EPBC ACT REFERRAL - CLARKE CREEK WIND FARM

ATTACHMENT FOR 2.4 AND 2.5

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

A detailed assessment of the potential impacts of the proposed action, including potential impacts to commonwealth listed threatened species and ecological communities is provided in the Ecological Assessment (EA) report prepared by NGH Environmental (2017) which accompanies this referral. The report details the site assessment methods, results, potential impacts, and recommended mitigation measures, including provision of a Biodiversity Offset Strategy (BOS) to mitigate potential impacts of the proposed action. A summary of the key components of the report as it applies to listed threatened species and ecological communities is provided below.

2.4.1 Site Assessment Methods

The site assessment methods are described in Section 6 of the EA, and included a combination of background review and desktop assessment, and an extensive field survey program, as described below (with relevance to EPBC MNES):

Desktop Assessment:

The desktop assessment included searches of publicly available databases (such as Birdata and Atlas of Living Australia), as well as the DoEE Protected Matters Search tool (PMST), within a 20 km search area using the coordinates (corners of a bounding polygon) for the proposed windfarm location (refer to Table 4 and Appendix 1A of the EA for the search area and results of the PMST).

Site Survey:

Two separate biodiversity site assessment field surveys were conducted between 13th and 27th of March, 2017 and between 11th and 25th September, 2017 to capture both wet and dry (or, pre-wet) season information.

The specific survey methods, survey locations, and overall survey effort are described in detail in Section 6.2 of the EA. Where relevant, surveys were undertaken in accordance with relevant EPBC Act survey guidelines (as listed in Section 6.2.2 of the EA).

2.4.2 Survey Results

A full description of the desktop and field survey results is provided in Section 7 of the EA (NGH 2017). A brief summary of the results as they apply to listed threatened species and ecological communities is provided below.

Flora and vegetation communities:

Records exist for 15 threatened flora species and five threatened ecological communities (TEC) within a 20 km radius on EPBC Search Tool, as well as seven records of threatened flora species on the QLD Wildlife Online. An evaluation of each of the threatened flora species included in the

database search results for their potential to occur within the study area is provided in Appendix 3 of the EA.

Two (2) threatened flora species were confirmed present on-site during the field surveys. These were both Cycad species, and included *Cycas megacarpa* and *C. ophiolitica*, both of which are listed as Endangered under the EPBC Act. All other species included in the database search results were considered either unlikely to occur at the site, or unlikely to be affected by the proposed action.

The locations of the two Cycad species recorded on site is provided on Figures F11, F12 and F13 of the EA. The location illustrates opportunistic records only, and do not represent a detailed survey of all individuals present in the project area, or the overall extent of distribution of the species within the subject site (given the extensive area and difficult to terrain it was impossible to cover all of the project area). The potential impacts of the project on these two species and recommended mitigation measures are described further below.

Four main vegetation communities were found to be present on site, in areas likely to be impacted by the development of the Clarke Creek wind farm, one of which has been identified as being a Threatened Ecological Community (TEC). These vegetation communities are described as:

- Vegetation Community 1: *Eucalyptus crebra* Open Woodland;
- Vegetation Community 2: Riparian Vegetation;
- Vegetation Community 3: Semi-Evergreen Vine Thicket (SEVT); and,
- Vegetation Community 4: Wetland/Alluvial plains.

Vegetation Community 3 (SEVT) is analogous to the EPBC TEC *Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions*. The potential impacts of the project on tis TEC and recommended mitigation measures are described further below.

Other TEC included in the database search results were considered either unlikely to occur at the site, or unlikely to be affected by the proposed action, including the Brigalow (*Acacia harpophylla* dominant and codominant) TEC, which was specifically considered during the site surveys to determine if it was present at the site.

Fauna and Fauna Habitats:

The fauna surveys conducted at the site resulted in 203 species of fauna being recorded (listed in Appendix 4 of the EA). In summary, the total number for each fauna group included:

- 132 bird species;
- 17 species of mammals (excluding microbats) of which seven species are introduced;
- A total of 20 microbat species were identified being potentially or definitely present on site;
- 25 reptile species; and,
- 11 amphibian species, one of which is introduced.

With regard to EPBC listed threatened species recorded at the site,

- Squatter Pigeon (*Geophaps scripta scripta,* Vulnerable under the EPBC Act). Species was recorded incidentally during the September survey at two localities, and incidentally on two occasions during the March survey, once near the southern part of the proposed wind farm site and once well south-east of the wind farm site.

- Koala (*Phascolarctos cinereus,* Vulnerable under the EPBC Act). Koala and evidence of the presence of Koala have been confirmed (17 koalas were heard or sighted on site) throughout the project area. Additional information on the use of the project area by Koala is provided below.

- Greater Glider (*Petauroides Volans,* Vulnerable under the EPBC Act). A small population was recorded at the site within highly fertile areas of the riparian community with a high concentration of remnant, old growth, *Eucalyptus tereticornis*. This community had low-level disturbance, with 13 individuals seen in an area no larger than 3 ha.

The locational records of each of the above threatened species is provided in Figures F11, F12 and F13 of the EA.

An evaluation of each of the threatened fauna species included in the database search results for their potential to occur within the study area is provided in Appendix 3 of the EA. With regard to the potential occurrence at the site of other listed threatened species included in the database searches, the following is specifically noted:

- Viable habitat for the **Northern Quoll** (*Dasyurus hallucatus*) (Endangered under the EPBC Act) was found on site, and this species is listed as likely to occur within the region, however, no evidence of the species presence within the project area was found, despite a survey effort of 20 cameras set up for a combined period of 24 days across the project area in suitable locations.
- Calls of *Nyctophilus corbeni* (Vulnerable under the EPBC) were included as possible records of the species in the bat call analysis results (refer to Section 6.2.2 and 7.3.4 as well as Appendix 9 of the EA for a full description of the bat call analysis methods and results). Calls of this species are not distinguishable reliably from other sympatric Nyctophilus species using Anabat/songmeter detectors. *Nyctophilus gouldi and Nyctophilus geofrroyi* were all captured in the harp traps during the survey, while *Nyctophilus corbeni* was not captured at all. The calls recorded by the songmeter and anabats match these three non-threatened species because they were recorded contemporaneously with and at the same location of their capture. Therefore, while *Nyctophilus corbeni* could occur within or near the project area, it is considered unlikely that it is present within the surveyed area based on the comparative capture results.
- No threatened species of reptile was found during the survey, however habitat suitable for the Ornamental Snake (*Denisonia maculata*) was identified.
- No threatened amphibians were recorded on site

2.4.3 Potential Impacts

A detailed assessment of the impacts of the proposed action for all ecological matters is provided at Section 8 of the EA. A summary of the anticipated impacts for listed threatened species and ecological communities is provided below.

Threatened Flora

The commonwealth listed threatened flora species recorded or considered likely to occur at the site includes the two endangered (under the EPBC Act) Cycad species, *Cycas megacarpa* and *Cycas ophiolitica*. An assessment of the significance of the impacts of the proposed action on the Cycads under the commonwealth significant impact criteria for endangered species is provided at Chapter 8 of the EA. In summary, the impacts of the project on both Cycad species will mainly involve direct clearing for the construction of access roads. Few Cycads were observed along the top of ridgelines where the turbines will be located (and roads largely located as much as possible), with most observations of these species made along mid-slopes of hills. Other infrastructure such as substations and site compounds will largely be located on flatter areas of the site which generally were found not to support Cycads.

The largest numbers/density of Cycads were found across the northern project areas; however, individual

Cycads were found to occur across most of the site. Given the size of the site and difficult terrain with limited access, it has not been possible to map every individual, or the exact boundaries of the distribution of Cycads within the site. Therefore, it is not possible at this time to estimate how many individuals may occur within the development footprint.

In order to reduce the potential impacts to these species, micrositing will be used during the detailed design of roads to avoid Cycads where practical. Where avoidance is not possible, they will be collected and translocated to suitable areas outside of the development footprint in accordance with the (draft) prescribed Cycad management measures provided at Appendix 6 of the EA, and including at a minimum the following mitigation measures:

- Pre-clearance surveys within road alignments to identify and mark individual Cycads
- Avoidance of Cycads where possible by relocating the access track alignment (micrositing).
- Where there is unavoidable clearing, the Cycads will be translocated under a best practice method outside of the clearing area. These species can be successfully transplanted.
- Propagation of any *Cycas megacarpa* and *Cycas ophiolitica* may be undertaken if translocation efforts have not reached desired success rates

Given the above measures, and that there is a large and healthy population of both species throughout the region it was concluded that the project is unlikely to lead to result in a significant impact to this species.

Threatened Fauna

The commonwealth threatened fauna species recorded or considered likely to occur at the site includes the following entities:

- Koala
- Greater Glider
- Squatter Pigeon

All of the above species are listed as vulnerable under the EPBC Act. An assessment of the significance of the impacts of the proposed action under the commonwealth significant impact criteria for vulnerable species is provided at Chapter 8 of the EA. A summary of the assessments of the impacts of the project on these entities is provided below.

- *Koala:*

  Koalas were found to be present throughout the project area with 17 recorded (heard or seen) during site surveys. There is currently 39,560 ha of vegetation mapped as being suitable to koala within the project study area (defined the property boundaries of the involved landholders). The habitat currently forms a contiguous landscape over the ridgelines with limits to connectivity in the flats which contain the more extensively cleared agricultural lands. The current project design requires the removal of up to 1,425.2 ha of koala habitat (less than 4% of the habitat within the project study area). The koala habitat in the region is estimated to extend well beyond the limits of the study area.

  The impact of this clearing will include localised losses of habitat from areas immediately adjacent to the existing tracks as well as from the construction of new tracks/roads through the ridge lines. Post-construction, the roads will generally be between 6-15 m in width, with slopes and batters to be rehabilitated or otherwise revegetated for soil stability. While roads and turbines could potentially disrupt movement through physical barriers, access to these roads and structures will be restricted to private use only (for farmers and wind farm staff), and with strict speed limits. With

these measures in place, it is not expected that the roads and turbines will pose a barrier to koala movement.

A number of management and mitigation measures were taken into consideration to minimise potential impacts on koala which are summarised in Section 8.5, Section 10, and Appendix 6 of the EA which includes the Development and implementation of a Fauna Management Plan to outline protection measures to minimise impacts on koala.

In summary, complete avoidance of clearing koala habitat will not be achievable and a up to 1,425.2 ha of suitable koala habitat will require removal. Given the high population of koalas through this area, it is expected that the removal of this habitat could have some impact on the local population. Provision of a koala habitat offset is therefore proposed to compensate the loss of vegetation on site. The offset requirements have been calculated using the EPBC Offset calculator and it was found that approximately 3,016.5 ha of suitable habitat was required to offset the project impacts on koala. Further details of the offset requirements are included in the (draft) Biodiversity Offset Strategy (BOS), included with this referral.

- *Greater Glider*:

A healthy population of greater gliders were found adjacent to and within parts of the riparian vegetation of the project area. A total of 1,822 ha of riparian vegetation is available in the project area and the project will require the clearing of 18.3 ha (<1% of the total available area) of good quality greater glider habitat within the riparian vegetation community.

The clearing of the vegetation in the waterway may have some impacts on the Greater Glider population, mainly through the loss of hollow-bearing trees which provide denning sites, and fragmentation of movement corridors along suitable riparian habitats.

The removal of hollow-bearing trees can be avoided to some extent through micrositing during detailed design or construction. Additionally, the felling of any hollow-bearing trees would be managed in accordance with a tree felling protocol, including the use of a fauna spotter to reduce potential impacts to resident fauna through death or injury. Nest box installation and/or other methods of habitat replacement will also combine with the above factors to greatly reduce the potential impacts on the local population.

During the construction phase, gliders may avoid the areas around the roads and turbines due to disturbance. The construction of roads through riparian zones may also disrupt glider movements in these areas. Greater Gliders are recorded as being able to glide long distances, with recorded “flights” of up to 100 m (Museum Victoria 2017). The clearing for road corridors will generally be up to 35 m in width across the majority of areas of mapped suitable habitat across the site (noting that the mapped habitat for this species is typically located in the riparian zones where construction widths are likely to be narrower than the steeper slopes that require wider construction widths of up to 200 m), and post-rehabilitation, tracks will on average be about 10 - 15 m wide. This narrow corridor, combined with the anticipated low traffic volumes should not result in any movement barriers for the Greater Glider, and consequently, it is not expected that the project will result in any fragmentation of habitat for the Greater Glider.

Rehabilitation activities will also be undertaken to enhance the riparian vegetation, where disturbance is to occur along the waterway. The aim of these activities will be to increase the buffering functions of the existing riparian zone by revegetating the top of bank and controlling weeds within the understorey within the riparian vegetation.

Given the above, it is considered unlikely that the proposed action would result in a significant impact on the Greater Glider population living in the project area.

- *Squatter Pigeon*:

  Squatter Pigeons were observed in proximity to water bodies throughout the project area. They are a locally nomadic species and will use vegetated corridors to disperse to areas with permanent water and better feeding grounds (DoTE 2017). The Squatter Pigeon ranges in tropical, open, dry sclerophyll woodlands and, savannahs of north-eastern Australia (Higgins & Davies 1996). Sightings are generally in the grassy understorey of eucalypt woodland, close to permanent water bodies (Garnett 1993). Nests are located on the ground, sometimes among, or sheltered by vegetation, including short, dry grass, grass tussocks or bushes (Frith 1982).

  Approximately 18.3 ha of riparian vegetation will potentially require removal for the project. As this clearing is linear, there will be large tracts of habitat surrounding the clearing for wildlife to disperse into. Squatter pigeons are nomadic and dispersal through the riparian corridor will remain possible.

  With regard to long-term operational impacts, this species is generally low-flying and spends much of its time on the ground. The species is therefore not considered to be at risk from collisions with turbines.

  Given the low population through the site and the higher population in the stock yards and farm dam areas outside the project area, as well as the low probability of being impacted by turbine collisions, it is considered unlikely that the project will result in a significant impacts to the local population of Squatter Pigeons.

Threatened Ecological Communities

The threatened communities listed as endangered and which have been recorded at the site includes the *Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions* (SEVT). An assessment of the significance of the impacts of the proposed action under the commonwealth significant impact criteria for threatened ecological communities is provided at Chapter 8 of the EA.

In summary, the proposed action would result in the removal of up to 44.7 ha of mapped SEVT. A total of 3,719.3 ha of SEVT was mapped across the study site. This equates to a reduction of approximately 1% of the total mapped extent community across the subject site. This extent in the reduction of the EEC may be considered significant, however based on the site observations, including review of aerial imagery of the vegetation across the broader surrounding region, as well as review of the existing QLD state Regional Ecosystem maps, there is substantially more patches of this community present in the area. As such, the overall portion of removal of the EEC in the region is unlikely to result in a significant impact.

The project also has the potential to result in some fragmentation of this community as a result of clearing for linear infrastructure such as roads and underground and overhead powerlines. The as-constructed road corridor width is expected to be about on average 10 – 15 m, with adjacent disturbed areas rehabilitated with suitable species for this community. Overhead powerline clearing requirements will vary depending on voltage, but will be up to a maximum of 45 m in width (for high voltage powerlines), in line with standard utility infrastructure management requirements, with areas beneath the powerlines to be regularly maintained (i.e. slashed). Road designs have been designed to avoid where practical, or otherwise minimise to the greatest extent possible. All turbines, construction compounds, laydown areas, substations, wind monitoring towers, and office and workshops have been located to avoid SEVT.

To ensure that the removal of up to 44.7 ha of the SEVT that occurs within the site and which cannot be avoided, does not result in a significant long-term reduction, a BOS will be implemented to manage and conserve existing areas of SEVT within the local area, including if required, further financial offset provisions.

2.4.4 Conclusions and Recommendations

The EA concluded that the project has the potential to result in a significant impact to the following species and ecological communities:

- Koala (Project will result in the removal of 1,425 ha of core koala habitat)
- Semi-Evergreen Vine Thicket (Project will result in the removal of 44.7 ha of SEVT)

A Biodiversity Offset Strategy (BOS) will be developed and implemented to offset these impacts. A preliminary BOS has been prepared and is included with this referral for consideration and further consultation with the DoEE.

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

The commonwealth migratory species recorded or considered likely to occur at the site includes the following entities:

- White-throated Needletail (*Hirundapus caudacutus*),
- Rainbow Bee-eater (*Merops ornatus*),
- Rufous Fantail (*Rhipidura rufifrons*) and
- Satin Flycatcher (*Myiagra cyanoleuca*) .

An assessment of the significance of the impacts of the proposed action under the commonwealth significant impact criteria for migratory species is provided at Chapter 8 of the EA.

In summary, the project is considered unlikely to result in any large-scale fragmentation of habitat, and accordingly, is unlikely to destroy or isolate any areas of important habitat for listed migratory species. Specifically, the project is located within an extensive area of remnant vegetation, with only a small percentage (>5%) of the total available habitat within the project study area to be removed, and with extensive areas of vegetation occurring in surrounding areas outside of the study area. As such, there will be sufficient habitat available for these species in the region after development of the CCWF. Additionally, highly mobile species (such as the migratory bird species recorded at the site), would not be affected by the project in terms of fragmentation or isolation of habitats. No migratory pathways or high use flight corridors of these species are known or predicted to occur through the CCWF site that would be disrupted or result in an increased risk of collision with turbines. The large tracts of suitable habitat present throughout the area outside of the project site will act as suitable rest and foraging areas. The project is also not expected to result in any substantial modification (through altered fire or hydrological regimes or nutrient cycles) within adjacent areas of the retained areas of vegetation to the extent that it might disrupt the life-cycle of these species

No invasive fauna or flora species are listed as a known threat to these migratory species. Pest management measures will be developed to ensure that the current pest species do not increase in population or range and that no new pest species are introduced into the area as a result of the project. It is not expected that the project will result in the establishment of invasive species that will be harmful to these migratory species.

Individuals of the migratory species listed above that may occur in the project area on occasion, are not considered to be an ecologically significant proportion of their respective populations. The proposed action is not likely to seriously disrupt the lifecycle of any of these migratory species. Furthermore, no ecologically significant areas were identified as occurring within the project area. Some ecologically significant areas were identified in the flats, outside of the project area.

Given the above, the proposed action is considered unlikely to result in a significant impact to listed migratory species.