



Edify Energy Solar Farm Development at Collinsville Queensland – Stage 2

Attachment E: Analysis of potential impacts

For: The Commonwealth Department of the Environment
and Energy
Date: March 2017



Squatter Pigeon (southern) (*Geophaps scripta scripta*)

GENERAL DESCRIPTION

The Squatter Pigeon is a medium-sized ground-dwelling pigeon listed as vulnerable under the EPBC Act. The species occupies a wide range of habitat types including areas of grassy woodlands and open forests. It is not known to be associated with specific vegetation communities across its range but is commonly recorded adjacent or near to permanent freshwater sources (DoEE 2017). The species is often recorded in areas of disturbed habitat including heavily grazed grasslands, scrub, and areas adjacent to roads and railway lines.

The species is distributed throughout the inland slopes of the Great Dividing Range, from the dry tropics of central Queensland to the south east of the state across a range of approximately 440,000 km² (DoEE 2017). The current population size of the Squatter Pigeon is estimated at 40,000 breeding birds, although the accuracy of this figure has been reported as low as systematic surveys of the species have not been undertaken. The population of Squatter Pigeon is thought to be stable in central to northern Queensland at present (TSSC 2015), given its ubiquitous nature and relatively abundant occurrence.

The subspecies remains common north of the Carnarvon Ranges in central Queensland, where it is likely distributed as a single, continuous sub-population (TSSC 2015). The contraction of the species range in a northward direction has led to the isolation of sub-populations of which the following are considered important to the species (noting none of these are relevant to the proposed action):

- Populations occurring in the Condamine River catchment and Darling Downs of southern Queensland.
- The populations known to occur in the Warwick-Inglewood-Texas region of southern Queensland.
- Any populations potentially occurring in NSW.

PRESENCE IN THE PROJECT AREA

Several individuals were recorded during the current field survey both within the Project Area and surrounding areas (see Attachment B, Figure 6). RPS (2016c) also recorded approximately 35 individuals of this species in grassy woodland within Stage 1 (to the south of the proposed action).

In line with the EPBC Act Red Hill Mining Project approval definition and the DoEE SPRAT Profile (DoEE 2017), Squatter Pigeon habitat is defined as grassy woodland communities on land zones 3, 5 or 7, which are either within 1 km of a permanent water body; or a Queensland Government mapped wetland or $\geq 3^{\text{rd}}$ order stream (DoE 2015). Based on this definition, there are approximately 150.3 ha of suitable habitat for the Squatter Pigeon in the Project Area.

Given the context about the species population status within the region (TSSC 2015), it is considered highly unlikely that these birds are part of an important sub-population.

ANALYSIS OF POTENTIAL IMPACTS

The proposed action will lead to a range of permanent and temporary impacts within the area under panels and associated management zones. It is considered likely that the Squatter Pigeon will be excluded from these areas during the construction period. However, post construction there will be little ongoing disturbance and ground cover under the solar arrays will return to grass and the species will be able to utilise the site once operation has commenced.

Potential indirect impacts to the species from the proposed action are considered negligible.

Based on the lack of impacts to an important sub-population and the temporary effects of the proposed action, significant impacts to the Squatter Pigeon will not occur as a result of the proposed action.

SIGNIFICANT IMPACT CRITERIA

The following points address the EPBC Act significant impact criteria (DoE 2013):

- The proposed action will not lead to a long term decline of the population within the region and this area is not considered to support an important sub-population
- The proposed action will not reduce the area of occupancy of the species and this area is not considered to support an important sub-population
- The proposed action will not lead to fragmentation and this area is not considered to support an important sub-population
- The proposed action will not adversely affect habitat critical to the survival of the species. Suitable habitat is widespread throughout the region and the area is not considered to support an important sub-population
- Given the availability of suitable habitat within the landscape, the proposed action will not significantly disrupt the breeding cycle of the species. The area is also not considered to support an important sub-population
- The proposed action will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. Suitable habitat is widespread in the region and disturbances from the proposed action will be temporary

- The proposed action will not result in invasive species that are harmful to the Squatter Pigeon. The nature of the proposed action means there is a very low risk of this occurring
- The proposed action will not introduce disease that may cause the species to decline. The nature of the proposed action means there is a very low risk of this occurring
- There will be minimal impacts to the Squatter Pigeon and the proposed action will not interfere substantially with the recovery of the species

Koala (*Phascolarctos cinereus*) (combined populations of Qld, NSW and the ACT)

GENERAL DESCRIPTION

The Koala is listed as vulnerable under the EPBC Act and NC Act. It is widespread in sclerophyll forest and woodland on foothills and plains on both sides of the Great Dividing Range from about Chillagoe, Queensland to Mt Lofty Ranges in South Australia (Menkhorst and Knight 2011). The Koala inhabits a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus* (Martin and Handrasyde 1999).

Any forest or woodland containing species that are known Koala food trees, or shrubland with emergent food trees provides potential Koala habitat. Koalas are known to occur in modified or regenerating native vegetation communities, and are not restricted to remnant vegetation (DoEE 2017). The EPBC Act referral guidelines for Koala (DoE 2014) defines Koala food trees as those of the following genus: *Angophora*, *Corymbia*, *Eucalyptus*, *Lophostemon* and *Melaleuca*. The guideline also notes that 'primary' and 'secondary' food trees may be referred to in other state or Commonwealth guidelines or policies, however, all are considered to be food trees for the purposes of the EPBC Act referral guidelines.

As part of the EPBC Act approval process for Stage 1 of the solar farm, DoEE accepted advice from Koala expert, Alistair Melzer of Central Queensland University, regarding locally important feed trees in the study area locality. Specifically, the following species have been accepted as the primary food trees: Narrow-leaved Red Ironbark (*Eucalyptus crebra*), Silver-leaved Ironbark (*E. melanophloia*, Coolabah (*E. coolabah*), Queensland Blue Gum (*E. tereticornis*), River Red Gum (*E. camaldulensis*) and Poplar Gum (*E. platyphylla*) (seasonally) (pers. comm. Alistair Melzer; Melzer et al. 2014; as reported in RPS 2016c). Other species within or adjacent to the study area that are secondary food species include Reid River Box (*Eucalyptus brownii*) (land zone 3), Black Ironbox (*Eucalyptus raveretiana*), Northern Swamp Box (*Lophostemon grandiflorus*) and Weeping Paperbark (*Melaleuca flaviatilis*), however these species are of secondary importance. The genus *Corymbia* spp. is considered to be of limited foraging value (pers. comm. Alistair Melzer; Melzer et al. 2014; as reported in RPS 2016c).

PRESENCE IN THE PROJECT AREA

This species was not directly observed during the current field surveys. However, RPS (2016c) recorded a Koala during spotlighting surveys completed as part of the ecological assessment for Stage 1 of the solar farm. The Koala was recorded within riparian vegetation associated with a third order watercourse south-east of the Strathmore substation. Characteristic scats for this species were found during the current surveys at the base of a Poplar Gum in the area of RE 11.3.4 mapped in the northern portion of the study area associated with Crush Creek.

Based on the habitat criteria that were applied for Stage 1 of the solar farm, Koala habitat has been mapped across the study area based on the presence of Koala feed trees (see Attachment B, Figure 7). Outside of riparian communities that generally support more than one of the recognised local feed tree species, the canopy cover of Narrow-leaved Red Ironbark and in some instances, Silver-leaved Ironbark, were used to determine the quality of Koala habitat within the study area. Overall, four categories of habitat have been mapped across the study area:

- High quality habitat – riparian corridors supporting more than one local primary feed tree species (i.e. Narrow-leaved Red Ironbark Poplar Gum) and a number of secondary feed tree species (i.e. Black Ironbox, Reid River Box, Northern Swamp Mahogany, Weeping Paperbark). See Attachment B, Figure 8, Photo 11 for an example of high quality habitat within Crush Creek.
- Moderate quality habitat – woodland vegetation supporting a cover of between 10-20 % cover of Narrow-leaved Red Ironbark or Silver-leaved Ironbark. See Attachment B, Figure 8, Photo 1 for an example of moderate quality habitat.
- Low quality habitat – woodland vegetation supporting a cover of <10 % cover of Narrow-leaved Red Ironbark or Silver-leaved Ironbark. See Attachment B, Figure 8, Photos 7 & 10 for examples of low quality habitat.
- Non-habitat areas – comprising natural grassland communities within the study area that have 0 % Koala feed tree cover. See Attachment B, Figure 8, Photos 5 & 8 for examples of non-habitat areas.

Taking a consistent approach to the Stage 1 referral (EPBC 2016/7824), additional field analysis was undertaken to calculate:

1. The density of Koala food trees across the Project Area.
2. The total aggregated area of Koala food tree habitat across the Project Area.

The results of the habitat mapping and tree density analysis are presented in Attachment B, Figure 7.

HABITAT QUALITY WITHIN PROPOSED DEVELOPMENT AREAS

The final layout of the solar panels within the Project Area has not been finalised. However, in order to ensure significant impacts to Koalas are avoided, development within the Project Area (solar arrays, associated management zones, supporting infrastructure) will primarily be focused on non-habitat areas and areas of low quality habitat.

In particular, Edify Energy will ensure that the final layout and associated management zones will impact no more than 15.8 ha of Koala food tree habitat. Therefore across Stages 1 and 2 of the solar farm, no more than a cumulative total of 20 ha of Koala food tree habitat would be impacted.

ES&M (see Attachment B) applied the Koala habitat assessment tool (DoE 2014) to habitat across the project area. Moderate and low quality habitat scored a 7 due to: occurrence (score of 2), vegetation composition (score of 1), habitat connectivity (score of 2), key existing threats (score of 2), and recovery value (score of 0).

As outlined in the Stage 1 referral and supported by the ES&M ecology report (2017), the actual potential value of the low quality habitat for Koalas is poor because:

- Vegetation within these areas does not incorporate the recognised elements of high quality Koala habitat in the region (i.e. reliable soil moisture, and multiple species of food tree). This conclusion is supported by work and expert input from Dr Alistair Melzer who is one of the leading Koala research scientists in Central and North Queensland and was part author of the Department's Koala Assessment Guideline (<http://cqes.com.au/alistair-melzer-koala-ecologist>).
- There is no evidence (i.e. sightings, scats, scratch marks) that Koalas use the low quality habitat.
- The low quality habitat comprises dry, low density (< 10% canopy cover) open woodland. The trees are generally of a low quality (i.e. subject to a dry environment, heavily degraded, and stunted) and they do not occur in a high enough density to support a population of the species.
- The low quality habitat areas only support one species of Koala food tree that is sub-dominant within the open woodland. The presence of a single food tree species does not provide a year round food source for the Koala. Particularly given the dry soils, and the low density and quality of the trees.

Attachment B, Figure 8 provides a series of images of habitat quality across the Project Area.

CONSERVATION PROGRAM

In addition to focusing development on low quality areas and minimising impacts to Koala habitat, Edify Energy will also undertake restoration works to improve high quality habitat along Crush Creek. This area supports at least two Koala food trees and may also be a drought refuge for the species.

Restoration works will entail:

- Excluding development and stock from Crush Creek. Fencing will be installed along both sides of the creek to provide for a suitable buffer from the high bank (noting that the top wire is to be plain wire not barbed to minimise the potential for fauna such as bats and gliders becoming entrapped)
- Creating off-stream watering points (if required)
- Installing gates to periodically allow pulse grazing if required for fire management purposes
- Encouraging natural regeneration of eucalypt species within this stock excluded buffer. This is a critical ecosystem process that is currently heavily restricted due to grazing
- Undertaking and maintaining a weed management program that targets the various high threat woody weeds such as Rubber Vine that currently threaten the ecological function and longevity of the fringing woodland community.
- Setting-up monitoring plots through which to monitor the recovery of natural regeneration and success of weed management activities.

The area of riparian vegetation along Crush Creek is approximately 46.5 ha but the area that occurs in the zone of 30 m from the high banks is likely to be larger. As the exact location of the high banks is not known the precise area can not be calculated.

These actions will provide a long term benefit to the Koala by addressing existing threats to areas of better habitat in the landscape and improving long term viability.

ANALYSIS OF POTENTIAL IMPACTS

As outlined above, direct impacts to Koala habitat will be limited to no more than 15.8 ha with a focus on non-habitat areas and low quality habitat. Impacts to high quality areas will generally be avoided and a conservation program will be applied to improve the condition of Crush Creek which is the key location for the species within the Project Area.

Limiting impacts to no more than 15.8 ha of primarily low quality habitat is considered to be below the significance threshold for the koala in this region for the following key reasons.

The level of clearing (calculated cumulatively across stages 1 and 2 of the solar farm) will not exceed the 20 ha upper threshold identified in the EPBC Act referral guidelines for Koala (DoE 2014).

For impacts below this upper threshold, the guidelines identify the need to assess the risk of significant impacts on a case-by-case basis considering factors such as habitat value and the scale and nature of the clearing.

In this case, the value of the low quality habitat areas to the local koala population is considered to be minimal. As outlined previously:

- Soil moisture is unreliable, the habitat contains only a single species of recognised feed tree, and these trees are in low density and in poor condition.
- There is no evidence that the koala uses these low quality areas. In contrast, evidence of koala has been found in nearby, higher quality areas that incorporate the elements that are considered necessary to support koala habitat use in the region (ie, reliable soil moisture and multiple species of feed trees).
- Habitat will be selectively cleared to avoid higher density areas. Importantly, riparian corridors that are expected to be important to movement and drought refuge will be retained and enhanced as a result of the proposed action.

A range of indirect impacts may also occur as a result of the proposed Solar Farm construction and ongoing operational activities. These potential impacts to Koala habitat will be appropriately minimised through a number of specific management measures in the relevant project management plans. These measures are discussed in Section 4 and include:

- Implementation of a Bushfire Management Plan (RPS 2016d) to ensure that the risk of bushfire is minimised and fuel loads are managed to reduce the rate of spread and intensity of bushfires. Asset protection zones are included in the proposed direct impact areas.
- Implementation of a number of measures through the Environmental Management Plan to facilitate landscape connectivity (RPS 2016b). These will include retaining all vegetation outside impact areas and using fencing that enables safe movement of Koalas across the Project Area.
- Implementation of a number of measures through the Environmental Management Plan to protect Koalas during construction (RPS 2016b). These will include specific measures to conduct pre-clearance surveys and the use of a fauna spotter, koala awareness as part of site induction and strict speed limits on internal roads.

All potential direct and indirect impacts associated with the proposed action on the Koala have been considered. Based on limiting direct impacts to no more than 15.8 ha of habitat (with a primary focus on low quality areas) and the management of potential indirect impacts, significant impacts to the Koala will not occur as a result of the proposed action.

SIGNIFICANT IMPACT CRITERIA

The following points address the EPBC Act significant impact criteria from the Koala guidelines (DoE 2014):

- The proposed action will not adversely affect habitat critical to the survival of the species, to the extent that a population of the species is likely to be affected. Impacts will be limited to no more than 15.8 ha and be focused on low quality habitat that is considered unlikely to support a population of the species.
- The proposed action will not substantially interfere with the recovery of the species or exacerbate key threats. The conservation program will improve the condition of habitat within the key areas for the species within the region, and potential indirect impacts will be mitigated and managed through a range of measures.

Black Ironbox (*Eucalyptus raveretiana*)

GENERAL DESCRIPTION

Black Ironbox is listed as vulnerable under the EPBC Act. This species occurs as scattered and disjunct populations in central coastal and sub-coastal Queensland, from Dipperu National Park southwest of Mackay, north to Charters Towers, Bowen and Ayr, in and around 100 km of Rockhampton and near the Mackenzie River north of Daringa. It is known from 23 main locations and there are many more sub-populations (Brooker and Kleinig 2008; DoEE 2017).

This eucalypt occurs on the banks of rivers, creeks and moderate sized watercourses on clayey or sandy loam and is often associated with White Paperbark (*Melaleuca leucadendra*) and/or Weeping Paperbark (*M. fluviatilis*) fringing open forest in coastal streams where it tends to displace Queensland Blue Gum (*E. tereticornis*) as the emergent eucalypt species (TSSC 2008). It is known to occur at an altitudinal range between 1-300 m in areas with annual rainfall between 650-1100 mm (DoEE 2017).

PRESENCE IN THE PROJECT AREA

Black Ironbox was found to be present along the majority of Crush Creek that intersects or fringes the western boundary of the study area, where it was associated with fringing riparian woodlands. Other canopy trees included Weeping Paperbark and Carbeen, while the mid-stratum was commonly composed of Northern Swamp Box (*Lophostemon grandiflorus*), Black Tea Tree (*Melaleuca bracteata*) and Cowitch Tree (*Lagunaria queenslandica*). It is anticipated that several hundred specimens occur

along the stretch of Crush Creek within the Project Area. The location of these records and suitable habitat for this species is presented in Attachment B, Figure 6.

This species was also recorded within Crush Creek and other watercourses within Stage 1 of the solar farm (RPS 2016a; 2016c).

There are approximately 44.7 ha of suitable habitat of Black Ironbox habitat in the Project Area (see Attachment B, Figure 6).

ANALYSIS OF POTENTIAL IMPACTS

There will be no direct impacts to Black Ironbox as a result of the proposed action. The panels and associated management zones will be located a minimum distance of 30 m from individuals (see Attachment B, Figure 6). This buffer distance accords with the recommendations under 'Threat Abatement and Recovery' in the species SPRAT profile (DoEE 2017).

Potential indirect impacts to Black Ironbox associated with the proposed action have also been considered. These potential impacts will be avoided or minimised through a number of specific management measures that will be implemented as part of the Solar Farm Environmental Management Plan (EMP) and the proposed Conservation Program for Crush Creek. These measures are discussed in Section 4 and include:

- Weed control and management. These will include measures to control the spread of weeds during construction and operation, and specific weed control measures within Crush Creek as part of the Conservation Program.
- A range of standard erosion and sedimentation management measures to be implemented during all phases of the project to ensure erosion is not exacerbated by project activities.
- Implementation of a Bushfire Management Plan (RPS 2016d) to ensure that the risk of bushfire is minimised and fuel loads are managed to reduce the rate of spread and intensity of bushfires.

Based on the avoidance of direct impacts and mitigation of potential indirect impacts, significant impacts to Black Ironbox will not occur as a result of the proposed action.

SIGNIFICANT IMPACT CRITERIA

The following points address the EPBC Act significant impact criteria (DoE 2013):

- The proposed action will not impact on any recorded individuals of the species or associated habitat within the Project Area. There will therefore be no long-term decrease in the size of an important population of the species.
- The proposed action will not impact on any recorded individuals of the species or associated habitat within the Project Area. As a result, the proposed action will not reduce the area of occupancy of the species.
- The proposed action will not impact on any recorded individuals of the species or associated habitat within the Project Area. As a result, the proposed action will not lead to fragmentation.
- The proposed action will not impact on any recorded individuals of the species or associated habitat within the Project Area. As a result, the proposed action will not adversely affect habitat critical to the survival of the species.
- The proposed action will not interfere with any aspects of species pollination or germination.
- The proposed action will not impact on any recorded individuals of the species or associated habitat within the Project Area. As a result, the proposed action will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
- Weed mitigation and management will be undertaken as part of the proposed action. The proposed action will not result in invasive species that are harmful to Black Ironbox species becoming established within habitat areas.
- The proposed action will not introduce disease that may cause the species to decline.
- The proposed action will not impact on any recorded individuals of the species or associated habitat within the Project Area. As a result, the proposed action will not interfere substantially with the recovery of the species.