

Biodiversity Assessment Addendum

COLLECTOR WIND FARM



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EXECUTIVE SUMMARY

This Biodiversity Assessment addendum assesses the potential impacts to biodiversity associated with proposed modifications to the approved Collector Wind Farm project. It provides an update to the original Biodiversity Assessment completed by NGH Environmental in 2012 and is designed to be read in conjunction with that document. Key changes of the modified project include:

- Modifications to the proposed road network,
- Modifications to the proposed cable layout
- Changes to the location of the construction and operational compound and substation
- Minor changes with regard to the specific dimensions of the turbines.

Additional studies

Additional studies were undertaken to assess the potential impacts of the modifications including:

- An updated desktop assessment
- Field validation of areas not previously surveyed
- Biometric plot surveys to inform offset requirements
- Targeted surveys for threatened species

The results of the additional studies were consistent with those of the original BA. One additional threatened species was recorded during the surveys; the Scarlet Robin. No other threatened species or Endangered Ecological Communities (EECs) additional to those identified in the original BA were considered to have the potential to occur at the development site.

Impact assessment

A revised impact assessment was undertaken to quantify and characterise the potential impacts resulting from the modification. Changes to the project have resulted in the avoidance and minimisation of impacts in particular to the Tablelands Snow Gum Woodland EEC where impacts have been eliminated. Impacts to other threatened species and communities including the Box-Gum Woodland EEC are largely consistent with the original BA. A key change in the assumptions of the impact assessment in this addendum, compared to the original BA, is that all impacts are considered permanent whereas certain impacts were previously considered temporary. This approach accounts for a 'worst case' scenario however, the proponent still intends to rehabilitate some of the areas cleared during construction that are not required during operation. Regardless, there has been no change to the conclusions of the significant impact assessments completed in the original BA and significant impacts to threatened species and endangered ecological communities are considered unlikely.

Revised mitigation and compensatory measures

It is the recommendation of this addendum that three additional mitigation measure be added to those previously prescribed in the original BA. In summary:

1. It is recommended that targeted surveys for threatened flora species with the potential to occur at the development site be conducted in areas of suitable habitat now proposed to be impacted by the development that were not previously surveyed.
2. Micrositing will be conducted with an ecologist in attendance to assist in identifying hollow-bearing trees that are to be avoided.

3. Where practical, hollow-bearing trees or individual hollow-bearing sections (whichever is most suitable or achievable) will be remounted in retained areas.

A revised offset strategy has been prepared for the project (NGH Environmental 2015) following close consultation with the NSW Office of Environment and Heritage (OEH). This strategy demonstrates that suitable offsets for the modified project are achievable according to the methodologies required by the NSW OEH. This will form the basis of the required biodiversity offset package for the project once the details of the offset site is negotiated and agreed with the relevant landowner(s).

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ACRONYMS AND ABBREVIATIONS

AoS	Assessment of Significance (pursuant to the <i>Threatened Species Conservation Act 1995</i> (NSW) or <i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cwth))
BA	Biodiversity Assessment
BBAM	BioBanking Assessment Methodology
BBAMP	Bird and Bat Adaptive Management Program
CEMP	Construction environmental management plan
Cwth	Commonwealth
DECC	Refer to OEH
DECCW	Refer to OEH
DGRs	Director General Requirements
DP&I	(NSW) Department of Planning and Infrastructure
DoE	(Cwth) Department of Environment
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EA	Environmental assessment
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cwth)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
ha	hectares
km	kilometres
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
SCRA	Southern Comprehensive Regional Assessment
SEWPAC	Refer DoE
TSC Act	<i>Threatened Species Conservation Act 1995</i> (NSW)

1 INTRODUCTION

1.1 ASSESSMENT CONTEXT AND SCOPE OF THIS REPORT

In May 2012 NGH Environmental submitted the biodiversity assessment (BA) of the potential impacts associated with the development of the Collector Wind Farm (the project). The content of the assessment was informed by the Director General's Requirements (DGRs). The BA was placed on public exhibition with the Environmental Assessment (EA) in July 2012. A number of public and government agency submissions were received which were responded to in the Preferred Project and Submissions Report for the project in March 2013.

On 2 December 2013 planning approval was granted by the NSW Department of Planning and Infrastructure (DP&I) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to construct and operate the Collector Wind Farm. The approved project included a turbine layout, road network, cable layout, construction and operational compound and the substation for the construction and operation of the Collector Wind Farm. Alterations to the proposed wind farm are now proposed and require an assessment as a modification.

The purpose of this addendum is to assess the potential impacts to biodiversity associated with the changes to the project.

1.1.1 Report structure

This Biodiversity Addendum provides specific detailed information and a revised assessment of potential impacts of the project including:

- | | |
|--|-----------|
| • Key changes to the project, justification for these changes and how impacts to biodiversity have been avoided and minimised. | Section 2 |
| • Additional studies undertaken, their approach and results relevant to assessing the modified project | Section 3 |
| • An updated and revised impact assessment, quantifying the impacts of the modified project and assessing the implications regarding potential impacts to threatened communities and species | Section 4 |
| • Revised mitigation and compensatory measures to ensure that impacts are adequately avoided, minimised and offset | Section 5 |

1.1.2 Key resources in the preparation of this report

To avoid duplication of information, where possible, this addendum report will refer to information contained in the following reports:

- NGH Environmental (2012): Biodiversity Assessment, Collector Wind Farm. Report prepared for Ratch Australia Corporation May 2012.
- APP (2013): Preferred project and Submissions report. Report prepared for Ratch Australia March 2013.

State and commonwealth policies and guidelines that have been consulted in the preparation of this report include:

- Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DoE 2013)
- Threatened species assessment guidelines (DECC 2007)
- BioBanking Assessment Methodology (OEH 2014)
- EPBC Act Environmental Offsets Policy (SEWPaC 2012)

State and commonwealth threatened species databases were also consulted including:

- NSW OEH Wildlife Atlas
- NSW OEH Threatened Species Profiles Database (TSPD)
- DoE Species Profile and Threats (SPRAT) database

2 CHANGES TO THE PROJECT

2.1 KEY MODIFICATIONS TO THE PROJECT

Changes to the project include modifications to the proposed road network, cable layout and location of the construction and operational compound and substation. Minor changes are also proposed with regard to the specific dimensions of the turbines. A description of the changes to each component and justification for the changes is provided below. An overview of the revised layout is shown on Figure 2-1 and on the maps in Appendix A.

2.1.1 Road layout

Proposed modifications

Details of the changes are described below. The EA included site-wide 8m width for site roads during construction, reducing to 6m of permanent site road following construction.

Table 2-1 Proposed changes to the road layout as part of the modified project

Item	Proposed change to road layout
1	Use of Lerida Road South (near Turbine 20) – requires a new exit point
2	Changes at intersection with Lerida Road South (between Turbines 19-21)
3	New section of road 840 metres long (between Turbines 25-27 and 8-9)
4	New site road parallel to Lerida Road South (near Turbine 16)
5	New road alignment to Turbines 61-63
6	New road alignment (between Turbines 39 and 45)
7	New road alignment to Turbine 22
8	Revised road alignment between Turbines 8 and 9
9	Wider corridor (between Turbines 1-3)
10	A number of other minor alignment changes

2.1.2 Cable layout and grid connection

Proposed modifications

There are two specific areas where the cabling, is proposed to be installed as overhead lines to minimise vegetation clearing, possibly overhead:

1. WTG12 to WTG11
2. WTG45 to WTG39 to WTG34

With the exception of these overhead sections, cabling would follow roads, most likely underground. Sections may be installed overhead. As described in the EA, the cables would [generally] be installed in trenches running parallel to the site roads, within an estimated easement of 10m either side of the construction road (so maximum potential easement width during construction would be 28m). Once cables are installed and construction completed, the power cable easements would be rehabilitated.

With the exception of two minor changes (noted below), grid connection works would be consistent with the EA. The layout of compound would be as per the attached drawings. Minor changes proposed include:

1. The original design basis for bringing the existing 330kV line down to the new substation and then back to its current position was for two of the existing lattice towers to be replaced with new ones in new locations, and two new lattice towers to be installed. Allowance has been made for a third new lattice tower to be installed to support the length of span.
2. An underground communications cable to connect in with TransGrid's broader Optical fibre Powerline Ground Wire (OPGW) communications network. The cabling would link with the system on the other 330kW transmission line, and then link into the substation as shown in Figure 2-1.

2.1.3 Construction compound / Operations and Maintenance building

Proposed modifications

These two elements would be located in the immediate vicinity of the site's modified primary access from Lerida Rd South near WTG20, adjacent to the site entry/exit roads and within 200m of the intersection. The specific location for each element within this defined area would be finalised during the final design process in consultation with the landholder.

Construction compound

The construction compound would be around 8,000 square metres.

Part of the area used for the construction compound would be utilised for the permanent Operation and maintenance building and associated compound (O&M Building), with the remainder being rehabilitated after the construction compound is decommissioned once construction has been completed.

Operation and Maintenance compound

The operation and maintenance compound would be around 2,750 square metres, which is smaller than the construction compound. It would be located close to the primary access off Lerida Road South.

2.1.4 Turbine dimension changes

Background

The approved project defined a maximum turbine tip height of 150m, within which the EA noted that the specific wind turbine model to be used had not yet been determined and would be subject to a competitive

tender process. Several turbines options were described, with the Vestas V112 wind turbine being the one with the longest rotor diameter of 112m (56m radius) used as an example of the best technology available at that time.

Recognising the need for design flexibility to accommodate possible layout variations between wind turbine models, given the rapid pace of technology development, the scope of the specialist studies in the EA included the following:

- Ecological and heritage assessments were undertaken within a development envelope, which included a buffer around the proposed turbine sites (100m radius), roads (25m wide corridor) and cable routes (10m wide corridor). This allowed for the micro-siting (minor relocation) of infrastructure within the assessed area or corridor without the need for further assessment
- Noise assessments were undertaken for three turbine models representing a range of noise emission levels
- Basing visual, aeronautical and telecommunications assessments on the Vestas V112 wind turbine with longest blade length within the maximum tip height of 150m (APP, 2012)

Following approval the Proponent has undertaken a tender process to select the final turbine technology for use on the site, based on the overall commitments within the EA. During this process the Vestas V117 turbine with a 117m diameter rotor (within the tip height envelope of 150m) was proposed as a competitive commercial option able to 'capture' more of the wind's energy for conversion to electricity.

Although this turbine option has not been selected for the project at this stage, this modification seeks to change the broad turbine dimensions defined in the EA to allow for the use of a turbine with this larger rotor diameter, giving further design flexibility to enable more efficient energy capture.

Additional studies assessing the potential impact of this proposed modification have been undertaken to consider visual (Green Bean Designs and Truescape Australia), avifauna (BL&A) and transport (AECOM) issues. These are presented in more detail in the following sections.

It is important to note that this 117m turbine rotor option has already been used as the technology basis in the development of the draft Bird and Bat Adaptive Management Program (BBAMP). The draft BBAMP is one of the requirements of the conditions of consent from the project approval, and has been prepared in close consultation with OEH. It is subject to final review and approval by the DoP&E.

Proposed turbine dimensions

The proposed modification to the project turbine dimensions seeks to maximise flexibility in technology selection for the project, whilst ensuring some planning certainty for other stakeholders by committing to remain within the approved tip height of 150m.

On this basis, with the selection of the Vestas V117 with the rotor blade diameter of 117m the tower would be sized (at 91.5m) to ensure that the overall tip height remains unchanged at 150m.

In the event that a turbine with a shorter blade was selected, the converse approach would be followed with the tower height increased (eg 94m tower with 112m rotor).

The potential increase in rotor diameter (from the approved 112m to 117m) represents a maximum increase of 4% in blade length and an overall increase to the rotor swept area of up to 9% (from the approved 9,847 m² to a maximum of 10,745m²).

2.2 AVOIDANCE AND MINIMISATION OF IMPACTS

The original BA for the proposal (NGH Environmental 2012) assessed the proposed construction of:

- Up to 68 wind turbines, 125-150m tall (80-90m to tower hub, 45-60m blade length).
- One substation and control building.

- Access tracks onsite (where existing tracks will be used, these tracks will be upgraded).
- Underground electricity cabling connecting turbines onsite (located within track areas).
- Overhead electricity cabling from the substation to the existing overhead lines to the north of the site.

Additionally, temporary construction infrastructure assessed included:

- Crane hard stand areas adjacent to turbine sites.
- Construction compound including site offices.
- Sediment erosion controls.

Avoidance and minimisation of impacts to biodiversity have occurred at two key stages of the project; the Preferred Project and Submissions Report (APP 2013) and project approval. These are discussed in more detail below.

2.2.1 Preferred Project and Submissions Report

The Preferred Project and Submissions Report for the project outlined a number of changes to the proposed wind turbine generator (WTG) layout to minimise impacts to biodiversity, specifically these included:

- Reduction of the total number of WTG's from 68 to 63, focussing on sensitive areas. As a result of removing the five turbines, there are two fewer turbines adjacent to forest areas which avoids threatened species habitat, four fewer turbines in woodland and all five previously occurred in areas that contained an Endangered Ecological Community (EEC).
- No turbines being proposed along the Lake George escarpment to avoid raptor habitat.
- The use of micro-siting to minimise the removal of hollow-bearing trees and positioning of associated layout features away from paddock trees and outside of forest as much as possible.
- Reduction of the total potential permanent impacts to EECs from 24.62 hectares to 20.48 hectares.

2.2.2 Project approval

The conditions of approval resulted in the removal of a further eight WTG's from the southern extent of the project (WTGs identified as 53 through to 60 in the original BA refer to Figure 2-1), reducing the total number of proposed WTGs to 55. The removal of these turbines avoids the more extensive area of the Tablelands Snow Gum Grassy Woodland EEC in the south of the project area. The removal of the eight turbines also adds an additional buffer to the Lake George escarpment to the south, further reducing collision risks in this area.

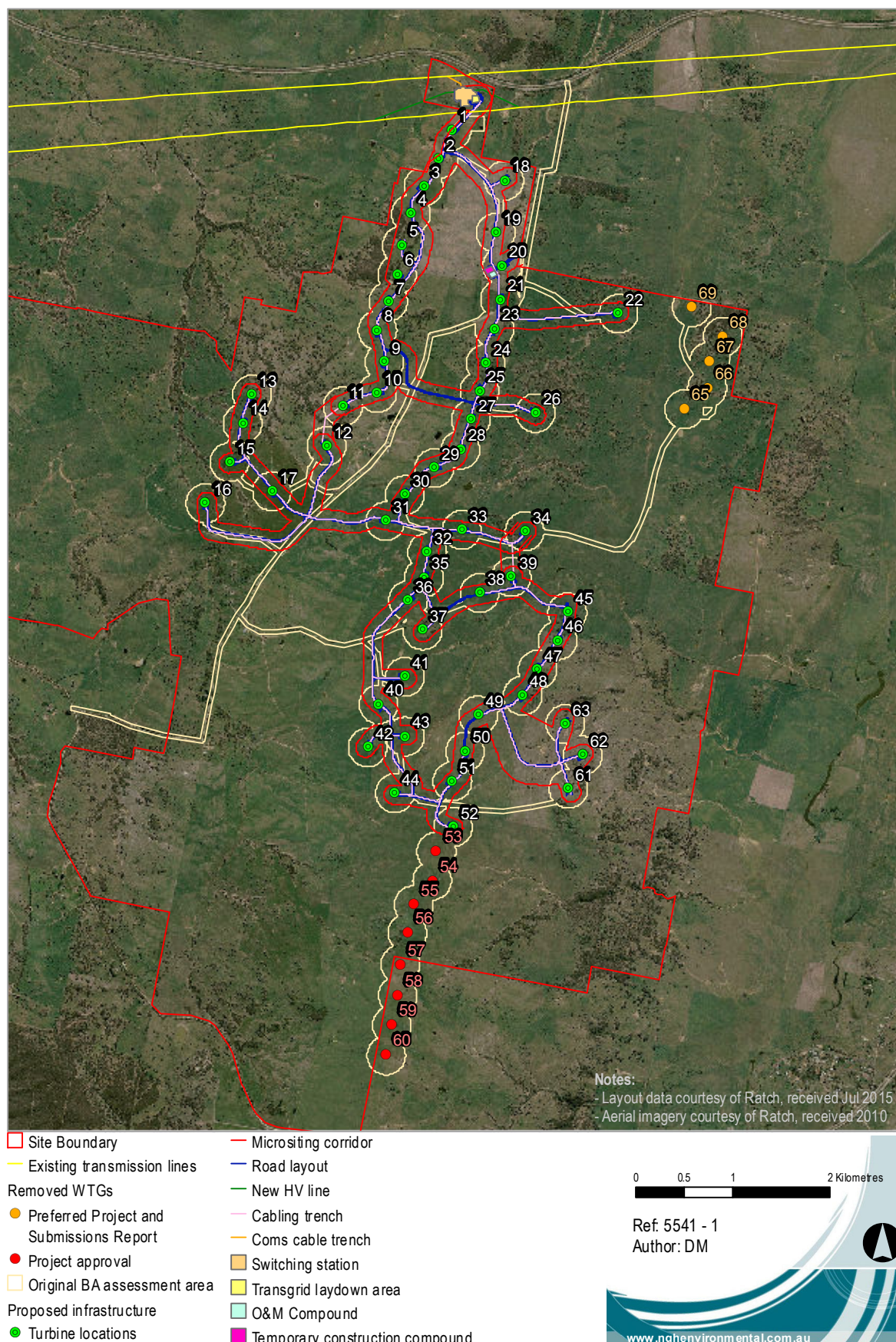


Figure 2-1 The modified proposed layout compared to the layout previously assessed

3 ADDITIONAL STUDIES UNDERTAKEN

3.1 APPROACH

3.1.1 Desktop assessment

Searches of State and Commonwealth threatened species databases were undertaken for the original BA on the 23 November 2010 to identify threatened and migratory species listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) with the potential to occur within the study area and be impacted by the project. Searches undertaken included:

- Murrumbidgee CMA Region – Monaro (MON) and Murrumbateman (MUR1) sub-regions (OEH threatened species tool)
- Lachlan CMA Region – Crookwell (CRO) and Murrumbateman (MUR2) sub-regions (OEH threatened species tool)
- EPBC Act Matters of National Significance search tool - 25 kilometre radius
- Atlas of NSW Wildlife – additional records for the local region

Given that almost five years has elapsed since these searches were undertaken and the potential for additional species and communities to have been listed during this time, it was considered prudent that updated searches be conducted. Updated searches were undertaken on the 6 July 2015 and included:

- NSW Wildlife Atlas searches for the Murrumbidgee CMA region Monaro and Murrumbateman sub-regions and the Lachlan CMA region Crookwell and Murrumbateman sub-regions.
- EPBC Act Protected Matters Search Tool – 10km radius additional to the site boundary.

Differences in the specific databases searched between 2010 and 2015 are due to updates in the tools used to access the databases. The maximum radius that can now be included in an EPBC Protected Matters Search is 10 kilometres, compared to the previous 25 kilometres.

3.1.2 Field validation survey

A field survey was undertaken on the 2 and 3 June 2015 to assess areas that were outside of the previous development envelope that was surveyed in detail for the original BA. The areas surveyed compared to the previous survey locations are identified on the mapping in Appendix A. Approximately 10 person hours was spent on the survey.

Surveys consisted of a random meander over each area, noting dominant flora species in all strata for the purposes of classifying vegetation types and condition. A general fauna habitat assessment was undertaken across each area and any important habitat features such as hollow-bearing trees (HBTs), riparian corridors, rocky outcrops etc. were identified to facilitate the identification of potential threatened species habitat. No detailed flora or targeted fauna surveys were undertaken.

It is acknowledged that the timing of the survey was not ideal with regard to identifying flora species and accurately ascertaining vegetation condition relevant to levels of diversity. However, all of the additional areas surveyed were adjacent to areas previously surveyed in detail at appropriate times for the original

BA. This enabled a comparative assessment to be made between adjacent previously surveyed areas and the new additional areas increasing the accuracy of condition classifications.

3.1.3 Biometric plot surveys

Additional survey has also been undertaken at the project site for the purposes of collecting Biometric plot data to inform the potential offset requirements of the project. These surveys were conducted on the 4 – 5 November 2014 with a total of 13 plots completed employing a survey effort of approximately 35 person hours (including travel between survey sites). The locations of the Biometric plot surveys are shown on the mapping in Appendix A. Further detail regarding the offset strategy for the project is discussed in Section 5.2.

3.1.4 Targeted Golden Sun Moth surveys

During late December 2014 and early January 2015, a survey targeting the Golden Sun Moth (GSM) was undertaken across areas with the Collector Wind Farm that had previously been identified as Box-Gum Woodland Derived Grassland and potential habitat for the GSM. The aim of the survey was to determine if GSM was present during the suitable survey window within these habitats and if so obtain an understanding of the distribution of the species across the proposed project site (and offset site if detected at the project site). The surveys were undertaken across four days in suitable conditions when known populations of the GSM in Canberra were known to be flying. Full details can be found in the survey report included as Appendix C.

3.2 RESULTS

3.2.1 Desktop assessment

The database searches returned an additional six threatened flora species, one EEC, seven threatened birds and one threatened amphibian compared to the searches undertaken for the original BA. These species are detailed in Table 3-1 below.

Table 3-1 Additional threatened species and communities returned from the updated database searches

Species		Status	
Scientific name	Common name	TSC Act	EPBC Act
FLORA			
<i>Bossiaea fragrans</i>		Critically Endangered	Not listed
<i>Dillwynia tenuifolia</i>		Vulnerable	Not listed
<i>Diuris pedunculata</i>	Small Snake Orchid	Endangered	Endangered
<i>Pelargonium</i> sp. <i>Striatellum</i> (G.W. Carr 10345)	Omeo Stork's bill	Not listed	Endangered
<i>Prasophyllum</i> sp. <i>Wybong</i> (C.Phelps ORG 5269)	A leek-orchid	Not listed	Critically Endangered
<i>Senecio macrocarpus</i>	Large-fruit Fireweed	Vulnerable	Not listed
FAUNA			
Aves			
<i>Falco subniger</i>	Black Falcon	Vulnerable	Not listed
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Vulnerable	
<i>Monarcha melanopsis</i>	Black-faced Monarch	Not listed	Migratory
<i>Pandion cristatus</i>	Eastern Osprey	Not listed	Migratory
<i>Rhipidura rufifrons</i>	Rufous Fantail	Not listed	Migratory
<i>Rostratula australis</i>	Australian Painted Snipe	Endangered	Endangered Migratory
<i>Tyto longimembris</i>	Eastern Grass Owl	Vulnerable	Not listed
Amphibians			
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	Vulnerable	Vulnerable
Endangered Ecological Communities			
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions		Endangered	Not listed

The potential for these species to occur at the project site and be impacted by the development is discussed further in Section 3.2.5 and 3.2.6 and assessed in detail through habitat evaluation in Appendix B.

3.2.2 Vegetation types and fauna habitats

The vegetation types identified during the survey and their general condition are largely consistent with those identified in the original BA. General observations on vegetation types and condition and fauna habitats in the additional areas surveyed are provided in Table 3-2 below. Updated vegetation mapping for the modified project is included in Appendix A. For consistency the same vegetation classifications utilised and mapped in the BA are utilised in this report. Relevant equivalent vegetation types are discussed in Section 3.2.3 below.

Table 3-2 Flora and fauna habitat values within the additional areas surveyed

Additional survey area	Habitat values	
	Flora	Fauna
Track between WTG_4 and WTG_6	Vegetation types and condition verified as those previously mapped in the vicinity including good quality Box-Gum Woodland derived grassland EEC to the east of the fence line. Potential for threatened flora species in this area.	Good and moderate condition native pasture only in this area which may provide habitat for reptiles.
Track between WTG_23 and WTG_22	Box-Gum Woodland EEC in poor condition consistent with nearby heavily grazed and degraded areas. Very low potential for threatened flora species.	Mature hollow-bearing trees present throughout the area (refer Figure 3-1) however, they are generally scattered and largely avoidable.
Transmission line between WTG_11 and WTG_12	The line spans an ephemeral drainage line in this area dominated by Apple Box (<i>Eucalyptus bridgesiana</i>) a species which also occurs in the surrounding Box-Gum Woodland EEC and the vegetation is considered continuous with this community. The drainage line is fenced off from the more degraded grazed areas to the south and is in moderate condition. Although in better condition than surrounding areas, the area has been subject to disturbance in the past and the likelihood of threatened flora species being present is considered to be low.	The drainage line contains standing water in the form of small pools that would provide ephemeral habitat for amphibians. The drainage line is unlikely to provide habitat for fish. Moderate condition native pasture in the surrounding area may provide habitat for reptiles.
Track from Lerida Road South to WTG_25 and WTG_27	Vegetation types and condition verified as those previously mapped in the vicinity being degraded Box-Gum Woodland derived grassland EEC in poor condition. Very low potential for threatened flora species.	Degraded native pasture providing limited habitat value.
Track from Lerida Road South to WTG_17 and WTG_31	Track to WTG_17 verified as traversing exotic dominated pastures. And track to WTG_31 verified as being degraded Box-Gum Woodland derived grassland EEC in poor condition. No potential for threatened flora species.	Exotic dominated and degraded native pasture providing limited habitat value.

Additional survey area	Habitat values	
	Flora	Fauna
Transmission line between WTG_34 and WTG_39	Vegetation types and condition verified as those previously mapped in the vicinity being degraded Box-Gum Woodland derived grassland EEC in poor condition. Very low potential for threatened flora species.	Degraded native pasture providing limited habitat value.
Track between WTG_39 and WTG_45	Track traversing ploughed and planted exotic pastures. No potential for threatened flora species.	Exotic pasture providing little habitat value
Area in the vicinity of WTG_37 and WTG_41	During the survey it was noted that the areas that had been converted to planted exotic pastures in this area had increased since the previous surveys. This area was surveyed to update the vegetation mapping for the project (refer to Appendix A). A small area in the vicinity of WTG_37 has been fenced off and retains a native groundcover which is considered likely to be in moderate condition at best. Given the high levels of previous and current disturbance in these areas the potential for threatened flora species is considered to be low.	Exotic dominated and degraded native pasture providing limited habitat value.
Track to WTGs_61, 62 and 63	Vegetation types and condition verified as those previously mapped in the vicinity including good quality Box-Gum Woodland EEC. Potential for threatened flora species in this area.	Mature hollow-bearing trees present throughout the area (refer Figure 3-2) however, they are generally scattered and largely avoidable. Potential for threatened woodland birds. Scarlet Robin recorded during the survey (refer Figure 3-2). Good condition native pasture in this area which may provide habitat for reptiles.

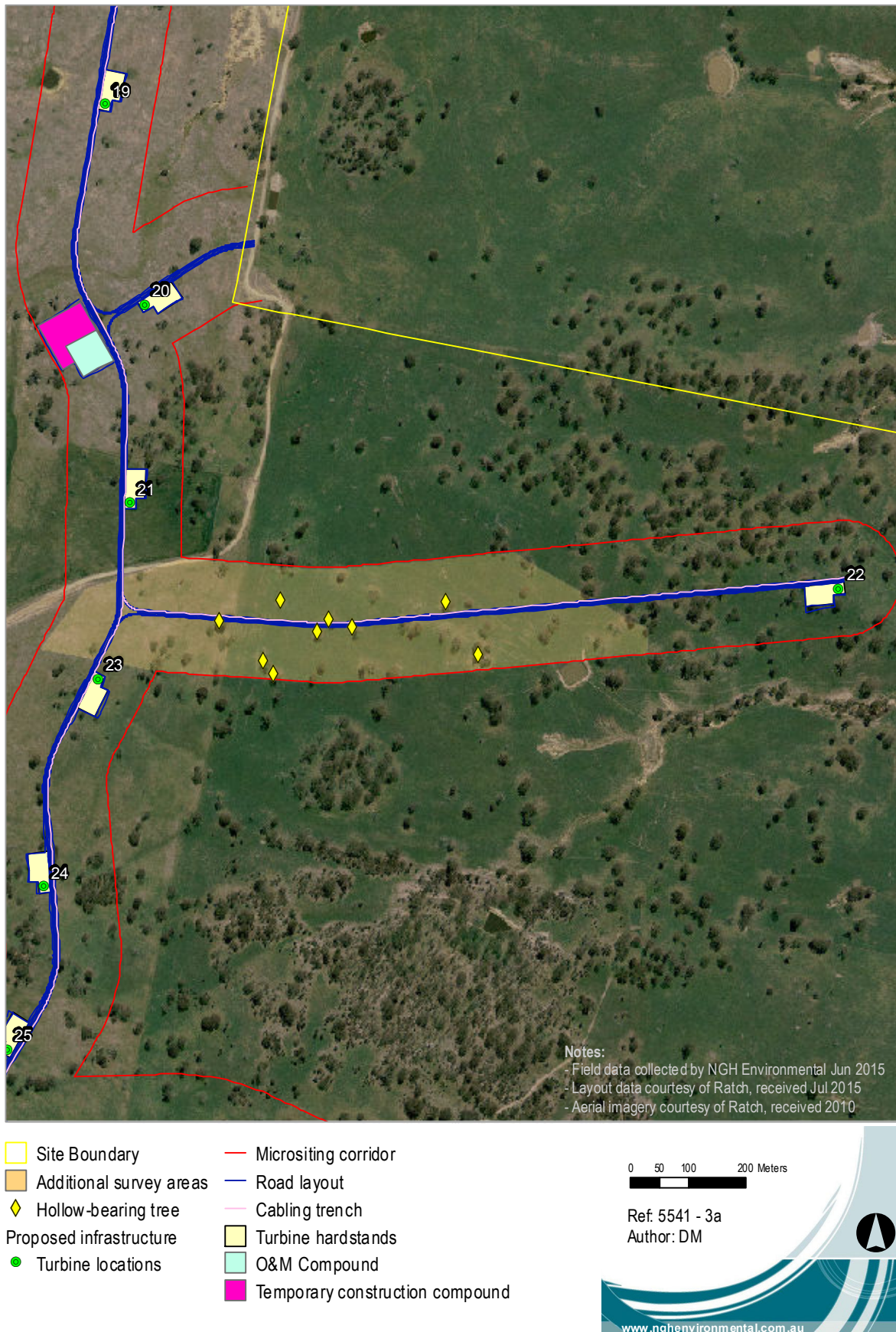


Figure 3-1 Hollow-bearing trees within the additional area surveyed east of WTG_23

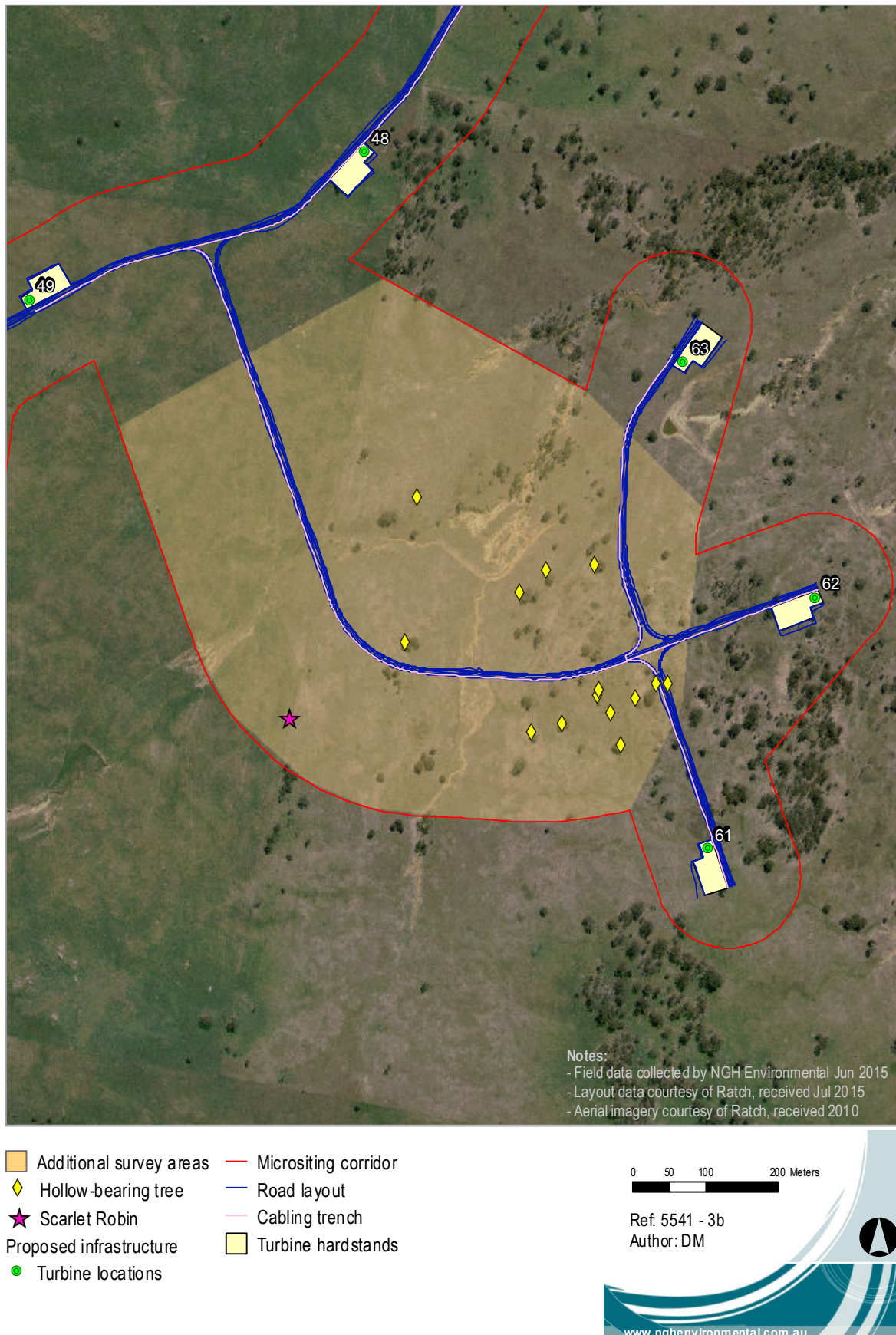


Figure 3-2 Hollow-bearing trees and Scarlet Robin record within the additional area surveyed west of WTG_61, 62 and 63

3.2.3 Biometric vegetation types

The original BA for the project described and mapped the vegetation based on the dominant species present and provided the equivalent classification using the system developed for the Southern Comprehensive Regional Assessment (SCRA) (Thomas et al. 2000), revised by Gellie (2005). The SCRA classification was used as at the time it provided better context for each vegetation type, particularly in terms of aerial estimates of remaining extent and reservation, which were critical for assessments of conservation status and impact significance.

To facilitate the Biometric plot surveys in November 2014, it was necessary to classify the vegetation according to the Biometric Vegetation Types Database (OEH 2012). This classification supersedes that of Gellie 2005 and is the preferred classification of the NSW OEH which has been used in the assessment of suitable offsets for the project (refer to Section 5.2). As such it is considered to be the most relevant vegetation classification for the project. The original classifications used in the BA and their Biometric vegetation type equivalents are detailed in Table 3-3 below.

Table 3-3 Vegetation types mapped within the project site and the Biometric equivalents

Vegetation types as mapped in the BA and this addendum	Equivalent SCRA classification (Gellie 2005)	Equivalent Biometric vegetation type
Box-Gum Woodland (and derived grassland)	Vegetation Group 160 Western Slopes Dry Grass Woodland and 161 Tablelands and Slopes Dry Herb/Grass Woodland	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120)
Brittle Gum – Broad-leaved Peppermint Dry Forest	Vegetation Group 109 Widespread Tablelands Dry Shrub/Tussock Grass Forest.	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands (LA124)
Snow Gum Grassy Woodland	May represent a woodland form of Vegetation Group 73 Eastern Tableland Dry Shrub/Grass Forest or the related Group 74 South Eastern Tablelands Dry Shrub/Grass/Herb Forest.	Snow Gum - Candle Bark grassland/woodland of the South Eastern Highlands (LA205)
White Gum Forest	Has some affinity to Vegetation Group 115 South East Tablelands Dry Shrub/Tussock Grass Forest, or may represent a variant of Group 109 Widespread Tablelands Dry Shrub/Tussock Grass Forest	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion (LA182)

3.2.4 Endangered Ecological Communities

The White Box, Yellow Box, Blakely's Red Gum Woodland (Box-Gum Woodland) EEC listed under the TSC Act and EPBC Act occurs within the project site largely as described and mapped in the original BA, except for some areas previously mapped as derived grassland around WTGs 37 and 41 which have since been converted to exotic pastures. This community is the dominant community across the project site ranging from highly disturbed degraded derived grasslands to good condition woodland remnants. Specific to the

additional survey areas, the TSC community occurs in the majority of the additional areas surveyed. The EPBC listed community occurs in the area surveyed for the track between WTG_4 and WTG_6 in a derived grassland form and across the broader area for the tracks to WTGs_61, 62 and 63 in a more intact woodland form.

The areas of Snow Gum trees over a native grassy groundcover in the north and to the south of the project area continue to belong to the Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland (Snow Gum Woodland) EEC listed under the TSC Act. No additional occurrences of this community were identified in the additional areas surveyed.

The Fuzzy Box Woodland on alluvial Soils EEC that was returned from the updated database searches is not considered to occur within the project area.

3.2.5 Threatened flora species

In general, habitats within the new areas surveyed were considered unlikely to be suitable for threatened flora species. No threatened flora species were observed during the survey although it is acknowledged that the survey timing was not suitable to detect the majority of species with the potential to occur.

Good quality habitat was, however, identified in the areas for the track between WTG_4 and WTG_6 and for the tracks to WTGs_61, 62 and 63. The threatened species identified as having the potential to occur at the site in the original BA have the potential to occur within these specific areas. Species with the potential to occur include

- | | |
|--|----------------|
| • Yass Daisy (<i>Ammobium craspedioides</i>) | TSC & EPBC Act |
| • Mauve Burr-daisy (<i>Calotis glandulosa</i>) | TSC & EPBC Act |
| • Buttercup Doubletails (<i>Diuris aequalis</i>) | TSC & EPBC Act |
| • Hoary Sunray (<i>Leucochrysum albicans</i> var. <i>tricolor</i>) | EPBC Act |
| • Button Wrinklewort (<i>Rutidosia leptorrhynchoidea</i>) | TSC & EPBC Act |
| • Small Purple-pea (<i>Swainsona recta</i>) | TSC & EPBC Act |
| • Austral Toadflax (<i>Thesium australe</i>) | TSC & EPBC Act |

Targeted surveys for threatened flora species were conducted as part of the original BA, however, the areas for the track between WTG_4 and WTG_6 and for the tracks to WTGs_61, 62 and 63 were not specifically targeted. As such the potential occurrence of the threatened species listed above cannot be ruled out for these areas.

Based on the habitat evaluation completed in Appendix B, none of the threatened flora species returned from the updated database searches, additional to those previously assessed in the BA (refer to Section 3.2.1), are considered likely to occur at the project site and be impacted by the development. This is primarily due to the absence of suitable habitat or where suitable habitat is present, an absence of records in the region.

3.2.6 Threatened fauna species

One additional threatened fauna species, the Scarlet Robin (listed as Vulnerable under the TSC Act) was recorded during the validation surveys. A single individual was observed foraging in the good quality Box-Gum Woodland within the micro-siting corridor for the tracks to WTGs_61, 62 and 63 (refer to Figure 3-2). Potential impacts to this species are discussed further in Section 4.4.3.

Targeted surveys for the Golden Sun Moth did not detect the species at the project site (refer to full report attached as Appendix C). While it cannot be conclusively stated that GSM is not present on the site, given the lack of the species being recorded when the species was known to be active in the region, combined with a lack of records of this species in the local area (the closest record being 16 kilometres south-west of the site), the potential for occurrence of the Golden Sun Moth is low.

Based on the habitat evaluation completed in Appendix B, the majority of the threatened fauna species returned from the updated database searches, additional to those previously assessed in the BA (refer to Section 3.2.1), are considered unlikely to occur at the project site and be impacted by the development. This is primarily due to an absence of habitat. It is considered possible that the Black Falcon and Black-faced Monarch could utilise the habitats at the site on occasion but no breeding habitat has been identified at the site and combined with the fact that they are highly mobile species, the potential for impact is considered low. Habitat is also present for the Eastern Grass Owl however, there is only one record for this species from the region in 1982 and it is considered unlikely to occur.

Combined with the results of the original BA, the following species are now considered to occur or have the potential to occur within the project site and [possibly] be impacted by the development:

- Raptors: Little Eagle, Spotter Harrier, Square-tailed Kite.
- Small diurnal dry forest/woodland birds: Brown Treecreeper, Diamond Firetail, Varied Sittella, White-fronted Chat and Scarlet Robin.
- Larger diurnal forest/woodland birds: Gang-gang Cockatoo, Superb Parrot, Powerful Owl.
- Microbats: Eastern Bentwing Bat, Yellow-bellied Sheathtail Bat, Large-footed Myotis, East Coast Freetail-bat.

All these species are all listed as Vulnerable under the TSC Act.

4 UPDATED AND REVISED IMPACT ASSESSMENT

The original BA for the project split the potential impacts of the development into two categories; permanent impacts that would remain for the duration of the project until decommissioning and temporary impacts that are required for construction only and would be rehabilitated.

This addendum assumes a 'worst case' scenario for the project to ensure that all possible impacts are accounted for and where required, able to be offset. In doing this all impacts are now considered to be permanent however, the proponent still intends to rehabilitate particular areas including cable routing, laydown areas, construction compounds and potentially some of the roads and hardstands.

4.1 IMPACT TYPES

The main impact types and the general nature of these impacts remain the same as identified in the original BA and include:

- Loss and modification of habitat from direct impacts such as:
 - Vegetation clearing
 - Earth moving and landform reshaping
 - Associated sediment, erosion, weed and pollution risks
- Collision with infrastructure causing injury or fatality to fauna
- Alienation risks (behavioural avoidance by fauna of suitable habitat near infrastructure)
- Indirect impacts (resulting from soil compaction, erosion, weed ingress etc.)
- Cumulative impacts

The key factors that have changed as a result of the modified project are the quantum of direct clearing of vegetation and fauna habitats, the potential for significant impacts to threatened species and communities resulting from that clearing and the contribution of the project to cumulative impacts given the ongoing development of the wind industry that has occurred in the region since the original BA was completed. Updated estimates of direct impacts to vegetation communities and fauna habitats is provided in Section 4.2. Potential impacts to threatened species and communities are discussed further in Section 4.4. Cumulative impacts are considered further in Section 4.5.

Collision and alienation risks remain but the magnitude of these impacts has been reduced due to the reduction in the total number of proposed WTGs from 68 originally assessed in the BA to the 55 included in the project approval. Collision risks are addressed in detail by Brett Lane and Associates in the Bird and Bat Adaptive Management Program (BBAMP, Brett Lane and Associates 2014) and in the modification report (Section 3.3.4) and are not considered further in this report.

4.2 ESTIMATED IMPACT AREA OF THE PROJECT

Estimates of total habitat loss for each of the affected vegetation types are presented in Table 4-1 to Table 4-4 below, based on the final modified infrastructure layout provided by the proponent. Impact areas have been calculated using GIS software overlaying the final infrastructure layers and micrositing envelope onto the revised vegetation and habitat mapping for the project.

A comparison of the quantum of habitat loss for threatened species and Endangered Ecological Communities between the original and modified project is provided in Table 4-5 and discussed further in Section 4.4.

Table 4-1 Estimated 'worst case' impact area of the development by vegetation type

Legend:

BGW	Box-Gum Woodland	SGW	Tablelands Snow Gum Grassy Woodland
DGL	Box-Gum Woodland Derived Grassland	NP	Native pasture
BBDGF	Brittle Gum – Broad-leaved Peppermint Dry Grass Forest	EX	Exotic
WGF	White Gum Forest		

Infrastructure	Total area	Impact areas (ha)						
		BGW	DGL	BBDGF	WGF	SGW	NP	EX
Turbine hardstand	11.85	2.35	6.01	0.05	0.22	0.00	0.21	3.01
Tracks (permanent formed width including batters)	35.75	5.75	17.49	0.04	0.38	0.00	0.57	11.52
Cable trenches (additional to formed tracks)	0.34	0.08	0.21	0.00	0.01	0.00	0.00	0.04
Communications cable trench	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Overhead line between WTG 11 and 12	0.54	0.54	0.00	0.00	0.00	0.00	0.00	0.00
Switching station	3.01	0.58	2.43	0.00	0.00	0.00	0.00	0.00
Transgrid laydown area	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00
Four new Transgrid towers	0.09	0.00	0.09	0.00	0.00	0.00	0.00	0.00
Operations and maintenance building	0.36	0.36	0.00	0.00	0.00	0.00	0.00	0.00
Construction compound, staging and storage	0.54	0.54	0.00	0.00	0.00	0.00	0.00	0.00
Total infrastructure footprint	52.91	10.20	26.66	0.09	0.61	0.00	0.78	14.57
Permanent habitat loss*	38.34	10.20	26.66	0.09	0.61	0.00	0.78	*
Area of habitat within microsinning corridor*	620.07	128.40	299.00	1.26	12.13	0.13	6.81	*
Percentage of habitat within the microsinning corridor permanently impacted*	6.18	7.94	8.92	7.14	5.03	0.00	11.45	*

*Habitat excludes vegetation in the exotic class

Table 4-2 Estimated 'worst case' impact areas by vegetation condition¹

Collector Windfarm					
Vegetation types	Worst case loss within each condition class (ha)				Total of each vegetation type within micro-siting corridor (ha)
	Good	Moderate	Poor	Total	
Box-Gum Woodland	2.27	2.92	5.01	10.20	128.40
Box-Gum Woodland Derived Grassland	4.43	7.49	14.74	26.66	299.00
Brittle Gum/Broad-leaved Peppermint Dry Grass Forest	0.09	0.00	0.00	0.09	1.26
White Gum Forest	0.00	0.61	0.00	0.61	12.13
Tablelands Snow Gum Grassy Woodland	0.00	0.00	0.00	0.00	0.13
Native Pasture	0.00	0.78	0.00	0.78	6.81
Exotic/planted	0.00	0.00	14.57	14.57	186.91

Table 4-3 Estimated 'worst case' impacts to Endangered Ecological Communities

Collector Windfarm				
EEC	Worst case habitat loss within each condition class (ha)			
	Good	Moderate	Poor condition	Total
Box-Gum Woodland and Derived Grassland	6.70	10.41	19.75	36.86
Total area within the DE	94.39	74.16	258.85	427.40

¹ All of the condition classes in Table 4-2 and 4-3 (good, moderate and poor) excluding the 'exotic' class would equate to the 'moderate to good' definition specified within the Biometric Guidelines due to the dominance of native vegetation in the ground layer or having a native overstorey with a percent foliage cover greater than 25% of the lower value of the over-storey percent foliage cover benchmark of that vegetation type. Exotic dominated vegetation would equate to 'low' condition.

Table 4-4 Estimated 'worst case' impact areas by fauna habitat type

Collector Wind farm					
Fauna habitat	Worst case loss within each habitat type (ha)				
	Exotic pasture	Native pasture	Pasture with trees	Woodland	Forest
Total impacts	14.55	25.79	12.06	0.08	0.11
Total in Micrositing Corridor	183.59	287.69	142.82	12.48	7.51

Table 4-5 Quantified impacts to threatened species and Endangered Ecological Communities from the original and modified project

Community/species	Habitat type	Extent in micrositing corridor (ha)	Quantified habitat loss (ha or individuals for hollow-bearing trees)		Equal, greater or lesser impact (ha)
			Original proposal	Modified project (worst case)	
Box-Gum Woodland (TSC Act)	All Box-Gum Woodland and Derived Grassland	427.40	21.9 (permanent) 14.97 (temporary) 36.87 (total)	36.86 (all impacts)	< 0.01
Box-Gum Woodland (EPBC Act)	Box-Gum Woodland and Derived Grassland in good condition	94.39	3 (permanent) 1.58 (temporary) 4.58 (total)	6.7 (all impacts)	> 2.12
Snow Gum Woodland (TSC Act)	Snow Gum Woodland	0.13	1.62 (permanent) 0.21 (temporary) 1.83 (total)	0	< 1.83

Community/species	Habitat type	Extent in microsite corridor (ha)	Quantified habitat loss (ha or individuals for hollow-bearing trees)		Equal, greater or lesser impact (ha)
			Original proposal	Modified project (worst case)	
Raptors • Little Eagle • Spotted Harrier • Square-tailed Kite	Box-Gum Woodland and Dry Forest (potential breeding) and all habitats present (potential foraging)	634.64	49.7 (all areas impacted) Potential habitat only, no known habitat present	52.91 (all areas impacted) Potential habitat only, no known habitat present	> 3.21
Small diurnal forest/woodland birds dry • Brown Treecreeper • Diamond Firetail • Varied Sittella • White-fronted Chat • Scarlet Robin	Woodland, forest and pasture with trees	162.81	22 (assumed maximum permanent habitat loss)	12.25 (calculated impacts)	< 9.75
Larger diurnal forest/woodland birds • Gang-gang Cockatoo • Superb Parrot • Powerful Owl	Woodland, forest and pasture with trees	162.81	22 (assumed maximum permanent habitat loss)	12.25 (calculated impacts)	< 9.75
			37 Hollow-bearing trees	38 Hollow-bearing trees	> 1 hollow-bearing tree
Microbats • Eastern Bentwing Bat	Woodland, forest and pasture with trees	162.81	22 (assumed maximum permanent habitat loss)	12.25 (calculated impacts)	< 9.75

Community/species	Habitat type	Extent in micrositeing corridor (ha)	Quantified habitat loss (ha or individuals for hollow-bearing trees)		Equal, greater or lesser impact (ha)
			Original proposal	Modified project (worst case)	(=, > or <)
- Yellow-bellied Sheath-tail Bat - Large-footed Myotis - East Coast Freetail-bat			37 Hollow-bearing trees	38 Hollow-bearing trees	> 1 hollow-bearing tree

4.3 LOSS OF HOLLOW-BEARING TREES

The density of hollow-bearing trees within wooded areas was identified in the BA as follows:

- Pasture with trees – 3 per hectare.
- Woodland – 35 per hectare.
- Forest – 60 per hectare.

These densities were used to estimate the number of hollow-bearing trees within the study area. However, to obtain a more accurate count of trees to be removed by the development, an alternative methodology was utilised where all mature trees were assumed to be hollow-bearing and all mature trees likely to be impacted by the proposal were identified and counted using high resolution aerial and GIS software. Based on this, the maximum number of hollow-bearing trees that would be removed as a result of the approved project is 37. This methodology was repeated with the modified layout. All trees with a canopy of 15m or more were assumed to be hollow-bearing. All such trees within fixed impact areas such as hardstands and compounds etc were counted. Trees in woodland and pasture where avoidance would be easily achieved were not counted. Where it was considered that avoidance would be difficult to achieve they were included as a worst case. This resulted in development of a worst case scenario where 38 hollow-bearing trees would be removed as a result of the modified project, one more than the approved project.

There will, however, be further mitigation with regard to the number of hollow-bearing trees impacted. Final design will allow for micro-siting within the existing allowance to facilitate avoidance of hollow-bearing trees. Micro-siting will be conducted with an ecologist in attendance to identify hollow-bearing trees that should be avoided. This process will also allow for accurate quantification of hollow-bearing trees that cannot be avoided and will be impacted by the development.

4.4 POTENTIAL IMPACTS TO THREATENED ENTITIES

The following sections discuss changes to potential impacts to Endangered Ecological Communities and threatened flora and fauna species resulting from the modified project. The significance of the changes is discussed in the context of the assessments of significance conducted for threatened entities in the original BA. A summary of the changes to the quantum of impacts for each community and species assessed is provided in Table 4-5 above. A summary of the conclusions of the original assessments of significance and whether or not there are any changes to these conclusions as a result of the modified project is provided in Table 4-6.

Table 4-6 Summary of impact significance assessments for threatened species and communities assessed in the original BA, indicating whether there is any change from final conclusions drawn in the BA

Subject species / community	Status	Significant impact?	Change to conclusions from BA?	Changes to mitigation measures?
Community				
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	EEC TSC	No	No	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CEEC EPBC	No	No	No
Fauna				
Raptors • Little Eagle • Spotted Harrier • Square-tailed Kite	V TSC	No	No	No
Small diurnal dry forest/woodland birds • Brown Treecreeper • Diamond Firetail • Varied Sittella • White-fronted Chat • Scarlet Robin	V TSC	No	No	No
Larger diurnal forest/woodland birds • Gang-gang Cockatoo • Superb Parrot • Powerful Owl	V TSC	No	No	No
Microbats • Eastern Bentwing Bat • Yellow-bellied Sheath-tail Bat • Large-footed Myotis • East Coast Freetail-bat	V TSC	No	No	No

4.4.1 Endangered Ecological Communities

The quantum of Impacts to EECs are shown on Table 4-3 and Table 4-5. Impacts are now restricted to the Box-Gum Woodland community only following the removal of the eight WTG's from the south of the project area avoiding impacts to the Snow Gum Woodland EEC previously identified in the BA. Although a small area (approximately 0.13 hectares) of Snow Gum Woodland EEC remains in the microsite corridor, this vegetation will be avoided by the project.

Considering the 'worst case' scenario, the modified project will result in the removal of up to 36.86 hectares of the Box-Gum Woodland EEC and Derived Grassland that is predominately in poor condition with little chance of recovery without assistance. The original BA considered that 20.9 hectares would be permanently cleared and an additional 14.97 hectares would be cleared for construction (such as laydown areas, hardstands and road verges) and able to be rehabilitated following construction.

An assessment of significance completed in the original BA concluded that:

"the majority of the vegetation on the site is in a degraded state due to past and present agricultural practices. The proposal would result in the removal of up to 20.9 hectares of Box-Gum Woodland EEC that is predominately in poor condition with little chance of recovery. Higher quality remnants will be affected by the proposal however, extensive areas of these higher quality remnants exist within the site boundary and provide good opportunities for offsetting and maintaining or improving biodiversity values of these areas. The removal of up to 22 hectares of this community is not considered to be significant with respect to its generally degraded state and the extent of similar vegetation in the locality"

The increase from 20.9 hectares considered in the original assessment to the 'worst case' 36.86 hectares identified in this addendum does not change the assessment conclusions reached above. Offsets have been demonstrated as achievable for the project (refer to Section 5.2) satisfying the goal to maintain or improve biodiversity values.

The original assessment of significant impact for to the EPBC listed community in the BA concluded that:

"The proposal will result in the permanent removal of up to 2.99 hectares of the Box-Gum Woodland CEEC causing a localised reduction in the occurrence of this community. The proposal will not impact on the broader extent of the CEEC within the proposal site. Localised disturbance to hydrological patterns that support the EEC will result from the proposal but are not considered to be substantial. The risks associated with the ingress of invasive species and disease and potential impacts from chemicals and fertilizers are considered to be acceptable if the recommendations included within Section 7 of this report (the original BA) are adhered to.

Offset plans are recommended by this report to maintain and improve the biodiversity values associated with the CEEC within the proposal site. Large areas exist within the site boundary that if properly managed can assist with the recovery of this community.

With the implementation of the controls and recommendations of this report the proposal is considered unlikely to have a significant impact on the Box-Gum Woodland CEEC and would result in a net positive gain."

The increase in the impacts to the Box-Gum Woodland CEEC from 3 to 6.7 hectares does not change the conclusions reached in the EPBC assessment. Over 94 hectares of this community is known to occur within and adjacent to the areas of the community within the microsite corridor namely, areas of grassland outside of the areas to be impacted between turbines 2 – 6 and turbines 18 – 20 and more extensively, the woodland and grassland outside of the areas to be impacted around turbines 61 – 63 (the community is also likely to extend beyond the known extent in this area). In this context the removal of 6.7 hectares is

not considered significant. Offsets proposed also protect the EPBC listed community resulting in a long-term gain in biodiversity values.

4.4.2 Threatened flora

No assessments of significance were completed for threatened flora as targeted surveys had reduced the probability of occurrence of these species to low. Additional areas of suitable habitat will now be impacted by the proposal that have not been subject to targeted surveys at suitable times. The occurrence of threatened flora species in these areas cannot be ruled out and it is recommended that surveys be conducted prior to construction in these areas to determine the presence or absence of threatened flora. Appropriate measures have been included in Section 5 of this report.

4.4.3 Threatened fauna

Raptors: Little Eagle, Spotter Harrier, Square-tailed Kite

The total area of potential habitat that may be impacted potentially utilised by these species has increased from 49.7 hectares to 52.91 hectares. This includes all areas impacted by the proposal, including exotic pasture areas, as these species may utilise any area for foraging. More important raptor habitat is associated with the woodland and forest areas that provide potential nesting opportunities, although there are no known occurrences of these species at the development site. The assessment in the original BA assumed that up to 22 hectares of potential raptor breeding habitat would be permanently impacted by the project. The 'worst case' scenario assessed in this addendum has quantified that up to 12.25 hectares of potential breeding could be permanently impacted, a reduction of 9.75 hectares.

An assessment of significance completed in the original BA concluded that:

"Whilst the proposal would reduce vegetated habitat for nesting for these three raptors, nesting opportunities would not be lost as much of the vegetation throughout the site would be retained. Little Eagle nesting habitat on the escarpment, south of the site, would not be impacted. The Spotted Harrier is unlikely to be impacted by turbine collision as they generally fly below the sweep zone. There is little evidence to suggest the Square-tailed Kite utilises the site. The Square-tailed Kite and Little Eagle could be impacted by collision as they both forage in the sweep zone, however as raptors are known to avoid turbines, it is likely that mortality rates would be minimal. The proposed wind farm at Collector would not significantly impact on the Square-tailed Kite or Spotted Harrier. It is unlikely that the proposal would significantly impact on the Little Eagle, however, this species is considered to be a key species and would be monitored as part of the bird and bat monitoring program."

The conclusion of a non-significant impact reached in the original assessment is still consistent with the modified project, particularly considering the reduction in potential nesting habitat impacts. However, recent consultation with OEH (3 September 2015) has identified that a Spotted Harrier carcass had recently been found on an operational wind farm in the region suggesting that they may indeed fly at rotor sweep height. This is contrary to the conclusion of the original BA above. Collision risks to the Spotted Harrier, Square-tailed Kite and Little Eagle are addressed in the BBAMP that has been prepared for the project and the modification report (section 3.3.4).

Small diurnal dry forest/woodland birds: Brown Treecreeper, Diamond Firetail, Varied Sittella, White-fronted Chat and Scarlet Robin

Potential impacts to woodland and forest habitat assessed for these species has reduced from 22 hectares assessed in the BA to 12.25 hectares assessed as a 'worst case' scenario in this addendum. An assessment of significance completed in the original BA concluded that:

"The proposal would not significantly impact on the Brown Treecreeper, Diamond Firetail, Varied Sittella or White-fronted Chat. Habitat loss for these species would constitute disturbance to pasture and pasture with trees, which White-fronted Chat inhabits, and a small amount of woodland and forest, which the other three species inhabit. Hollow-bearing trees and fallen timber would be retained where possible to mitigate impacts. Furthermore, habitat loss would be offset by preserving and improving large areas of woodland that are in moderate to good condition."

Although not specifically included in the assessment, the Scarlet Robin is also a small diurnal forest/woodland bird and the discussions and conclusions of the original assessment are considered to be applicable to this species. Given that the quantum of impacts to habitat for these species has been reduced, the conclusions reached in the original assessment are still considered relevant to the modified project.

Larger diurnal forest/woodland birds: Gang-gang Cockatoo, Superb Parrot, Powerful Owl

Potential impacts to woodland and forest habitat assessed for these species has reduced from 22 hectares assessed in the BA to 12.25 hectares assessed as a 'worst case' scenario in this addendum. Estimated 'worst case' impacts to hollow-bearing trees have increased marginally to those originally estimated in the BA (from up to 37 to up to 38) although there is further potential to minimise impacts to hollow-bearing trees through micro-siting. An assessment of significance completed in the original BA concluded that:

"The proposal would not significantly impact on the Gang-gang Cockatoo, Superb Parrot or Powerful Owl provided mitigation measures are implemented. Habitat loss for these species is largely through loss of hollow-bearing trees and stags as breeding resources. Hollow-bearing trees and stags would be retained where possible to mitigate impacts. Artificial hollows would replace hollow-bearing trees that are removed. Furthermore, habitat loss would be offset by preserving and improving large areas of woodland that are in moderate to good condition."

The conclusion of a 'non-significant impact' reached in the original assessment is assessed as being consistent to the modified project. However, the appropriateness of replacing hollow-bearing trees with artificial hollows has been reassessed. A more appropriate method identified in consultation with OEH involves either hollow-bearing trees or individual hollow-bearing sections being remounted in retained areas. This has been included as an additional mitigation measure in Section 5.1.

Microbats: Eastern Bentwing Bat, Yellow-bellied Sheath-tail Bat, Large-footed Myotis, East Coast Freetail-bat

Potential impacts to woodland and forest habitat assessed for these species has reduced from 22 hectares assessed in the BA to 12.25 hectares assessed as a 'worst case' scenario in this addendum. Estimated 'worst case' impacts to hollow-bearing trees have increased marginally to those originally estimated in the BA (from up to 37 to up to 38) although there is further potential to minimise impacts to hollow-bearing trees through micro-siting. An assessment of significance completed in the original BA concluded that:

"Whilst the proposal would reduce potential roosting and foraging habitat for all bat species, the loss of habitat would be offset through an offset plan and impacts to vegetation avoided through micro-siting infrastructure. Potential impacts to the Large Myotis and East Coast Freetail-bat would not be significant"

as these species were recorded in low numbers and are unlikely to be impacted by collision. The Yellow-bellied Sheathtail Bat and Eastern Bentwing Bat could be impacted by turbine collision/barotrauma as they fly in the sweep zone. Yellow-bellied Sheathtail Bat is likely to occur in low numbers and therefore unlikely to be impacted at a population level. Potential impacts to this species are not likely to be significant. Impacts to the Eastern Bentwing Bat could occur as this species was recorded across the site. However, there is no evidence to suggest this species utilises the site heavily for foraging from a known nearby maternity cave. It is therefore unlikely that the proposal would significantly impact on the Eastern Bentwing Bat, however, this species is considered to be a key species and would be monitored as part of the bird and bat monitoring program.”

The conclusions reached in the original assessment are consistent with those assessed in the modified project, although it is acknowledged that (based on advice from OEH) high numbers of Eastern Bentwing-bat calls have been recorded on the site during the migration period. Collision risks to Microbats (in particularly the Eastern Bentwing Bat) are addressed in the BBAMP that has been prepared for the project and the modification report (Section 3.3.4).

4.5 CUMULATIVE IMPACTS

Cumulative impacts resulting from the combined actions that will be required for construction and operation of the Collector Wind Farm are adequately discussed in the original BA.

As discussed in the original BA, cumulative impacts may also result from the operation of a number of wind farms or other large industries that may affect the distribution or use of habitat by species. At the time of writing the BA in 2012, relevant operating wind farms included Crookwell, Capital, Woodlawn and Cullerin. Since then additional wind farms have been constructed and are operational including Gullen Range and Gunning. There is also an increased understanding in the region of potential cumulative impacts from additional studies undertaken since the writing of the BA including migration routes of the Eastern Bentwing-bat and the potential cumulative impacts on raptors and mobile species such as the Superb Parrot.

The two main cumulative impacts identified in the BA are:

- Loss and modification of habitat and;
- Collision and alienation risks

These cumulative impacts are still considered most relevant in the context of ongoing wind farm development in the region.

The Collector Wind Farm project has avoided and minimised direct impacts to flora and fauna habitats through the design and approval processes and its cumulative contribution is considered to be relatively minor in this regard particularly considering that the majority of areas impacted are highly degraded and disturbed.

Additional turbines have been removed from the south and east of the site, which reduces collision risks to bird and bat species utilising the escarpment as a movement corridor from or to Lake George. The vegetation and area south of the project is likely to provide the primary movement corridor for avifauna to the west and south of the site. The project does not occur within these corridors and is considered unlikely to result in avoidance behaviours that would direct avifauna movements towards the other currently operating wind farms in the area.

Monitoring completed as part of the BBAMP in March 2014 identified high numbers of the Eastern Bentwing-bat in the south of the Collector Wind Farm site during the migration period for this species

suggesting that the site may form part of a migratory route for this species. It is not known however, if these migrations across the site are regular and further monitoring will be conducted to confirm this. This may contribute to cumulative impacts with other wind farms in the region.

Raptors and other mobile species such as the Superb Parrot have also been identified as key species at risk from cumulative collision impacts. The BBAMP for the project identified low utilisation of the site by raptors at impact points and concluded that collisions risk to this group of birds was low. Therefore, the contribution of the project to cumulative impacts to raptors is also likely to be low. The Superb Parrot was recorded just to the south of the site during the surveys for the original BA. It was not recorded during surveys for the BBAMP. Further, all of the records for this species from the region in the NSW Wildlife Atlas occur to the west of the site. The site is located on the eastern edge of the core range of this species and based on the survey results from the BA and BBAMP, appears to occur infrequently at the site. It is assessed that any cumulative impacts to the Superb Parrot arising from the project are likely to be minimal.

The BBAMP for the project facilitates the ongoing monitoring of all bird and bat strikes specific to the Collector Wind Farm. Being adaptive, the plan can respond to any changes in the frequency or type of species that are being impacted. Through the BBAMP, collision impacts to avifauna resulting from the project will be minimised and therefore the cumulative contribution to the combined impacts of other wind farms operating in the area will also be minimised.

5 REVISED MITIGATION AND COMPENSATORY MEASURES

5.1 ADDITIONAL MITIGATION MEASURES

A comprehensive list of mitigation measures designed to avoid and minimise impacts to threatened species is provided in Section 7 of the original BA.

The following mitigation measures are in addition to those listed in the original BA.

- Prior to construction targeted surveys for threatened flora species will be undertaken in the areas for the track between WTG_4 and WTG_6 and for the tracks to WTGs_61, 62 and 63. Surveys will be undertaken in Spring (October – November) for:
 - Yass Daisy (*Ammobium craspedioides*)
 - Mauve Burr-daisy (*Calotis glandulosa*)
 - Buttercup Doubletails (*Diuris aequalis*)
 - Hoary Sunray (*Leucochrysum albicans* var. *tricolor*)
 - Button Wrinklewort (*Rutidosis leptorrhynchoides*)
 - Small Purple-pea (*Swainsona recta*)
 - Austral Toadflax (*Thesium australe*)

If threatened flora species are identified in these areas they will be avoided. If avoidance is not possible, impacts will be minimised, and all species specific impacts offset.

- Micrositing will be conducted with an ecologist in attendance to assist in identifying hollow-bearing trees that are to be avoided. This process will also allow for accurate quantification of hollow-bearing trees that cannot be avoided and will be impacted by the development.
- Where practical, hollow-bearing trees or individual hollow-bearing sections (whichever is most suitable or achievable) will be remounted in retained areas. The locations of remounted hollows will be undertaken with the assistance of an ecologist and documented. Remounted hollow trees or sections will be inspected annually to check the adequacy of the mounting. Inadequate mountings would be corrected. Where it is not practical to remount a particular hollow-bearing tree or section, the reason will be documented and included in the environmental reporting for the project.

5.2 REVISED OFFSET STRATEGY

An offset strategy was prepared for the project (NGH Environmental 2012) which identified a potential offset area and appropriate offset ratios and measures to manage the area for preservation and improvement. It was a commitment of the BA to:

- Finalise an offset plan (in accordance with the Draft Principles for the use of Biodiversity Offsets in NSW) based on the final infrastructure design, prior to construction and in consultation with OEH.

The proponents and authors have consulted closely with OEH, and this has resulted in refinement of the offset strategy. Key changes to the strategy are:

- Utilisation of the BioBanking Assessment Methodology (BBAM) to determine the offset requirement for the project and demonstrate the suitability of proposed offsets.
- Quantification of hollow-bearing trees at the proposed offset site to demonstrate a suitable offset is achievable for the loss of hollow-bearing trees as a result of the development.

A revised draft offset strategy has been prepared for the modified project (NGH Environmental 2015). This will form the basis of the required biodiversity offset package for the project once the details of the offset site are negotiated and agreed with the relevant landowners. The offset strategy demonstrates that there are more than adequate local offsets available and achievable for the project.

6 CONCLUSION

This Biodiversity Assessment addendum assesses the potential impacts to biodiversity associated with proposed modifications to the approved Collector Wind Farm development, including:

- Modifications to the proposed road network,
- Modifications to the proposed cable layout
- Changes to the location of the construction and operational compound and substation
- Minor changes with regard to the specific dimensions of the turbines.

Additional studies were undertaken to assess the potential impacts of the modifications. The results of the additional studies were consistent with those of the original BA. One additional threatened species was recorded during the surveys; the Scarlet Robin. No other threatened species or Endangered Ecological Communities (EECs) additional to those identified in the original BA were considered to have the potential to occur at the development site.

The revised impact assessment identified no change to the conclusions of the significant impact assessments completed in the original BA and significant impacts to threatened species and endangered ecological communities are considered unlikely.

It is the recommendation of this addendum that three additional mitigation measure be added to those previously prescribed in the original BA. In summary:

4. It is recommended that targeted surveys for threatened flora species with the potential to occur at the development site be conducted in areas of suitable habitat now proposed to be impacted by the development that were not previously surveyed.
5. Micrositing will be conducted with an ecologist in attendance to assist in identifying hollow-bearing trees that are to be avoided.
6. Where practical, hollow-bearing trees or individual hollow-bearing sections (whichever is most suitable or achievable) will be remounted in retained areas.

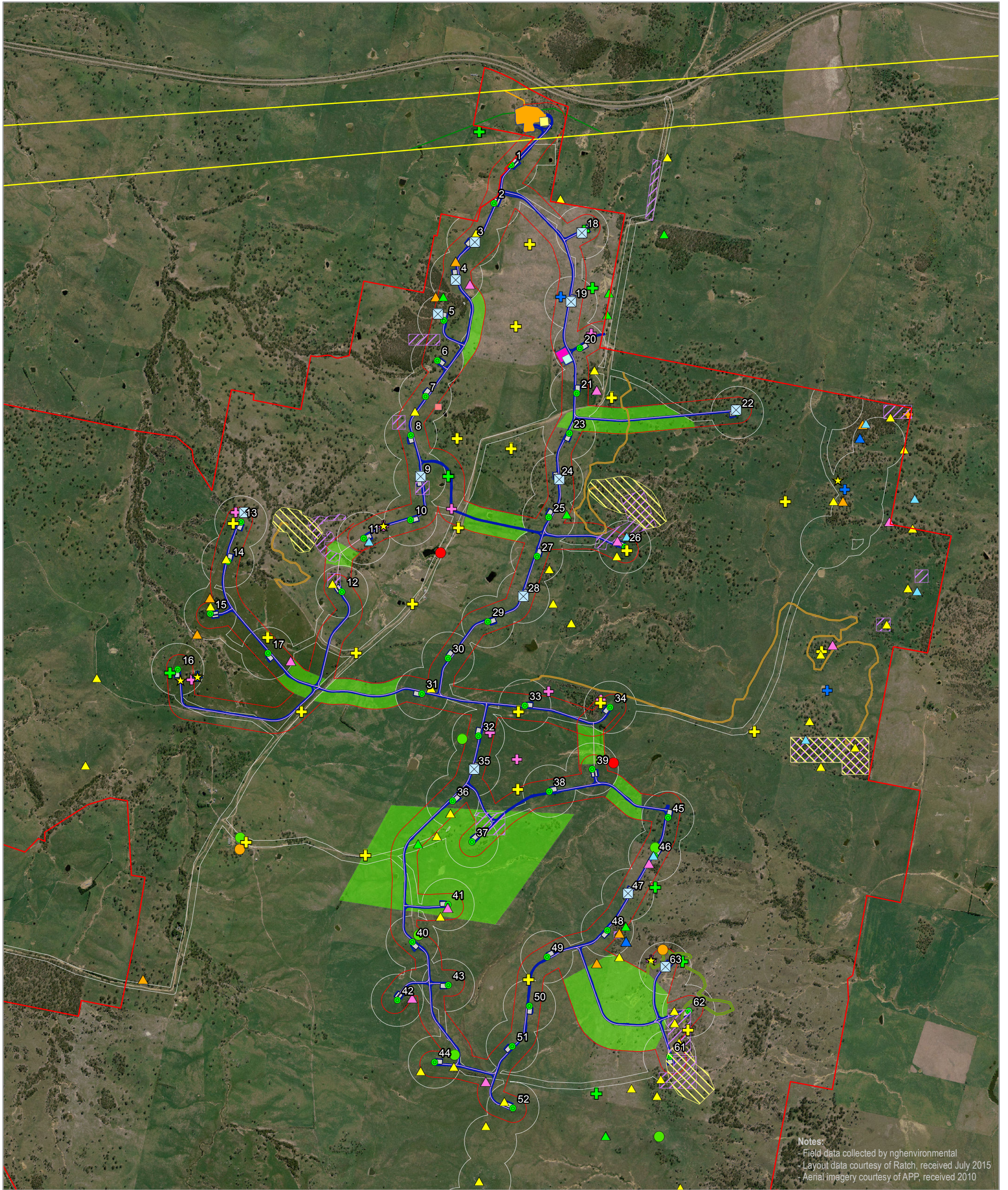
A revised draft offset strategy has been prepared for the project in close consultation with the NSW OEH. This strategy demonstrates that suitable offsets for the modified project are achievable. A detailed biodiversity offset package, including a plan of management (and demonstration that funding for management will be available to manage the site) will be finalised and subject to the approval by the Director General of DoP&E prior to construction commencing.

The offset strategy employs the BioBanking Methodology to determine the quantum of impacts at the development site and the adequacy of the offsets proposed. This approach allows for the recalculation of impacts associated with the modification. It would also allow for offsetting of impacts to native vegetation from any further minor infrastructure changes within the micrositing corridor. Offsets proposed would adequately compensate for the residual impacts of the project.

7 REFERENCES

- Brett Lane and Associates (2014) *Collector Wind Farm – Bird and Bat Adaptive Management Program*. Report prepared for Ratch Australia Pty Ltd, November 2014.
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- Gellie, N. J. H. (2005) *Native vegetation of Southern forests: South-East Highlands, Australian Alps, South-West Slopes & South-East Corner bioregions*, Cunninghamia 9, 219-254.
- NGH Environmental (2012) *Biodiversity Assessment, Collector Wind Farm*. Report prepared for Ratch Australia Corporation May 2012.
- NGH Environmental (2015) *Offset Strategy, Collector Wind Farm*. Report prepared for Ratch Australia Corporation July 2015.
- OEH (2014) *BioBanking Assessment Methodology 2014*. NSW Office of Environment and Heritage, Sydney.
- SEWPaC (2012) *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*. Cwth Department of Sustainability, Environment, Water, Population and Communities.
- Thomas V, Gellie N, Harrison T (2000) *Forest Ecosystem Classification and Mapping for the Southern CRA Region*, report for the NSW CRA/RFA Steering Committee, Project No. NS 08EH. NSW National Parks and Wildlife Service, Queanbeyan.

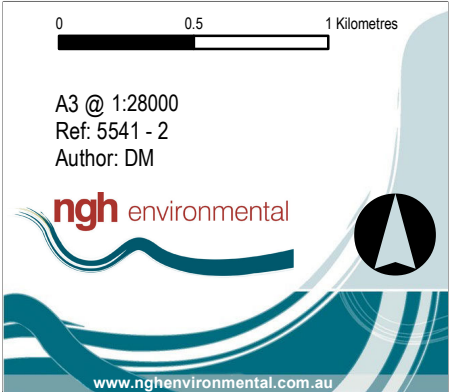
APPENDIX A MAPS

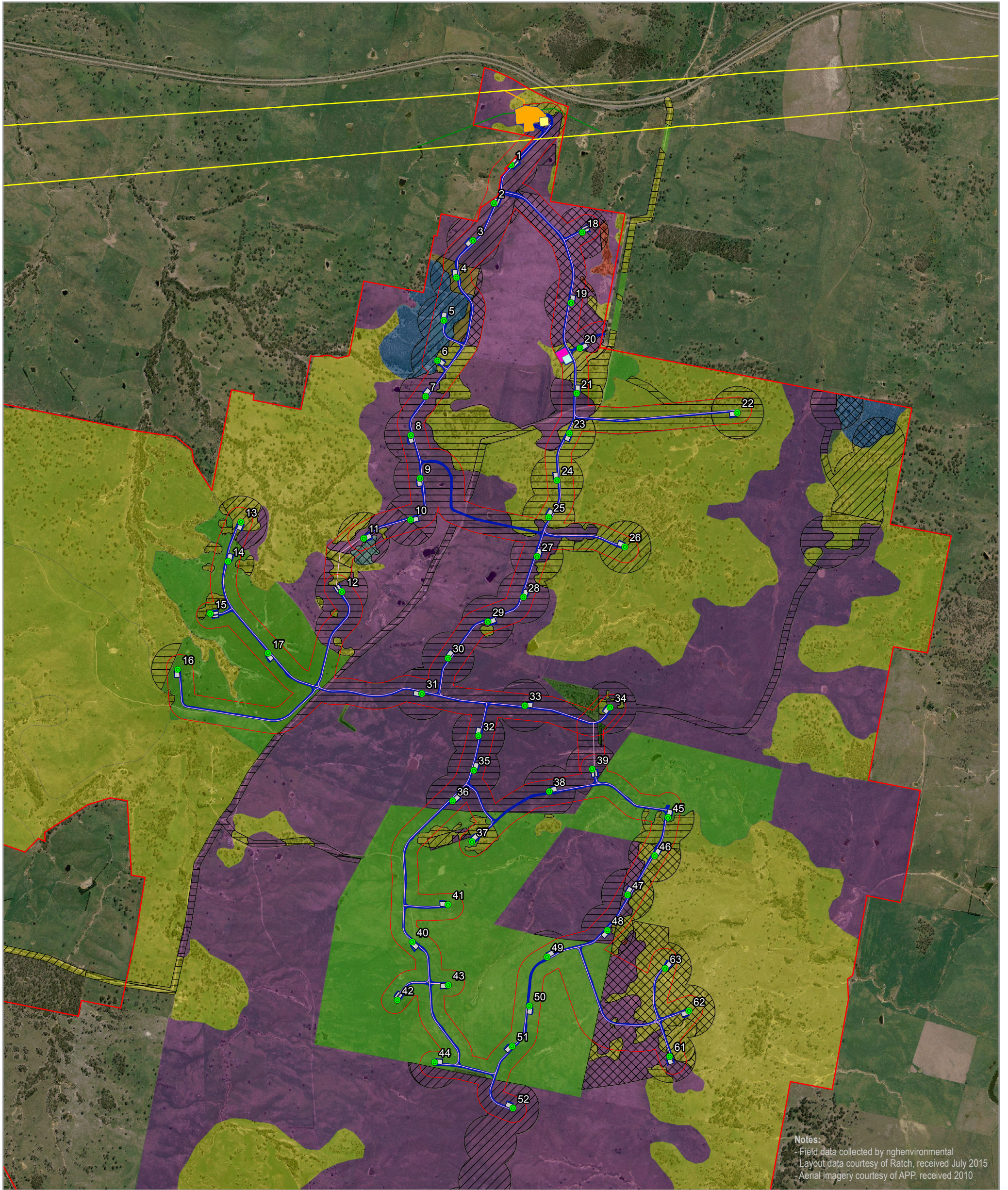


ADDITIONAL AREAS SURVEYED AND PREVIOUS SURVEY EFFORT

Collector Wind Farm BA Addendum

- | | | | | |
|--|--|---|--|--|
| <ul style="list-style-type: none"> Site Boundary Existing transmission lines Original BA assessment area New survey areas 2015 Biometric plots 2014 Proposed infrastructure Turbine locations Micro-siting corridor Cabling trench Road layout | <ul style="list-style-type: none"> New HV line Proposed Cabling Layout Cable trench Turbine hardstands Switching station Transgrid laydown area O&M Compound Temporary construction compound | <p>BA Flora survey effort</p> <p>March 2009</p> <ul style="list-style-type: none"> Quadrat and Random Meander Random meander only Inspection point <p>November 2010</p> <ul style="list-style-type: none"> Inspection point Random meander | <p>BA Fauna survey effort</p> <p>PEI 2009</p> <ul style="list-style-type: none"> AnaBat Bird utilisation survey Habitat evaluation <p>November 2010</p> <ul style="list-style-type: none"> AnaBat Bird survey Habitat assessment Reptile survey | <p>March 2010</p> <ul style="list-style-type: none"> Bird survey Frog listen Reptile search Diurnal quadrats HBT quadrats Nocturnal quadrats Grassland reptile transect Vehicle spotlight transect |
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UPDATED VEGETATION TYPE AND CONDITION MAPPING

Collector Wind Farm BA Addendum

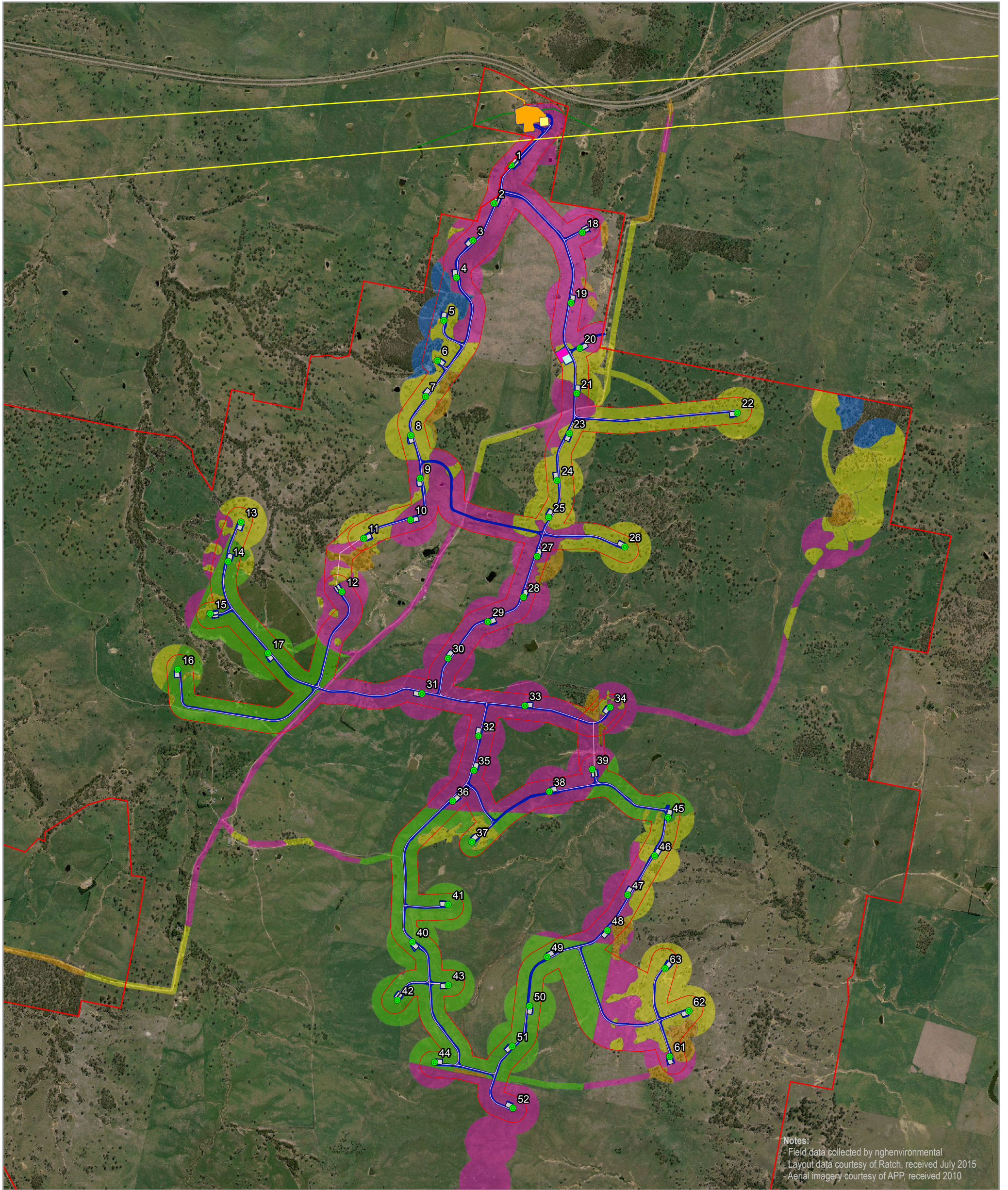
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| <ul style="list-style-type: none"> Site Boundary Existing transmission lines Proposed infrastructure Turbine locations Micrositing corridor Cabling trench Road layout | <ul style="list-style-type: none"> New HV line Coms cable trench Turbine hardstands Switching station Transgrid laydown area O&M Compound Temporary construction compound | <p>Vegetation type</p> <ul style="list-style-type: none"> Box-Gum Woodland (tree cover) Box-Gum Woodland Secondary Grassland Brittle Gum - Broad Leaved Peppermint Dry Forest Snow Gum Grassy Woodland White Gum Forest Exotic dominated pasture Native dominated pasture Planted non local vegetation | <p>Vegetation condition</p> <ul style="list-style-type: none"> Good Moderate Poor |
|---|--|--|--|

0 0.5 1 Kilometres

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 Author: DM

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UPDATED FAUNA HABITAT MAPPING

Collector Wind Farm BA Addendum

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> Site Boundary Existing transmission lines Proposed infrastructure Turbine locations Micrositing corridor Cabling trench Road layout | <ul style="list-style-type: none"> New HV line Coms cable trench Turbine hardstands Switching station Transgrid laydown area O&M Compound Temporary construction compound | <ul style="list-style-type: none"> Habitat Exotic pasture Forest Native pasture Pasture with scattered trees Woodland |
|---|--|---|

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 Author: DM

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APPENDIX B THREATENED SPECIES HABITAT EVALUATION

The tables in this attachment present the habitat evaluation for additional threatened species, ecological communities and endangered populations (compared to the searches conducted for the original BA for the project) listed in the Atlas of NSW Wildlife² from the searches for the Murrumbidgee CMA region Monaro and Murrumbateman sub-regions and the Lachlan CMA region Crookwell and Murrumbateman sub-regions and the Commonwealth EPBC *Protected Matters Search Tool*³ for a radius of 10km around the site.

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

- Present: Potential or known habitat is present within the study area.
- Marginal: Habitat present within the study area is not typical for this species but contains elements that may be suitable as potential habitat.
- Absent: No potential or known habitat is present within the study area.

Likelihood of occurrence

- None: No habitat is present for this species within the study area.
- Unlikely: Habitat present. Species known or predicted within the locality but unlikely to occur in the study area based on the proximity of nearest records.
- Possible: Habitat present. Species could occur in the study area based on the proximity of nearest records.
- Present: Species was recorded during the field investigations.

Possible to be impacted

- No: The proposal would not impact this species or its habitats. No Assessment of Significance (AoS) is necessary for this species.
- Low: The proposal has a low probability of impacting this species, due to a low probability of its occurrence on the site, or an abundance of suitable habitat in the vicinity and a mobile species capable of avoiding impacts. No AoS has been applied to these species.
- Moderate: The proposal could impact this species or its habitats. An AoS has been applied to these entities.
- High: The proposal is likely to impact this species or its habitats. An AoS has been applied to these entities.

² The *Atlas of NSW Wildlife* is administered by the NSW Office of Environment and Heritage (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

³ This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Species	Description of habitat ⁴	Presence of habitat	Likelihood of occurrence	Possible impact?
FLORA				
<i>Bossiaea fragrans</i> CE – TSC	An erect shrub that grows to 1-2.5m high. Currently only known from the Abercrombie Karst Conservation Reserve, south of Bathurst on the NSW central tablelands. It is highly restricted with only two known populations. Occurs on slate and volcanic substrates within open White Box (<i>Eucalyptus albens</i>) Woodland.	Marginal	Unlikely (nearest records over 100km north)	No
<i>Dillwynia tenuifolia</i> V – TSC V – EPBC	A low spreading pea-flower shrub to a metre high. The core distribution is the Cumberland Plain from Windsor to Penrith east to Deans Park. This species may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. At Yengo, is reported to occur in disturbed escarpment woodland on Narrabeen sandstone.	Absent	None	No

⁴ Information sourced from species profiles on NSW DECCW's threatened species database or the Australian Government's Species Profiles and Threats database (SPRAT) unless otherwise stated.

DECCW threatened species database: <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>

SPRAT: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Species	Description of habitat ⁴	Presence of habitat	Likelihood of occurrence	Possible impact?
Small Snake Orchid <i>Diuris pedunculata</i> E – TSC E - EPBC	Originally found scattered from Tenterfield south to the Hawkesbury River, but is now mainly found on the New England Tablelands, around Armidale, Uralla, Guyra and Ebor. The Small Snake Orchid grows on grassy slopes or flats. It prefers moist areas, and has been found growing in open areas of dry sclerophyll forests with grassy understoreys, in riparian forests (including gallery rainforests), swamp forests, in sub-alpine grasslands and herbfields. The species is not often found in dense forests or heavily shrubby areas. Soils are well-structured red-brown clay loams and stony loams, though occasionally the Small Snake-orchid has been found in peaty soils in seasonally moist areas, from shale, and fine granite. The altitude range known for the species is 50–900 m.	Marginal	Unlikely (nearest records over 50km south)	No
Omeo Stork's bill <i>Pelargonium</i> sp. <i>Striatellum</i> (G.W. Carr 10345) E - EPBC	Currently known to occur at four localities in the Southern Tablelands, at altitudes ranging from 680-1030m a.s.l.: Lake Bathurst near Goulburn, on grazing leasehold; two sites (one probably extinct) on private grazing properties south-west of Cooma; and at Maffra Lake near Dalgety in a fenced Travelling Stock Reserve assessed as having high conservation values. A terrestrial plant with a narrow habitat just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the paludal and aquatic communities. It colonises exposed lake beds during dry periods.	Absent	None	No
A leek-orchid <i>Prasophyllum</i> sp. <i>Wybong</i> (C.Phelps ORG 5269) CE - EPBC	A perennial orchid, appearing as a single leaf over winter and spring. The species flowers in spring and dies back to a tuber over summer and autumn. Leek orchids are generally found in shrubby and grassy habitats in dry to wet soil. <i>Prasophyllum</i> sp. <i>Wybong</i> (C. Phelps ORG 5269) is known to occur in open eucalypt woodland and grassland.	Present	Unlikely (only known population over 200km north)	No

Species	Description of habitat ⁴	Presence of habitat	Likelihood of occurrence	Possible impact?
Large-fruit Fireweed <i>Senecio macrocarpus</i> V - EPBC	The Large-fruit Groundsel occurs in a variety of habitats, including grasslands, sedgeland, shrublands and woodlands, generally on sparsely vegetated sites on sandy loam to heavy clay soils, often in depressions that are waterlogged in winter.	Present	Unlikely (not recorded in NSW)	No
EEC				
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions E - TSC	Tall woodland or open forest dominated by Fuzzy Box <i>Eucalyptus conica</i> , often with Grey Box <i>Eucalyptus microcarpa</i> , Yellow Box <i>Eucalyptus melliodora</i> , or Kurrajong <i>Brachychiton populneus</i> . Buloke <i>Allocasuarina luehmannii</i> is common in places. Shrubs are generally sparse, and the groundcover moderately dense, although this will vary with season. Found on alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly found in the Dubbo-Narromine-Parkes-Forbes area. Community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes. Community often occurs upslope from River Red Gum communities above frequently inundated areas of the floodplain. It also occurs on colluvium soils on lower slopes and valley flats	Absent	None	No
FAUNA				
Aves				
Black Falcon <i>Falco subniger</i> V - TSC	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population. Occurs on plains, foothills, timbered watercourses, wetlands, agricultural lands and occasionally over towns and cities.	Present	Possible although not recorded within 30km	Low. Not recorded in the locality. No breeding habitat identified and highly mobile species.

Species	Description of habitat ⁴	Presence of habitat	Likelihood of occurrence	Possible impact?
Major Mitchell's Cockatoo <i>Lophochroa leadbeateri</i> V - TSC	Found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and about Jurien. In NSW it is found regularly as far east as about Bourke and Griffith, and sporadically further east than that. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Normally found in pairs or small groups, though flocks of hundreds may be found where food is abundant. Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least 1 km apart, with no more than one pair every 30 square kilometres.	Absent	Unlikely	No
Black-faced Monarch <i>Monarcha melanopsis</i> M - EPBC	The Black-faced Monarch is found along the coast of eastern Australia, becoming less common further south. The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. Resident in the north of its range, but is a summer breeding migrant to coastal south-eastern Australia, arriving in September and returning northwards in March. The Black-faced Monarch forages for insects among foliage, or catches flying insects on the wing. The Black-faced Monarch builds a deep cup nest of casuarina needles, bark, roots, moss and spider web in the fork of a tree, about 3 m to 6 m above the ground. Only the female builds the nest, but both sexes incubate the eggs and feed the young.	Marginal	Possible (may pass through on migration)	Low. Not breeding habitat and highly mobile species.

Species	Description of habitat ⁴	Presence of habitat	Likelihood of occurrence	Possible impact?
Eastern Osprey <i>Pandion cristatus</i> M - EPBC	The Osprey has a global distribution. In Australia they are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	Absent	Unlikely	No
Rufous Fantail <i>Rhipidura rufifrons</i> M - EPBC	The Rufous Fantail occurs in coastal and near coastal districts of northern and eastern Australia. Mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (<i>Eucalyptus microcorys</i>), Mountain Grey Gum (<i>E. cypellocarpa</i>), Narrow-leaved Peppermint (<i>E. radiata</i>), Mountain Ash (<i>E. regnans</i>), Alpine Ash (<i>E. delegatensis</i>), Blackbutt (<i>E. pilularis</i>) or Red Mahogany (<i>E. resinifera</i>); usually with a dense shrubby understorey often including ferns.	Absent	None	No
Australian Painted Snipe <i>Rostratula australis</i> E – TSC E, M - EPBC	Feed in shallow water or at the waters' edge and on mudflats, taking seeds and invertebrates such as insects, worms, molluscs and crustaceans. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on the ground amongst tall vegetation, such as grass tussocks or reeds. Forages nocturnally on mud flats and in shallow water.	Absent	Unlikely	Low

Species	Description of habitat ⁴	Presence of habitat	Likelihood of occurrence	Possible impact?
Eastern Grass Owl <i>Tyto longimembris</i> V - TSC	Eastern Grass Owls have been recorded occasionally in all mainland states of Australia but are most common in northern and north-eastern Australia. Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. They rest by day in a 'form' - a trampled platform in a large tussock or other heavy vegetative growth. Always breeds on the ground. Nests are found in trodden grass, and often accessed by tunnels through vegetation.	Present	Unlikely (only one record in the region approximately 30km west of the site from 1982)	Low
Amphibians				
Giant Burrowing Frog <i>Heleioporus australiacus</i> V – TSC V - EPBC	The Giant Burrowing Frog occurs from the NSW Central Coast to eastern Victoria, but is most common on the Sydney sandstone. It has been found from the coast to the Great Dividing Range. Found in heath, woodland and open forest with sandy soils. Generally lives in the heath or forest and will travel several hundred metres to creeks to breed. Burrows into deep litter or loose soil, emerging to feed or breed after rain. Diet includes ground-dwelling invertebrates such as ants, beetles and spiders. Breeds from August to March and the eggs are laid in a white foam-mass under vegetation in creeks or in yabby holes.	Absent	Unlikely	Low

APPENDIX C TARGETED GOLDEN SUN MOTH SURVEY REPORT



23 September 2015

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Dear Neil,

COLLECTOR WIND FARM – GOLDEN SUN MOTH SURVEY (SUMMER 2014)

This letter represents our report on the recently completed survey targeting the Golden Sun Moth (GSM) at Collector. Included with this letter are details of our method and results together with photographs taken during the survey.

In summary, four days of survey effort was successfully completed during which no GSMs were observed in the Box-Gum Woodland Secondary Grassland. It should be noted that the timing of the survey was appropriate given that flying male GSMs were detected in the region during the period of survey.

Yours sincerely,

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Director

COLLECTOR WIND FARM – GOLDEN SUN MOTH SURVEY (SUMMER 2014)

INTRODUCTION

During late December 2014 and early January 2015, a survey targeting the Golden Sun Moth (GSM) was undertaken across areas with the Collector Wind Farm that had previously been identified by NGH Environmental as being Box-Gum Woodland Secondary Grassland (see attached map). This survey was undertaken by a suitably qualified person namely, Richard Sharp, FEIANZ, CEnvP. The purpose of this survey was to attempt to detect the presence of flying males on the site in locations associated with proposed turbine sites. If at any time during the survey flying males were detected, then the survey effort would shift to the location identified as the proposed offset area.

SURVEY METHOD

To maximise the chance of detecting flying males, each of the areas of the Box-Gum Woodland Secondary Grassland was traversed on foot on days when weather conditions¹ were optimal for detecting flying males. Such conditions are as follows:

- Warm to hot day (above 20°C)
- Clear or mostly cloudless sky (<3/8)
- No wind or relatively light winds (< 10km/h)
- At least 2 days since the last 1.0mm or greater rainfall event²

On each day during the survey, these weather conditions were monitored every 30 minutes and this information was used to determine when to terminate the survey effort on each day. Both air temperature and wind speed were obtained on site by using a hand held Kestrel weather meter.

During the survey, any observations of other diurnal moth or butterfly activities were noted and attempts were also made to find any pupal casings or larvae on areas of bare ground. Where possible, photos were taken and are attached to this letter report. When traversing across the Box-Gum Woodland Secondary Grassland, particular attention was made of the nearest turbine location marker.

During the survey period we liaised with the local Golden Sun Moth email notification group, that consists of an informal group of researchers, consultants and government agency representatives concerning GSM observations, to assess if moths were active during our survey periods within the region. Notifications were sent out stating that moths were active in the ACT on the 7th and 8th of January 2015. Further, advice received from OEH in the form of an email, identified that GSM's were active in early December, and while rain had reduced their activity in early December, that the week starting 15 December was likely to be suitable for survey. This would be dependent on suitable weather and environmental conditions.

The locations of the surveys are shown on the attached map.

¹ Australian Government – Department of the Environment, Water, Heritage and the Arts, Significant impact guidelines for the critically endangered golden sun moth (*Synemon plana*), Nationally threatened species and ecological communities EPBC Act policy statement 3.12

² Based on observations from Goulburn Airport, but some from Goulburn TAFE <http://www.bom.gov.au/climate/dwo/201412/html/IDCJDW2049.201412.shtml>

SURVEY RESULTS

Nearest Turbine	Time 2400 hrs	Air Temperature °C	Cloud Cover #/8	Average Wind Speed km/h	Site Observations
15 December 2014 (2 days since last rainfall event)					
T18, T19	1030	25	0/8	2.9	Brown butterflies active
T20, T04	1100	24	1/8	4.6	Skippers active (see Photo #1)
T03, T02	1130	22	1/8	2.2	Brown butterflies active
T9, T10	1200	24	1/8	6.3	Browns & small blue butterflies active
T11	1230	30	0/8	2.1	Brown butterflies active
T14	1300	26	1/8	3.4	Browns & small blue butterflies active
T13	1330	26	2/8	8.6	No activity
T44	1400	31	2/8	2.6	Brown butterflies active
T52	1430	26	3/8	3.0	Brown butterflies active (see Photo #2)
18 December 2014 (5 days since last rainfall event)					
T18, T19, T20	1030	26	1/8	2.2	No activity
T03, T02	1100	24	1/8	4.6	No activity
T01	1130	22	1/8	2.2	No activity
T09, T10	1200	24	1/8	6.3	Brown & small blue butterflies active (see Photo #3 & Photo #4)
T14	1230	24	1/8	5.4	No activity
T13	1300	25	1/8	5.9	Brown & small blue butterflies active
T44	1330	26	1/8	8.2	No activity
7 January 2015 (2 days since last rainfall event)					
T18	1130	24	1/8	1.7	Brown butterflies active (see Photo #5)
T19, T20	1200	29	1/8	1.8	Brown butterflies active
T10	1230	33	1/8	0.0	No activity
T14	1300	26	1/8	7.2	No activity
T13	1330	29	2/8	3.7	No activity
T42	1400	30	2/8	0.0	Brown butterflies active
T52	1430	31	4/8	2.6	White butterflies active
8 January 2015 (3 days since last rainfall event)					
T18, T19	1130	26	1/8	5.2	White butterflies active
T02, T01	1200	30	1/8	5.7	No activity
T09	1230	33	2/8	2.0	Caterpillars active (see Photo #6)
T10	1300	30	3/8	3.2	No activity
T42	1330	29	3/8	5.2	No activity
T52	1400	33	5/8	6.6	No activity
T51	1430	27	6/8	5.7	No activity

Habitats sampled

Biometric plot data collected in the vicinity of the areas sampled is presented below. All Biometric plots are within the Biometric vegetation type LA 120 - Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion.

Survey area (nearest turbines)	Nearest plot	Native Spp. #	Native cover				Native ground cover						Exotic plant cover	HBTs	Logs (m)
			Overstorey		Midstorey		Grasses		Shrubs		Other				
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max			
	Benchmark	23	8%	35%	1%	20%	15%	70%	3%	5%	3%	20%	0%	0.8	66
T18, T19, T20	DE1	27	0		0		64		0		10		18	0	0
	DE12	30	0		0		72		0		6		34	0	9
T3, T2, T1	DE13	17	0		0		66		0		4		18	0	0
T9, T10, T11	DE5	6	0		0		62		0		0		60	0	0
T13, T14	DE4	38	10		0		20		0		6		70	0	21.5

As the majority of the plots are in derived grassland, the overstorey and midstorey is generally absent. Most of the plots indicate a good native species diversity and cover of native grasses.

Native species of Wallaby Grass and the exotic Chilean Needle Grass are species favoured by the GSM. Areas supporting higher relative abundance of these species were targeted for the surveys. Comments with respect to the habitat values in the areas surveyed are provided below based on the data collected for each Biometric plot.

Survey area (nearest turbines)	Nearest plot	GSM habitat comments
T18, T19, T20	DE1	Three species of Wallaby Grass were recorded in this plot. Kangaroo Grass was dominant however, Wallaby Grass species comprised the next most dominant component. No Chilean Needle Grass was recorded.
	DE12	Two species of Wallaby Grass recorded in this plot, co-dominant with various other native grass species. No Chilean Needle Grass was recorded.
T3, T2, T1	DE13	Two species of Wallaby Grass were recorded within the plot and formed approximately 50% of the native grass component. No Chilean Needle Grass was recorded.
T9, T10, T11	DE5	One species of Wallaby Grass recorded in this plot with the Wallaby Grass comprising approximately 50% of the native ground cover. No Chilean Needle Grass was recorded.
T13, T14	DE4	Two species of Wallaby Grass were recorded within the plot in relatively low abundance however, Chilean Needle Grass was common throughout

DISCUSSION

The current known distribution of the Golden Sun Moth occupies an area bounded by Queanbeyan, Gunning, Young and Tumut. The nearest records for this species are approximately 16km south-west of the development site near Gundaroo and these records mark the edge of the known current distribution.

During the survey no GSMs were observed. Further, it is considered that the survey method and effort undertaken meets the minimum requirements for this threatened invertebrate species in that at least four days of survey time was expended. During each day of the survey period, butterflies were observed on the site which suggested that the weather conditions are also suitable for the GSM. Although there are no known GSM reference sites close to the proposed Collector Wind Farm and the local flying season for the GSM varies annually and geographically, personnel communication with other environmental scientists in the region in early January did confirm that male GSMs were still flying in grassland areas in the Canberra area

throughout the period of this survey. For instance, on the 7 January 2015 the GSM was observed flying in York Park which is a long-standing reference site in the Australian Capital Territory. On the 8 January 2015, the GSM were observed flying over an area of native grasses and Chilean Needle Grass at the Canberra airport.

CONCLUSION

In conclusion, four days of survey effort was successfully completed across much of the Box-Gum Woodland Secondary Grassland which occurs on the site of the proposed Collector Wind Farm. While it cannot be conclusively stated that GSM is not present on the site, given the lack of the species being recorded when the species was known to be active in the region, combined with a lack of records of this species in the local area (the closest record being 16 kilometres south-west of the site), the potential for occurrence of the Golden Sun Moth is low. On this basis additional survey is not warranted.

PHOTOGRAPHS

Photo #1



Photo #2



Photo #3



Photo #4



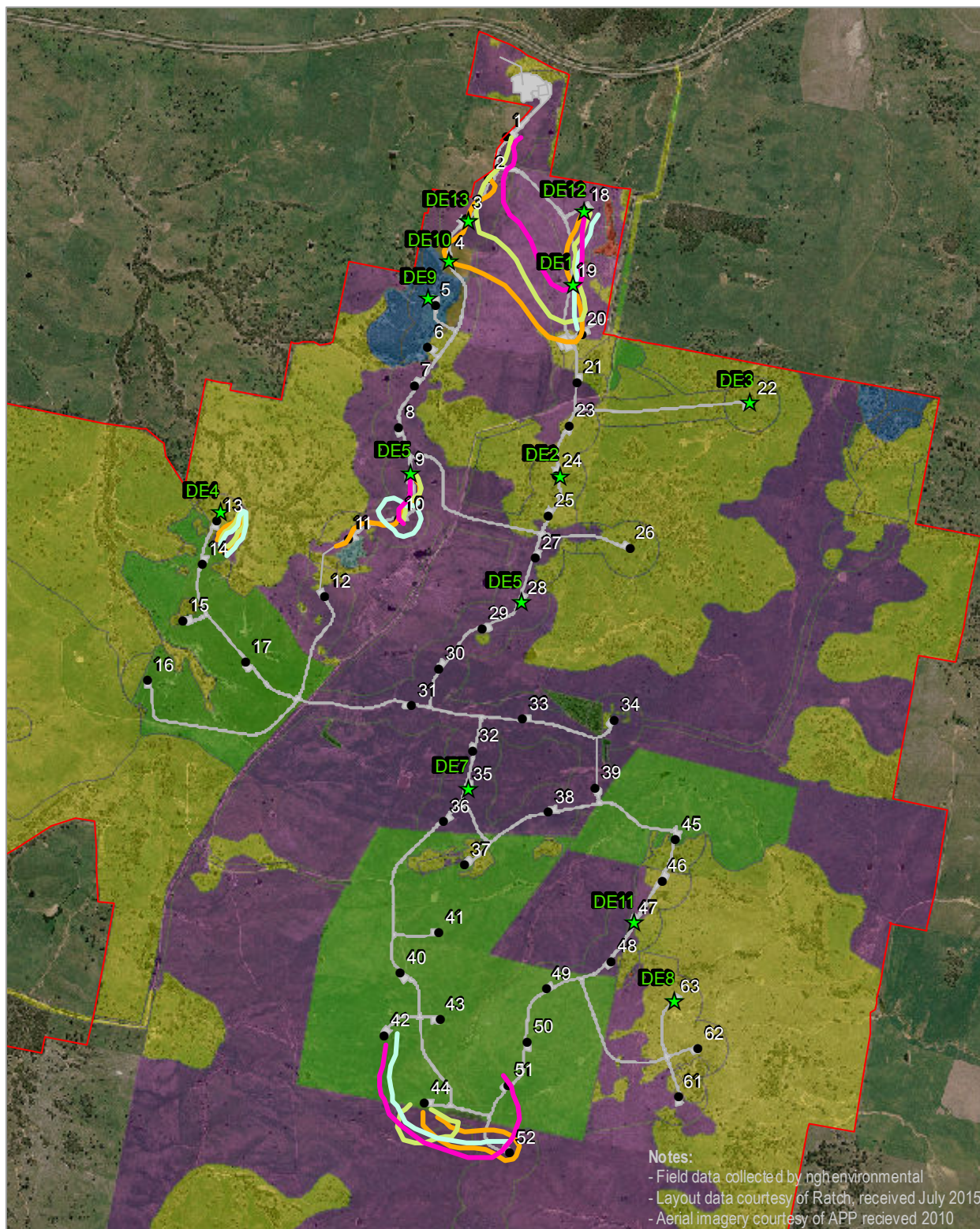
Photo #5



Photo #6



MAPS



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| <ul style="list-style-type: none"> □ Site Boundary ● Approved turbine locations ■ Development footprint ★ Biometric plot GSM survey transects — 15 Dec 2014 — 18 Dec 2014 — 7 Jan 2015 — 8 Jan 2015 | <ul style="list-style-type: none"> Vegetation type ■ Box-Gum Woodland (tree cover) ■ Box-Gum Woodland Secondary Grassland ■ Brittle Gum - Broad Leaved Peppermint Dry Forest ■ Snow Gum Grassy Woodland ■ White Gum Forest ■ Exotic dominated pasture ■ Native dominated pasture ■ Planted non local vegetation |
|--|--|

0 0.25 0.5 1 Kilometres

Ref: 5541 - 4
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