	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		

# 9 Contacts, signatures and declarations

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	Person proposing to take	e action		
	e contraction of the contraction			
	1. Name and Title:	Greg Jarvis, General Manager, Dibles alle & Tri a Business Sales.		
	2. Organisation;	Origin Energy Darling Downs Solar Farm Pty Ltd		
		Organisation name should match entity identified in ABN/ACN search		
	3. EPBC Referral Number:	N/a		
	4: ACN / ABN:	ABN 35 611 319 003		
	5. Postal address	Level 45, Australia Square. 264-278 George St Sydney 1		
6. Telephone:		02) 8345 5000		
	7. Email:	adam. trethowan@ originerergy.com.au		
	<ol> <li>8. Name of proposed proponent (if not the same person at item 1 above and if applicable):</li> <li>9. ACN/ABN of proposed proponent (if not the same person named at item 1 above): Declaration</li> </ol>	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence. I agree to be the proponent for this action. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.		
	Signature	Date 28/4/2012		
	Person preparing the ref	erral information (if different from 8.1)		
	N			
	Name	Allison Rushton		
	Orregionalise	Principal Environmental Scientist		
	Organisation	Parsons Brinckerhoff Australia Pty Ltd		
ACN / ABN (if applicable) Postal address Telephone		GPO Box 2907 Brisbane, Queensland, 4001		
		07 3854 6241		
	Email	arushton@pb.com.au		
	Declaration	I declare that to the best of my knowledge the information I have given on, or attached		
		to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.		