

COPPABELLA
Wind Farm

Modification Application Environmental Assessment Report

COPPABELLA (FORMERLY YASS VALLEY) WIND FARM

SSD-6698



SEPTEMBER 2017



Document Verification



Project Title: Coppabella (formerly Yass Valley) Wind Farm Modification Application Environmental Assessment Report

Project Number: 16-440

Project File Name: Coppabella WF Mod Report_Final v2 010917

Revision	Date	Prepared by (name)	Reviewed by (name)	Approved by (name)
Draft v1	7/04/177/ 04/17	Alana Gordijn Jane Blomfield Dave Maynard	Brooke Marshall	Brooke Marshall
Draft v2	9/06/179/ 06/17	Alana Gordijn Jane Blomfield Dave Maynard Brooke Marshall	Brooke Marshall	Nick Graham-Higgs
Draft v3	14/07/17	Alana Gordijn	Brooke Marshall	Brooke Marshall
Draft v4	26/07/17	Alana Gordijn	Brooke Marshall	Brooke Marshall
Final v1	1/08/17	Alana Gordijn	Brooke Marshall	Brooke Marshall
Final v2	01/09/17	Brooke Marshall	Alana Gordijn Marilyn Purton	Brooke Marshall

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ACRONYMS AND ABBREVIATIONS

AAAA	Aerial Agricultural Association Australia
ACHA	Aboriginal Cultural Heritage Assessment
ACMA	Australian Communications and Media Authority
AFAC	Australasian Fire and Emergency Services Council
AGL	Above Ground Level
AHMP	Aboriginal Heritage Management Plan
AHD	Australian Height Datum
AMSL	Above Mean Sea Level
ASA	Airservices Australia
BA	Biodiversity Assessment
BoM	Bureau of Meteorology
CASA	Civil Aviation Safety Authority
CCC	Community Consultative Committee
CEMP	Construction Environmental Management Plan
CWF	Coppabella Wind Farm
CWFPL	Coppabella Wind Farm Pty Ltd
DoEE	Department of the Environment and Energy (Commonwealth)
DPE	Department of Planning and Environment (NSW)
EA	Environmental Assessment
EEC	Endangered Ecological Community
EMF	Electro-magnetic Field
EP&A	Environmental Planning and Assessment Act 1979
EPA	Environment Protection Authority (NSW)
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
HBT	Hollow-bearing Tree
HMP	Heritage Management Plan
LSALT	Lowest Safe Altitude
MOC	Minimum Obstacle Clearance
MSA	Minimum Safe Altitude
NHMRC	National Health and Medical Research Council
OEMP	Operational Environmental Management Plan
OOHW	Out of Hours Work Protocol

PAC	Planning and Assessment Commission
PFM	Planning Focus Meeting
PPA	Power Purchase Agreement
PPSR	Preferred Project and Submissions Report
RFDS	Royal Flying Doctor Service
RFS	Rural fire service
SSD	State Significant Development
TSC Act	Threatened Species Conservation Act 1995 (NSW)
UHF	Ultra high frequency
UTM	Universal Transverse Mercator
VHF	Very high frequency
VFR	Visual Flight Rules
VIA	Visual Impact Assessment
YVWFPL	Yass Valley Wind Farm Pty Ltd

EXECUTIVE SUMMARY

BACKGROUND TO THE DEVELOPMENT CONSENT

Epuron initially submitted a project application MP08_0246, on 02 December 2008, for three wind farm precincts and up to 200 wind turbines. The precincts included Coppabella, Marilba and Carroll's Ridge precincts; together named the Yass Valley Wind Farm project.

A revised application was subsequently submitted which reflected a reduced number of precincts and turbines including a 330kV Connection Precinct. The revised application was determined by the NSW Planning and Assessment Commission (PAC) on 30 March 2016 (State Significant Development SSD-6698).

The Development Consent granted in March 2016 relates to the Coppabella Precinct only, which is the western half of the original Yass Valley Wind Farm project (Coppabella Precinct) and allows only 79 of the 124 proposed turbines that were proposed for the Preferred Project. It excludes the 330kV grid connection precinct, and therefore requires that the project is connected at 132kV to the north of the wind farm.

PURPOSE OF THE COPPABELLA WIND FARM MODIFICATION REPORT

This report has been prepared to support an application to modify Development Consent SSD-6698 (Modification Application) for the Coppabella Wind Farm (CWF) (previously known as the Yass Valley Wind Farm). This Report provides context and detailed assessment to support the modification application.

This Modification Application is being lodged under Section 96(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The proposed modified development remains substantially the same development for which development consent was obtained on 30 March 2016. In particular, no new turbines are proposed as part of this modification and the grid connection arrangement and site access are essentially the same. The conditions of consent are still mostly applicable but some variations are sought.

The Modification Application has been prepared in the context of consultation with involved landowners and the local community.

MODIFICATIONS BEING SOUGHT

The key modifications sought to the Development Consent include:

- Increasing the vegetation clearing limit to address changes to the civil design footprint having regard to the steep and challenging terrain (as well as required clearing for the 132kV connection and a larger turbine model);
- The installation of a larger turbine model with an overall tip height of approximately 171 metres and blade length of approximately 70 metres;
- Minor changes to the location of ancillary infrastructure including additional temporary facilities to improve constructability and workforce safety;
- Minor clarifications to the project description. These include:
 - Reuse of excavated material onsite;
 - Upgrade of a 2km section of Coppabella Road and use of Coppabella Road for standard vehicles (not over mass or over dimensional vehicles).
 - The project would be developed in stages.

- o The project would require subdivision of land (within the consented project boundaries).

JUSTIFICATION FOR THE MODIFICATION

The proposed modifications to the Development Consent are required to deliver an efficient, constructible and commercially viable project utilising current wind farm technology while minimising impacts to the extent practically and reasonably feasible.

The changes proposed reflect technological improvements in the wind farm industry, improved site knowledge and understanding of the construction process following detailed design, additional site investigations and pre-construction planning.

The key benefits of the modifications to the project will be:

- An improved design that realistically reflects the construction requirements;
- A more efficient development, reflected in enhanced viability over the operational life of the project; and
- Reduced cost of renewable energy power generation.

IMPACT ASSESSMENT AND MANAGEMENT

The modification would result in some specific changes to the level of impacts assessed for the approved project. A process to identify these changes involved the following components:

- Review of the environmental impacts considered for the approved project.
- Identification of areas where the modifications could result in new or increased impacts.
- Identification of any modifications that could result in inconsistency with existing consent conditions.

Specialist investigations were then undertaken and included:

- Additional assessments of new or increased impacts, specific to the modification.
- Review of options to avoid or reduce new or increased impacts of the modification.
- Identification of appropriate mitigation measures to address new or increased impacts of the modification.
- Consultation with relevant agencies and/or the community as applicable to the potential impacts.

Ten environmental issues were identified on this basis as requiring additional investigation:

1. Visual impacts
2. Shadow flicker
3. Noise impacts
4. Biodiversity – impacts to native vegetation
5. Biodiversity – bird and bat collision risks
6. Biodiversity - offsets
7. Indigenous heritage impacts
8. Telecommunications impacts
9. Traffic and transport impacts
10. Aviation hazard impacts

The results can be summarised in terms of whether the additional impacts were substantive enough to warrant changes to the consented mitigation strategies or consent conditions.

No change to mitigation strategies or consent conditions required

Six of the ten environmental issues investigated by specialists concluded marginal additional impacts would occur as a consequence of the proposed modifications and that the management strategies would remain in accordance with the consented project. No changes to the consent conditions are required in relation to these six issues:

Visual impacts

The increased turbine size would be discernible for some surrounding view locations. This would be limited to up to eight turbines. This relates only to blade tips. No additional turbine hubs would be visible. The magnitude of the increase would not be significant. The implementation of landscape works for a number of dwellings would provide mitigation, in accordance with existing consent conditions. No changes to the consent conditions are required.

Shadow flicker

The increased turbine size would not result in any receivers exceeding the allowable exposure of 30 hours of shadow flicker per year. Mitigation of impacts will be in accordance with the approved project's mitigation strategy. No changes to the consent conditions are required.

Biodiversity – bird and bat collision risks

The increased turbine size would result in negligible additional risk to birds and is unlikely to increase effects on bats during operation. Existing mitigation strategies (bird and bat management plan including removal of prey and carcasses) are appropriate to mitigate the impact. No changes to the consent conditions are required.

Indigenous heritage impacts

The heritage impacts of the modified project are less compared to the approved project. The mitigation strategies proposed as part of the approved project are adequate and are addressed in an updated Aboriginal Heritage Management Plan. No changes to the consent conditions are required.

Telecommunications impacts

Modelling the increased turbine size has resulted in one additional wind turbine (7 wind turbines in all) impacting on existing point to point links compared to the original. The mitigation strategies proposed as part of the approved project are adequate to address the additional impact. No changes to the consent conditions are required.

Traffic and transport impacts

The increased turbine size and associated dimensions of transport vehicles has been taken into account by the civil design for access from the Hume Highway and, access tracks within the project area. Mitigation strategies proposed remain in accordance with the approved project. No changes to the consent conditions are required.

Minor change to mitigation strategy required

One environmental issue (aviation hazard) concluded marginal additional impacts would occur as a consequence of the proposed modifications and that an update to the management strategy was warranted. No changes to the consent conditions are required.

Aviation hazard impacts

An additional impact, due to larger turbines has been identified, where the modified Turbine 9 may slightly impact an obstacle limitation surface by 4.6m. It is anticipated that this minor impact can be addressed through micro-siting and/or detail design that results in lowering of the wind turbine relative to the obstacle limitation surface. Should this issue not be resolved by the above means then further consultation with Airservices Australia may be required to seek a marginal increase in the height of the surface in proximity of the wind farm. Consultation is in progress based on the assessment. The identified impact does not require any change to consent conditions.

Minor change to consent conditions required

One environmental issue (operational noise) concluded marginal additional impacts would occur as a consequence of the proposed modifications. As separate issues, updates to the construction noise and operational noise consent conditions was considered warranted.

Noise impacts

Operational noise modelling for the increased turbine size shows all neighbouring receivers except for one (C04) would be compliant when assessing against conservatively assumed base criteria. In relation to C04, further assessment is warranted to assess compliance and consultation is underway regarding a neighbour agreement. Should further mitigations be required, then several solutions have been assessed to result in compliance against the conservative base criteria and these could be applied. Further to this, a change to consent conditions is sought to allow for updated background noise testing which will ensure greater accuracy and confidence in the operational compliance assessment.

Regarding *construction* noise, a change to consent conditions is sought to allow for an Out-Of-Hours Work (OOHW) Protocol as has been used for other similar wind farm projects. This Protocol would provide for a process to identify whether specific OOHW can be allowed and under what circumstances.

More than a minor increase in impact, minor change to mitigation strategy and consent conditions required

For biodiversity issues, the additional vegetation clearing impact is substantive, requiring a change to the mitigation strategy and consent conditions including revised quantities for vegetation clearing and biodiversity offsets:

Biodiversity – impacts to native vegetation, Biodiversity - offsets

The increased vegetation clearing arising from a more realistic civil design footprint (having regard to steep terrain and larger turbine model) and recognition of the omission of clearing allowance for the 132kV connection has increased the assessed impact on Box Gum Woodland Endangered Ecological Community (EEC) by 95.5 ha or 112% of the clearing limit allowed in the consent conditions. The majority of the clearing remains in low diversity native pasture, as a result of iterative design with input from ecologists and additional site surveys.

Existing mitigation strategies (minimisation of impacts during construction and securing offsets under biobanking agreements) will be adequate to address the impacts. However, the implementation would benefit from additional pre-clearance surveys (hollow bearing trees, specific threatened flora, raptor nests) in areas that fall outside the consented development corridor.

While the management strategies proposed to manage these impacts would remain generally in accordance with the approved project, changes to the consent conditions are required to ensure the additional impacts are accurately reflected by the Consent, including:

- An increase in the Box Gum Woodland EEC clearing limit to 180.9 ha.
- Targeted surveys to assist minimisation and ensure accurate offsets for the final project in areas outside the consented development corridor (specifically, (hollow bearing trees, specific threatened flora, raptor nests).
- An increase in the offset credit requirement; the required ecosystem and species requirements under the modification are 1578 and 3396, respectively.
- Allowance for staging of offsets, so only those offsets associated with impacts of the stage being implemented are secured in conjunction with the stage of development.

CHANGES SOUGHT TO CONSENT CONDITIONS

As described in this Modification Assessment Report, 13 modifications to the consent conditions are sought which together will address:

- Requirements for a more constructible project – larger clearing limit, minor alterations to the layout, reuse of any excavated material, upgrade of a 2km section of Coppabella Road, staging, subdivision and decommissioning;
- The use of larger turbines as the consequence of improved technology with project benefits including better efficiencies and power pricing; and
- The additional mitigation measures required for construction and operational noise, biodiversity clearing and offsetting.

All proposed modifications to the consent conditions are set out in Table 16-1. It is requested that these be incorporated into the modified consent for the project.

On balance, the modification proposed is considered justifiable and the identified impacts are considered manageable with the effective implementation of specific strategies that form commitments of the modified project.

1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

This report has been prepared to support an application to modify Development Consent SSD-6698 (Modification Application) for the Yass Valley Wind Farm (YVWF) now referred to, by the proponent, as Coppabella Wind Farm (CWF) (see section 1.2).

This Report provides context and detailed assessment to support the modification application including:

- | | |
|---|-------------------|
| • Background to the Development Consent SSD 6698 granted on 30 March 2016 (Development Consent) and legislative context. | Section 1.4 - 1.6 |
| • Details of the consultation undertaken in relation to the proposed modifications. | Section 2 |
| • Detailed description and justification of the modifications being sought. | Section 3 |
| • An outline of the approach taken to identify and assess the impacts of the modifications. | Section 4 |
| • Specialist environmental assessments of changes in level of impact associated with the modifications. | Sections 5 - 14 |
| • Updated mitigation measures, where required, to ensure that any impacts of the modified project, are appropriately managed and mitigated. | Sections 5 - 14 |
| • Impact summary. | Section 15 |
| • An outline of the amendments sought to the conditions of consent. | Section 16 |
| • Conclusion | Section 17 |

Supporting appendices include:

Appendix A Map sets for the approved and modified projects.

Appendix B Specialist assessments of the modified project.

This report has been prepared by NGH Environmental Pty Ltd on behalf of the proponent, Coppabella Wind Farm Pty Ltd (CWFPL). Project ownership is described in Section 1.2.

The proponent proposes to commence construction of the CWF in early 2018. The proposed modifications to the Development Consent are required to deliver an efficient, constructible and commercially viable project.

1.2 THE PROPONENT

In 2008, Epuron Projects Pty Ltd sought development consent for the Yass Valley Wind Farm. Development Consent SSD-6698 for the YVWF was granted by the Planning Assessment Commission, as delegate to the Minister for Planning, on 30 March 2016. At the time of determination, the project was owned by Yass Valley Wind Farm Pty Ltd (YVWFPL), a wholly owned subsidiary of Epuron Projects Pty Ltd.

On 8 February 2017, YVWFPL was acquired by Yass Valley Wind Farm (Holding) Pty Ltd (ACN 614 758 431) and is now ultimately owned by Xinjiang Goldwind Science & Technology Co., Ltd (Goldwind).

Following the acquisition, Yass Valley Wind Farm was renamed 'Coppabella Wind Farm' (CWF) and correspondingly, the entity, YWFPL, has been renamed to Coppabella Wind Farm Pty Ltd (CWFPL). The change of name reflects the reduced extent of the approved project and its location within the Coppabella hills southwest of Binalong. Formal advice of the name change has been previously provided to DPE.

1.3 OVERVIEW OF THE PROPOSED MODIFICATIONS

The proposed modifications sought by this application include both infrastructure and layout modifications as well as project description clarifications. These are detailed in Section 3.

The key modifications sought to the Development Consent include:

- Increasing the vegetation clearing limit to address changes to the civil design footprint having regard to the steep and challenging terrain (as well as required clearing for the 132kV connection and a larger turbine model);
- The installation of a larger turbine model with an overall tip height of approximately 171 metres and blade length of approximately 70 metres;
- Minor changes to the location of ancillary infrastructure including additional temporary facilities to improve constructability and workforce safety;
- Minor clarifications to the project description. These include:
 - Reuse of excavated material onsite;
 - Upgrade of a 2km section of Coppabella Road and use of Coppabella Road for standard vehicles (not over mass or over dimensional vehicles).
 - The project would be developed in stages.
 - The project would require subdivision of land (within the consented project boundaries).

1.4 LEGISLATIVE CONTEXT FOR THE MODIFICATION APPLICATION

This Modification Application is being lodged under Section 96(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Under Section 96 of the EP&A Act, a SSD development consent can be modified where the “*development to which the consent as modified relates is substantially the same development as the development for which the consent was originally granted*”.

In determining an application for a modification under section 96 of the EP&A Act, the consent authority must consider such matters referred to in section 79(c)(1) as are relevant to the development. These matters include the likely impacts of the proposed amendments to the Development Consent, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality.

1.5 PLANNING HISTORY OF THE PROJECT

The assessment and approval of the project took place over several years from December 2008 to 30 March 2016. That process involved various iterations of the project, with the initial proposal containing up to 200 wind turbines, while the approved project comprises up to 79 turbines.

A chronology of the key NSW environmental assessments, regulatory review and approval events is provided in Table 1-1, citing the key reference documents relevant to each phase.

Separately, a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) was made for the Yass Valley Wind Farm (EPBC 2013/7002). The project was determined to be a controlled action and Commonwealth approval for a project involving 126 wind turbines was granted on 5 November 2014.

Table 1-1 Chronology of the NSW environmental assessment and approval process

Date	Event or document	Reference document
Nov 2009	Environmental Assessment (EA) lodged with the Department of Planning and Environment (DPE).	NGH Environmental (2009a) Environmental Assessment Proposed Yass Valley Wind Farm.
Nov 2012	Preferred Project and Submissions Report (PPSR) lodged with the DPE.	Epuron Projects (2012) Yass Valley Wind Farm Preferred Project and Submissions Report.
July 2013	PPSR Revision 1 lodged with the DPE.	Epuron Projects (2013a) Yass Valley Wind Farm Preferred Project and Submissions Report Revision 1.
Dec 2013	PPSR Revision 2 lodged with the DPE.	Epuron Projects (2013b) Yass Valley Wind Farm Preferred Project and Submissions Report Revision 2.
May 2014	PPSR Revision 3 lodged with the DPE.	Epuron Projects (2014a) Yass Valley Wind Farm Preferred Project and Submissions Report Revision 3.
Sept 2014	PPSR Revision 4 lodged with the DPE.	Epuron Projects (2014b) Yass Valley Wind Farm Preferred Project and Submissions Report Revision 4.
Feb 2015	The DPE refers the application to the Planning Assessment Commission (PAC) for determination.	DPE (2015) State Significant Development Assessment: Yass Valley Wind Farm (SSD08_0246).
13 Feb 2015	Epuron provides additional information to the PAC.	Epuron (2015a) Initial Response: Yass Valley Wind Farm (SSD08_0246).
27 Feb 2015	Epuron provides additional information to the PAC.	Epuron (2015b) Detailed Submission in response to the Secretary's Environmental Assessment Report.
26 March 2015	Epuron provides additional information to the PAC.	Epuron (2015c) Further Response: Yass Valley Wind Farm.
26 March 2015	PAC refers application back to the DPE.	-
Feb 2016	The DPE refers the application back to the PAC.	DPE (2016a) Yass Valley Wind Farm (SSD-6698) Assessment Report.
30 March 2016	The PAC determined to approve the project subject to conditions.	PAC (2016) NSW Planning Assessment Commission Determination Report.
Post-consent	Goldwind acquired the project from Epuron Goldwind arranged pre-construction design planning and further environmental impact assessment.	Notification to DPE of change of ownership This Modification Application describes changes to the design and the associated environmental assessments.

1.6 COMMONWEALTH APPROVAL

The Commonwealth approval (EPBC 2013/7002) under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* was obtained on 5 November 2014. The EPBC approval authorises a larger project with up to 126 turbines (compared to the project ultimately approved under the Development Consent).

The EPBC Act approval was varied on 01 June 2017 to allow geotechnical investigations prior to commencement of the Action.

2 COMMUNITY INVOLVEMENT

2.1 PREVIOUS COMMUNITY CONSULTATION

An important context to the detailed planning of the construction-ready project is community consultation.

Consultation was initiated for the original planning application that covered the Coppabella, Marilba and 330kV Precincts. The exhibition of the original planning application received a low number of submissions. The Preferred Project Report was exhibited from 14 December 2012 to 1 March 2013 and received 17 submissions, of which 8 were from individuals and 9 from Government agencies. Consultation for the larger project was undertaken through to gaining of consent and included a Community Consultative Committee that was established from March 2013.

2.2 CONSULTATION FOR THE MODIFICATION APPLICATION

In addition to the community consultation activities described below, prior to the public exhibition period, a notification will be issued via the post to all neighbours up to 10km of the project. During the public exhibition period, associated documentation will be available in hard copy at the Local Council Offices (Yass Valley Council and Hilltops Council) as well as at the local Post Office to the project (Binalong Post Office). Documentation will also be available online at the project website. A dedicated 1800 telephone line, email address and postal address will be available for any enquiries related to the application.

2.3 COMMUNITY CONSULTATION IN 2017

Following acquisition of the project in February 2017, community consultation has focussed on engaging with near neighbours to the project area (landowners that own residences up to 5km from an approved turbine location). Engagement with near neighbours has focussed on the following discussion areas:

- Listening to feedback and observations on the project to date,
- Details around pre-construction planning, including information on internal road design and optimal turbine model, including the potential for an increased tip height, and
- Discussion regarding the most effective way to engage those members of the community most affected by the wind farm moving forward.

This engagement has included over 50 face-to-face meeting between representatives of the proponent and near neighbours. Where face-to-face meetings were not possible, consultation has been undertaken over the phone, via emails and letters.

In addition to direct consultation with representatives of the proponent, a specialist community engagement consultancy was appointed to undertake a community context review of the local area and provide suggestions for future engagement based on the local context, interviews with local community members, previous engagement undertaken for the project and best practice case studies.

Based on the feedback received from the initial engagement with near neighbours, qualitative data from the community context review and previous experience as a proponent of other wind energy projects in NSW, a stakeholder and community engagement plan (the Plan), a neighbour benefit sharing strategy and a community benefit sharing strategy has been developed for CWF to guide all engagement activities.

Stakeholder and Community Engagement Plan

The Plan outlines objectives and aims, identifies project stakeholders, identifies the local community context and describes in detail engagement tools to be used throughout all phases of the project.

The objectives of the Plan include:

- To establish and maintain a level of good understanding of the project within the local community, and the local benefits it may provide.
- To have a culture of openness, inclusiveness, responsiveness, and accountability.
- To enable community integration of the project.
- For the project to be considered as a valued component of the social and economic fabric of the local community.
- To achieve a low or infrequent level of complaints regarding lack of information about the project.
- To achieve all regulatory requirements in relation to community engagement for the project.

In line with the Plan, a range of engagement tools will be used for the CWF Project. These include:

- Direct engagement with near neighbours through face to face meetings, phone calls, letters and emails.
- A local information centre to be run by a local community member employed to manage the community relations for the project.
- CWF Community Consultative Committee (CCC).
- Development of project newsletters, project factsheets and other communication products for distribution as required to the local community.
- Briefing for local community groups and local schools as required.
- A dedicated 1800 telephone line, email address and postal address.
- A project website to provide information and updates.
- Provision of media releases to the local newspapers.
- Engagement with elected members and officers at all levels of government, through briefing, site visits, media releases etc. as required.

The Plan will be reviewed regularly, as well as at key transition phases between different stages of project development (e.g. prior to construction or operation). The Plan will continue to guide engagement activities at all stages of the project, ensuring that engagement is appropriate and is consistent with good industry practice for a project of this nature.

Neighbour benefit sharing strategy

A key feature of the Plan includes a neighbour benefit sharing strategy (which is currently being developed). This includes offering neighbour agreements to up to 60 residences that have been identified as eligible within the neighbour benefit sharing strategy. The neighbour agreements recognise the impacts that the wind farm may have on near neighbours to the project and outlines a process for raising any concerns for the entire life cycle of the project. As of August 2017, 35 neighbour agreements have been offered as part of the strategy. An annual payment is attached to the neighbour agreements based on distance proximity of a residence from an approved turbine location.

Community benefit sharing strategy

In parallel with the neighbour benefit sharing strategy, a community benefit sharing strategy is currently being developed. Discussions have been undertaken with 16 local community groups and schools regarding opportunities for the project to be an active member of the local community and provide financial assistance and support. As of August 2017, the project has provided financial support through a sponsorship fund to 10 community initiatives and events in the local area.

Once the project becomes operational, a community fund will be established and will consist of \$2,500 per installed turbine each year, for the entire life cycle of the project. Coppabella Wind Farm will work with the CCC to develop the framework and structure for the fund. The Yass Valley Council and the Hilltops Council will administer the community fund based on the installed turbines within each specific Local Government Area.

Community Consultative Committee (CCC)

Schedule 4 of the Development Consent, requires the proponent to establish a CCC for the life of the project. Epuron, as the previous project proponent, established a combined CCC with Conroy's Gap Wind Farm in March 2013. The most recent CCC meeting was held in June 2016. As CWF is not associated with Conroy's Gap Wind Farm and the local communities for the two separate projects are distinct, CWFPL is currently working with the Department to establish a CCC specifically for this project. On 17 May 2017, the Department appointed an independent chairperson. The Department is currently in the process of appointing community representatives to the CCC. Following the appointment of members, meetings would be held on a quarterly basis.

Landowner consultation

At this stage, it is anticipated that approximately eleven landowners will host project infrastructure such as wind turbines or ancillary infrastructure such as access tracks, refer to Appendix A.1.

Following acquisition of the project on 8 February 2017, targeted consultation has been undertaken with host landowners. A briefing providing a high-level overview of the pre-construction planning process and timeline, including information on internal road design and optimal turbine model with a potential for an increased tip height was provided to all involved landowners in February/March 2017. All landowners were directly consulted with regarding the internal road design that was specific to their property within the project area. Additionally, a detailed briefing on the internal road design was given to host landowners in August 2017.

3 MODIFICATION DESCRIPTION

3.1 SUBSTANTIALLY THE SAME PROJECT

The modified project will be substantially the same project for which Development Consent was obtained on 30 March 2016. The approved project comprises a wind farm of up to 79 wind turbines with associated access tracks, 33kV internal electrical reticulation system, grid connection at 132kV, permanent meteorological (met) masts and temporary construction infrastructure. No changes are proposed to this general description as part of the modification. In particular:

- No new turbines are proposed as part of the modification; and
- The modified layout is generally in accordance with that shown in Appendix 2 of the Development Consent apart from variations to the routes of access tracks and changes to the underground and overhead reticulation (up to 33kV).

The location of the site and the proposed infrastructure layout is shown on Figure 3-1. All impacts remain within the Coppabella precinct project boundaries and on the same land as for the approved project; the total project area is approximately 6,445 ha. There would be up to eleven host landowners (refer to Appendix A.1).

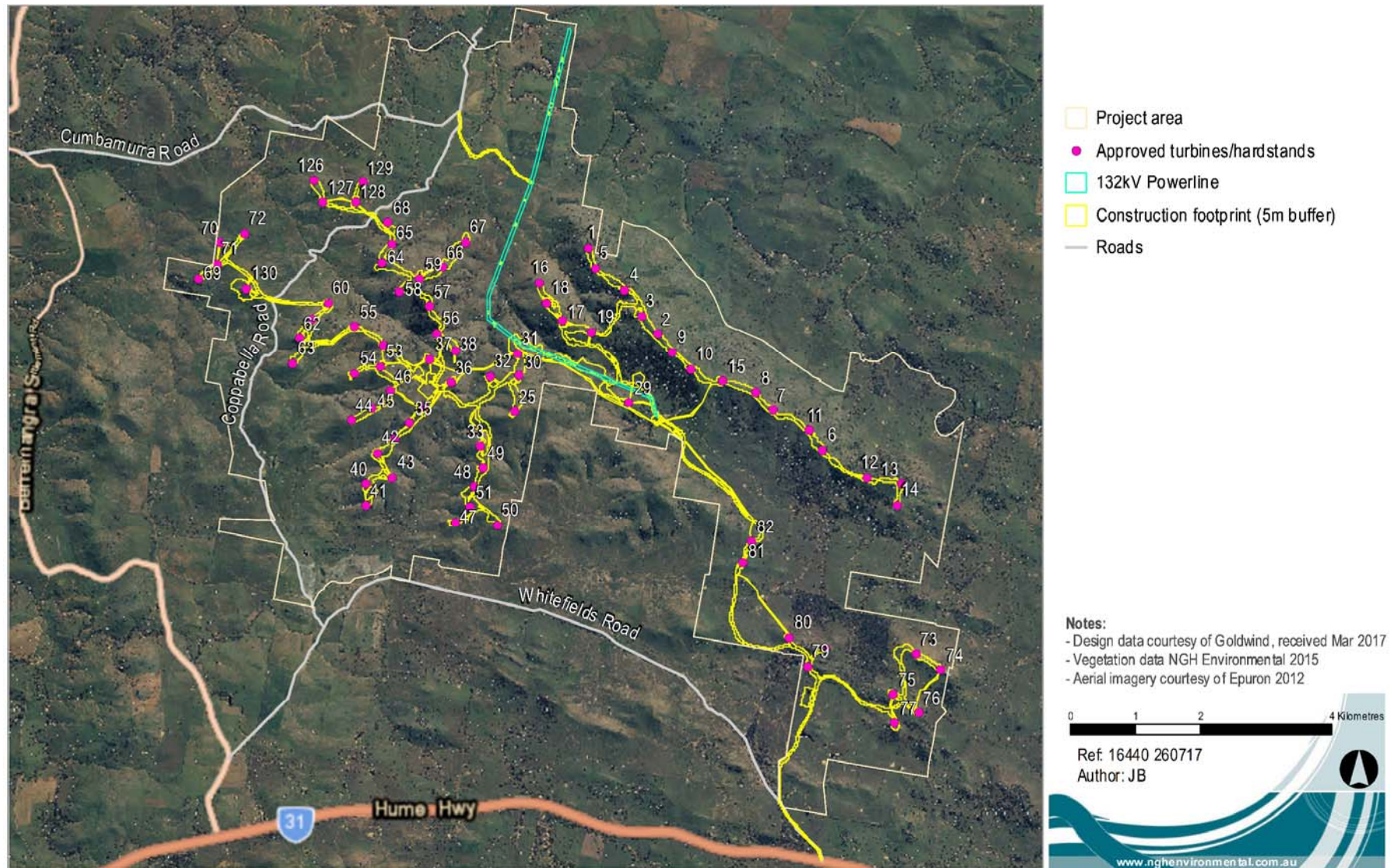


Figure 3-1 Coppabella wind farm: approved turbine locations, modified layout construction footprint.

3.2 JUSTIFICATION FOR THE PROPOSED MODIFICATION

The proposed modifications are required to ensure the construction of a feasible, efficient and commercially viable project that utilises the latest commercially available wind turbine technology.

The changes proposed reflect improvements in available wind farm technology, improved site knowledge and detailed design for the purposes of construction. The proposed amendments follow detailed review of project constructability, viability and community consultation (with the benefit of additional site investigations and pre-construction planning).

Improved technology

The details of the proposed turbine equipment had not been confirmed when assessments were undertaken for the existing Development Consent. Given the time that has elapsed between the original planning application and, in conjunction with significant advancements in wind turbine technology and scale of equipment for efficient and commercially viable operation of the wind farm, the Development Consent does not allow for use of the currently available optimum turbine models. A modification to the Development Consent is therefore required in order to construct and operate a commercially viable project. Modification to the Development Consent will improve the efficiency of the project.

Improved site knowledge

Further detailed investigations have been undertaken since the Development Consent was granted to inform the detailed layout and construction process.

Subsequent to the NSW and Commonwealth approvals, project planning, environmental and engineering studies have commenced to progress the project through the pre-construction detailed design phases. Specific investigations that are informing the current phase of the development and this Modification Application include:

- Updated vegetation mapping (including ground validation);
- Updated heritage mapping;
- Updated siting and other environmental assessment studies;
- Detailed engineering designs for internal and external access track network; and
- Extensive community consultation.

The more robust data set now available for the site increases certainty around the prediction of impacts and appropriateness of mitigation measures.

Improved understanding of the construction process

These detailed investigations above have highlighted a number of issues requiring further consideration in respect of the constructability of the project within the approved parameters. These issues relate to:

- The alignment of access tracks;
- An inadequate clearing allowance for construction of the project; and
- The location of additional ancillary infrastructure.

Specific changes to the project would improve the constructability and operational viability of the project in the long term. The proposed changes are based on, the detailed design and more intensive ground-truthed specialist information.

3.3 DETAIL OF THE MODIFICATIONS SOUGHT

The modifications sought can be categorised as:

- Infrastructure and layout modifications:
 - Increasing the vegetation clearing limit;
 - The installation of a larger turbine model; and
 - Minor changes to the location of ancillary infrastructure including additional sites.
- Project description clarifications:
 - Reuse of excavated material onsite;
 - Upgrade of a 2km section of Coppabella Road and use of Coppabella Road for standard vehicles;
 - Project staging; and
 - Subdivision of land.

The proposed modifications are detailed below.

Increased clearing allowance and offsets

The modification would require increasing the vegetation clearing limit to address changes to the civil design footprint, having regard to the steep and challenging terrain which characterises some of the site. While the total number and general location of turbines remain the same, the impact footprint is greater than that approved as a consequence of earlier clearing assumptions which informed the approved clearing limit and the subsequent detailed civil design.

The currently approved project requires an increased allowance for impact on Box Gum Woodland and derived grasslands compared to that currently allowed by the consent. An increase would be required regardless of whether the proposed larger turbine is used, merely on the basis of the earthworks design necessary to construct the project.

The relevant conditions of the Development Consent are as follows:

Schedule 3, Condition 19: the applicant shall ensure no more than 68.3 ha of Box Gum Woodland EEC is cleared for the development unless the Secretary agrees otherwise.

Schedule 3, Condition 20: Within 2 years of the commencement of construction, unless otherwise agreed by the Secretary, the Applicant shall retire biodiversity credits of a number and class specified in Tables 4 and 5 below to the satisfaction of OEH.

Reasons for the increased clearing

A number of assumptions around the impact area were included in the application and ultimately the Development Consent for the project. These earlier assumptions underestimate the impacts for current wind farm designs and, as a consequence, the clearing limits specified in the Development Consent are insufficient to permit the construction of the project. In particular:

- The Yass Valley Wind Farm proposal included clearing estimates for five separate precincts: Coppabella, Marilba (east and west), Conroy's Extension and the 330kV Grid Connection

(identified as 'Transmission') to connect the wind farm to the 330kV line to the south of the project. When approval was granted for the Coppabella precinct only, the clearing allowance omitted some infrastructure elements required for development of this precinct. This was due to the assignment of these infrastructure elements to the Transmission 330kV Grid Connection precinct in the project's GIS files. Refer to Appendix A, Map A.5. The result is that the clearing limit in Condition 19 does not include the additional 18 ha of Box Gum Woodland required to construct the Coppabella precinct.

- The EA (NGH Environmental 2009a) assumed cabling could be co-located in the track widths but this cannot be achieved for the steep terrain at this site. Doing so would introduce construction scheduling difficulties and safety risks and also result in large electrical losses (reducing the amount of renewable energy able to be exported to the grid).
- Average buffers used to estimate track clearance requirements on indicative layouts in the Environmental Assessment (NGH Environmental 2009a) were not based on realistic civil design parameters given the steep terrain and consideration of the required equipment and work methods. In particular, they did not allow sufficient room for cut and fill requirements of the Coppabella precinct.
- The consent restricts access tracks and cabling to the development envelope shown in the consent and which was established prior to a detailed access track design being prepared. The detailed design studies have now considered the steep terrain and realistic design parameters for the proposed type of equipment and indicate that alignments need to be varied to enable a constructable project with a modified development corridor. Additional assessment has also been undertaken for areas outside the previously defined development corridor.

Since Development Consent was granted for the project, detailed civil designs have been iteratively prepared in conjunction with additional vegetation assessment onsite. The designs reflect the larger turbines now proposed, which also adds to the clearing required to transport and manoeuvre larger turbine blades across the site.

The detailed civil designs now provide a more reliable estimate of the clearing that will be required for the project, through consideration of road design features, grades of tracks, radius of curvature for oversize transport vehicles and batter slope geometry. The detailed designs have been developed to account for landform features such as steep terrain which require significant cut and fill works and large batters adjacent to tracks and hardstands. The designs have also been developed with input from ecologists to minimise where possible, impacts within Box Gum Woodland and derived grasslands. As the site is derived from this community, avoidance is not possible and the focus has been on minimising impacts in the higher diversity areas; those being more capable of regeneration and having greater value to threatened species.

The overall increase in the infrastructure footprint is summarised in Table 3-1 and broken down by infrastructure component in Table 3-2.

Table 3-1 Summary of the increase in on-ground impacts for the Coppabella infrastructure

Approved footprint	Modification footprint (approx.)
100.90 ha (Note 1)	362.10 ha (Note 2)
Notes: 1 - This is the figure provided in the Coppabella precinct breakdown provided by Epuron. The figure is derived by buffering an indicative layout with generic infrastructure widths. For example, 8m access track widths. It also excludes 18 ha now known to be required for the Coppabella precinct (refer to Section 6.2 and A.5). 2 - This figure is derived from a detailed civil engineering design, taking into account realistic cut and fill batters for the terrain and larger turbines turning arcs. 3 - It is further noted that about 59 ha or 6% of the modification footprint is now located outside the consented development corridor (Appendix 3 of the consent). This area is shown in this report in Appendix A.3 and has been considered by the biodiversity and indigenous heritage impact assessments.	

Table 3-2 Infrastructure components and disturbance footprint

Infrastructure element	Area (Note 2) (approx.)	Percentage of total footprint (approx.)
Disturbance footprint		
Civil works footprint (Note 1)	331.03 ha	91.37%
Additional underground cabling	28.94 ha	7.99%
Additional 132 kV OH lines (Note 3)	2.29 ha	0.63%
Total	362.29 ha	
Notes: 1 – A buffer of 5m is included in the footprint, to account for necessary disturbance during construction, such as installation of sediment erosion controls. While it is required as part of the clearing limit, this area can be fully rehabilitated after construction and in this area avoidance of features such as hollow bearing trees is more achievable. 2 - Where overlap of infrastructure elements occur, the impact area has been assigned to only one infrastructure component. 3 - Overhead lines are calculated as an impact area only where they occur in woodland vegetation and then are given a disturbance width of 45m.		

It is noted that all impacts are still within the project boundary.

The map sets provided in Appendix A (A.2-A.4) demonstrate, for comparison, the:

A.2 Approved layout versus modified project layout - including detailed vegetation mapping

A.3 Approved infrastructure corridor versus modified project

A.4 Minimisation of biodiversity impacts during the detailed design process

The explanation of each area where minimisation of impacts has been considered is provided in Section 8.2.

Vegetation impacts and offsets

Using the recent civil designs and updated assessment of vegetation communities, it has been possible to update the calculation of vegetation impacts for the project. The new calculations are much more reliable and show a greater extent of clearing than for the limit set out in the Development Consent. As a consequence, an increased clearing limit is sought to enable realistic implementation of the project. This is set out in Section 8. In summary:

- The consented clearing limit is 68.3 ha Box Gum Woodland Endangered Ecological Community (EEC), including derived grasslands.
- The required clearing limit under the modification is 180.9 ha Box Gum Woodland EEC, including derived grasslands.
- An increase of 112.6 ha of Box Gum Woodland EEC, including derived grasslands, is required.

The offset credit requirement in the Development Consent (Tables 4 and 5) related directly to the vegetation clearing impact assessments provided for the pre-consented project. This included impacts for the Golden Sun Moth, which has not been identified at the Coppabella Precinct. To accurately reflect the increase in clearing and the absence of the Golden Sun Moth, a change is requested to Tables 4 and 5 of the consent. Accurate credit requirements for the modified project are contained in this Modification Application, Section 10. In summary:

- The consented ecosystem and species requirements are 769.3 and 1829, respectively.
- The required ecosystem and species requirements under the modification are 1578 and 3396, respectively.

Staging

Additionally, given the likelihood that the project will be developed in stages, it is requested that offsets are able to be progressively secured and retired based on the stage of development being undertaken, in line with estimated construction impacts for the respective stage. Subdivision would only occur within the consented project boundaries.

Summary

- **The key justifications for the increased clearing limit are not related to the modifications proposed as part of this application. Rather they reflect:**
 - The more accurate and realistic civil design resulting in a greater area of impact being required for the approved project than the earlier assessments indicated; and
 - Previous omission of 18 ha impact required for the grid connection of the Coppabella precinct when the 330kV Precinct was excluded.
- Increased impacts related to this change have been assessed in Sections 8 to 11 (biodiversity and Indigenous heritage).
- A revised offset requirement addressing the increased clearing has been calculated.
- Offsets should be retired according to the stage being developed.

Turbine model selection

The Modification Application seeks approval for the use of current model turbines, which have larger dimensions than those approved in the Development Consent. These larger turbines will optimise the resource utilisation and enable improved pricing. The modification seeks to install a larger turbine model with an overall tip height of up to approximately 171 metres and blade length of approximately 71 metres.

Schedule 2 Condition 8 of the Development Consent requires that:

No wind turbines may be greater than 150 metres (measured from above ground level to the blade tip height).

The turbine model was not confirmed in the assessments relating to the Development Consent although typical dimensions were indicated, which were based on wind farm technology current at the time of the EA preparation (NGH Environmental 2009a). Assessments were conducted in respect of those indicative parameters. The Preferred Project and Submissions Report, September 2014 (PPSR; Epuron 2014a) referred to turbine equipment with the following dimensions (Rotor 90 to 121m and Hub height of 78 to 100m).

The Development Consent (Schedule 2, Condition 6) already anticipates upgrades to turbines. With the rapid development of wind turbine technology, upgrade options are now available and can improve the efficiency and viability of the project relative to those that were considered during the lengthy development application process.

Although a number of turbine models may still be considered for the project, the assessment of the proposed modification is based on the use of the:

- Goldwind GW140 model wind turbine for visual and biodiversity impacts.
- Goldwind GW140 model wind turbine for aviation impacts.
- Goldwind GW140 and standard compliance criteria for noise impacts.

The turbine parameters of the Goldwind GW140 model, compared to that proposed in the EA (NGH Environmental 2009a), are shown in Table 3-3.

Table 3-3 Approved versus modified turbine indicative parameters

Parameter	Turbine dimensions referenced by assessments pre-consent (no specific model)	Modification Application (uses GW140 as reference model)
Number of wind turbine sites	Up to 79	Up to 79
Rotor diameter	90 to 121m	Up to approximately 142m
Approximate hub height	78m to 100m	Up to approximately 100m
Max height of Rotor Swept Area (RSA) height above ground	150m	Up to approximately 171m
Min height of Rotor Swept Area (RSA) height above ground	17.5m (where HH 78m and 121m rotor)	Approximately 29m

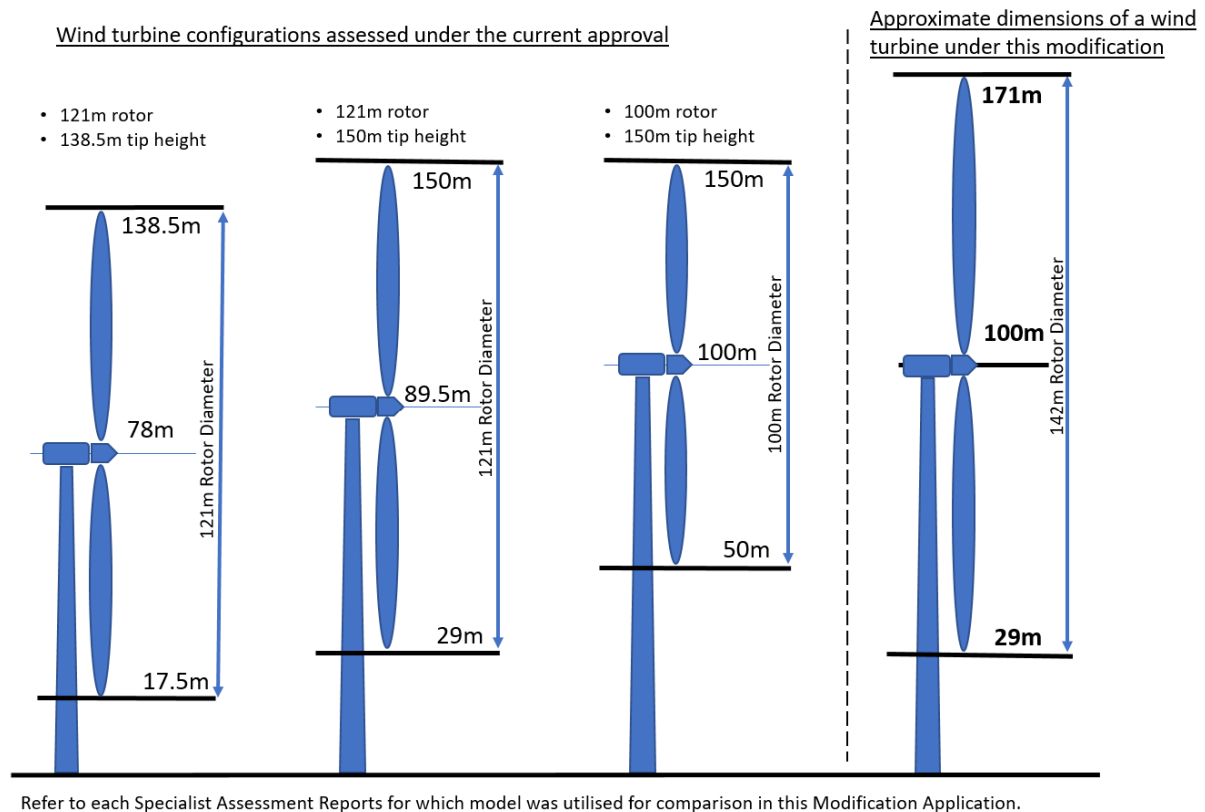


Figure 3-2 Modified turbine dimensions

Under the existing consent, the maximum height of turbines, from ground to blade tip, is 150m. The proposed turbine tip height of approximately 171m, or approximately 21m higher than described in the EA, is an increase of approximately 14%. The Modification Application seeks an amendment to Schedule 2, Condition 8 to increase the turbine tip height from 150m to up to approximately 171m.

Assessments of the change in impacts for these aspects are described in Sections 4 to 14.

It is noted that if using the larger turbines, the minimum height of the turbine rotor above ground could increase by up to 11.5m, based on the turbine size ranges assessed in the original application. The position and size of the rotor for the GW140 means that the turbine accesses a better wind resource and may be less subject to turbulence that occurs closer to the ground or above tree tops. The increase in minimum RSA level above ground will reduce the potential impact of the project on low flying avifauna species.

Summary

- A modification is sought to Schedule 2, Condition 8 to allow use of larger turbines (taller, up to approximately 171m and with increased rotor diameter up to approximately 142m).
- The key justification for the increased size of the turbine is increased operational yield for the life of the project.
- Potential impacts related to this change include visual, shadow flicker, noise, avifauna, aviation and telecommunications (addressed in Sections 4, 5, 6, 11 and 12 respectively).
- A reduced risk applies for avifauna species that fly above tree-tops due to increase in minimum RSA above ground. This aspect is assessed in Section 8.

Alterations to layout to include additional ancillary facility areas

The Development Consent defines ancillary infrastructure as:

All wind farm infrastructure with the exception of wind turbines, including but not limited to collector substations, switching stations, permanent offices and site compounds, electricity transmission lines and internal roads.

The ancillary infrastructure may also include:

- Wind monitoring masts.
- Both overhead 132kV and 33kV powerline.
- Control and operation facilities building.

The Modification Application seeks allowance for minor changes to the location of ancillary infrastructure including additional temporary facilities to improve constructability and workforce safety. These have been undertaken to minimise impacts on biodiversity and land use. These include:

- Minor variations to access track routes;
- Variations to the proposed overhead and underground reticulation (up to 33kV);
- Minor changes to the location of ancillary infrastructure including additional temporary facilities.

Some of these changes are now in areas outside the consented development corridors.

Changes to ancillary infrastructure

The proposed wind farm modification involves changes to some of the above ancillary infrastructure. These changes are outlined below:

- The associated 132kV overhead line for grid connection is essentially the same as for the approved arrangement but it is possible that the optional switching station locations may no longer be required.
- Additional temporary construction compounds and laydown areas are proposed for the modification but are located such that they will have limited visibility from surrounding residences. Biodiversity and heritage impacts were also assessed for the additional sites. Additionally, these facilities can be removed at the completion of construction.
- The 33kV overhead lines are replaced by 33kV underground cables for the modification.

Replacement of 33kV overhead lines with 33kV underground cables

The Modification Application seeks approval for the replacement of the approved 33kV overhead lines with underground cables and adjustment to some of the routes to be followed for the collection circuits.

The wind turbines are connected to the substation by 33kV collection circuits. The Development Consent allows collection circuits that include overhead lines and underground cables. The Development Consent identifies the location of overhead 33kV transmission lines (Appendix 2 General layout of the development).

Further design studies for the site have identified that the 33kV overhead lines would be better replaced by 33kV underground cables. The disturbance widths and visual impact of underground cables would be less than for the overhead lines, particularly where woodland clearing would have been needed. The routes for cabling have also been reviewed and where practicable, varied to further reduce the impact on native vegetation.

These changes are reflected in the modified project layout, presented in Appendix 1.1.1A.1.

Areas now outside the consented development corridors

Condition 9 of the Development Consent provides that:

The Applicant may micro-site the wind turbines and ancillary infrastructure without further approval provided:

(a) they remain within the development corridor shown in the figure in Appendix 3.

The detailed civil design has primarily sought to locate ancillary infrastructure within the consented development corridors identified in Appendix 3 of the Development Consent. However, in specific locations, advantages to locating ancillary infrastructure outside the corridor have been identified, in consultation with host landowners and specialists (biodiversity and Aboriginal archaeology). The locations of the proposed ancillary facilities have been selected in the context of detailed civil designs prepared iteratively with additional heritage and vegetation assessments and consultation with landowners, to minimise impacts to the environment, heritage values or on-going farming activities.

The reason for changes are primarily due to the large extent of the site; construction staff can be working at significant distance from amenity facilities, shelter and workshops for long periods of time. Health and safety requirements warrant provision of amenities for shelter, meals and ablutions.

Areas that currently fall outside of development corridors shown in Appendix 3 of the Development Consent have been identified on Appendix A.3 and assessed by this Modification Report. The map sets provided in Appendix A (A.3-A.4) demonstrate, for comparison, the:

A.3 Approved infrastructure envelope versus modified project layout

A.4 Minimisation of biodiversity impacts during the detailed design process (key locations)¹.

The overall area of modified layout currently outside the consented development corridor is minor; approximately 6% of the total development footprint.

Additional areas that may be required outside the modified layout during the development of the final infrastructure layout are proposed to be addressed by requiring that they meet predefined criteria as follows:

- Not within 40m of waterways.
- Not on steeply sloping terrain.
- Not requiring any greater level of environmental impact.

Summary

- **Additional ancillary facility areas are justified to enable constructability and ensure safety.**
- **The proposed additional ancillary sites have been sited to minimise impacts and as necessary with additional assessment to confirm suitability.**
- **The 33kV underground cables will serve the same purpose as the 33kV overhead lines that they replace**

¹ The explanation of each area where minimisation has been considered is provided in Section 8.2.

- The key justifications for the replacement of the approved 33kV overhead lines with underground cables are:
 - Benefits for construction and operation with simpler electrical collection system.
 - Reduced visual impact
 - Reduced easement widths (and associated environmental impacts).
- Additional ancillaries represent a small proportion of the total development footprint.
- A process for locating any additional ancillary infrastructure items is proposed.

Reuse of excavated material

The EA (NGH Environmental 2009a) describes the reuse of material *excavated from turbine footings* in the development of the track network.

Current design considerations have now identified that there are reuse opportunities for material excavated during other earthworks onsite; primarily, due to the large amount of cut and fill required for access tracks and hardstands. This material can be beneficially reused onsite and thereby reduce the volume of traffic delivering material to the site and associated haulage impacts and costs. Efficient planning of the works seeks to balance cut and fill volumes and limit transport of material within the project area.

An integral part of the access track construction involves the excavation of rock and redistribution to other locations (particularly for tracks or hardstands) through normal cut and fill earthworks operations. While some of the excavated rock may be able to be used in the form it has been excavated, a significant proportion may require crushing to achieve suitable size for reuse at other locations. The sizing of this material can be important for compaction undertaken to form strong stable roadways. On-site crushing is a normal part of the on-site earthworks and reduces the need for a large volume of transport to site. Section 3.5.1, of the Environmental Assessment prepared by NGH Environmental (2009a) states that:

‘materials excavated during the construction of wind turbine footings may be able to be reused as road base for the road surface upgrades. For this purpose, it is possible that a mobile rock crusher would be used during construction’.

Both the extractive activity and crushing activity are fee based activities under an Environment Protection Licence (EPL) that is required to be held for the CWF project. An application for an EPL will be separately lodged with the Environment Protection Authority (EPA) to cover ‘scheduled development activities’ required during construction of the project and operational activities associated with electricity generation once operational.

Summary

- A minor clarification is sought to the consent to provide for onsite reuse of suitable material excavated during any project earthworks.
- The benefits of this change are:
 - Reduced cost and impacts of materials haulage to establish access tracks.
 - Reduced amount of transport of materials on public roads.
 - Reduced disturbance at offsite locations
- On this basis, reduced impacts will result from reuse of excavated material onsite.

Coppabella Road upgrade

The main access to the project area will be from the eastern end of Whitefields Road (Figure 3-3) and involve approximately 1.3km of Whitefields Road from the Hume Highway to a property entrance where on-site access tracks will be used. Whitefields Road would be upgraded in accordance with existing Development Consent conditions.

Access to the 132kV line route, to the northwest of the project will also be required from Coppabella Road Figure 3-1(Figure 3-1) with access via Binalong, Garry Owen Road and the northern section of Coppabella Road. Items transported by this route would include pole sections, conductors, insulators, fittings and various installation equipment to enable the construction of the northern section of the 132kV transmission line.

Upgrade of 2km section

In addition, upgrade of a short section (approximately 2km) of Coppabella Road () would facilitate efficient internal access between the western parts of the wind farm. The proposed use does not include over-dimensional vehicles and is proposed to reduce travel times between these parts of the wind farm.

Regarding the potential to use Coppabella Road, the EA (NGH Environmental 2009a) states:

'Additional access points may be available from Coppabella Road for low volumes of 4 wheel drive or specialist vehicles.'

Further, regarding the impact of traffic on local roads, the EA states:

There is the potential to impact Westbourne Road, Coppa Creek Road, Cumbarmurra Road, Garry Owen Road and Coppabella Road (Northern Section). Although it is not anticipated that these minor roads would become primary access routes, it is probable that some of these routes will experience a small increase in traffic volumes. A relatively small increase in traffic volumes would require improvements to ensure the safety of road users particularly in relation to conflicts between vehicles and stock.

Minor upgrades are now proposed for a short section (approximately 2km) of Coppabella Road to enable better internal access within the wind farm. The section of Coppabella Road is between two wind farm access tracks that cross Coppabella Road, between Turbine 60 and 130 at the southern end and the access track between Turbine 68 and 128 at the northern end of the short section of Coppabella Road. Pre-construction planning and design studies have indicated that access in this location will reduce access time across the site. No trees are required to be removed for the upgrade.

Use of other sections of Coppabella Road

It is also contemplated that use of other sections of Coppabella Road would be restricted to light vehicles other than for delivery of 132kV line components while constructing the line, no further upgrades are proposed however. While it would not be a primary access route, during construction as well as operations and maintenance, some light vehicle use of this road would make activities more efficient.

While this use was not specifically contemplated by the EA or addressed by the Development Consent, it is not considered inconsistent with the consent. A clarification is sought, allowing minor upgrades for a 2km section of Coppabella Road to enable use by light vehicles. No over size or over mass vehicles are intended in this area. No tree removal would be required for these upgrades. Access along other sections of the road may be required but no upgrades, no over dimensional or over mass vehicles would be used.

Summary

- A clarification is sought to the approval to allow for upgrade and use of a short section (approximately 2km) of Coppabella Road during construction and operation.
- The key justification for the change is to reduce travel time during construction and operations.
- No tree removal would be required for these upgrades.
- Access along other sections of the road may be required but no upgrades and no over dimensional or over mass vehicles would be used.
- Mitigation of impacts will be in accordance with the consented project's mitigation strategy; Traffic Management Plan.

Staging

The project is proposed to be developed in stages. The actual extent of staging and scope of project components for individual stages will be confirmed prior to the commencement of the stage of construction and the conditions of consent will be addressed relative to the extent of the stage being undertaken.

Property and subdivision

The project is located on the same land as applicable for the existing consent. The modification also clarifies that the project includes the subdivision of land so as to create new lots for the approved substation and any switchyards; and any deemed subdivision arising from the grant of leases or licences for project elements.

Decommissioning

In addition to the requirements already contained in the Development Consent, CWFPL proposes to proactively commit to the preparation of an appropriate Decommissioning and Rehabilitation Plan within 5 years of the project becoming operational. The Decommissioning and Rehabilitation Plan would be updated every 5 years and would include:

- Environmental management controls for decommissioning;
- Estimated costs of decommissioning and funding arrangements (including residual value of turbines and infrastructure at end of life); and
- In the event of any shortfall between the estimated costs of decommissioning and funding arrangements, the provision for an appropriate funding mechanism (such as a decommissioning bond or the like).

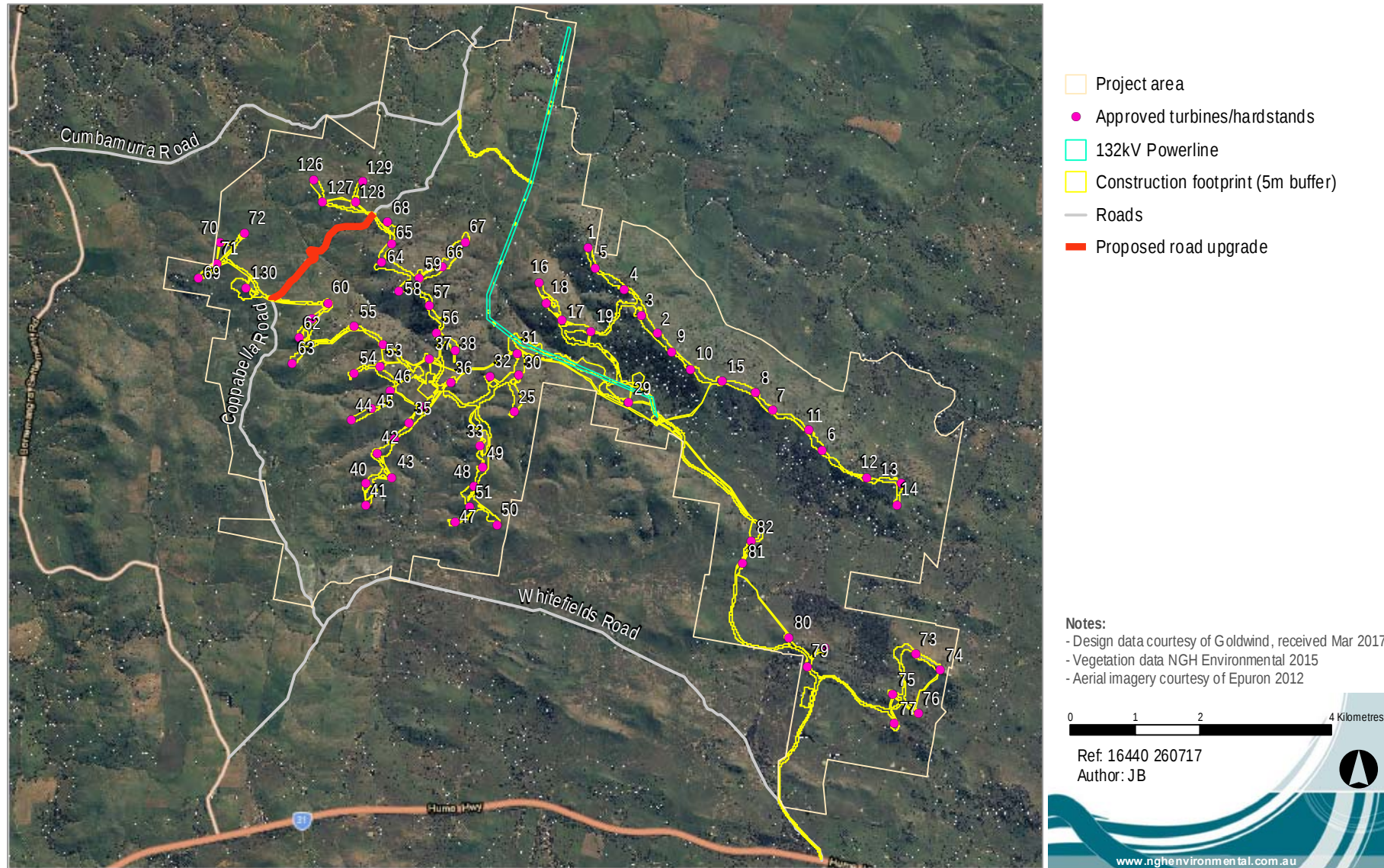


Figure 3-3 Project access including 2km section of Coppabella Road proposed for light vehicle use

4 ENVIRONMENTAL ASSESSMENT APPROACH

4.1 ENVIRONMENTAL IMPACTS OF THE APPROVED PROJECT

The key environmental impacts for the approved project include:

- Visual and Shadow Flicker;
- Noise;
- Biodiversity;
- Indigenous heritage;
- Aviation safety;
- Telecommunication interference; and
- Traffic and Transport.

Other issues considered for the approved project included:

- Electric and Magnetic Fields (EMFs);
- Bushfire;
- Hydrological impacts;
- Soils and landforms;
- Mineral exploration impacts;
- Land value impacts;
- Economic impacts;
- Community wellbeing impacts;
- Lifestyle impacts;
- Tourism impacts;
- Agricultural impacts;
- Health and safety impacts;
- Historic Heritage impacts;
- Climate and air quality impacts;
- Resource impacts; and
- Cumulative impacts.

All potential impacts relating to the additional issues listed above were considered manageable with the implementation of appropriate mitigation measures, included as commitments that form part of the consented project.

4.2 ENVIRONMENTAL ASSESSMENTS FOR THE PROPOSED MODIFICATIONS

Process for identifying new or additional impacts

This modification report provides the assessment of changes to the level of impacts for the modified project relative to those assessed for the approved project. The process to identify these changes involved the following components:

- Review of the environmental impacts considered for the approved project.
- Identification of areas where the modifications could result in new or increased impacts.
- Identification of any modifications that could result in inconsistency with existing consent conditions.

Issues requiring assessment

Ten environmental issues were identified using the evaluation criteria above as requiring additional investigation:

1. Visual impacts
2. Shadow flicker
3. Noise impacts
4. Biodiversity – impacts to native vegetation
5. Biodiversity – bird and bat collision risks
6. Biodiversity - offsets
7. Indigenous heritage impacts
8. Telecommunications impacts
9. Traffic and transport impacts
10. Aviation hazard impacts

An overview of assessments undertaken and provided with this report for these issues is outlined below:

Visual and landscape impacts

Taller turbines will have a marginally expanded view shed, potentially affecting more receivers and increasing the impact on existing receivers.

A comprehensive visual impact assessment for the proposed modification, undertaken in accordance with the Wind Energy Visual Assessment Bulletin, is presented in Section 5 and Appendix B.1.

An updated shadow flicker analysis has also been undertaken for the proposed modification and the findings are described in Section 6 and Appendix B.2.

Operational noise impacts

Different turbine models can have individual turbine specific noise profiles and can result in different impacts for the wind farm. An assessment of the noise impact of the proposed wind farm, with a potential turbine that could be selected for the site and, ancillary infrastructure, specifically in relation to meeting operational noise criteria as per Development Consent Conditions 11 and 12 of Schedule 3, is presented in Section 6. The full Operational Noise Assessment report is provided in Appendix B.3.

Biodiversity impacts

The expanded footprint for roads, hardstands and cable routes based on realistic civil designs in the context of steep terrain and larger turbines has increased the area of clearing required for the project. Assessment of the additional clearing for the increased footprint of the modified project and the associated impacts on native vegetation and threatened species habitat has been undertaken by NGH Environmental and is provided in Section 8.

The increased clearing will generate a larger offset requirement. A revised and more accurate credit calculation and offset strategy in accordance with the NSW Biodiversity Offsets Policy for Major Projects is provided in Section 10.

Indigenous heritage

The increased extent of the development footprint and associated ground disturbance has potential to increase the risks of impacting Aboriginal heritage sites. An updated assessment and a draft Aboriginal Heritage Management Plan has also been developed by NSW Archaeology for the modified project and consultation with Aboriginal Stakeholders has been undertaken. An assessment of the modifications and changes in impacts on indigenous heritage is provided in Section 11 (supporting documents are provided in Appendix B.7).

Aviation hazard

An Aviation Safety Assessment for the modified project has been undertaken by Aviation Projects and the assessment sent to relevant stakeholders for review and comment. The assessment has considered the risks of taller turbines in respect of aircraft activities and regulated clearances as well as the need for aviation safety lighting.

Separate assessment of impacts on aviation radar systems has also been undertaken together with consultation with Air Services Australia and options for mitigation identified.

The Development Consent includes conditions (Schedule 3, Conditions 34 to 37) relating to development and implementation of an Aviation Impact Management Plan (AIMP) that relates to radar issues. The preparation of the AIMP is occurring separate from the process for this Modification Application and is appropriately addressed by the existing conditions.

Assessment of aviation safety risks for the modified project is presented in Section 12 and Appendix B.8.

Communications impacts

Assessment of potential for impacts of the modified wind farm on telecommunications services has been undertaken by Lawrence Derrick and Associates (LD&A). This has included identification of options for mitigation of the impacts. The assessment of operational risks on telecommunications services is presented in Section 13 and Appendix B.9. Existing conditions of consent are appropriate for this issue.

Traffic and haulage impacts

Implications of the on-site haulage of turbine components with larger dimensions has been considered in the civil design for on-site access tracks that has been referenced by assessments for the modification.

The Traffic Management Plan and preparation of off-site road and intersection upgrade designs required by the consent are well advanced and initial consultation has included input from Hilltops Council and RMS.

CWFPL considers that the existing consent conditions are equally appropriate for the modified project. Assessment of potential impacts and proposed mitigation are addressed in Section 14.

Supporting specialist assessments

Specialist investigations undertaken for this modification considered:

- The impacts assessed for the approved project.
- Any additional or increased impacts of the modified project.
- Options to avoid or reduce new or increased impacts of the modification.
- Any changes to the mitigation strategies required to appropriately manage impacts.
- Consultation with relevant agencies and/or the community as applicable for the potential impacts.

The additional impacts as a consequence of the modification have been assessed by specialists and commitments to additional mitigation measures have been developed where warranted.

Supporting specialist assessments undertaken to inform the Modification Application are listed below.

Table 4-1 Overview of specialist assessments

Specialist assessment type	Author	Within this Modification Application	Supporting Appended assessments
Landscape and visual impact assessment	Green Bean Design Pty Ltd	Section 5	Appendix B.1
Shadow flicker analysis	WSP Parsons Brinckerhoff	Section 6	Appendix B.2
Operational noise assessment	Marshall Day Acoustics	Section 7	Appendix B.3
Native vegetation clearing and habitat impact assessment	NGH Environmental Pty Ltd	Section 8	Supporting material provided in Appendix B.4
Operational bird and bat impact assessment	Brett Lane & Associates Pty Ltd	Section 9	Appendix B.5
Biodiversity offset strategy	NGH Environmental Pty Ltd	Section 10	Supporting material provided in Appendix B.6
Indigenous heritage assessment	NSW Archaeology Pty Ltd	Section 11	Appendix B.7
Aviation impact assessment	Aviation Projects	Section 12	Appendix B.8
Telecommunications assessment	Lawrence Derrick and Associates	Section 13	Appendix B.9
Traffic and transport impacts	GWA and Cardno	Section 14	NA

5 VISUAL IMPACTS

5.1 VISUAL IMPACTS OF THE APPROVED PROJECT

The currently approved project includes the construction and operation of up to approximately 79 wind turbines (with a maximum tip height of 150 m) and associated infrastructure. In March 2015, Environmental Resources Management Australia Pty Ltd prepared the report *Landscape and Visual Impact Assessment – Response to Secretary’s Environmental Assessment Report*. The report notes that the most affected landowners in the Coppabella Precinct have reached agreement with Epuron (the original proponent). The report concluded that the overall level of visual impact of the proposed wind farm on the surrounding residents and communities is acceptable. The report states ‘the proposed Yass Valley Wind Farm will have a generally low visual impact on its surrounds, and the site is a suitable landscape for the construction of a wind farm’.

The DPE Assessment Report (2016) concluded that:

The impacts of the western part of the project comprising 79 turbines (i.e. the Coppabella precinct) can be effectively managed to achieve acceptable environmental and amenity outcomes for the local community, and should be approved, subject to conditions.

Schedule 3, Conditions 1 to 3 of the Consent, address visual impact mitigation and appearance.

5.2 VISUAL IMPACTS OF THE MODIFIED PROJECT

Approach

Since the consent was granted, the following studies relevant to assessment and mitigation of visual impacts have been undertaken:

- Review of the revised wind turbine specifications and other modifications;
- Consultation with neighbours;
- Confirmation of sensitive receivers; and
- Consideration of whether any changes in the impacts are acceptable or require further mitigation.

A Visual Impact Assessment (VIA) of the modified project has been undertaken by Green Bean Design (GBD) and is presented in Appendix B.1. The VIA was prepared to assess the potential visual effect of the proposed modifications which includes an increased blade length to approximately 71m and increased tip height to approximately 171m. The VIA included the following tasks:

- Preparation of Zone of Visual Influence Diagrams;
- Preparation of 11 wire frame models and 12 photomontages to illustrate the approved Coppabella Wind Farm and modified wind turbines;
- Assessment of 24 non-associated residential dwellings; and
- Review of changes to ancillary facilities.

The VIA report has been prepared with regard to the New South Wales State Government Wind Energy: Visual Assessment Bulletin December 2016 (the Guidelines) as applicable to the Modification Application.

A summary of findings of the VIA is presented in the following sections.

Potential impacts of the modified project

Proposed CWF wind turbine modification

The proposed CWF Modification design would include:

- Up to 79 wind turbines (as approved).
- An increase of the blade tip height up to approximately 171 metres.
- A hub height up to approximately 100 metres (as used for previous visual assessment).
- An increase in rotor radius up to approximately 71 metres.
- An increase in rotor diameter up to approximately 142 metres.

Table 5-1 outlines the differences between details of wind turbines in the compliant CWF (allowable under existing consent) and proposed CWF modification.

Table 5-1 Compliant CWF and proposed CWF modification design criteria

	Hub height (assessment)	Rotor diameter (assessment)	Max. tip height	Total number
Approved CWF wind turbine	100 m	100 m	150 m	79
CWF proposed modification wind turbine	100 m	141 m	171 m	79
Difference	Nil	+41 m	+21 m	Nil
Percentage difference	0%	+41%	+14%	0%

Table 5-2 Compliant CWF and proposed modified CWF rotor swept area

	Rotor diameter	Swept area
Compliant CWF wind turbine	100 - 121 m	7,850 m ² to 11,499 m ²
Proposed CWF modification	141 m	15,459 m ²
Difference	+41 m	+3,960m ² to 7,609 m ²
Percentage difference	+41%	+34%

Zone of Visual Influence diagrams

Zone of visual influence (ZVI) diagrams show theoretical visibility of the project from neighbouring lands and primarily indicate the influence of topography in screening views of the wind farm but have not modelled other fine detail such as intervening vegetation that may provide screening. As such they can overestimate the visibility.

It is noted that ZVI diagrams for the approved project and modified project show a very similar extent within 5 kilometres of the CWF.

Whilst the overall extent of wind turbine visibility would be contained by topography for both the approved CWF and the proposed wind turbine modification, the number of wind turbine rotors and tips visible from specific receiver locations within the wind farm viewshed is likely to be subject to a marginal increase. The theoretical maximum change in blade tip visibility for any residence is eight additional visible blade tips.

The maximum change is in respect of residences C06 (29 to 36 tips) and C76 (54 to 62 tips). This assessment of visibility represents a theoretical maximum visibility as visual obstruction due to vegetation is not accounted for. Actual visibility at the residences will typically be less than the theoretical visibility derived from computer modelling, often substantially so. In the case of residence C06, mentioned above, there is significantly less than 36 tips evident in the photomontage for this viewpoint.

Ancillary infrastructure

The proposed modification involves changes to some of the ancillary infrastructure including additional temporary facilities at new locations. These changes are outlined below:

- The 132kV overhead line for grid connection the same as for the approved arrangement but it is possible that the optional switching station locations may no longer be required.
- Additional temporary construction compounds and laydown areas are proposed for the modification but are located such that they will have limited visibility from surrounding residences. Additionally, these facilities can be removed at the completion of construction.
- The 33kV overhead lines are replaced by 33kV underground cables as part of the modification.
- Clarifications are proposed to access tracks to confirm clearing requirements and larger batter formations, some of which will be visible from surrounding lands but these features are lower to the ground than structures such as wind turbines and revegetation of batter structures will ultimately reduce their visual impact.

Overall, these changes to ancillary infrastructure are not likely to result in any significant additional visual impacts relative to the consented project.

Assessment of Visual Effect

For the purpose of the VIA, the magnitude of visual effect takes account of the scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition or contrast with the landscape, including the proportion of the view occupied by the proposed updated wind turbine dimensions proposed as part of the modification relative to the currently consented wind turbine dimension.

A Visual Effects Matrix is included in the VIA (Table 7 of Appendix B.1) which sets out the comparative assessment of visual effects from eight representative residential dwellings within 3.4km from the modified project relative to the Visual Rating by ERM in 2015. Locations of the dwellings are illustrated in Figure 5-1. The matrix includes a determination of visual effects from dwellings and also takes into account any curtilage surrounding each dwelling which may be considered an extension to the dwelling for domestic or social activities.

The determination of residual visual effects resulting from the proposed CWF wind turbine modification would result primarily from observable differences between the consented project turbines and the modified wind turbines.

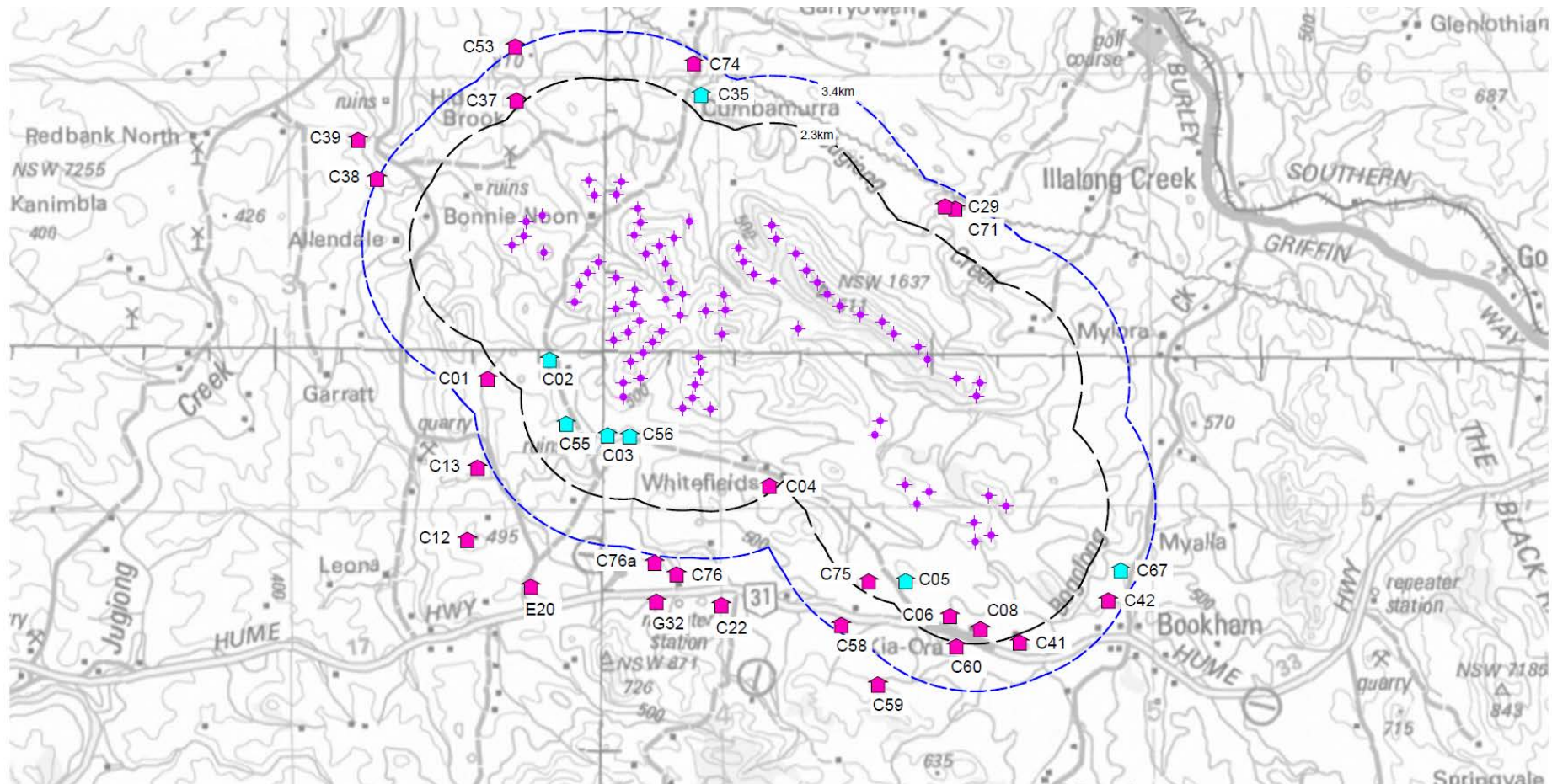
The Visual Effects Matrix summary below shows the results of analysis for the eight representative residential dwellings within 3.4km (C42 at 3,540m) of a proposed CWF wind turbine modification which were originally assessed in the Yass Valley Wind Farm Environmental Assessment. The overall assessment of magnitude of visual effects associated with the proposed CWF wind turbine modification is the same as for the 2015 assessment by ERM.

Table 5-3 Visual ratings for receivers for the consented and modified project (visual effect matrix)

Receiver location	Distance (m)	Visual Rating ERM 2015	Modified Visual Rating
C01	2,771	Low	Low
C06	2,077	Low	Low
C08	2,286	Low to negligible	Low to negligible
C37	2,527	Nil	Nil
C41	2,720	Low	Low
C42	3,540	Medium	Medium
C60	2,564	Low	Low
C75	2,831	Medium to Low	Medium to Low

GBD concluded that:

“The scale of change in the wind turbine structures, whilst noticeable from proximate residential view locations would not result in a degree of change significantly above the visibility of the approved CWF wind turbines.”



Coppabella wind turbine modification layout and residential dwelling locations

- | | |
|---|--|
| ★ Approved CWF and wind turbine modification location | --- 2.3 km wind turbine distance offset in accordance with DPE Visual Bulletin Dec 2016, Figure 5 - 171 metre tip height |
| ■ Non associated dwelling | --- 3.4 km wind turbine distance offset in accordance with DPE Visual Bulletin Dec 2016, Figure 5 - 171 metre tip height |
| ■ Associated dwelling | |

0km 2km



Figure 5-1 Consented CWF wind turbine modification layout with residential dwellings to 3.4km

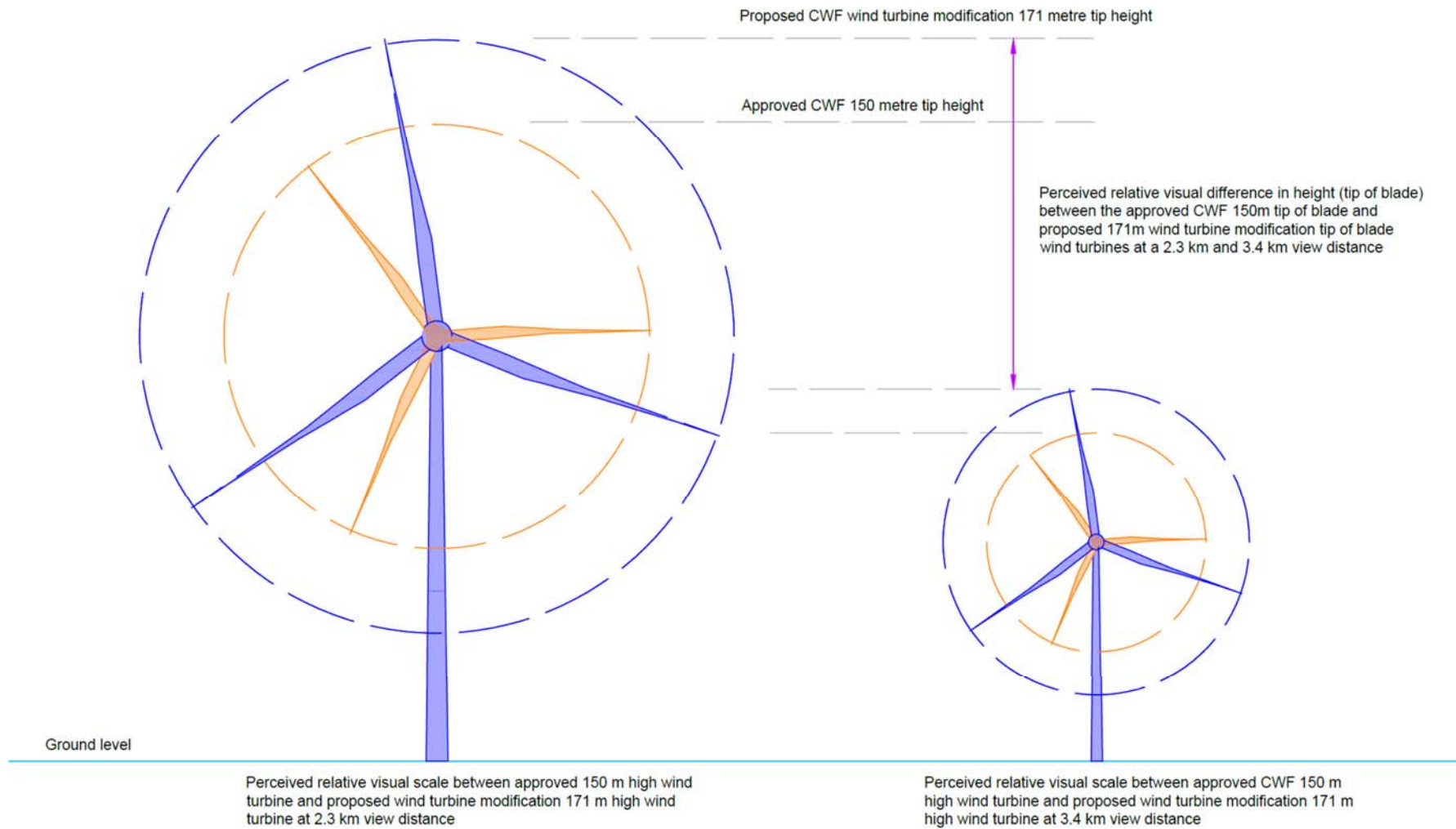


Figure 5-2 Observable difference in consented and modified CWF wind turbines at 2.3km and 3.4km view distance

Visual assessment – impacts to residential dwellings

The VIA (GBD 2017) provides a further visual assessment of the wind turbine modifications on people at residential dwellings surrounding the consented CWF.

The VIA notes that a number of dwellings around the project are considered associated under the development consent but with agreements that do not waive their visual screen rights. As such these dwellings have been designated and assessed as if non-associated.

Viewer sensitivity and visibility distance zones are included in Table 8 of the VIA (Appendix B.1). These predominantly include Level 2 Sensitivity Levels from rural dwellings. Visibility distance zones have been classified from near-middle ground to far middle-ground views.

Whilst the consented CWF and the proposed CWF wind turbine modifications would be visible (in whole or in part) from the majority of residential dwellings within 3.4 kilometres of wind turbine locations, overall visibility would be partially restricted from many areas (including from dwellings and associated curtilage) due to tree cover and/or the influence of surrounding landforms.

The visual assessment of the modified CWF wind turbines has been assessed by GBD as consistent with that for the consented wind turbines with regard to their visual form, design, pattern and colour. The proposed wind turbine modification would not introduce elements that are significantly more prominent or out of character with the consented project, and the potential for the proposed wind turbine modifications to result in any additional significant cumulative visual effects is considered to be low. The proposed Coppabella Wind Farm modification would result in an overall low level of visual magnitude and a largely unchanged visual impact rating in accordance with the consented Coppabella Wind Farm project.

The implementation of landscape works would provide visual mitigation for a number of dwellings surrounding the consented wind farm site in accordance with the Conditions of Consent.

The proposed wind turbine modification would not result in any fundamental change to the consented ancillary structures and would not result in any additional visual impacts to those outlined in the consented application.

Previously consented ancillary wind farm infrastructure would not result in unacceptable levels of visual impact from surrounding key receiver locations with regard to the proposed CWF Modification.

Wire frame models and photomontages

Eleven wire frame models and 12 photomontages have been prepared to illustrate the consented YVWF and proposed modification wind turbine layouts. The wireframe model and photomontage locations have been prepared to illustrate viewpoints from residential dwellings with views towards the consented YVWF and the proposed CWF wind turbine modifications. The wireframe model and photomontage locations are illustrated in Appendix B.1, from Figure 7 of the VIA.

The 12 photomontages simulate the visibility of the modified turbines in the site's terrain at selected viewpoints. The wireframes indicate turbines that may potentially visible but do not take into account screening vegetation and can therefore often overstate visibility. They provide more realistic guide to the visual impact than the wireframe diagrams.

Table 5-4 Changes in visibility of wind turbines for the modification relative to the existing consent

Non-associated residential dwellings (figure 1)	Distance to closest wind turbine (m)	Wind turbine hubs and tips theoretically visible (tips in brackets)			ERM Visibility Rating (2015)
		Approved CWF	Modified CWF	Difference	
C01	2771	7 (17)	7 (22)	0 (5)	Low
C04	2280	42 (51)	42 (53)	0 (2)	Medium
C06	2007	25 (29)	25 (36)	0 (8)	Low
C08	2286	20 (33)	20 (39)	0 (6)	Low/Med
C22	3711	25 (39)	25 (42)	0 (3)	Not assessed
C29	3025	18 (22)	18 (24)	0 (2)	Not assessed
C37	2527	23 (27)	23 (31)	0 (4)	Nil
C41	2720	31 (46)	31 (51)	0 (5)	Low
C42	3540	19 (24)	19 (27)	0 (3)	Medium
C46a	3626	10 (14)	10 (16)	0 (2)	Not assessed
C49	3875	25 (35)	25 (39)	0 (4)	Not assessed
C53	3522	54 (59)	54 (61)	0 (2)	Not assessed
C58	3324	44 (55)	44 (62)	0 (7)	Not assessed
C59	4056	61 (65)	61 (68)	0 (3)	Not assessed
C60	2564	30 (41)	30 (47)	0 (6)	Low
C61	4071	31 (48)	31 (54)	0 (6)	Not assessed
C71	2978	15 (22)	15 (24)	0 (2)	Not assessed
C75	2831	5 (5)	5 (7)	0 (2)	Med to low
C76	3864	45 (54)	45 (62)	0 (8)	Not assessed
C76a	4162	39 (52)	39 (57)	0 (5)	Not assessed

GBD concluded that:

“...the proposed CWF wind turbine modification would result in additional wind turbine blades being visible at residential dwellings within 3.4 km of the approved wind turbine locations. There would be no additional wind turbine hubs visible from the surrounding residential dwellings. Views toward additional wind turbine rotors and blade tips are not considered to result in a magnitude of visual effect which is greater than the magnitude of visual effect associated with the approved CWF project.”

Night lighting

The Yass Valley Wind Farm Consent Conditions note that the Applicant shall ensure that any aviation hazard lighting complies with CASA’s requirements. The VIA notes that no requirements have been provided by CASA with the regard to the proposed CWF modification.

No additional conditions are considered necessary to address the marginal increased visual impacts arising from the modifications. The Conditions of Consent issued for the project remain valid for the proposed modification.

5.3 SUMMARY OF VISUAL IMPACTS AND THEIR MANAGEMENT

- The proposed wind turbine modification would not introduce elements that are any more prominent or out of character with the compliant project. The potential for the proposed wind turbine modifications to result in any additional significant cumulative visual effects relative to the impact of the approved turbines is considered to be low.
- Previously consented ancillary wind farm infrastructure would not result in unacceptable levels of visual impact from surrounding key receiver locations with regard to the proposed CWF modification.
- The proposed CWF modification would result in an overall low level of visual magnitude and a largely unchanged visual impact rating relative to the consented project.
- The implementation of landscape works would provide visual mitigation for a number of dwellings surrounding the consented wind farm site in accordance with the Conditions of Consent.

6 SHADOW FLICKER

6.1 SHADOW FLICKER IMPACTS OF THE APPROVED PROJECT

As part of the environmental assessment for the approved project, Epuron conducted a shadow flicker assessment in September 2014, titled *Yass Valley Wind Farm – Shadow Flicker Addendum Report*. The assessment was based on a 100m diameter blade on a 100m tower. The shadow flicker assessment determined that:

1. Under a worst-case scenario, one receptor (receptor C02) would be affected by shadow flicker for a duration of 19 hours per year.
2. Under the 'expected' scenario (which takes into consideration variables such as cloud cover), it was found that receptor C02 would not be affected at all by shadow flicker.

The model used to calculate the 'expected' shadow flicker impact used a calculation distance of 1.06km. In comparison, a 2km distance was used under the worst-case scenario.

6.2 SHADOW FLICKER IMPACTS FOR THE MODIFIED PROJECT

Approach

WSP Parsons Brinckerhoff (WSP|PB) was commissioned by the proponent to prepare a Shadow Flicker assessment report for the Modification Application. The report is attached in full at Appendix B.2 and details are summarised below.

WSP|PB used modelling software, WindPro v3.1, to model the impacts of shadow flicker on receptors at the Coppabella Wind Farm. The model used for the calculation of flicker effects contains a mathematical model of the sun's position in the sky for a given location and time of year. Also contained in the model is information in relation to the three-dimensional positions and sizes of the turbines and residential receptors. This information is combined within the model to calculate the times for which the turbine rotors will cast shadows over the receptors.

Each of the 79 wind turbines were included in the model to assess the impacts of shadow flicker. The assessment was based on the following wind turbine parameters:

- Turbine hub height of 100m
- Turbine rotor diameter of 140m
- Turbine blade chord length of 4.51m

WSP|PB considered a conservatively large receptor window of 10m in width and 2m in height to adequately include borderline situations where a receptor is marginally exempt from experiencing the effects of shadow flicker.

The NSW Planning Guidelines state that when undertaking an assessment for shadow flicker, the zone of influence that should be considered in the model is 2km. The guidelines also specify that if a receptor is located within this zone of shadow flicker influence, receptor exposure to shadow flicker should not exceed 30 h/year. Therefore, WSP|PB has investigated shadow flicker within a maximum distance of influence of 2km.

WSP|PB applied a reduction factor to account for cloud cover at the CWF site to provide a statistical average annual estimate of shadow flicker. This is based on recorded information on sunlight and cloud cover by the Bureau of Meteorology (BoM). The closest reference site is located at Canberra Airport (Station Number 070014), approximately 79km southeast of CWF. This sunlight and cloud cover information is applied to the shadow flicker assessment on a monthly average basis, measured using a Campbell-Stokes device.

The cloud cover reduction factor has been applied to the shadow flicker results for the annual aggregate value only.

Potential impacts of the modified project

Shadow flicker is the fluctuating light levels caused by intermittent (moving or changing) shadows. Shadow flicker occurs when the sun passes through a wind turbine rotor and the rotating blades cast an intermittent shadow that projects to various distances depending on the angle of incidence, terrain and atmospheric conditions.

The shadow flicker effect can cause irritation when the shadow is received at a dwelling. The intensity of the shadow flicker effect will decrease with the distance from the wind turbine. If a dwelling is within 2km of a wind turbine, there is potential for shadow flicker to be noticeable and may cause irritation to the resident but at increasing distance the effect may be more diffuse than if at close proximity.

Of the 129 receptors assessed for shadow flicker impacts by WSP|PB (2017), and similar to the pre-approval assessment, it was found that one receptor (C02), located approximately 1.6km from the nearest wind turbine, would experience shadow flicker impacts. Receptor C02 has been estimated to experience 13:17 hours of shadow flicker per year on a statistical average basis. Therefore, Receptor C02 does not exceed the suggested allowable exposure of 30 hours of shadow flicker per year.

Mitigation strategies for the modified project

Potential shadow flicker impacts resulting from any turbine micro-siting may need to be investigated prior to the micro-siting location being confirmed, if the turbine is within 2km of a residence location. This is in accordance with the approved project's mitigation strategy.

6.3 SUMMARY OF SHADOW FLICKER IMPACTS AND THEIR MANAGEMENT

- **No receptors exceed the allowable exposure of 30 hours of shadow flicker per year.**
- **Mitigation of impacts will be in accordance with the approved project's mitigation strategy.**
- **No change to consent conditions is required.**

7 NOISE IMPACTS

7.1 NOISE IMPACTS FOR THE CONSENTED PROJECT

Separate noise assessments were completed for Coppabella and Marilba precincts and provided in the Environmental Assessment (2009). The Coppabella Assessment found that construction noise associated with the project would be below the 'highly noise affected' criterion (i.e. 75dB(A)) for all non-associated residences for construction works during standard hours. The assessment found that a small number of non-associated residences may be subject to temporary noise above the 'noise affected criterion' (i.e. 40dB(A)) for some construction activities during the day, but these exceedances would be temporary and not significant (i.e. not exceed 5dB(A) above the criteria).

The results of the operational noise assessments demonstrated that the predicted noise levels at each assessed location comply with the applicable non-associated limits across the range of assessable wind speeds for the Senvion MM92 candidate turbine. The results also generally demonstrated compliance at all locations for the Vestas V90 candidate turbine, with the exception of receiver C04 where the predicted noise levels were marginally higher than the noise limits (by up to 0.4dB(A)), however the NSW EPA considered this minor exceedance to be inaudible.

The NSW Department of Planning and Environment noted in their Assessment Report (2016) that it was satisfied that the noise generated by the project would comfortably comply with the applicable noise criteria (provided that the Vestas V90 turbine model is not used (Schedule 2, Condition 7 of Consent)) and is unlikely to result in any significant noise impacts.

7.2 NOISE IMPACTS FOR THE MODIFIED PROJECT

Assessment Methodology

Marshall Day Acoustics were commissioned by the proponent to prepare an Operational Noise Assessment for the Coppabella Wind Farm Modification Application. The assessment is provided in Appendix B.3 and details are summarised below.

The approach to the noise assessment included:

- Determining the assessment criteria and guidelines: the updated operational noise assessment considered both the conditions set out in the Development Consent (refer to Table 7-1 outlined below) and the NSW Noise Assessment Bulletin (NSW DPE, 2016). The NSW Noise Assessment Bulletin was deemed to be the relevant assessment criteria and was adopted as the basis of the assessment.
- Prediction of noise levels using a three-dimensional noise model generated in SoundPLAN®.
- Assessment of predicted noise levels associated with turbine model GW140-3.4MW against the noise criteria defined for each receiver.

The noise assessment notes that a number of receivers around the project are considered as associated according to the broader definitions of the development consent but do not have an increased base criterion defined in their agreements. As such, these receivers have been designated and assessed as non-associated receivers in this report.

Table 7-1 Noise Criteria dB(A) (as detailed in Condition 11 of Schedule 3 of the Development Consent)

Residence	Criteria (dB(A)) with Reference to hub height wind speed (m/s)											
	3	4	5	6	7	8	9	10	11	12	13	14
C04	35	35	35	35	35	35	35	35	36	37	38	38
C74	35	35	35	35	35	35	35	38	39	41	43	44
All other non-associated residences	The higher of 35 dB(A) or the existing background noise level (L _{A90} (10-minute)) plus 5 dB(A)											

The original background noise data and the Development Consent limits have not been reanalysed as part of the updated Noise Assessment. Specifically, the data have not been correlated with the wind speeds at the increased hub-height that is presently proposed. Accordingly, for the purpose of the updated operational noise assessment, a simplified and conservative assessment has been carried out by referring to the base noise criterion of 35 dB only.

The modified project uses turbines with larger rotor size and output capacity than previously assessed. The modification is seeking to increase the maximum tip height of the wind turbines up to approximately 171m and output capacity up to approximately 3.57 MW to reflect improvements in wind turbine technology. The noise impact assessment is based on the wind turbines with a capacity of approximately 3.4 MW.

The approach taken is considered conservative. If the worst-case approach undertaken is shown to comply then it can be safely assumed that the turbines being considered would comply by a more significant margin.

Potential impacts of the modified project

Predicted noise levels

Table 7-2, below, presents the assessed receiver locations where operational wind farm noise levels are predicted to be higher than 30 dB L_{Aeq}. Predicted noise levels at all fifty-seven (57) receiver locations identified within a distance of 5km of the Coppabella Wind Farm can be found in Appendix F of the Operational Noise Assessment (Appendix B.3).

Table 7-2 Predicted A-weighted noise levels dB L_{Aeq} (from Marshall Day Acoustics, 2017)

Receiver	Receiver status	Hub-height wind speed	
		8 m/s	9 to 12 m/s
C01	Non-associated	33.7	34.8
C02	Associated	39.0	40.1
C03	Associated	38.6	39.7
C04	Non-associated	35.6	36.7
C05	Associated	33.8	34.9
C06	Non-associated	33.0	34.1
C08	Non-associated	31.0	32.1
C13	Non-associated	31.6	32.7

Receiver	Receiver status	Hub-height wind speed	
		8 m/s	9 to 12 m/s
C22	Non-associated	30.2	31.3
C29	Non-associated	33.4	34.5
C30	Non-associated	31.7	32.8
C34	Non-associated	30.2	31.3
C35	Associated	34.7	35.8
C37	Non-associated	33.0	34.1
C41	Non-associated	30.1	31.2
C53	Non-associated	31.3	32.4
C55	Associated	37.4	38.5
C56	Associated	39.4	40.5
C58	Non-associated	31.4	32.5
C60	Non-associated	30.7	31.8
C71	Non-associated	33.5	34.6
C74	Non-associated	33.9	35.0
C75	Non-associated	31.7	32.8
C76	Non-associated	31.8	32.9
C76a	Non-associated	31.0	32.1
G30	Non-associated	30.5	31.6
G32	Non-associated	30.5	31.6
H30	Non-associated	30.5	31.6

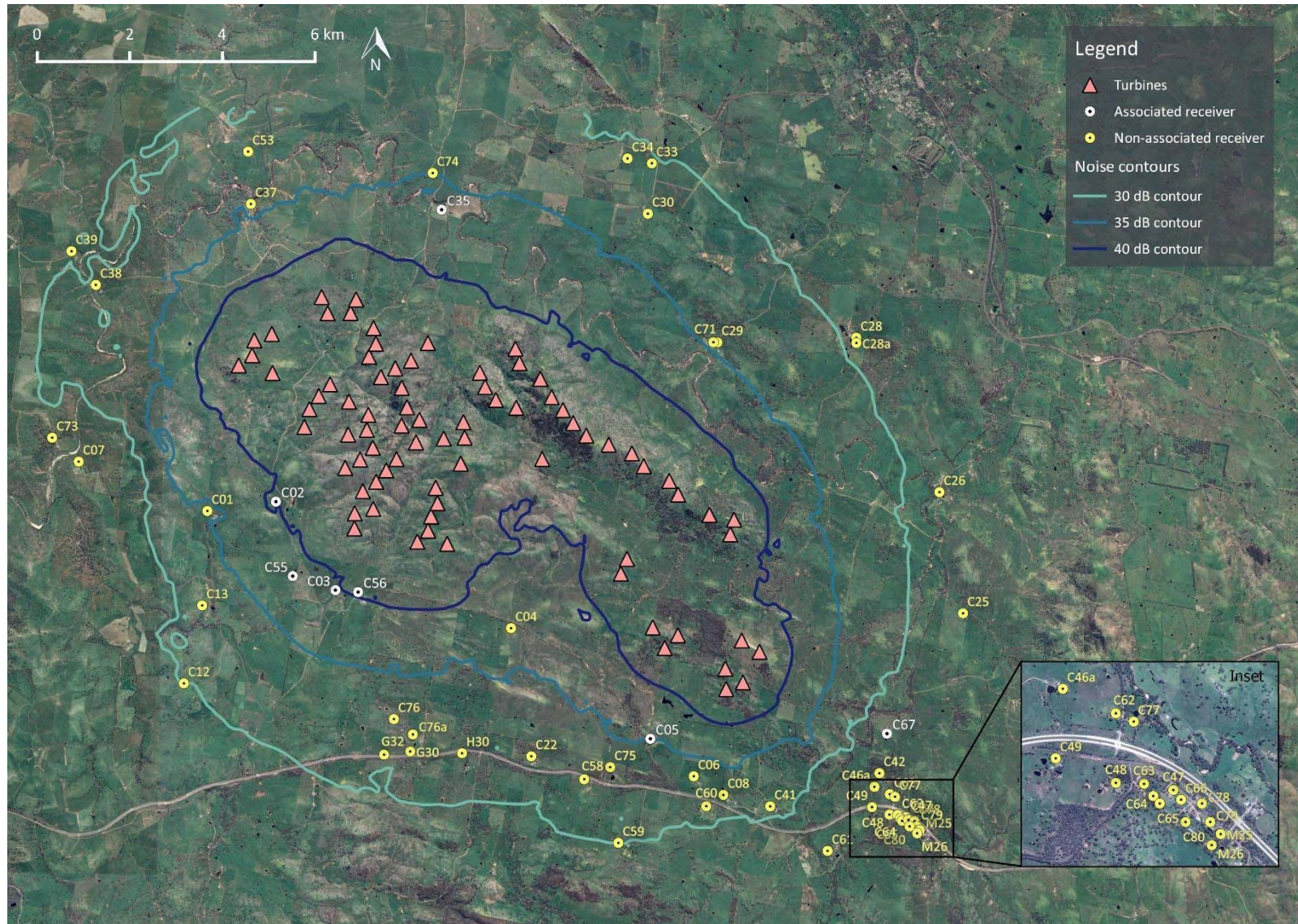


Figure 7-1 Noise contour map showing associated and non-associated receivers

The results of the operational noise assessment demonstrate that the predicted noise levels achieve the base criterion of 35 dB at all assessed wind speeds at all non-associated receiver locations, with the exception of C04 where the wind farm noise level is predicted to be 36.7 dB (1.7 dB higher than the base criterion).

In relation to the assessed associated receiver locations, the maximum predicted wind farm noise level was 40.5 dB. Agreements are in place between the proponent and associated land owners and the predicted noise levels remain within the parameters accepted under these agreements.

Ability to undertake compliance monitoring

In order to assess compliance during operation, noise testing is to be performed at a representative number of non-associated residents around the wind farm. The noise data is correlated with wind speed data from the nearest reference meteorological mast. The results of these tests will be compared to the background measurements previously measured at these sites to ensure that the operational measurements do not exceed the criteria specified in Schedule 3, Condition 11. However, uncertainty can result from these comparisons due to:

- Original background data being outdated due to changes in vegetation, layouts or structures at the measurement location over time (original data collected in 2008).
- Seasonal differences between the measurement periods.
- Correlation of wind speeds between meteorological masts that are in different locations, or no longer installed.
- Extrapolation of wind speed data from measured heights to revised hub heights.

For the original assessment, most background measurements were recorded in 2008, with some additional locations being recorded in 2013. None of the meteorological masts installed in 2008 remain and the meteorological masts that were utilised in 2013 will need to be removed to allow construction. Prior to construction, new masts will be installed at locations that can be maintained for the life of the wind farm and these will be used for monitoring wind speeds at the likely hub height for the modified project (approximately 100m).

Condition 11, Table 3 of the conditions of consent sets separate criteria for two residences (C04 and C74) based on the previous background tests. The noise criteria for C04 is based on background noise measurements taken in July 2008 and based on wind speed measurements taken at 10m above ground level. This criterion was re-referenced to 80m wind speeds in a later report in 2013. The noise criteria for C74 is based on background noise measurements taken in October 2013 and based on wind speed measurements taken at 80m above ground level. The noise assessment by Marshall Day Acoustics was unable to accurately assess against these criteria as the criteria are referenced to 80m hub height, rather than the proposed 100m hub height in this modification.

In order to assess noise compliance accurately, updated background testing is proposed to be performed at representative non-associated locations around the wind farm. This will be completed prior to commissioning of the wind farm and these locations will form the basis for operational noise tests. Assessing both background and operational noise data using the same reference mast will increase accuracy and confidence in the results.

Mitigation strategies for the modified project

Results from the assessment generally suggest that mitigation is not required for the project as compliance is predicted at all but one location, receiver C04. In relation to C04, further assessment is being carried out including:

- Updated background noise data to determine the specific noise limits at each integer wind speed with reference to hub height wind data.
- Sound power level testing on the proposed wind turbine to verify the noise predictions for the assessed receiver locations.

Further, ongoing consultation is also occurring with the owner of receiver C04.

This further assessment and ongoing consultation may establish that full compliance has been achieved. If, however, the review of this additional data indicates that mitigation measures are required to achieve compliance at C04, then a number of mitigation options that have been assessed by Marshall Day Acoustics to ensure compliance with the conservatively assumed base criteria could be configured. These mitigation strategies include nearby wind turbines being shut down or entering reduced power modes during certain wind conditions.

7.3 SUMMARY OF NOISE IMPACTS AND THEIR MANAGEMENT

- The approach to modelling and assessing noise was conservative.
- The project is compliant at all neighbouring receivers except for one (C04), where the predicted noise level is potentially 1.7dB higher than the limit, depending on the level of the background noise at C04. Further assessments are being carried out to determine compliance and the neighbour is also being consulted regarding a neighbour agreement. Should mitigation be required, then several solutions have been assessed as able achieve compliance against the conservative base criteria and these could be applied.
- Mitigation strategies are generally in accordance with the approved project.
- Additional management measures to improve the accuracy and reliability of compliance assessments include the following:
 - Provide hub height monitoring masts.
 - Update background noise data.
 - Derive up-to-date criteria in accordance with SA EPA Guidelines.

8 BIODIVERSITY IMPACTS FOR THE MODIFIED PROJECT: NATIVE VEGETATION CLEARING

8.1 NATIVE VEGETATION CLEARING IMPACTS OF THE CONSENTED PROJECT

The Yass Valley Wind Farm Environmental Assessment (NGH Environmental 2009a) and subsequent studies² found that the construction and operation of a wind farm at the Coppabella precinct would or could have the following potential key impacts to biodiversity:

- Impacts to native vegetation communities, including:
 - Box Gum Woodland;
 - Long-leaved Box Dry Grass Forest;
 - Riparian vegetation; and
 - River Red Gum Forest.
- Removal of hollow-bearing trees (HBTs).
- Impacts to threatened species habitat, including:
 - Regent Honeyeater *Anthochaera Phrygia* (Critically Endangered – EPBC Act and TSC Act); and
 - Superb Parrot *Polytelis swainsonii* (Vulnerable – EPBC Act and TSC Act).

Assessments of Significance (under the TSC Act and EPBC Act) found that the impacts would not be significant for any assessed entity, with the implementation of the proposed mitigation measures. Offsetting of the BGW community and threatened species habitat, in accordance with the NSW Biodiversity Offsets Policy for Major projects, set out in Schedule 3 Condition 20 is a requirement for the project. The proponent has committed to addressing the requirement through the retirement of credits in accordance with the NSW BioBanking methodology. A Biodiversity Management Plan to minimise other risks during construction is also required for the project.

Approval does not include all required Coppabella infrastructure

It is noted that the Biodiversity Risks and Offsets submission to the PAC (NGH Environmental March 2015), upon which the approval was based, included clearing estimates for five separate precincts: Coppabella, Marilba (east and west), Conroy's Extension and the 330kV Grid Connection (identified as 'Transmission') to connect the wind farm south. When only the Coppabella precinct was approved, the clearing allowance omitted some infrastructure elements required for this precinct. This was due to the assignment of these infrastructure elements to the Transmission 330kV Grid Connection precinct in the project's GIS files. Refer to Appendix A.5. The result is that the clearing limit in Condition 19 does not include 18.1 ha of Box Gum Woodland required to construct the Coppabella precinct; about 26% of the Box Gum Woodland clearing

² Subsequent studies key to the assessment of biodiversity impacts at the Coppabella include the Yass Valley Wind Farm Supplementary Ecology Report (NGH Environmental 2012), Yass Valley Wind Farm – Golden Sun Moth and Striped Legless Lizard 2014/2015 Summer Survey Results (NGH Environmental 2015) and the Yass Valley Wind Farm Submission to the PAC (NGH Environmental 2015)

limit allowed for the project. This change in vegetation impact also has implications for Schedule 3 Condition 20 that addresses offset requirements for the project. This issue is addressed specifically in the sections below.

Flora

The *Biodiversity Risks and Offsets* submission to the PAC (NGH Environmental March 2015) is the most recent biodiversity document for the approved project. It summarises the results of several detailed biodiversity surveys and assessments which assessed the impact of the approved layout on flora from the construction of turbines and access tracks, substation, switchyard, operational buildings, construction compounds and facilities and overhead and underground transmission lines. Additional investigations for the submission to the PAC (March 2015) included targeted surveys for the threatened Yass Daisy, field validation of treeless pasture areas and Biometric plot surveys to better define the extent and condition of the White Box – Yellow Box – Blakely's Red Gum community (Box-Gum Woodland). This community is listed as an Endangered Ecological Community (EEC) under NSW, and as a Critically Endangered Ecological Community (CEEC) under Commonwealth legislation.

Regarding flora of conservation significance, the submission to the PAC identified that approximately 67.3 hectares of Box-Gum Woodland EEC would be impacted by the project. This included areas of derived grassland, including those in low condition (exotic dominated with a minor native component). The loss of 67.3 hectares was assessed as being unlikely to result in a significant impact to the Box-Gum Woodland EEC. As indicated above, a loss of 85.4 hectares is associated with the Coppabella precinct and 132kV grid connection infrastructure. The submission to the PAC had identified a total of 226.4 hectares impacted for the five precincts assessed.

The submission to the PAC noted specifically, that all areas where Yass Daisy have been identified would be buffered to protect this species during construction and, no impacts were anticipated. As this species is known to occur in moderate – good (high diversity) condition woodland at the project site, it is considered pertinent to quantify the impacts on this habitat from the consented layout to facilitate comparison to the modification layout. As such this has been included as threatened flora habitat.

No other EECs or threatened flora species were identified as having the potential to be impacted by the approved project.

Fauna

The key fauna habitat impacts relating to vegetation and habitat clearance identified in the submission to the PAC were:

- Loss of hollow-bearing trees (HBTs)
- Habitat loss for threatened microbats
- Habitat loss for woodland birds (in particular Superb Parrot and Regent Honeyeater); and
- Habitat loss for the Golden Sun Moth (GSM) (not found at the site after targeted surveys).

Loss of hollow-bearing trees

An assessment of desktop aerial imagery was employed for the Coppabella Precinct to estimate potential impacts to HBTs. The method was developed in consultation with OEH and involved measuring the crown diameter of all trees using a GIS and assumed that all trees with a canopy diameter over 15m were hollow-bearing. The assessment was focussed on the turbine sites and defined an impact zone of 50m from the turbine where land sloped away and up to 100m from the turbine site where the land was flat or sloped

upward. Using this methodology up to 251 HBTs (152 live trees and 99 stags) were identified as being impacted under the approved layout. The desktop assessment did not include areas proposed to be developed for access tracks and the powerline.

Habitat loss for the Superb Parrot and Regent Honeyeater

The Coppabella Hills Precinct Biodiversity Assessment (Coppabella BA) (NGH Environmental 2009b), identified one threatened fauna species as being at high risk of impact due to habitat removal (based on the assessments of significance pursuant to the TSC Act and EPBC Act); Superb Parrot - *Polytelis swainsonii* listed as Vulnerable TSC Act and Vulnerable EPBC Act. All other threatened fauna species were assessed as being at a low risk of impact due to habitat loss. The Coppabella BA assessed the significance of the impact to the Superb Parrot and identified four areas containing high condition woodland remnants supporting hollow-bearing trees that provided important breeding habitat for this species:

- Road-side remnants adjacent to Whitefield's Road
- Around Turbines 78, 79 and 80 and in the saddle to the south-east (identified in the BA as "In the saddle and north west crest on Cluster 10")
- Between Turbines 2 and 19 (identified in the BA as "In the transmission easement on the south-facing slope and saddle between Clusters 6 and 7a")
- In hollow-bearing paddock trees and woodland that occur around and to the west of Turbine 29 (identified in the BA as "within the valley between Clusters 5 and 7a")

Habitat along Whitefield's Road was identified as being particularly important. The assessment concluded that:

Impacts on these areas, in particular on hollow-bearing trees, should be avoided to ensure that the proposed action does not result in a significant impact on the lifecycle of Superb Parrot such that a local population is likely to be placed at risk of extinction.

Impacts to these areas have been largely avoided or, are able to be managed to minimise impacts to hollow-bearing trees (refer minimisation process summary in Table 8-3), with the exception of Whitefield's Road where road widening works over a 1.3km section are a requirement for site access. A number of hollow-bearing trees would be impacted in this area. Works in this area were part of the consented project. Condition of Approval 19 (b) requires the proponent to:

...implement all reasonable and feasible measures to minimise the impact on hollow-bearing trees and mature trees along Whitefield's Road....

The design is being finalised to minimise impacts, in accordance with this condition.

The Coppabella BA identified the risk to the Regent Honeyeater from habitat removal in the Coppabella precinct as low. The Regent Honeyeater was not detected onsite during surveys for the Coppabella BA or during the additional investigations for the PAC submission, however, as a precautionary approach, and given the species is nomadic, it was assumed to sometimes use the site. Given that this species is listed as critically endangered under both the NSW TSC Act and Commonwealth EPBC Act, habitat loss was conservatively identified as a key impact in the submission to the PAC, despite it not having been detected onsite.

Habitat loss for the Golden Sun Moth

Surveys for Golden Sun Moth were undertaken in December 2013 for Coppabella and Marilba precincts. The results of these surveys are documented in the Commonwealth Controlled Action Referral and Additional Information Report (Epuron 2014). These surveys identified Golden Sun Moth to occur broadly

across the Marilba precinct, east and west, with a small number of sightings at the Conroys Gap Extension precinct. No Golden Sun Moth were identified at the Coppabella precinct. Follow up Golden Sun Moth surveys were undertaken, focusing on the Coppabella precinct, in December 2014 and early January 2015 (NGH Environmental 2015b). No Golden Sun Moths were recorded. Based on the results of the above surveys, the species is considered unlikely to occur.

8.2 NATIVE VEGETATION IMPACTS FOR THE MODIFIED PROJECT

This assessment was undertaken to address new or increased biodiversity impacts arising from the modified project. It also acknowledges an error affecting the Condition 19 clearance limit, as above, where 18.1 ha required for the construction of the Coppabella precinct was omitted from the clearance limit.

Note: Section 7 deals only with the vegetation clearing impacts, Section 8 addresses avifauna collision risks and Section 9 addresses Biodiversity Offset requirements.

Approach

This section provides details of an assessment of changes to the biodiversity impacts for the modified project relative to the approved project in relation to:

1. Changes to development footprint arising from the detailed engineering design and larger turbine model including impacts extending outside the consented 'Development Corridor'.
2. Increased vegetation clearing impacts on communities and species listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act). This is now based on the civil design footprint and includes a 5m buffer on most infrastructure for the design footprint, to account for associated disturbance during construction.
3. Increased number of hollow-bearing trees to be cleared. As above, this is now based on the civil design footprint and includes a 5m buffer. This was included in consultation with OEH.
4. Additional field work and investigation conducted to inform the assessment and assist preparation of responses to consent conditions.
5. Additional mitigation measures required for the modified project.

Updated desktop assessment

Given that the original database searches for threatened species and communities were undertaken in September 2008, updated searches have been undertaken (in 2017) to identify any threatened species or communities that have been more recently listed that have the potential to occur at the project site and to determine if any other threatened species have been recorded more recently in proximity to the project site. An updated Bionet search undertaken for the Murrumbateman, Upper Slopes and Bondo CMA subregions (from the Murrumbidgee region) and an EPBC Protected Matters Search within a 50km radius of the study area (centre point 34° 44' 42.51" S, 148° 33' 36.16" E) identified the additional species listed in Table 8-1 that have the potential to occur at the project site:

Table 8-1 Additional species returned from the updated database searches

Scientific name	Common name	TSC Act	EPBC Act	Habitat present?	Potential to occur and be impacted?
FLORA					
Caladenia arenaria	Sand-hill Spider Orchid	V	V	No	No
Caladenia concolor	Crimson Spider Orchid	E	V	No	No
Pterostylis foliata	Slender Greenhood	V		No	No
Brachyscome muelleroides	Claypan Daisy	E	V	No	No
Caesia parviflora var. minor	Small Pale Grass-lily	V	V	No	No
Carex raleighii	Raleigh Sedge	V	V	No	No
Discaria nitida	Leafy Anchor Plant	V		No	No
Eucalyptus aggregata	Black Gum	V		Yes	No, conspicuous species not detected during survey
Euphrasia collina subsp. muelleri	Mueller's Eyebright	V		No	No
Euphrasia scabra	Rough Eyebright	V		No	No
Pomaderris pallida	Pale Pomaderris	V		No	No
Pultenaea humilis	Dwarf Bush-pea	V		Yes	Yes, potential habitat in good condition woodland and forest. Although no records within 50km, the species is predicted to occur
Senecio macrocarpus		E	E	Yes	Unlikely, only two records in NSW around 50km south-east
Swainsona recta	Small Purple-pea	E	CE	Yes	Yes, potential habitat in good condition woodland and forest. Although no records within 50km, the species is predicted to occur
Pelargonium sp. Striatellum (G.W. Carr 10345)	Omeo Stork's-bill		E	No	No
Pterosytilis oreophila	Blue-tongued Orchid		CE	No	No
FAUNA					
Amphibia					
Pseudophryne pengilleyi	Northern Corroboree Frog	E	V	No	No

Scientific name	Common name	TSC Act	EPBC Act	Habitat present?	Potential to occur and be impacted?
<i>Crinia sloanei</i>	Sloane's Froglet	E	E	Yes	No, potential habitat along powerline route only
Aves					
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V		No	No
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V		Yes	Unlikely, all but one record (1982) to the west of the site
<i>Anseranas semipalmata</i>	Magpie Goose	V		No	No
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V		Yes	Yes, recorded on or near the site
<i>Calidris ferruginea</i>	Curlew Sandpiper	V		No	No
<i>Circus assimilis</i>	Spotted Harrier	V		Yes	Yes, recorded widely in the region
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	V	Yes	Yes, recorded widely in the region
<i>Epthianura albifrons</i>	White-fronted Chat	V		No	No
<i>Falco subniger</i>	Black Falcon	V		Yes	No, foraging habitat only
<i>Glossopsitta pusilla</i>	Little Lorikeet	V		Yes	Yes, recorded near the site and uses hollows for breeding
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V	V	No	No
<i>Hieraaetus morphnoides</i>	Little Eagle	V		Yes	Yes, recorded widely in the region
<i>Pachycephala olivacea</i>	Olive Whistler	V		No	No
<i>Petroica boodang</i>	Scarlet Robin	V		Yes	Yes, recorded widely in the region
<i>Petroica phoenicea</i>	Flame Robin	V		Yes	Yes, recorded widely in the region
<i>Petroica rodinogaster</i>	Pink Robin	V		No	No
<i>Tyto longimembris</i>	Eastern Grass Owl	V		No	No
<i>Tyto novaehollandiae</i>	Masked Owl	E	E	No	No
<i>Tyto tenebricosa</i>	Sooty Owl	V		No	No
<i>Leipoa ocellata</i>	Malleefowl		V	No	No
<i>Numenius madagascariensis</i>	Eastern Curlew		CE	No	No
<i>Monarcha melanopsis</i>	Black-faced Monarch		M	No	No
<i>Motacilla flava</i>	Yellow Wagtail		M	No	No

Scientific name	Common name	TSC Act	EPBC Act	Habitat present?	Potential to occur and be impacted?
Rhipidura rufifrons	Rufous Fantail		M	No	No
Mammalia					
Macrotis lagotis	Bilby	V		No	No
Mastacomys fuscus	Broad-toothed Rat	V		No	No
Petauroides volans	Greater Glider	V	V	No	No
Pteropus poliocephalus	Grey-headed Flying-fox	V		No	No
Nyctophilus corbeni	Corben's Long-eared Bat		V	No	No

The development consent was granted based on assessments undertaken for the original application and some additional supporting information for PAC. These were prior to the species in Table 8-1 being identified through updated background searches. The species identified as having the potential to be impacted above, would have been impacted by the approved project without the requirement for further consideration. Whether the modification layout imposes a greater impact on these species is assessed below (refer Section 0).

No additional threatened ecological communities are relevant to project site.

Additional field surveys

Additional field flora and fauna habitat surveys of the modification layout were undertaken (approximately 192.5 person-hours) to ensure that:

- The most accurate and up to date data were being utilised to identify areas of higher conservation value where impacts could be minimised.
- To assess any areas where changes to the footprint may have warranted additional assessment.
- To improve data for Hollow Bearing Trees.
- To calculate the residual impacts of the revised project.
- Additional biometric plot surveys were undertaken to inform updated offset requirements.

Additional flora and fauna habitat surveys undertaken in 2016 and 2017 are detailed in Table 8-2 below. All surveys were undertaken by experienced botanists and ecologists. The survey work was led by senior botanist Dave Maynard who has been working on this project since June 2014.

Table 8-2 Additional flora field surveys undertaken within the modification layout

Survey date(s)	Surveys undertaken	Person-hours onsite
30 November – 2 December 2016	- Validate / update vegetation type and condition within the modification layout civil design footprint - Determine vegetation type and condition for any new areas within the modification layout footprint (outside of the consented areas) - Map location of significant weeds within the final impact area	84.5
6 – 8 December 2016	Collection of representative plot data for the impact areas, in accordance with the NSW FBA guidelines	
24 – 25 January 2017	Completion of the tasks above for additional areas to be included in the modification layout	
22 – 23 May 2017	- Determine vegetation type and condition for proposed cable routes within the modification layout footprint (outside of the consented areas) - On site meeting with engineers and designers to determine an access route of least impact along Whitefield's Road - Field validation of hollow-bearing trees in the vicinity of Turbine 56 and along Coppabella Road to assess a potential alternate access route - Assessment of a potential alternate access route along Coppabella Road.	12
18 – 21 July 2017	Hollow bearing tree survey of the buffered civil design footprint.	96
	TOTAL	192.5

In the further assessment, for consistency, vegetation types and condition were defined according to the existing vegetation classifications used in the previous assessments of the site to facilitate direct comparison. This included assigning a condition class as defined in the original Biodiversity Assessment for the Coppabella precinct (NGH Environmental 2009b) as follows:

Poor	Groundcover dominated by exotic species
Poor-moderate	Groundcover dominated by one or two native grass species, very few native forbs
Moderate	Groundcover dominated by several native grasses, native forbs present but low diversity
Moderate-good	Groundcover dominated by several native grasses with a range of native forbs
Good	High groundcover diversity, including significant forb species.

A condition class was also assigned according to the vegetation zones defined in the submission to the PAC:

Low	Vegetation where: The over-storey per cent foliage is <25% of the lower value of the over-storey per cent foliage cover benchmark for that vegetation type. AND < 50% of vegetation in the ground layer is indigenous species or > 90% ploughed or fallow.
Moderate to good (low diversity)	Woodland or derived grassland vegetation not in low condition and within the Poor, Poor-moderate or Moderate condition classes above.
Moderate to good (high diversity)	Woodland or derived grassland vegetation within the Good or Moderate-good condition classes above

Vegetation was mapped as exotic where there was no overstorey and little to no native component in the ground cover.

The results of the field surveys were used to develop revised vegetation and condition mapping for the modification layout (Appendix A.1 map set). This informed the avoidance of impacts (discussed below) and then the residual impact calculations.

Investigation of the potential access for over-dimensional vehicles along Coppabella Road was considered as an alternate route to the steep access track from Turbine 56 to 57. However, the investigation determined that there would likely be impacts to a number of hollow-bearing trees that could provide suitable nesting habitat for the Superb Parrot. These impacts were assessed by NGH Environmental to be greater than those required for the track from Turbine 56 to 57 and the alternate access route option is no longer proposed for over-dimensional transport, based on the advice from NGH Environmental.

Avoidance or minimisation of impacts

While the infrastructure layout presented remains indicative, it is now based on further civil design studies, additional field inspections and, meetings between the design team and the ecology team (documented above) with the intention of ensuring that:

1. The information used to inform the design is as robust as possible
2. The design minimises impacts on high constraint biodiversity features as much as practical, as required by the project approval.

Construction and operational impact management strategies for the modified project remain the same in all areas: minimise impacts during construction, offset all residual native vegetation and hollow bearing tree impacts of construction. A comparison of the approved project, initial design and the current detailed design are provided in the Appendix 18A.4 map set, to demonstrate the project's outcomes with regard to minimising biodiversity impacts. Table 8-3 summarises specific areas of consideration given to minimising biodiversity impacts. This involves 18 impact areas that have been reviewed to assess options for further reducing impacts and indicates the outcome of the review as to whether reduced impact has been achieved.

Table 8-3 Minimisation process, specific infrastructure components (refer to Appendix A.4).

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
	Number of turbines – general The existing approval allows for 79 turbines to be constructed. While a lesser number is likely to be constructed, the impact footprint has been calculated based on this upper number to retain flexibility in the project approval. The final layout will be subject to further input from TransGrid and EPC contractors	Box Gum Woodland EEC (NSW) A clearance limit is part of the project approval. Based on the civil and cabling layouts, a larger impact footprint is now expected.	Updated validation of vegetation mapping by senior ecologists has occurred in a number of locations to verify the vegetation type and condition of vegetation (refer Table 8-2) The vegetation mapping for the project is far more accurate than previous mapping, having additional ground validation, and provides for a greater confidence in the quantification of impacts and subsequent offset requirements.	Two design meetings held between the civil, cabling and ecology team (April 2017). The civil and cabling impact footprints have considered the location of the EEC. Particularly, it has considered the higher constraint areas (set out separately below). While no turbines have been removed, the track and cable routing has minimised impacts on higher value vegetation in many locations (see below).	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol	Update offset calculations to reflect increased impact areas. Offset native vegetation clearing, in accordance with approval conditions.	Lower impact solution adopted in many locations (see below).
1 and 2	Access tracks between Turbine 66 and 57 (via Turbine 59)	Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in these areas. Hollow bearing trees (HBTs) One actual and four potential HBTs mapped in this area, based on field	No	The routes and widths were considered specifically in this area. The areas cannot be avoided or minimised further.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: confining impact footprint as much as possible during works	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	No further reduction has been achieved.

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
		data (1) and desktop assessment (4).			• micrositing protocol • preclearance surveys for all HBTs		
3	Access road south of Turbine 57 (via Turbine 56) The upgrade and use of a section of Coppabella Road was considered as an alternative to developing the road between Turbine 57 south to Turbine 37 (linking these ridges via Turbine 56). Separately it was considered as an additional access point that may alleviate onsite construction traffic (light and heavy).	Hollow bearing trees (HBTs) High density of potential HBTs mapped north of Turbine 56, based on Diameter at Breast Height (DBH). Unquantified but general high density of HBTs observed adjacent to Coppabella Road (north of water way crossing).	Site inspection by a senior ecologist to evaluate the degree of constraint in both areas (May 2017). 14 HBTs were identified in the modification construction footprint with a 10m buffer applied. A substantially greater number occur within the section of the Coppabella Road reserve with many suitable for the Superb Parrot. The internal access route will better minimise impacts to HBTs.	The originally proposed access track linking Turbine 56 to Turbine 57 has been re-routed to minimise impacts on mature trees. Further, the road width is the narrowest that can be achieved in this area.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: • confining impact footprint as much as possible during works • micrositing protocol • preclearance surveys for all HBTs	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	Lower impact solution adopted.
4	Cable route to the east of turbine 53	Box Gum Woodland EEC (NSW) Moderate to good condition EEC has been mapped in this area.	Site inspection by a senior ecologist to evaluate the degree of constraint in both areas (May 2017).	The areas cannot be avoided or minimised further.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: • confining impact footprint as	Offset native vegetation clearing in accordance with approval conditions.	No further reduction has been achieved.

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
					much as possible during works • micrositing protocol		
5	Cabling between Turbines 31 and 38	Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in this area.	No	The cabling has been rerouted to avoid all tree clearing in this area.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: • confining impact footprint as much as possible during works • micrositing protocol	Offset native vegetation clearing in accordance with approval conditions.	Lower impact solution adopted
6	132kV Powerline north-west of Turbine 31	Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in this area.	No	The areas cannot be avoided or minimised further.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: • confining impact footprint as much as possible during works • micrositing protocol	Offset native vegetation clearing in accordance with approval conditions.	No further reduction has been achieved.
7	Turbine 4	Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in this area.	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016).	Consideration was given to the removal of Turbines 1, 5 and 4; this would need to be undertaken to avoid impacts here.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions:	Offset both native vegetation clearing and HBTs, in accordance	No further reduction has been achieved.

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
		Hollow bearing trees (HBTs) Several potential HBTs mapped in this area, based on desktop assessment.		Without affecting project viability, the areas cannot be avoided or minimised further.	- confining impact footprint as much as possible during works - micrositing protocol - preclearance surveys for all HBTs	with approval conditions.	
8	Cabling between turbines 4 and 19	Native woodland vegetation Connected woodland, while not mapped as a high constraint, has value to many species including threatened birds and bats.	No	The cabling has been rerouted to avoid additional tree clearing in this area by collocating within civil design.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol	Offset native vegetation clearing, in accordance with approval conditions.	Lower impact solution adopted
8	Access track east of Turbine 19	Superb Parrot Important Superb Parrot habitat has been mapped in this area. The key feature for this species is trees and particularly HBTs.	No	The track has been rerouted to avoid any tree clearing in this area.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: confining impact footprint as much as possible during works	Offset native vegetation clearing, in accordance with approval conditions.	Lower impact solution adopted

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
					micrositing protocol		
9	Access track between Turbines 17 and 29	Box Gum Woodland EEC (CW and NSW) Moderate to good condition EEC and CEEC has been mapped in this area. In most cases, it is the trees that are the key feature however, CEEC also has high native understorey diversity. Threatened species habitat Yass Daisy recorded outside of the development corridor but in contiguous habitat.	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016 and May 2017).	The areas cannot be avoided or minimised further. Moving the track further east or west does not reduce understorey impacts.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol	Offset native vegetation clearing, in accordance with approval conditions.	No further reduction has been achieved.
10	Access track, cabling and Turbine 29	Superb Parrot Important Superb Parrot habitat has been mapped in this area. The key feature for this species is trees and particularly HBTs. Hollow bearing trees (HBTs) HBTs mapped in this area, (actual and based on desktop assessment).	No	The areas cannot be avoided or minimised further.	Protocols to enforce minimisation of impacts on native vegetation and HBTs, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol - preclearance surveys for all HBTs	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	No further reduction has been achieved.

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
11	Substation site	Superb Parrot Important Superb Parrot habitat has been mapped in this area. The key feature for this species is trees and particularly HBTs. Hollow bearing trees (HBTs) HBTs mapped in this area, (actual and based on desktop assessment).	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016).	Substation footprint has been reduced. Access roads and cabling routed to minimise tree clearing in this area	Protocols to enforce minimisation of impacts on native vegetation and HBTs, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol - preclearance surveys for all HBTs	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	Lower impact solution adopted
12	Cable route (previous design iteration) between the substation site and Turbine 10	Box Gum Woodland EEC (NSW) Moderate to good condition EEC has been mapped in this area. Threatened species habitat Yass Daisy recorded outside of the development corridor but in contiguous habitat.	No	Cabling rerouted to avoid this area	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol	Offset native vegetation clearing, in accordance with approval conditions.	Lower impact solution adopted
13	Overhead powerline and cable route east of the substation site heading towards turbine 15	Box Gum Woodland EEC (NSW) Moderate to good condition EEC has been mapped in this area.	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016).	Overhead line removed. Cable route routed to avoid tree clearing	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: confining impact footprint as much as possible during works	Offset native vegetation clearing, in accordance with approval conditions.	Lower impact solution adopted

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
					possible during works • micrositing protocol		
14-17	Access track and cabling between Turbines 4 and 14 (via Turbines 12 and 13).	Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in this area. Hollow bearing trees (HBTs) Several potential HBTs mapped in this area, based on desktop assessment.	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016).	Consideration was given to the removal of Turbines 12, 13 and 14; this would need to be undertaken to avoid impacts here. Without affecting project viability, the areas cannot be avoided or minimised further.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: • confining impact footprint as much as possible during works • micrositing protocol • preclearance surveys for all HBTs	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	No further reduction has been achieved.
18,19,20	Access track and Turbines 78 and 80	Superb Parrot Important Superb Parrot habitat has been mapped in this area. The key feature for this species is trees and particularly HBTs. Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in this area. Hollow bearing trees (HBTs)	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016).	The access and cabling routes have been rerouted to minimise tree clearing in this area. Impacts to HBTs from turbines and hardstands remain.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: • confining impact footprint as much as possible during works • micrositing protocol • preclearance surveys for all HBTs	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	Lower impact solution adopted

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
		Several actual and potential HBTs mapped in this area, based on desktop assessment.					
See 20	Access track and cable route (previous design iteration) west of Turbine 79	Box Gum Woodland EEC (NSW) Moderate to good condition EEC has been mapped in this area.	Site inspection by a senior ecologist to evaluate the degree of constraint (May 2017).	Cable route collocated within civil design. Access road rerouted to avoid tree clearing. Road now routed through Superb Parrot habitat and CW CEEC however, ground validation has demonstrated that tree clearing can be avoided in this area. High diversity groundcover is not present within the modification layout footprint.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol	Offset native vegetation clearing, in accordance with approval conditions.	Lower impact solution adopted
21-22	Track between Turbine 73 and 75	Box Gum Woodland EEC (NSW) Moderate to good condition EEC has been mapped in this area.	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016).	Due to the topography in this area, there is minimal ability to further reduce impacts in this area.	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol	Offset native vegetation clearing, in accordance with approval conditions.	No further reduction has been achieved.
23	Cable route to the west of Turbine 77 and from Turbine 77 to Turbine 76 (previous design iteration)	Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in this area.	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016).	Cable routes rerouted and collocated within civil design to avoid tree clearing in this area	Protocols to enforce minimisation of impacts on native vegetation, in accordance with approval conditions: confining impact footprint as	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	Lower impact solution adopted

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
		Hollow bearing trees (HBTs) Several potential HBTs mapped in this area, based on desktop assessment.			much as possible during works micrositing protocol preclearance surveys for all HBTs		
23	Turbine 77 and associated hardstand area	Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in this area. Hollow bearing trees (HBTs) Several potential HBTs mapped in this area, based on desktop assessment.	Site inspection by a senior ecologist to evaluate the degree of constraint (December 2016).	The areas cannot be avoided or minimised further.	Protocols to enforce minimisation of impacts on native vegetation and HBTs, in accordance with approval conditions: - confining impact footprint as much as possible during works - micrositing protocol - preclearance surveys for all HBTs	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	No further reduction has been achieved.
24	White fields road	Superb Parrot Important Superb Parrot habitat has been mapped in this area. The key feature for this species is trees and particularly HBTs. Box Gum Woodland EEC (NSW) Mature moderate to good condition EEC has been mapped in this area.	Site inspection to map sensitive areas (September 2016) and site meeting with a senior ecologist (May 2017) to discuss detailed design and minimisation strategies	Impacts in this area based on the civil design are overestimated. Detailed design is being undertaken and a landscape plan is being developed for this section of works to minimise the impacts to trees, in particular, HBTs suitable for Superb Parrot.	Implementation of Landscape Plan. Protocols to enforce minimisation of impacts on native vegetation and HBTs, in accordance with approval conditions: confining impact footprint as much as possible during works	Offset both native vegetation clearing and HBTs, in accordance with approval conditions.	Lower impact solution adopted

ID	Infrastructure component	Constraint to be impacted	Verification	Design consideration	Construction consideration	Operational consideration	Outcome
		Hollow bearing trees (HBTs) Numerous actual HBTs mapped in this area, based on field survey ³ .			• micrositing protocol • preclearance surveys for all HBTs		

³ Note, the constraints mapped in Appendix A.4 do not include HBT data collected during the September 2016, May 2017 or July 2017 site inspections.

Potential impacts of the modified project

Increased impact area

The change to the development corridor and increased footprint does not generate any new impact types than those considered in the original assessment. The construction of the turbines and access tracks would still involve ground disturbance resulting in the removal of native vegetation and flora and fauna habitat.

The impact on native vegetation (all native vegetation communities combined) would increase by approximately 212.4 ha overall, based on the modification, refer to Table 8-4.

Notes:

- The modified layout impact areas are precautionary in that they now include a buffer on the entire civil construction footprint (all tracks, turbines, hardstands, ancillary facilities, including batters). This includes the Whitefield's Road upgrades, though this area is subject to detailed design that will not require this level of clearing. Minimisation of impacts in the 5m buffer is anticipated, particularly for features such as hollow bearing trees.
- The approved layout total does not include 18.1 ha of Box Gum Woodland (required to construct the Coppabella precinct and included in the assessment) but not included in the clearing limit allowed for under the consent. The Yass Valley Wind Farm proposal included clearing estimates for five separate precincts: Coppabella, Marilba (east and west), Conroy's Extension and the 330kV Grid Connection (identified as 'Transmission') to connect the wind farm south. When only the Coppabella precinct was approved, the clearing allowance omitted some infrastructure elements required for this precinct. This was due to the assignment of these infrastructure elements to the Transmission 330kv Grid Connection (Transmission) precinct in the project's GIS files. This amount is addressed explicitly in the table below, third column from left.
- The calculation of overhead transmission line impacts differs between assessments. In the approved layout, a 15m clearing easement was assumed. In the modified layout, only impacts in woodland are calculated and for these, a 45m clearing easement is applied.

Table 8-4 Summary of changes in areas of vegetation clearing requirements: consented versus modified layouts taking into account the transmission component required for the Coppabella precinct.

Vegetation Type / Condition	Consented Layout (ha)	Coppabella transmission component (ha)	Total that should have been approved (ha)	Modification Layout total with 5m buffer (ha) (approx.)	Increase (ha) ⁴	Percent increase
Box Gum Woodland	11.2	18.1	29.3	36.8	7.5	
Low	0.7	17.5	18.2	0.3	-17.9	
Moderate-good (high diversity)	0.3	0.3	0.6	0.3	-0.3	
Moderate-good (low diversity)	10.1	0.3	10.4	36.2	25.8	
Box Gum Woodland Derived Grassland	56.1	0.0	56.1	239.1	183	
Low	2.7	0.0	2.7	95.0	92.3	
Moderate-good (high diversity)	0.0	0.0	0.0	2.3	2.3	
Moderate-good (low diversity)	53.4	0.0	53.4	141.8	88.4	
Long-leaved Box Dry Grass Forest	0.9	0.0	0.9	8	7.1	
Moderate-good (high diversity)	0.3	0.0	0.3	0.5	0.2	
Moderate-good (low diversity)	0.6	0.0	0.6	7.5	6.9	
Long-leaved Box Dry Grass Forest Derived Grassland	0.0	0.0	0.0	14.6	14.6	
Moderate-good (low diversity)	0.0	0.0	0.0	14.6	14.6	
Riparian	0.1	0.0	0.1	0.3	0.2	
Moderate-good (low diversity)	0.1	0.0	0.1	0.3	0.2	
Exotic dominated pasture	14.7	0.0	14.7	63.1	48.4	329%
Total native vegetation	68.3	18.1	86.4	298.8	212.4	246%
Total EEC	67.3	18.1	85.4	180.9	95.5	112%
Grand Total	83	18.1	101.1	361.9	260.8	258%
Note 3 - The increase, taking into account the 18.1 ha that was originally required to construct the Coppabella precinct independently.						

Impacts outside the consented Development Corridor

Considering the composition of areas outside of the consented Development Corridor that would now be impacted, the following conservation significant features are relevant:

- Box Gum Woodland Endangered Ecological Community
- Threatened flora habitat
- Threatened microbats and woodland bird's habitat

These are high constraint features for the project.

The consented Development Corridor totalled 798.90 ha and are shown overlaid on the modification footprint in Appendix A.3. The areas now outside that corridor total approximately 49.65 ha (no buffer) or approximately 59.28 ha (when the civil footprint is buffered by 5m to account for indirect impacts during construction). This is an increase of between 6.2-7.4% of the total Development Corridor.

Impacts on key entities for the modified project

Increased areas of impact for each of the key features identified in Table 8-5 are discussed below.

There is no increase in impacts to Golden Sun Moth habitat as surveys to date have demonstrated that the species is absent from the Coppabella Precinct.

Table 8-5 Summary of changes in areas of key vegetation and habitat clearing requirements

Feature	Approved Layout impact	Coppabella transmissi on componen t (ha)	Total that should have been approved (ha)	Modificati on Layout impact with 5m buffer (approx.)	Increased impact area (approx.)	Percent increase in impact
Native vegetation total	68.3 ha	18.1 ha	86.4 ha	298.8 ha	212.4 ha	246%
Box Gum Woodland EEC	67.3 ha	18.1 ha	85.4 ha	180.9 ha	95.5 ha	112%
Threatened flora habitat	0.3 ha	0.3 ha	0.6 ha	2.2 ha	1.6 ha	266%
Woodland habitat for threatened microbats and birds	12.1 ha	18.1 ha	30.2 ha	44.1 ha	13.9 ha	46%
Golden Sun Moth habitat	0 ha	0 ha	0 ha	0 ha	0 ha	0%
Hollow-bearing trees near turbines	251 -based on desktop	0	0	Not calculated	NA	NA
Hollow-bearing trees: entire construction footprint	Not calculated	Not calculated	Not calculated	473	NA	NA

Box-Gum Woodland EEC

Clearing of Box-Gum woodland EEC has increased by approximately 112% from 85.4 ha (which includes the 18.1 ha required for independent construction of the Coppabella precinct) in the approved layout to approximately 180.9 ha in the modification layout. It should be noted that this figure excludes derived grassland areas in low condition which were included in the approved layout calculations. Further consideration and analysis has determined that these areas do not meet the criteria for the EEC. The majority of the vegetation across the site has been subject to high levels of disturbance, some areas greater than others. Based on the composition of some of the grassland areas, it appears that these areas are likely to have been 'improved' in the past by applications of herbicide and/or fertilizing and sowing of exotic pasture species. Many of these areas coincide with those mapped as Box-Gum Woodland derived grassland in low condition. Generally, this vegetation is dominated by exotic annual grasses and forbs with some areas dominated by exotic perennials such as *Phalaris* (**Phalaris aquatica*). Native species occur in very low abundance and diversity, usually as scattered individual grass tussocks, most commonly Wallaby Grass (*Rytidosperma* sp.). Native forbs are mostly absent except for the occasional disturbance tolerant species such as Native Dock (*Rumex brownii*).

The NSW Scientific Committees determination for the EEC states that "The understorey may be highly modified by grazing history and disturbance... Disturbed remnants are still considered to form part of the community including remnants where the vegetation, either understorey, overstorey or both, would, under appropriate management, respond to assisted natural regeneration, such as where the natural soil and associated seed bank are still at least partially intact". The areas mapped as Low condition derived grassland are considered unlikely to respond to assisted natural regeneration. There was no evidence of natural overstorey regeneration in these areas and given the very low density and diversity of native species, the seed bank appears to be mostly depleted. Weed loads are very high, particularly of annual

species which flourish in spring and autumn and die off to form a dense cover of litter in summer and winter which is likely to inhibit the further establishment of perennial native ground covers. The conservation value of these areas is considered to be very low and they are not considered to be part of the Box-Gum Woodland EEC.

Areas mapped as Box-Gum Woodland and derived grassland in Moderate to good condition (high diversity) or Moderate to good condition (low diversity) are all considered to meet the definition of the EEC either due to the presence of the characteristic overstorey trees and/or the dominance of native grasses in the perennial groundcover.

In many cases, derived grassland in Moderate to good condition (low diversity) has only one native grass species present (but which has greater than 50% foliage cover) and no native forbs but this is still considered to meet the definition of the EEC. The majority of the EEC to be impacted by the modification layout is comprised of this low diversity derived grassland (approximately 141.8 ha). As with the low condition derived grassland, these areas have been subject to high levels of disturbance and a long grazing history. Given the low species diversity, the habitat these grasslands provide is limited and although technically meeting the criteria of the EEC, they are considered to be of low conservation significance. This is reflected in the fact that offsets are not required for low diversity derived grassland in Moderate to good condition (refer to Section 10 below).

Threatened flora habitat

Impacts to threatened flora habitats have increased from 0.3 ha in the approved layout to approximately 2.16 hectares in the modification layout. This 1.86 ha increase is largely due to a larger extent of high diversity Box-Gum woodland derived grassland being identified on the lower slopes to the south-east of turbine 19. Some reduction in project footprint has been achieved here by deleting one of the access options previously shown south-east of Turbine 19. Given this increase and that areas of the modification layout extend outside of the consented Development Corridor in these areas, it is a commitment of the project to survey all areas of threatened flora habitat outside of the consented Development Corridor for threatened flora species prior to construction (refer Section 0). If threatened flora species are identified in these areas, they would be avoided where possible. If unavoidable, translocation would be implemented. Any residual impacts (such as unsuccessful translocation) would be offset.

Woodland habitat for threatened microbats and birds

The area of woodland habitats, for threatened microbats and birds, to be impacted by the approved layout has been assessed as approximately 30.2 ha (12.1 ha approved plus additional 18.1 ha required for the transmission line component). This has increased to approximately 44.1 ha for the modified project, an increase of 13.9 ha. Given the large area over which this impact is dispersed and the existing highly fragmented nature of the habitats, this increase is not considered to be substantial for threatened woodland bird species, including those additional species identified in Table 8-1).

Specifically, for the Superb Parrot, it should be noted that the approximately 44.1 ha of Box-Gum woodland habitat for this species to be impacted by the modification layout includes all Box-Gum woodland habitat, including the woodlands that tend to occupy the ridge tops. Comprehensive flight path mapping by NGH Environmental (2014), indicates that the Superb Parrot does not utilise the ridge top habitats at the site. As such, the actual impacts to this species with regards to habitat loss, would only be a proportion of this amount. Approximately 17.5ha of the 44.1 ha to be impacted has been assessed as important habitat for the Superb Parrot. As identified in Table 8-3 above, the project has minimised impacts in key habitat areas for the Superb Parrot, including onsite meetings with an ecologist for the access design along Whitefield's

Road. As such, the 17.5 ha assessed as important habitat to be impacted by the modified layout is considered an overestimate.

Two additional raptor species (Spotted harrier and Little Eagle) were identified in the updated database searches as having the potential to occur on site. These species could be utilising woodland and forest areas for nesting. As such it is a commitment in Section 0 below that pre-construction surveys be conducted in areas of the modification layout outside of the consented Development Corridor to determine if these species are nesting in these areas.

Hollow bearing trees

IMPACTED BY TURBINES

Generally, impacts to Hollow Bearing Trees (HBTs) *near turbines* have not changed as no changes to the approved turbine locations are proposed and the same desktop assessment methodology used in the original assessment is relevant. However, it is noted that this does not reflect allowable micro-siting. This has commenced for 45 of the 79 turbine locations⁵. For the original assessment, mapping of HBTs was not undertaken across the entire consented Development Corridor and as such, quantification of the approved impacts in areas away from turbines was not provided.

IMPACTED BY TRACKS AND OTHER INFRASTRUCTURE

The key issue regarding HBT impacts for the modification is the degree to which HBTs can be avoided during the detailed design of the track layout. Lesser track widths of 8m were assumed by the approved project. The civil design footprint now shows, that including cut and fill batters, the access track widths are substantially larger. While a commitment to minimising impacts on HBTs remains, the increase warranted additional on-ground assessment to quantify the number of HBTs in the civil footprint. Appendix B.4. provides the survey method, effort and results of this work. In summary, 48% of the entire construction footprint including 5 m buffer was assessed in 96 person hours in July 2017. This excludes the cabling and transmission lines but includes areas required for tracks, turbines and hardstands, ancillary areas and their associated batters and 5 m buffer. Based on aerial imagery, areas with the most trees were assessed as a priority and as such, the majority of trees within the construction footprint have been assessed (400 out of 548; 73% of trees). The 148 trees that were not able to be assessed during the July survey have been assumed to be HBTs as a worst case scenario.

Details of the HBTs identified within the survey area were recorded, including:

- Species type (Yellow Box, White Box, Long-Leaved Box, Blakely's Red Gum, River Red Gum and Red Stringybark)
 - Size of hollows using the criteria of small: < 10cm; medium 10-20cm; large > 20 cm).
- Type of hollow:
 - Trunk, limbs, fissures.
- GPS location for each HBT.

⁵ While this process has commenced, final locations have not been determined. Consideration of micro-siting has been undertaken as much as is possible at this time and represents part of the final design phase activities.

The location of all HBTs are mapped in the Appendix B.4; differentiating ground validated HBTs from assumed HBTs. The results are summarised below. Detailed HBT inventory is provided in Appendix B.4.

Table 8-6 Summary of HBTs in survey and extrapolated areas

Hollow bearing trees	Survey area (ground validated)	Extrapolated using aerial imagery	Total
Within the civil footprint – no buffer	338	135	473
Within the 5m buffer	62	13	75
Total	400	148	548

In Table 8-6 above, the 5m buffer is differentiated as this is the additional area expected to be impacted indirectly, for machinery movements and installation of sediment erosion controls. A higher degree of (and possibly complete) avoidance of HBTs in the buffer area is anticipated.

It is the intention of the Biodiversity Management Plan for the project (which will be prepared in consultation with OEH and DoEE) to address the remaining areas of the footprint. This will provide an accurate quantification of all HBTs within the modification layout footprint prior to construction. This is included as a commitment in Section 0 and will facilitate further avoidance of HBTs where possible, appropriate management during construction and allow for the accurate determination of offsets for HBTs if required.

Mitigation measures for the modified project

The mitigation strategies for the approved project focused on minimising impacts and offsetting residual impacts. The original conditions of approval for the project require that all reasonable and feasible measures are implemented to:

- Minimise the impact on hollow-bearing trees and mature trees along Whitefield's Road;
- Minimise impacts on the Yass Daisy (*Ammobium craspedioides*);
- Minimise impacts on threatened bird and bat populations;
- Minimise the consented clearing of native woodland vegetation and fauna habitat; and
- If micro-siting turbines:
 - ensure that the revised location of the turbine is at least 50 metres from existing hollow-bearing trees; or
 - where the proposed turbine location is already within 50m of existing hollow-bearing trees, the revised location is no closer to existing hollow-bearing trees.

The conditions of approval also required the retirement of credits (offsets – discussed further in Section 9 below) and the preparation of a biodiversity management plan, both to be prepared in consultation with OEH.

Additional Statements of Commitment (SoC's) by the proponent (Epuron 2014) include:

- Replacement of dams removed during construction (where practical) (SoC 14);
- Further targeted surveys in identified areas of hollow-bearing trees with potential for removal (SoC 15); and
- Buffers on treed areas (twice the drip line) for temporary construction activities in sensitive areas (SoC 17).

The above commitments and measures are still considered relevant to the modification layout. However, to ensure these are able to be met for the modification layout, the following additional measures are committed to by the proponent:

- Accurate identification, mapping and quantification of all HBTs within the modification layout footprint prior to construction.
- Pre-clearance surveys for threatened flora (Yass Daisy, Small Purple-pea and Dwarf Bush-pea) in moderate to good (high diversity) condition woodland, forest and derived grasslands outside of the consented Development Corridor. If threatened flora species are identified in the construction footprint, they would be avoided by the project to the extent practicable. If unavoidable, translocation would be implemented. Any residual impacts would be offset.
- Pre-clearance surveys for threatened raptor nests in potentially impacted areas outside of the currently consented Development Corridor. If raptor nests are identified, surveys would be undertaken to determine if they are in use by threatened species for breeding. If in use by threatened raptor species, nests would not be impacted until breeding activities have ceased.

8.3 SUMMARY OF VEGETATION CLEARING IMPACTS AND THEIR MANAGEMENT

- **The increased vegetation clearing to address changes to the civil design footprint (having regard to steep terrain as well as the required clearing for transmission line connection and a larger turbine model) would result in a substantially increased impact to native vegetation; 95.5 ha more Box Gum Woodland EEC or 112% of the clearing limit.**
- **The majority of the clearing remains in low diversity native pasture.**
- **Existing mitigation strategies (minimisation and offsets) will be adequate to address the impacts.**
- **These strategies should be informed by additional preclearance surveys (HBTs, threatened flora in areas of moderate to good (high diversity) condition woodland, forest and derived grasslands, raptor nests) in areas outside the consented Development Corridor.**
- **Changes to the consent are required to increase the Box Gum Woodland EEC clearing limit to 180.9 ha.**

9 BIODIVERSITY IMPACTS FOR THE MODIFIED PROJECT: BIRD AND BAT COLLISION RISK

9.1 RISK ASSESSMENT OF THE APPROVED PROJECT

Approach

The risk assessment in the Coppabella Biodiversity Assessment (BA; NGH Environmental 2009b) involved the following key stages:

1. An analysis of potential avifauna movements considering topography, regional habitat provision, site connectivity, the results of surveys completed for the BA and historical species records.
2. An analysis of species that could be at risk of operational impact primarily based on the flight characteristics and behaviour (e.g. foraging, flocking, temporal and seasonal activity) of each species or species group identified as potentially moving through the project site.

Potential impacts

The key operational impacts to birds and bats were identified in the Coppabella BA as:

1. Potential for collision with wind turbines.
2. Potential for sudden decompression (barotrauma) for birds and bats.
3. Potential for 'avoidance' behaviour caused by the presence of the turbines and associated infrastructure.

The assessment considered a potential Rotor Swept Area (RSA) of the turbines ranging from approximately 17.5 (min) to 150 (max) metres above the ground. The assessment identified raptors, migratory birds, nocturnal species and bats as being most at risk from these impacts, due to foraging behaviour, flocking or colonial movements, awkward flight characteristics, susceptibility to air pressure change, or night activities.

The risk assessment conducted for threatened and migratory species (Assessments of Significance) identified one species: Eastern Bent-wing Bat as being at high risk from collision and barotrauma impacts during the operation of the wind farm with potential for significant population-scale impacts. Further assessment was recommended to be undertaken, coinciding with the peak activity at the Wee Jasper Eastern Bent-wing Bat maternity roost, to determine whether the site is used as a foraging area for the Eastern Bent-wing Bat. Follow up bat surveys and assessment were undertaken. These identified that the turbines are unlikely to be located within foraging distance of the Wee Jasper Eastern Bentwing Bat maternity roost or on identified migration pathways (NGH Environmental 2015).

The risk assessment conducted for non-threatened species considered that the Wedge-tailed Eagle was at high risk from collision impacts.

Threatened and non-threatened species considered to be at moderate risk included:

Threatened and migratory species: and Rainbow Bee-eater, Square-tailed Kite, Gang-gang Cockatoo, Swift Parrot, Superb Parrot and Barking Owl

Non-listed species: Australian Hobby, Barn Owl, Peregrine Falcon and Silvereye

Specific mitigation measures were recommended for species identified as having a high risk of collision and barotrauma impacts including carcass management for the Wedge-tailed Eagle. High and moderate risk species were recommended to be targeted for operational bird and bat monitoring.

9.2 RISK ASSESSMENT FOR THE MODIFIED PROJECT

Approach

A comprehensive revision of risks to bird and bats arising from the taller turbines with increased Rotor Swept Area (RSA) as proposed for the modification was undertaken by Brett Lane and Associates (BL&A 2017). The assessment benefited from additional surveys undertaken since the consent was granted as follows:

- CWF – Bird and Bat Adaptive Management Plan - Risk Assessment, Report 16079 (1.0) for Goldwind Australia (BL&A 2016a).
- CWF – Superb Parrot Literature Review, Report 16079 (2.0) for Goldwind Australia (BL&A 2016b).
- Proposed CWF – Targeted Superb Parrot Survey Breeding Season 2016, Report 16079 (3.0) for Goldwind Australia (BL&A 2016c).
- 2014 Superb Parrot Flight Path Mapping surveys (NGH Environmental 2015b), Report prepared for Goldwind Australia.
- 2016 Superb Parrot Flight Path Mapping surveys (NGH Environmental 2017b), Report prepared for Goldwind Australia.

The EPBC Approval has required comprehensive surveys for Superb Parrot over three years. Two years of survey have been completed and indicated the occurrence of Superb Parrots in areas that would be developed for turbines is very low.

The BL&A assessment is provided in full, Appendix B.5 of this report, and summarised below with reference to:

1. Any additional impact types that would occur as a consequence of the modification.
2. Any increase in the level of impacts that would occur as a consequence of the modification.
3. Any additional mitigation strategies required to manage the impacts above.

The proposed turbines will be larger and will be higher above the ground than the approved models. The modified turbine dimensions relevant to avifauna impact assessment are:

- Increased rotor diameter to approximately 140.3m, increasing the total extent of each turbine's Rotor Swept Area (RSA) from 13,478m² to approximately 15,460m², representing an increase in the total RSA area of approximately 15%.
- Minimum RSA height approximately 30m above ground, which is approximately 12.5m higher than for the application on which the approval was based.

- Maximum RSA height (tip height) increased from 150 m to approximately 171m above ground.

The original assessments were reviewed with reference to newer literature and guidance documents. The original assessments included:

- NGH Environmental (2009b) *Biodiversity Assessment: Coppabella Hills Precinct*. NGH Environmental, Surry Hills, New South Wales.
- Preferred Project and Submissions Report (Epuron, with assistance from NGH Environmental 2012).

The assessment by BL&A compared the impacts of the approved and modified turbine specifications on birds and bats based on reviews of previous assessments and field surveys between 2007 and 2016 (Refer Section 8.1). BL&A also used the results of Bird Utilisation Surveys (BUS) from eleven other proposed and operational wind farms in agricultural settings in south-eastern Australia.

Potential impacts of the modified project

New impact types

The key operational impacts to birds and bats are the same as those discussed in the original assessment:

1. Potential for collision with wind turbines.
2. Potential for sudden decompression (barotrauma) for birds and bats.
3. Potential for 'avoidance' behaviour caused by the presence of the turbines and associated infrastructure.

Potential impact on birds from the modification

The consequence of larger, higher turbines will change the level of impact. This will differ for different species due to the heights they generally fly at. Overall, the following changes in the level of impact are anticipated:

- Reduced risk to birds that fly between 20 and 30m, as the minimum level of the turbine blade will be approximately 7.85m higher above the ground;
- Decreased level of risk to birds that fly between 30 and 100m as there will be a decrease in the area of turbine exposure below 60m. This includes a decreased risk to the Superb Parrot as it mostly flies below 60m;
- Slightly increased risk to birds recorded flying between 60 and 100m. Approximately 1% of bird flights from other sites occurred within this height range;
- Increased risk of collision by Wedge-tailed Eagles and other high flying raptors. Wedge-tailed eagles can fly at heights of up to 2000m, well above but including the RSA of the wind turbines. Only three pairs of Wedge-tailed Eagles have been recorded using the area (no nests for this species have been observed onsite), therefore the risk to the local population as a result of the modification is considered to be low;
- A slight increase in the low risk to the Little Eagle, given its very low numbers and low frequency of interaction with turbines (no nests for this species have been observed onsite);
- Bird utilisation surveys at 10 similar wind farm sites have observed that 84% of birds are recorded on the ground. There is a slight increase in risk to the remaining 16% of birds as a result of the modification. The majority of birds at the site are common and widespread.

Additionally, it is noted that there would be a reduced risk if not all the 79 turbines are eventually developed due to possible grid connection restrictions in the 132kV line. However, the assessment has been carried out based on all 79 larger turbines being installed.

Potential impact on bats from modification

Most bats fly up to 60m in height. The decrease in the area of turbine exposure below 60m indicates that impacts to bats below this height will be reduced. There will be a small increase in risk to bats that fly between 60 and 100m, but this is unlikely to be significantly different to the original assessment.

Most of the bats recorded on site are common and widespread species. The only listed threatened bat to be recorded on site was the Eastern Bentwing-bat. A known maternity cave occurs at Wee Jasper, approximately 35km to the south of the site. In open habitats they tend to fly at low heights up to a few metres above ground (Churchill 1998, 2008). As such, this species is unlikely to experience any increased risk from the modification in turbine specifications proposed, since most of its flights are expected to occur in the area below the new lower RSA of approximately 30m.

Conclusion of the risk analysis

Given these findings, BL&A have assessed that the impacts of the proposed modified turbine design are negligible. There will be no new impacts due to the modifications proposed. The operational risks to birds and bats of the project would be essentially the same as that for the project for which consent was obtained.

Mitigation measures for the modified project

No additional mitigation strategies have been recommended for the modification relative to the approved project. The preparation of a bird and bat adaptive management plan (BBAMP), is required by Schedule 3, Condition 21 of the Consent, which requires a detailed description of measures to *'be implemented on site for minimising bird and bat strike during operation of the development'*. The condition includes requirement for *'prompt carcass removal'*.

9.3 SUMMARY OF BIRD AND BAT COLLISION RISKS AND THEIR MANAGEMENT

- The increased turbine size would result in negligible additional risk to birds and is unlikely to increase effects on bats during operation.
- Existing mitigation strategies (bird and bat management plan including removal of prey and carcasses) are appropriate to address the impact.
- No change to consent conditions is required.

10 BIODIVERSITY OFFSET STRATEGY

10.1 OFFSET REQUIREMENTS FOR THE APPROVED PROJECT

Schedule 3 condition 20 of the Development Consent states that:

Within 2 years of the commencement of construction, unless otherwise agreed by the Secretary, the Applicant shall retire biodiversity credits of a number and class specified in Tables 4 and 5 below to the satisfaction of OEH.

The retirement of these credits must be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Projects, and can be achieved by:

- (a) acquiring or retiring credits under the Biobanking scheme in the TSC Act;*
- (b) making payments into an offset fund that has been established by the NSW Government; or*
- (c) providing suitable supplementary measures.*

The values listed in Tables 4 and 5 of the consent conditions (Sched 3, Cond 20; provided below) were based on the quantum of impact identified in the submission to the PAC.

Table 4: Ecosystem credit requirements

Vegetation Community	Code (BVT)	Biometric Vegetation Type	Biometric Condition	Impact Area (ha)	Credits Required
Box Gum Woodland	MR528	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low (other)	18.1	507
Box Gum Woodland	MR528	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate-good (high diversity)	0.6	23
Box Gum Woodland	MR528	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate-good (low diversity)	10.1	202
Box Gum Woodland Derived Grassland	MR528	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate-good (low diversity)	54	0
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass – shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate-good (high and low diversity)	0.9	34
River Red Gum and Riparian	MR616	Yellow Box – River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate-good (low diversity)	0.1	3.3

Table 5: Species credit requirements

Species	Credits Required
Golden Sun Moth	1,028
Regent Honeyeater	801

Table 4 indicates an impact area of 83.8 ha and Ecosystem Credit requirement of 769.3. Table 5 indicates species credit requirements of 1829.

10.2 OFFSET REQUIREMENTS FOR THE MODIFIED PROJECT

Approach

Additional survey and assessment has been completed, for the modified layout and turbine models, which has more accurately defined the distribution of vegetation types and their condition and the quantum of impacts now proposed for flora and fauna. Additional BioBanking plot data has been collected to meet the requirements of the BioBanking Assessment Methodology (BBAM) for the increased area of impact. Revised credit calculations have been run for the modification layout which has determined a revised credit requirement for the project as detailed in Table 10-1 below.

The revised assessment was completed as 'major project' in the BioBanking Credit Calculator (BCC) as a 'linear development'.

Revised offset requirements

Ecosystem and species credits

The results of the revised offset calculations are presented in Table 10-1 below. The credit profile is provided as Appendix B.6.

Table 10-1 Revised offset requirements for the project

Ecosystem credits

Vegetation community	PC type code	Plant community type name	Biometric condition	Management zone area (ha) (approx.)	Loss in site value score	Credits req for TS	Ecosystem credits required
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.34	49.48	15	15
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	36.50	32.29	1098	1098
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall	Low	95.02	9.90	0	0

Vegetation community	PC type code	Plant community type name	Biometric condition	Management zone area (ha) (approx.)	Loss in site value score	Credits req for TS	Ecosystem credits required
derived grassland		woodland of the NSW South Western Slopes Bioregion					
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	2.32	20.83	50	50
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	141.83	15.10	2439	0
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.51	32.81	16	16
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	7.53	61.46	391	391
Long-leaved Box Dry Grass Forest derived grassland	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	14.63	15.62	257	0
River Red Gum and riparian	MR616	Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate to good (low diversity)	0.27	31.77	8	8
					Total:		1578

Species credits

Scientific name	Common name	TS multiplier	offset	Species credits required
<i>Anthochaera phrygia</i>	Regent Honeyeater	7.7		3396

It should be noted that the proposed cable routes for the modification layout were defined and verification of these additional areas completed, following the collection of the additional plot data. This resulted in an increase to the areas of Long-leaved Box Dry Grass Forest and derived grassland (moderate to good – low). For both of these vegetation zones three plots were required by the BBAM whereas only two have been completed. Late autumn/winter was not considered appropriate timing to collect additional plot data. For both of these zones an additional plot has been created based on the average of the site attributes from the other two plots to meet the minimum plot requirements of the BBAM until such time as additional plots can be completed (spring).

The credits for Golden Sun Moth has been removed from Table 10-1 on the basis that this species has not been found for the Coppabella site and the credits shown for the consent relate to the Marilba Precinct that has been removed from the Development Consent.

Supplementary offsets: hollow bearing trees

The project commits to offsetting HBTs removed by the project, within the identified offset sites. While the BBAM takes into account HBTs in assigning credits, this additional commitment recognises the importance of this resource in the locality and the need to provide an incentive during construction to reduce the impacts on this important resource.

Detailed field mapping and conservative extrapolation provides an estimate of the number of hollow bearing trees to be impacted as 473 – an additional 75 trees occur within 5m of the footprint and are anticipated to be able to be avoided in most cases.

The final number of HBTs impacted by the project would be quantified. In respect of the offset area, a verification process would be undertaken (which may include extrapolation of field data) to estimate the number of hollows to be protected within the offset package. This would be documented within the Offset Plan, to be developed in consultation with OEH.

10.3 COMMITMENT TO OFFSET

The Coppabella Wind Farm would offset native vegetation cleared in accordance with the FBA for Major Projects. It is proposed that the offset will:

- Account for the final impact area of the development.
- Be managed for biodiversity improvement in perpetuity.
- Be compliant with OEH endorsed offset guidelines and methodologies.
- Account for impacts to HBTs.
- Incorporate input from OEH, Local Land Services, Commonwealth Dept. of Environment and Council, as appropriate.

Mechanisms for securing an offset site

The Schedule 3 Condition 20 of the Development Consent requires offset credits be retired:

...in accordance with the NSW Biodiversity Offsets Policy for Major Projects, and can be achieved by:

- (a) acquiring or retiring credits under the Biobanking scheme in the TSC Act;*
- (b) making payments into an offset fund that has been established by the NSW Government; or*
- (c) providing suitable supplementary measures.*

The preferred method for securing offset sites required for the Coppabella Wind Farm is option (a); Credits representative of the physical offsets would be secured and banked under the Biobanking scheme. However, if CWFPL is unable to secure sufficient credits for physical offsets, alternate allowable options would be undertaken (options (b) and (c)).

Implementation overview

Schedule 3 Condition 2 of the Development Consent requires offset credits be retired:

...Within 2 years of the commencement of construction, unless otherwise agreed by the Secretary, the Applicant shall retire biodiversity credits...

The intention of offsets is to account for impacts on biodiversity values. For projects that require some flexibility in developing the final construction footprint and take some time to construct, it can be a relatively complicated process to identify and secure the precise quantum of offset land at key stages of the project's detailed planning and construction phase.

The following stages of implementing the Offset Package are proposed. The aim is to set out a clear path to identifying, securing and managing suitable offset lands in accordance with the conditions of the Development Consent. Once the final construction footprint is available, a verification process (audit) would demonstrate the actual impact areas. This would dictate the final requirement for the offset lands. Monitoring and management of the offset would be undertaken in perpetuity.

The process for development and implementation of the offset plan is included in Table 10-2 below.

Table 10-2 Implementation of offsets.

Phases of planning and implementation of offsets	Timing
1. Offset Strategy sets out methods to:	This document provides the Offset Strategy
a) estimate loss of habitat required for the project	
b) calculate the offset requirement	
c) secure the offset site in perpetuity	
d) manage the offset site in perpetuity	
2. Offset Plan reflects consultation with Local Land Services (LLS, previously CMA), Council the Commonwealth Dept. Environment and OEHL in relation to:	Pre-construction
a) Updating the credit requirement for the areas to be impacted, based on the latest construction design (on the basis of field collected plot data).	Pre-construction
b) Selecting the final suite of offset sites including accurate calculation of uppermost credits generated at the offset site (on the basis of field collected plot data). This will allow for some refinement based on the final construction footprint.	Pre-construction
a) Management planning for each offset site:	During construction
o Establishment of baseline data.	
o Documentation of key biodiversity risks, opportunities and relevant local initiatives.	
o Refinement of management actions specific to the site (with input from the landowner), including monitoring regime and reporting requirements.	
o Consultation with LLS and OEHL to finalise the Offset Plan (could be documented separately for each site or in one combined document).	
3. Verification of the actual area of native vegetation clearing required for the final construction footprint.	During construction.
4. Formalisation of the security mechanism for the offset site (Biobanking agreements).	Retire credits within 2 years of commencement of construction.
5. Monitoring and management as required at the offset site.	During operation.

10.4 THE ESTIMATED OFFSET AREAS

Ecosystem and species credit requirements

Section 10.2 sets out the updated credit requirement for the project in (Table 10-1).

Using the online OEHL credit converter tool, these credits were converted to estimated offset areas, to provide an indicative estimate of the offset area required. The result of the offset requirements are summarised in Table 10-3.

Table 10-3 Estimated offset areas (ecosystem credits)

Vegetation community	PC code	Plant community type name	Biometric condition	Management zone area (ha) (approx.)	Ecosystem credits required	Estimated offset area (ha)
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.34	15.00	1.60
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	36.50	1098.00	118.10
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	95.02	0.00	0.00
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	2.32	50.00	5.40
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	141.83	0.00	0.00
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.51	16.00	1.70
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	7.53	391.00	42.00
Long-leaved Box Dry Grass Forest derived grassland	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	14.63	0.00	0.00

Vegetation community	PC code	Plant community type name	Biometric condition	Management zone area (ha) (approx.)	Ecosystem credits required	Estimated offset area (ha)
River Red Gum and riparian	MR616	Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate to good (low diversity)	0.27	8.00	0.90
Total				298.95	4017	169.70

Regarding 'species credits', 3396 credits are required for the Regent Honeyeater. These credits would be retired within Box Gum woodland. Only the moderate to good condition vegetation will be suitable habitat for these threatened species.

Using the credit converter tool, approximately 98 ha of moderate to good condition Box Gum woodland would be required for this species. This can be found within the Box Gum woodland identified above and is unlikely to be an additional requirement (that is, area that satisfies the Box Gum woodland requirement) can also satisfy the Regent Honeyeater requirement.

It is anticipated that the offsets under the NSW Biobanking scheme will also satisfy the requirements under the EPBC approval. The Commonwealth entities requiring offsets are a subset of those already being offset for NSW, which typically requires higher offset : impact ratios.

10.5 INVESTIGATION OF SUITABLE OFFSET SITES

General availability of suitable offsets

At various stages during the planning and assessment stage of this project, potential offset areas have been identified and evaluated. Many additional potential areas that appear to offer high quality offsets have not yet been surveyed. It is noted that several areas and not one contiguous site can be used to meet the offset criteria. The final 'package' may comprise a number of sites although preference will be given to minimising the edge area of the package as a whole.

The selection process has involved the following considerations:

- Areas of high constraint, where these areas occur sufficient distance from wind farm infrastructure, are the most likely candidates. Where they can be secured in relatively continuous areas, they would represent the least ongoing management cost as they are already in good condition. They provide good habitat values worth protecting and improving in perpetuity.
- Areas of EEC vegetation in better quality in the lower elevation landscape provide habitat for Superb Parrot and would offset habitat loss for this species.
- Areas of more intact woodland, provide hollow-bearing trees for a number of threatened birds and provide landscape connectivity in a relatively cleared and open landscape. Areas that increase and protect landscape connectivity area are worth protecting in perpetuity.

Based on the investigations and assessment carried out on the project site, there is a high level of confidence that suitable offsets are available within the site boundaries or on land immediately adjacent to the site which is owned by involved landowners. Key factors contributing to this confidence include:

- Since 2008, a very broad survey coverage has been achieved. The surveyed land surrounding the impact areas provide similar habitat types and values as those that would be impacted. This is verified by on ground survey and site inspections. These areas are therefore well placed to provide a 'like for like' offset.
- A substantial amount of area is available from which to select the most suitable offset sites. While not all of the land within the project boundaries is available or suitable for offsets, the area of land impacted by wind farm infrastructure is approximately 5% of the land included within the Coppabella project boundaries.
- The project has been developed to reflect biodiversity constraints identified early and throughout the assessment process and therefore, the areas adjacent to the impact zones but within the project boundaries are more likely to contain better habitat values, more appropriate to an offset site that will be managed for biodiversity outcomes in perpetuity.

Examples of this include:

- large areas of connected tree cover are mostly avoided by infrastructure, being declared as high constraints due to their contribution to landscape connectivity and higher density of hollow bearing trees. These areas are available for the offset area.
- high diversity (meeting Commonwealth CEEC criteria) Box Gum Woodland of conservation significance is mostly avoided by infrastructure (less than 3 ha total impact). Additional areas are available for the offset area.
- protocols have been developed to microsite infrastructure away from hollow-bearing trees, where possible. Areas with hollows will be included in the offset area to account for all hollows to be removed.

The total amount of area investigated to date with potential to be used as offsets is mapped in Appendix B.6.

While it is considered preferable to offset within the Coppabella site on host landholdings, it is also considered feasible that some of the landowners in the nearby Marilba area may be interested. While they are no longer involved in the project, relationships exist with these landowners and areas of high biodiversity value are known to occur.

Specific criteria

Avoidance of indirect impacts of the operational wind farm

The preference of the proponent is to secure offset lands from within the project boundary. In order that the offset sites are not adversely impacted by operational impacts of the wind farm, the proponent would ensure the following minimum buffers between wind farm infrastructure and offset areas:

- Approximately 300m from wind turbines (300m from turbine tower centres);
- Approximately 50m from tracks, powerlines and other linear infrastructure (50m from centrelines); and
- Approximately 50m from the outer edge of all other infrastructure.

Suitable vegetation types

Broad vegetation mapping is available within the Coppabella project boundary. As expected, the lands adjacent to the impact areas contain similar habitat and are therefore broadly suitable as offsets. Excluding areas above that are too close to the development to be free from operational impacts, the residual areas were summed using GIS. Refer to Appendix B.6.

The project boundaries contain sufficient area to satisfy the estimated Box Gum Woodland and Long-leaved Box areas required for offsets. The small amount of River Red Gum required could be investigated in the Marilba area – sufficient areas are known to occur here from past surveys. There is also potential for this vegetation type to occur along Jugiong Creek in the north-west of the Coppabella project boundary.

Plot data has been collected for the development site (to inform the offset requirement) but has not yet been collected specifically for the offset sites. Many of the plots collected may be suitable for use in the offset sites, if the areas are shown to be located in homogenous zones, in accordance with the BBAM.

The plot data collected to date could be utilised to provide an estimate of the credits that would be generated by the total area outside of the consented Development Corridor however, this is not considered a valid approach as the BioBanking Credit Calculator requires:

- Aa landscape assessment that estimates native vegetation cover before and after offsets. Using the entire area outside of the consented Development Corridor would skew this assessment.
- Calculations of patch sizes to determine potential use of the offset areas by ecosystem credit species. Using the entire area outside of the consented Development Corridor would not facilitate an accurate determination of the likely patch sizes that would result from individual offset sites. This could result in the inclusion of ecosystem credit species that could inflate the potential credits generated.

As such, the credit estimates that would be generated by using entire area outside of the consented Development Corridor are unlikely to be meaningful. Table 10-4 below demonstrates that there are large areas available on involved landowners land that are highly likely to be able to satisfy the majority of the modified projects offset requirements (Box-Gum woodland and Long-leaved Box dry grass forest). As discussed above, the small area of offset required for the River Red Gum riparian vegetation is also likely to be available however, if not able to be physically secured, then the alternate offset options available in the project consent would be implemented.

Table 10-4 Potential offset areas – within the Coppabella precinct

Vegetation community	PC code	Plant community type name	Biometric condition	Estimated offset area required (ha)	Available at Coppabella (ha)	Net	Additional areas that could be investigated at Marilba (ha)
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good	125.10	886.05	760.95 surplus	Not required
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good	43.70	97.21	53.51 surplus	Not required
River Red Gum and riparian	MR616	Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate to good (low diversity)	0.90	0.00	-0.9 deficit	1.02
Total				169.70	983.26	813.56 surplus	1.02

Threatened species

The areas mapped in Appendix B.6 are known to contain 93.07 ha of good condition Box Gum Woodland, suitable for the Regent Honeyeater. It is feasible that this credit requirement can be met from within the Coppabella site boundaries.

Management measures at the offset sites

Management measures required at the offset sites are likely to include:

- Exclusion of commercial apiaries;
- Exclusion of feral species;
- Control of overabundance of native herbivores;
- Fox control;
- Slashing;
- Management of grazing for conservation (note: while grazing is not prohibited, it must be managed carefully for the objective of biodiversity improvement. This may affect the timing of grazing and stocking rates. It will require agreed monitoring methods to inform stock management);
- Weed control;
- Management of human disturbance;
- Retention of regrowth and remnant native vegetation;
- Replanting or supplementary planting where natural regeneration will not be sufficient;
- Retention of dead timber;
- Erosion control;
- Retention of rocks; and
- Monitoring of performance.

A management plan for each offset area, using the Biobanking proforma, would be established, including targeted management actions, success criteria, triggers for action and monitoring requirements. The plan would be developed in consultation with OEH and submitted as part of the formal Biobanking application process for each site.

10.6 SUMMARY

- **The modification would result in increased impact to native vegetation.**
- **Existing mitigation strategies (Biobanking offsets) will be adequate to address the impact. However, the offset requirement should be updated in the conditions of consent to reflect the modified layout.**
- **It is considered highly feasible that sufficient physical offset sites can be developed within the project boundaries and adjacent areas, as required, to meet the offset requirement. This would be detailed within an offset management plan.**
- **As the wind farm may be developed in stages (or it is possible that a number of turbine sites would not be developed at all) staging for offsets is also proposed.**

Proposed changes to the consent conditions regarding offsets are provided in Section 16.

11 INDIGENOUS HERITAGE IMPACTS

11.1 INDIGENOUS HERITAGE IMPACTS FOR THE APPROVED PROJECT

Archaeological and heritage assessments carried out by NSW Archaeology Pty Ltd (Dibden 2009) identified 70 Aboriginal heritage sites within the Coppabella precinct and the assessment concluded that artefact density is generally very low.

The majority of the Aboriginal object locales recorded (45) were very low or low density distributions of stone artefacts. The archaeological significance of these was assessed to be low. Accordingly, a management strategy of unmitigated impact was considered to be appropriate.

A number of the Aboriginal object locales and/or discrete areas within Survey Units were assessed to be of low/moderate (4) or moderate (21) archaeological significance. Accordingly, in regard to these it was generally recommended that limiting the extent of impacts to these locales, if at all feasible, should be given consideration. In regard to these locales it was recommended that a salvage program of subsurface excavation be undertaken as a form of Impact Mitigation.

11.2 INDIGENOUS HERITAGE IMPACTS FOR THE MODIFIED PROJECT

Approach

In 2016, NSW Archaeology Pty Ltd was commissioned by Goldwind to conduct an Aboriginal heritage (archaeological and cultural) assessment in relation to the proposed project modification. A revised report has been prepared (Dibden, 2017a) (attached in full at Appendix B.7). In preparing the revised report, Dibden conducted additional field surveys from 24 – 27 November 2016 and on 13 April 2017. Approximately 43km of linear impact areas were surveyed during the 2016/2017 field work.

In addition, some impact areas were assessed without a field inspection but based on a consideration of the relevant predictive model of site location. Given the strength of the predictive model relevant to the subject area, the survey results can be confidently extrapolated to any unsurveyed areas. The unsurveyed areas include steep slopes and small areas of ridge crests. Both landforms are predicted to contain negligible or at best very low density artefact distribution. It is concluded that the proposed wind farm is generally of low archaeological and cultural potential and sensitivity. The exception to this is flats and basal simple slopes adjacent and close to higher order streams.

The results of the additional assessments have been documented in a revised and updated heritage report (Dibden, 2017a). The revised report documents the Aboriginal cultural heritage assessment undertaken in respect of changes to the project layout. In order to function as a standalone report, the document describes the assessment of the entire project area.

Potential impacts

The original archaeology assessment (Dibden 2009) recorded 70 Aboriginal object locales within the activity area.

During the two additional periods of field survey an additional 12 Aboriginal object locales were recorded. A total of 82 Aboriginal object locales have been recorded by Dibden (2017a) across the Coppabella precinct.

All 12 Aboriginal object locales identified in the 2016 and 2017 surveys are within areas that would be directly impacted by the proposed project modification. Of the 12 newly recorded Aboriginal object locales, six were assessed as having low local scientific significance and the other six were assessed as having potentially moderate scientific significance (Dibden 2017a).

As a result of the proposed modifications to the wind farm layout, 34 of the original 70 Aboriginal object locales are now outside the proposed layout. A total 48 Aboriginal object locales, inclusive of 36 original and 12 new sites, would now be impacted as a result of the modification. There are now 34 fewer Aboriginal object locales that would be impacted, compared to the approved project.

The potential impacts of the approved project and the proposed modified project are summarised in Table 11-1, in terms of Aboriginal object locale significance.

Table 11-1 Potential impacts to recorded Aboriginal heritage artefacts, consented project and modified project

Aboriginal object locale significance	Total number of Aboriginal object locales recorded in Coppabella precinct, by significance (Dibden, 2017)	Potential number impacted under consented project	Potential number impacted under proposed modified project
Low local scientific significance	51	45	33
Low/moderate local scientific significance	4	4	0
Potentially moderate scientific significance	27	21	15
Total	82	70	48

Dibden (2017a) states that the results of the revised assessments are entirely comparable to that as previously surveyed (Dibden 2009). The modified project would entail ground disturbance similar in nature to that under the approved project. Accordingly, the construction of the modified project would have potential to cause impacts to any Aboriginal areas, places or objects which may be present within the zones of direct impact.

Mitigation measures for the modified project

The mitigation strategies outlined in the original ACHA report (Dibden, 2009) are all applicable to the modified project. Other strategies recommended by Dibden (2009) are focussed on minimising the impact to Aboriginal locales within the project area and importantly, include the development and implementation of a salvage program of archaeological excavation and analysis for certain Aboriginal object locales prior to construction. The revised ACHA report (Appendix B.7) provides recommended management strategies relating to each of the Survey Units and Aboriginal object locales that Dibden has recorded in the Coppabella precinct to date. In summary:

- The majority of Aboriginal object locales recorded across the Coppabella precinct are very low or low density distributions of stone artefacts, assessed to be of low significance. Accordingly, a management strategy of unmitigated impact is considered appropriate for those sites.

- A number of the Aboriginal object locales and/or discrete areas within Survey Units are assessed to be of low/moderate or moderate archaeological significance. For these areas, it has been recommended:
 - To consider limiting the extent of impacts, if feasible.
 - Implement a salvage program of subsurface excavation as a form of mitigation.

The mitigation strategies remain in accordance with the consented project.

Additionally, it is noted that a draft Heritage Management Plan (HMP) has been developed (Dibden, 2017b) to satisfy the requirements of Condition 25 of the Development Consent. The HMP document will provide a framework to ensure that the Development Consent conditions are complied with during the construction and operation of the wind farm.

11.3 SUMMARY OF HERITAGE IMPACTS AND THEIR MANAGEMENT

- **The heritage impacts have reduced compared to the approved project.**
- **The mitigation strategies proposed as part of the approved project are adequate are captured within the Heritage Management Plan.**
- **No change to consent conditions is required.**

12 AVIATION HAZARD IMPACTS

12.1 AVIATION IMPACTS FOR THE APPROVED PROJECT

The Environmental Assessment completed in 2009 (NGH Environmental 2009a) included an aviation navigation services assessment. Further aviation assessments were carried out in 2010, including an Aeronautical Impact Assessment (Ambidji Group 2010) for the Coppabella and Marilba Precincts.

The assessment concluded that the location of the wind farm and its individual turbines would not impact on the safety of aerial agricultural operations. It was also concluded that the wind farm would not have any impact on the operation of any of the identified airstrips in the vicinity of the wind farm. The assessment involved preparation of a qualitative risk assessment to assess the degree of risk (hazard) posed by the project. The risk assessment determined that the probability of an aircraft impacting with a turbine day or night or in poor weather was very low, and that aviation obstacle lighting would not be required.

Conditions 34-39 of the existing Development Consent require preparation of a detailed report to the satisfaction of Airservices Australia (ASA) on all the potential aviation-related impacts of the development, and also prepare an Aviation Impact Management Plan to the satisfaction of ASA.

Since Development Consent was granted, further studies have included:

- Risk assessment for aviation safety and need for aviation safety lighting on wind turbines.
- Consultation with ASA in respect of potential impacts on radar systems based on assessments by aviation specialists.

12.2 AVIATION SAFETY IMPACTS FOR THE MODIFIED PROJECT

Approach

In 2017, Goldwind commissioned Aviation Projects to carry out an Aviation Safety Assessment to determine the potential impacts that the modified project may have on aviation operations. The assessment is provided in full in Appendix B.8.

The Aviation Safety Assessment was undertaken for the proposed GW140 turbine, with an overall tip height of approximately 171 metres. Specifically, the assessment involved:

- A review of previous reports prepared for the project.
- Preparation of an Aviation Impact Statement, including consideration of:
 - Obstacles (wind turbines (GW140 model), wind monitoring towers (masts) and their locations).
 - Nearby aerodromes, air routes and airspace.
 - Identification of aircraft operator characteristics (passenger transport, private operations, aerial agriculture operations, aerial firefighting, aerial emergency services) and impacts to aircraft operations.
 - Consideration of the need for hazard lighting and marking. A lighting design has also been prepared, in the event that obstacle lighting is required.
 - Completion of an obstacle lighting risk assessment.
- Aviation Impact Assessment distributed to relevant stakeholders for consultation.

The Development Consent Conditions (Schedule 3, Condition 34-39) require the proponent to:

- Prepare a detailed report to the satisfaction of Airservices Australia on all the potential aviation-related impacts of the development (addressed by Aviation Impact Assessment and consultation in progress).
- Prepare and implement an Aviation Impact Management Plan to the satisfaction of Airservices Australia (in preparation).
- Implement notification procedures with CASA, Airservices Australia, RAAF and aviation users.

These existing conditions of consent are equally applicable for the modified project.

Potential impacts of the modified project

Aviation impact assessment

Proximity to aerodromes

There are two aerodromes within 30 nm of the approved project. These are summarised in Table 12-1 below, along with an analysis of impacts on the aerodromes obstacle limitation surfaces (OLS).

Table 12-1 Nearby aerodromes and proximity of turbines to obstacle limitation surfaces.

Aerodrome	Location	Nearest turbine and distance (approx.)	Impacts (height m)	
			(150m)	(171m)
Cootamundra YCTM Operator: Cootamundra-Gundagai Regional Council	UTM zone 55 E 594953.18 N 6168115.53	Closest turbine: No. 69 41.8 km 22.6 nm	150 m high turbine AGL – aviation protection surface not penetrated	Turbine no. 9 penetrates the 25 nm MSA 1000 ft protection surface by 4.6 m (16 ft).
Young YYNG Operator: Young Shire Council	UTM zone 55 E 614912.29 N 6208803.32	Closest turbine: No. 126 56.0 km 30.1 nm	Aviation protection surfaces are not penetrated by any turbine.	

Aviation Projects, 2017 found that:

- The approved project, with a maximum blade tip height of approximately 150m, would not have any impacts relating to obstacle clearance.
- For the modified project, Turbine No. 9 (based on a maximum blade tip height of 171m and base at existing ground level) would encroach the 1000 ft minimum obstacle clearance (MOC) for the 25 nm minimum safe altitude (MSA) (or 4200 ft above mean sea level (AMSL)) at Cootamundra Airport by approx. 4.6m (16 ft).
- To ensure that the minimum obstacle clearance surface is not encroached by Turbine No. 9, one or more of the following mitigation options may be applied:
 - o Micro-siting of Turbine No. 9 to reduce the maximum tip height by at least 4.6m;
 - o Detailed design of hardstand and turbine base level resulting in lower maximum tip height

- o A request to Airservices Australia to raise the 25 nm MSA for Cootamundra by 100 ft to 4300 ft AMSL.

Air routes and grid lowest safe altitudes

Lowest safe altitudes (LSALTs) published in AIP must be clear of obstacles by 1000 ft. The project is entirely located within a grid with a LSALT of 4600ft AMSL. The grid LSALT would not be impacted by the modified project.

There are five air routes that are located near the project site. The minimum LSALT is 4600 ft AMSL. The modified project would not impact any published air routes.

Airspace considerations

The Coppabella Wind Farm project would be situated entirely inside uncontrolled, G Class airspace. The lower limit of E Class controlled airspace is 8500 ft AMSL (2590.8 m AHD) and will not be impacted. The project is not located inside designated (danger, restricted or prohibited) airspace.

Impacts to aircraft operations

Passenger transport

Regular Public Transport operations are only conducted at certified aerodromes. There are no certified aerodromes within 30 nm of the project.

Private operations

Private operations are generally conducted during daylight hours or Visual Flight Rules (VFR) at night, and some under Instrument Flight Rules (IFR). Flight under day VFR is conducted above 500 ft (152.4m) above the highest point of the terrain within a 600m radius (300m for helicopters). It is expected that the wind turbines will be sufficiently visually conspicuous to pilots conducting VFR operation to enable appropriate obstacle avoidance manoeuvring if transiting the area of the project.

Aerial agricultural applications

The Aviation Impact Assessment investigated the impacts of the proposed turbines on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the project.

Consultation with local aerial application operators was undertaken by Aviation Projects (2017). Based on previous studies, and subject to the results of consultation with the Aerial Agricultural Association of Australia (AAAA) and local aerial application operators, it is reasonable to conclude that safe aerial application operations would be possible on properties within the project site and neighbouring site, subject to confirmation of final turbine locations and a case-by-case assessment and by implementing the recommendations of the Aviation Safety Assessment.

Aerial fire fighting

The Australasian Fire and Emergency Services Council (AFAC) developed a national position on wind turbines: *Wind Farms and Bush Fires Operations*, version 2.0, dated 30 October 2014.

Of specific interest in this document is the following paragraph:

Aerial fire fighting operations will treat turbine towers similar to other tall obstacles. Pilots and Air Operations Managers will assess these risks as part of routine procedures. Risks due to wake turbulence and the moving blades should also be considered. Wind turbines are not expected to pose unacceptable risks.

Aerial emergency services

Consultation with the Air Ambulance and the Royal Flying Doctor Association is being undertaken as an outcome of the Aviation Safety Assessment. Feedback has not yet been received.

Hazard lighting and marking

The CASA regulates aviation activities in Australia. The requirements of CASA, including regulations, standards and guidance material are outlined in detail in Section 7.1 of the Aviation Safety Assessment (Appendix B.8). Australia also has an obligation to implement the standards and recommended practices of the International Civil Aviation Organization. Requirements are outlined in further detail in Section 7.2 of the Aviation Safety Assessment.

Obstacle risk assessment

Obstacles at the Coppabella Wind Farm would include the wind turbines and wind monitoring towers. To assess the requirements for obstacle lighting, Aviation Projects (2017) carried out an Obstacle Lighting Risk Assessment for the following risks associated with the wind farm:

- Aircraft collision with a wind turbine;
- Aircraft collision with a wind monitoring tower;
- Harsh manoeuvring in order to avoid colliding with a wind turbine or monitoring tower resulting in controlled flight into terrain (CFIT);
- Effects on crew; and
- Visual impact from obstacle lights.

These risks are summarised in the Table 12-2. The full risk assessment is available in the Aviation Impact Assessment (Aviation Projects, 2017) provided at Appendix B.8.

Table 12-2 Risk assessment – hazard obstacle lighting

Risk element	Consequence	Likelihood	Risk	Conclusions
Aircraft collision with a wind turbine	Catastrophic	R Unlikely	7 - Tolerable	Risk level is acceptable without obstacle lighting on wind turbines.
Aircraft collision with a monitoring tower.	Catastrophic	R Unlikely	7 - Tolerable	Risk level is acceptable without obstacle lighting on wind monitoring towers.
Harsh manoeuvring leads to CFIT	Catastrophic	R Unlikely	7 - Tolerable	Risk level is acceptable without obstacle lighting.
Effect on crew	Minor	Possible	5 - Tolerable	Risk level is acceptable without obstacle lighting.
Visual impact from obstacle lights	Moderate	P Likely	6–7 - Tolerable	Risk level is acceptable without obstacle lighting (zero risk of visual impact from obstacle lighting).

ICAO Annex 14 Vol 1 Section 6.4.2 recommends that the rotor blades, nacelle and upper 2/3 of the supporting mast of the wind turbines should be painted white, unless otherwise indicated by an aeronautical study. It is generally accepted that, as an alternative to white, an off-white or light grey colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.

12.3 MITIGATION MEASURES FOR THE MODIFIED PROJECT

The mitigation strategies remain in accordance with the approved project.

Notification and reporting requirements

- Prior to construction the proposed wind turbine coordinates and elevations (after micro-siting) would be provided to the Royal Australian Airforce Aviation Impact Assessment in accordance with AC 139-08(0) *Reporting of Tall Structures*. Updated notification of 'as built' coordinates and elevations are to be provided following the erection of the turbines.
- Details of wind turbines and wind monitoring towers on the Project site should be communicated to Airservices Australia, and local and regional aerodrome and aircraft operators before, during and following construction.
- Any obstacles above 110 m AGL (including temporary construction equipment) should be reported to Airservices Australia Notice to Airmen office until they are incorporated in published operational documents.
- The location of wind turbines, monitoring towers and powerlines should be made available to the Rural Fire Service (RFS), the Royal Flying Doctor Service (RFDS), aerial agriculture operators and land owners so they are able to provide this information to aerial application pilots when requested for flight planning purposes.

Marking of turbines

- The rotor blades, nacelle and the supporting mast of the wind turbines should be painted white.

Lighting of turbines

- Aviation Projects has assessed that obstacle lighting will not be required to maintain an acceptable level of aviation safety. Further consultation will occur with CASA in respect of aviation safety lighting requirements.

Marking of wind monitoring towers

- Consideration be given to marking any wind monitoring towers according to the requirements set out in MOS 139 Section 8.10 (as modified by the guidance in NASF Guideline D), as these structures are less visible than wind turbines.

Marking of overhead transmission lines and poles

- Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be identified in consultation with local aerial agriculture operators and marked in accordance with MOS 139 Section 8.10.2.8. Note that the new transmission lines that are proposed will not adversely affect aircraft operations.

Aerodrome impacts

- To address the encroachment of the Cootamundra 25 nm MSA 1000 ft protection surface by wind turbine 9 (by 4.6m; 16 ft), CWFPL will consult with Airservices Australia to identify whether the 25 nm MSA at Cootamundra can be raised by 100 ft to 4300 ft AMSL. If the surface can be raised without adverse consequence for local air traffic, then this would enable the optimum turbine configuration.

12.4 SUMMARY OF AVIATION IMPACTS AND THEIR MANAGEMENT

- Additional impacts arising from the modified project have been assessed.
- Consultation is in progress based on the assessment.
- It is anticipated that additional impacts can mostly be mitigated using the same mitigation measures proposed as part of the approved project and required by the consent.
- An additional task will involve consultation with Airservices Australia in respect of Turbine 9 to raise the potentially impacted obstacle limitation surface.
- No change to consent conditions is required.

13 TELECOMMUNICATIONS IMPACTS

13.1 TELECOMMUNICATION IMPACTS FOR THE APPROVED PROJECT

Epuron undertook a Telecommunications Assessment in May 2009 as part of its Environmental Assessment (NGH Environmental 2009a), which investigated potential impacts on television and radio broadcast services, mobile phone services, radio communication services and aircraft navigation services. The assessment included consultation with telecommunications service providers. It was found that telecommunications impacts would be limited to the operational phase of the wind farm development. Potential impacts were identified for television communications services, including television interference which can be caused by a range of wind farm design factors including turbine elevation, rotor size and orientation, speed of rotation, blade material and pitch). Five point-to-point radio communication links were identified as crossing the Coppabella Precinct but it was found that impacts to these services could be avoided through the implementation of appropriate mitigation measures.

The investigations concluded that the project would have a minimal effect on telecommunications services in the area. The 2009 assessment is now dated and given the potential for new services to exist or previous services to be modified or deleted a further assessment was required.

The Development Consent (Schedule 3, Condition 40) requires the proponent to make good any disruption to radio or telecommunications services in the area.

13.2 TELECOMMUNICATION IMPACTS FOR THE MODIFIED PROJECT

Approach

In 2017, the proponent commissioned Lawrence Derrick & Associates (LD&A) to carry out investigations into the possible impacts of the modified project on broadcasting and radio communication services. Specifically, the investigation provided an analysis of each of the radio services registered within the area surrounding the wind farm or that may have signals passing through the wind farm that could be subject to interference. Where necessary, it provided calculated clearances for radio link paths based on accepted industry criteria for radio links crossing the wind farm and any required buffer zones for radiocommunications sites located close to turbine sites. An investigation report was prepared, titled *Coppabella Wind Farm – Investigation of Possible Impacts on Broadcasting Services and Radiocommunication Services* (LD&A, 2017a). This investigation involved the following approaches:

- Legislation and guidelines – the assessment was undertaken with consideration of the *Australian Radiocommunications Act 1992*; the NSW Wind Energy Guidelines DPE 7812 for State Significant energy development (2016), and; the Clean Energy Council (Auswind) Best Practice Guidelines (2006).
- Desktop research, to determine the broadcast transmitter site locations and radio frequency channels which provide cover of the area.
- Desktop analysis, to determine the likely impact, if any, of the wind turbines and their supporting towers on broadcasting and radio communications in the area surrounding the wind facility.

The services that have been considered by LD&A (2017a) include:

- Broadcasting services:

- o Digital television;
 - o TV retransmission stations;
 - o FM sound broadcasting;
 - o AM sound broadcasting; and
 - o Satellite TV.
- Radiocommunications services:
 - o Point to point services;
 - o Cellular mobile base stations;
 - o Two-way mobile;
 - o NSW RFS base stations;
 - o CB radio;
 - o Aviation services;
 - o Point to multipoint services;
 - o Radio sites; and
 - o Met Bureau radar and other services.

LD&A were engaged to carry out a second investigation, specifically focussed on investigating the change in potential impacts of the project on radiocommunication services as a result of using larger rotor GW140 turbines, relative to the GW121 turbine that has dimensions which are consistent with the Development Consent. The assessment investigates the horizontal and vertical clearances required for radio link paths that traverse the boundaries of the proposed modified project. A report was prepared, titled *Coppabella Wind Farm Radio Link Exclusion Zones Comparison Between GW 121 and GW 140 Turbines* (LD&A, 2017b).

The telecommunications reports are provided in full in Appendix B.9 and the potential impacts are summarised in the following sections.

Potential impacts of the modified project

This section outlines the potential impacts associated with various telecommunications services, as presented in Lawrence Derrick & Associates 2017a and 2017b. Impacts to the various broadcasting and radiocommunications services are discussed separately in the following sections.

Broadcasting services

Digital television

It is expected that residents in the area surrounding the proposed wind facility generally view digital TV from the SW Slopes National and Commercial main stations located at Mt Ulandra and from the Canberra National and Commercial stations at Black Mountain. Marginal TV reception from the Central Tablelands stations at Mt Canobolas may be available to the north of the wind farm at a few sites. There is also a low power retransmission station 25 km away to cover the Harden town and surrounds

Digital television is not subject to degraded picture quality (eg. ghosting degradation) in high signal strength areas. However, in the area around the wind farm where there are predicted marginal signal levels from the other two potential sources of TV signal, some reduction of service area could result from reflected unwanted signals. There may be individual houses located in shadow areas where mitigating techniques may need to be applied.

TV retransmission stations

TV retransmission stations in the area have been considered. The off-air TV reception links are not included on the Australian Communications and Media Authority (ACMA) database as licensed links, and therefore

do not appear on the link mapping should they exist. If their input signals passed near or traverse the proposed Coppabella wind farm, some interference to input signals and therefore to the TV service areas of the station could occur. Two TV rebroadcast stations exist at Harden and at Cootamundra where the input signals are likely to be from the SW Slopes Stations at Mt Ulandra and without the wind farm being in the path. Satellite sources of signals are often used by some of the TV networks.

FM and AM audio sound broadcasting

National and Commercial Services are radiated from Mt Ulandra and Canberra sites. Based on overseas field and experimental evidence, discussed in Section 8, the proposed wind farm is unlikely to negatively impact these services and therefore FM Stations covering this area have not been investigated in detail.

AM coverage in the general area of the wind farm is expected to be limited. Based on overseas field and experimental evidence, discussed in Section 8, the proposed wind farm is unlikely to negatively impact Medium Frequency reception and therefore the stations serving the area have not been investigated in detail.

No interference from the wind facility is expected to the FM and AM sound broadcasting services in the area.

Satellite television

Some residents in the area may have satellite pay TV or “Free to Air” TV service installations. The signal from the satellite to the subscriber’s antenna arrives at an elevation angle which typically passes well over the top of a turbine particularly where there is substantial setback of neighbouring residences from turbine sites. The proposed Coppabella wind farm is unlikely to cause signal obstruction/scattering to satellite TV reception, given that all nearby residents are further than 1km from proposed turbine locations and the satellite dish antenna have narrow reception beam width.

Radiocommunications services

Point to point services

A number of point to point links are registered for operation within 50km of the CWF site. There are three UHF/VHF links that traverse the boundaries of the modified project and which connect to the Coppabella Hills site 9452 within the project area. There are also another two link paths known to exist between the Coppabella Hills site 9452 and Jugiong, and a Harden Council site, which are not shown as point to point links in the ACMA database. The paths presumably do not appear on the link mapping as they are part of a point to multipoint system where the remote ends are not listed.

Path profiles were generated for each of the 5 links with turbine blade tip heights of approximately 170m superimposed at representative positions along the link. The 5 link paths need to have vertical clearance but for at least two turbines closer to Site 9452 (where the links originate), there does not appear to be sufficient clearance. In such cases, horizontal clearance is required for the relevant point to point link.

Calculations were made for the UHF links crossing the CWF to determine the acceptable Fresnel zone horizontal clearances for each link. These are shown in Attachments 10 and 11 of LD&A (2017b) (Appendix B.9).

The approved project would have six GW121 turbines that have insufficient clearance to the link paths. For the modified project with the larger GW140 turbine, seven of the GW 140 turbines have insufficient horizontal clearance to the link paths. Six of the turbines involved are the same in both cases, with an additional turbine site having inadequate clearance where the GW140 turbine is used.

Under the modified project, the following turbines would have potentially insufficient horizontal clearance and need more detailed assessment of vertical clearance.

- Turbines T68, T129, T66, T32, T38, T56, T58.

Where horizontal and vertical clearances are both insufficient then further design mitigations would be required potentially through micro-siting and/or other technical solution for the installed services. If required, the horizontal clearances are all able to be addressed by adjustment of turbine locations within the 100m micro-siting allowance.

Cellular mobile base stations

The nearest Optus/VHA or Telstra cellular mobile base stations are registered at sites 100784, and 130627 which are 6km, and 11km respectively from the nearest proposed turbine location. These distances are remote enough from the proposed Coppabella wind farm that operation of the wind facility would have no significant impact on antenna patterns and general service area coverage; however it is recommended that Optus and Telstra be advised of the wind facility proposal.

Two-way mobile

A number of private and Public Utility mobile bases exist in the wider area surrounding the proposed Coppabella wind farm site. These bases likely provide cover to mobiles in a 360 degree arc from their location. The proposed Coppabella wind farm is not expected to have any impact on base coverage beyond normal mobile operational performance. The base antennas are remote enough from the proposed turbine locations that an associated negative impact is highly unlikely.

It is noted that a mobile transceiver unit communicating with a base station may experience some local performance disruption when the mobile is located within metres of a wind turbine, this disruption is not limited to just wind farms and is experienced near any large building, silo, tower etc and moving a short distance would mitigate and restore performance to normal.

NSW RFS base stations

There are a number of ACMA registrations for VHF base stations in the 50km radius around the proposed Coppabella wind farm site. The closest of these is site 9519 approximately 12.5km from the nearest proposed wind turbine. These services may experience some very local performance disruption when a portable unit is located in close proximity of a wind turbine, however moving a short distance away would mitigate any performance disruption. It was recommended that the RFS be contacted for their view on the potential impacts.

CB radio

No significant impact from the wind facility is expected, however there may be local performance disruption when a portable CB radio unit is located in close proximity of a wind turbine structure, however moving a short distance away would mitigate any performance disruption.

It is noted that a CB repeater (CBRS) is licenced to the Hill Tops Council and is located on the Coppabella Hill site 9542 in the centre of the Wind Farm. As the CB mobiles and portables using the repeater will potentially have paths to and from the repeater with wind turbines in both paths, some loss of coverage may be experienced.

Aviation navigation services

Navigational aids at Cootamundra and Yass and Radar/Ground to Air at Mt Bobbara near Binalong were identified within 50km of the project boundaries.

Separately to the LD&A Assessment of Telecommunications, CWFPL has undertaken consultation with AirServicesAustralia (ASA) and provided specialists reports on potential impacts on air navigation radar systems including those associated with the Mt Bobbara and Mt Majura facilities. This work is addressing existing Consent Conditions 34 to 36. To date, ASA has indicated acceptance of the approved project utilising the GW121 turbine model. A further submission has been made to ASA in respect of the modified project utilising the GW140 turbine model. That submission is currently under review by ASA.

Ultimately, CWFPL is focussed on ensuring compliance with the existing consent conditions that are equally as appropriate to the approved or modified projects.

Point to multipoint systems

There are 10 Point to Multipoint systems registered in the ACMA database within 50 km radius of the proposed CWF project boundary. The base stations are registered and are generally remote from the CWF site. However, the customer/remote ends are generally not registered and as a result, the potential impact from turbines on the customer ends could not be investigated. Given that most of the base station locations are generally remote from the proposed CWF site, there is low probability that any path to the remote (subscriber or device) would traverse the proposed wind facility.

The Hilltops Council have indicated that there are telemetry links from their Harden office and the Jugiong reservoir via the Coppabella Hill site on the wind farm, however this is not registered in the ACMA database. This system operates in the UHF frequency bands. This needs to be examined further with the Council and if necessary a remedial solution be developed.

Radio sites in close proximity to wind turbines

One radio site 9542 (Coppabella Hill) is located inside the proposed CWF development envelope. Wind turbine number 25 is approximately 72m from Site 9542 and with a blade length of 70.15m for the GW140 turbine interference cannot be ruled out. Mitigation options are available and will need to be discussed further with Hilltops Council.

The proposed wind farm facility is located outside any radio buffer zones; the closest radio site is located at least 4km from the nearest turbine and thus it is unlikely to be impacted. There are no TV/Radio broadcasting or emergency services paging facilities near the proposed wind facility.

Met bureau radar and other services

No registrations of radar for the Met Bureau were found in the wider area and therefore the proposed Coppabella wind farm is not expected to impact the operation of the Met Bureau.

Mitigation measures for the modified project

The mitigation strategies proposed remain in accordance with the approved project.

Options to mitigate the point to point link interferences by the seven turbines that may have insufficient horizontal and vertical clearance, include:

- Turbines micro-sited within the 100m allowance (this can address all inadequate clearances);
- Consultation with the affected link operator(s) to re-route their links or to install repeaters, or to tolerate small intrusion of blades into the clearance zones;
- If agreed to by the operator of the service, arrange microwave links to replace UHF links where the substitution provides acceptable clearance; and
- A combination of the above measures.

For individuals that experience any degraded FM (unlikely) or TV broadcasting service due to identified interference from the proposed modified project, possible options to reduce the interference to acceptable limits include:

- Replacement of receiving antenna system with a higher gain more directive model;
- Reposition antenna in height or horizontally on the dwelling;
- Install an antenna elsewhere on the property and cable to dwelling;
- Change the orientation of antennas to receive an alternative station if available;
- Provision of an alternative satellite service e.g. the Viewer Access Satellite Television (VAST) (Ref. 10) or Austar Pay TV Service; and
- In certain circumstances, consideration could be given to the installation of a TV repeater station to provide service to groups of residents in a shadow zone. However this is only likely to occur in higher density population areas.

13.3 SUMMARY OF TELECOMMUNICATION IMPACTS AND THEIR MANAGEMENT

- **Modelling the modified project has shown that the increased turbine parameters have resulted in one additional wind turbine (7 wind turbines in all) impacting on existing point to point links compared to the original approval (6 wind turbines in all).**
- **The mitigation strategies proposed as part of the approved project are adequate to address the additional impact. Additionally, options for micro-siting in accordance with the consent conditions are possible to reduce impacts.**
- **No change to consent conditions required.**

14 TRAFFIC AND TRANSPORT IMPACTS

14.1 TRAFFIC AND TRANSPORT IMPACTS FOR THE APPROVED PROJECT

Construction of the project involves the delivery of plant, equipment and materials including the movement of over-dimensional vehicles, which has the potential to impact the local and regional traffic network.

Overall, the Environmental Assessment (NGH Environmental 2009a) found that the project would not result in significant impacts on the road network, with the increased traffic generated by the project not expected to compromise the capacity, efficiency of the local and state road network.

The Department of Planning and Environment (2016) states that:

The Department is satisfied that the transport route is suitable for construction traffic subject to the implementation of some minor road upgrades, and any damage caused by project-related traffic would be required to be rehabilitated and/or made good by Epuron in consultation with the relevant road authority.

The Development Consent included conditions requiring:

- Design for upgrade of Whitefields Road;
- Design for upgrade of intersection of Hume Highway and Whitefields Road; and
- Preparation of Traffic Management Plan (TMP).

Since the Development Consent was granted, traffic and transport design studies have been undertaken by Cardno for upgrade of Whitefields Road and upgrade of intersection of the Hume Highway and Whitefields Road. These activities have occurred in conjunction with consultation with Hilltops and Yass Valley Councils and RMS. A draft TMP has also been prepared.

14.2 TRAFFIC AND TRANSPORT IMPACTS FOR THE MODIFIED PROJECT

Approach

The modified project proposes the use of larger wind turbines. Therefore, some of the transport vehicles for items such as turbine blades, which are approximately 70m long, will require transport vehicles with longer dimensions. As a consequence, further route analysis and design of upgrade works to allow for the larger equipment has been undertaken by Cardno in conjunction with Goldwind engineers. It is also anticipated that, for the initial stage, less than the 79 proposed turbines will be constructed and a reduced number of vehicle movements will apply to that stage. Overall, traffic and transport issues will be similar to that for the approved project.

The onsite tracks also involve marginal increase in dimensions to accommodate alignment required for the over-size loads. This requirement has been addressed as part of the detailed civil design works that have been undertaken for the modified project.

Potential impacts of the modified project

The potential impacts are considered to be only marginally different to the approved project and adequately manageable within the existing consent conditions. The longer transport vehicles associated

with the increased blade length will require adequate clearance through intersections and around bends in road alignment. This requires minimal change for the short section of Whitefields Road and the intersection with Hume Highway. These matters have required targeted design that considers the increased vehicle dimension, defined transport route and, potential environmental and road safety issues. It has also involved consultation with the relevant road authorities, RMS and local Councils.

Staging of the project has the potential to extend the overall duration of impacts on nearby receivers, who may be impacted by dust, noise and vibration during the haulage process. Equally, staging could be considered to lessen impacts by providing a period of respite between stages. The same mitigation strategy of notification would be employed. Increased impacts are considered to be marginal and manageable within the existing conditions.

Mitigation measures for the modified project

The existing consent conditions set out measures to be addressed by the proponent that will serve to ensure the potential impacts are appropriately considered and managed. No additional conditions are considered necessary to address the marginal changes arising from the modifications.

14.3 SUMMARY OF TRAFFIC IMPACTS AND THEIR MANAGEMENT

- **The increased turbine size and associated dimensions of transport vehicles has been taken into account by the civil design for access from the Hume Highway and, access tracks within the project area.**
- **Mitigation strategies proposed remain in accordance with the approved project.**
- **No change to consent conditions is required.**

15 IMPACT SUMMARY

Sections 4-14 of this report considered the key environmental issues relevant to the proposed modifications and in particular, whether there were any additional or increased impacts and whether any changes to the mitigation strategies would be required as a consequence of the modifications.

The following table summarises these results and identifies where changes to the consent conditions may be required to address these impacts. All proposed changes to the conditions of consent are discussed in Section 16.

Table 15-1 Outcomes of the specialist assessments undertaken to inform the Modification Application

Specialist assessment type	Any additional or increased impacts of the modified project?	Any changes to the mitigation strategies required?	Any change to consent conditions?
Landscape and visual impact assessment	Marginal increased impact.	No – Mitigation strategies proposed remain in accordance with the approved project.	No changes required.
Shadow flicker analysis	Increased impact is within acceptable limits.	No – Mitigation strategies proposed remain in accordance with the approved project.	No changes required.
Noise assessment - operational	Marginal increased impact.	No - Mitigation strategies proposed remain in accordance with the approved project.	Yes – Seeking allowance to update background noise levels and associated compliance criteria.
Noise assessment – construction	Marginal increased impact.	Yes - An OOHW Protocol is sought to improve efficiencies for construction without adversely impacting neighbours.	Yes – Addition of an OOHW Protocol is considered warranted.
Native vegetation clearing and habitat impact assessment	Increased amount of clearing.	Yes – Mitigation strategies proposed remain generally in accordance with the approved project. However, additional survey for HBTs across the modified project footprint and surveys for threatened flora species and raptor nests in areas outside of the consented Development Corridor are a commitment of the modification.	Yes – The existing clearing limit of 68.3 ha Box Gum Woodland is not sufficient. Proposed increase to 180.9 ha of Box Gum Woodland EEC clearing.

Specialist assessment type	Any additional or increased impacts of the modified project?	Any changes to the mitigation strategies required?	Any change to consent conditions?
Operational bird and bat impact assessment	Negligible additional risk to birds; unlikely to increase effects on bats.	No - Mitigation strategies proposed remain in accordance with the approved project.	No changes required.
Revised offset credit requirement and offset strategy	Increased ecosystem credits, reduction in number of species credit species but increased requirement for individual species.	No - Mitigation strategies in accordance with the approved project but increased offset provision required.	Yes – Existing credit requirement does not reflect the modified project. An updated estimate is provided (1578 ecosystem credits and 3396 species credits). Also, provisions for staging for offsets to reflect impacts as they are incurred.
Indigenous Heritage Assessment	Marginal reduced impact.	No - Mitigation strategies proposed remain in accordance with the approved project.	No changes required.
Aviation impact assessment	Marginal increased impact.	Yes - An additional task will involve consultation with Airservices Australia in respect of Turbine 9 to raise the potentially impacted obstacle limitation surface.	No changes required.
Telecommunications assessment	Marginal increased impact.	No - Mitigation strategies proposed remain in accordance with the approved project.	No changes required.
Traffic and transport	Marginal increased impact.	No - Mitigation strategies proposed remain in accordance with the approved project.	No changes required.

16 CHANGES SOUGHT TO CONSENT CONDITIONS

In general, the additional impacts identified as a consequence of the modifications proposed can be addressed by mitigation strategies that are in accordance with the approved project. However, a number of amendments are sought to the consent conditions to:

1. Allow for improvements in technology – larger turbines (taller and larger rotors);
2. Allow for changes to the civil design footprint - increased clearing limit⁶, minor alterations to the layout, reuse of any excavated material, upgrade of a 2km section of Coppabella Road, staging, subdivision and decommissioning; and
3. Reflect any additional mitigation measures identified in Sections 4-14.
4. Reflect project clarifications identified in Section 3.

All 13 proposed modifications to the consent are set out below in Table 16-1. It is requested that these be incorporated into the modified consent for the project.

Table 16-1 Changes sought to the consent conditions

ID	Original versus proposed change to consent condition	
1 – Sched 2, Cond 8	Original	Condition 8 requires that: “No wind turbines may be greater than 150 metres (measured from above ground level to the blade tip height)”.
	Proposed	Condition 8 to be amended as follows: “No wind turbines may be greater than 171 metres (measured from above ground level to the maximum blade tip height)”.
2 – Sched 2, Cond 9	Original	Condition 9: The Applicant may micro-site the wind turbines and ancillary infrastructure without further approval provided: (a) they remain within the development corridor shown in the figure in Appendix 3.
	Proposed	Condition 9 reworded such that: The Applicant may micro-site the wind turbines and ancillary infrastructure without further approval provided: They remain generally in accordance with the Modification layout. ⁷ Additional areas that may be required during the development of the final infrastructure layout are proposed to be addressed by requiring that they meet predefined criteria as follows: • Not within 40m of waterways. • Not on steeply sloping terrain. • Not requiring any greater level of environmental impact.
3 - Sched 2, Cond 9	Original	Appendix 2: General layout of the development
	Proposed	Appendix 2: General layout of the development as modified. ⁸

⁶ Primarily a consequence of a realistic civil design developed for the site but also to include 18 ha that was not ascribed to the Coppabella precinct in the project approval (refer to Appendix A.5) and use of the larger turbines.

⁷ Modified layout provided in this document as Appendix A.2 of the Modification Report.

⁸ As above.

ID	Original versus proposed change to consent condition	
4 – Sched 3, Cond 8	Original	Condition 8 allows that: ... “The following construction activities may be undertaken outside these hours without the approval of the Secretary: activities that are inaudible at non-associated residences; the delivery of materials as requested by the NSW Police Force or other authorities for safety reasons; or emergency work to avoid the loss of life, property and/or material harm to the environment.”
	Proposed	Condition 8 allows that: ... “The following construction activities may be undertaken outside these hours without the approval of the Secretary: • activities that are inaudible at non-associated residences; • activities approved under an out-of-hours (OOHW) work protocol (to form part of the EMS required by Schedule 4, Condition 1) • the delivery of materials as requested by the NSW Police Force or other authorities for safety reasons; or • emergency work to avoid the loss of life, property and/or material harm to the environment.”
5 - Sched 3, Cond 11	Original	There is currently no allowance to update the background noise levels to derive reliable compliance criteria relative to likely hub height for operational noise monitoring. Condition 11, Table 3 also requires that the project does not exceed specific criteria for residences C04 and C74. This is based on outdated data at a different hub height.
	Proposed	Replace Condition 11 with: 11A Background Noise Survey and Verification Report Prior to commissioning of the wind farm, the Applicant shall provide an updated determination of background noise levels at representative non-associated residence locations and calculate the appropriate noise criteria according to this Condition 11. The report should also predict the wind farm noise levels at all non-associated residences. The report is to be prepared in consultation with the EPA. 11B Operational Noise Criteria – Wind Turbines The Applicant shall ensure that the noise generated by the operation of wind turbines does not exceed the greater of: a) 35dB(A); or b) The existing background noise level for each integer wind speed from cut-in speed to the rated power of the wind turbine generators, by more than 5 dB(A) Unless otherwise replaced by an equivalent NSW wind farm noise guideline, noise generated by the project is to be measured in accordance with the relevant requirements of Sections 3.1 and 3.2 of the South Australian Environmental Protection Authority’s Wind Farms Environmental Noise Guidelines 2009. However, these criteria do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.
6 - Sched 3, Cond 19	Original	Condition 19: the applicant shall ensure no more than 68.3 ha of Box Gum Woodland EEC ... is cleared for the development unless the Secretary agrees otherwise.

ID	Original versus proposed change to consent condition	
	Proposed	Condition 19 amended as follows: the applicant shall ensure no more than 181 ha of Box Gum Woodland EEC ... is cleared for the development unless the Secretary agrees otherwise.
7 - Sched 3, Cond 20	Original	Condition 20 requires that: Within 2 years of the commencement of construction, unless otherwise agreed by the Secretary, the Applicant shall retire biodiversity credits of a number and class specified in Tables 4 and 5 below to the satisfaction of OEH.
	Proposed	Proposed to update to Tables 4 and 5 of the Consent as shown below with explicit allowance in Condition 20 for staging of offsets, such that the offsets are required only for areas that are impacted ⁹ .

Table 4 Ecosystem credits

Vegetation community	PC code	type Plant name	community	Biometric type condition	Management zone area (ha) (approx.)	Loss site value score	in Credits req for TS	Ecosystem credits required
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.23	49.48	15	15	
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	29.78	32.29	1098	1098	
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	81.45	9.90	0	0	
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	1.93	20.83	50	50	
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	119.21	15.10	2439	0	
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.30	32.81	16	16	

⁹ This would have a large implication for the project's viability where less than 79 turbines are developed.

ID	Original versus proposed change to consent condition					
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Moderate Long-leaved Box - Inland to good Scribbly Gum tussock grass (low - shrub low open forest on diversity) hills in the southern part of the NSW South Western Slopes Bioregion	6.43	61.46	391	391
Long-leaved Box Dry Grass Forest derived grassland	MR598	Red Stringybark - Red Box - Moderate Long-leaved Box - Inland to good Scribbly Gum tussock grass (low - shrub low open forest on diversity) hills in the southern part of the NSW South Western Slopes Bioregion	13.62	15.62	257	0
River Gum and riparian	MR616	Yellow Box - River Red Gum Moderate tall grassy riverine to good woodland of NSW South (low Western Slopes Bioregion diversity) and Riverina Bioregion	0.27	31.77	8	8

Table 5 Species credits

Scientific name	Common name	TS multiplier	offset Species credits required
<i>Anthochaera phrygia</i>	Regent Honeyeater	7.7	3396

8	Additional clarification to be included in consent:		
Proposed	Reuse of suitable material excavated during any project earthworks onsite is allowable for use in any areas of the development footprint.		
9	Additional clarification to be included in consent:		
Proposed	A minor upgrade to Coppabella Road (approximately 2km, identified on Figure 3-3) is to be designed in consultation with Hilltops Council to facilitate movements between parts of the layout during construction and operation. No over size or over mass vehicles are proposed for this section of Coppabella Road. No tree removal is allowed for the upgrade works, other than may be consented by Hilltops Council.		
10	Additional clarification to be included in consent:		
	The project is proposed to be developed in stages.		
11	Additional clarification to be included in consent:		
	The modification also clarifies that the project includes the subdivision of land so as to create new lots for the approved substation and switchyards; and any deemed subdivision arising from the grant of leases or licences for project elements		

ID	Original versus proposed change to consent condition
12	Additional biodiversity management clarification to be included in consent:
Proposed	To be required within the Biodiversity Management Plan: • Accurate identification, mapping and quantification of all HBTs within the modification layout footprint prior to construction. • Pre-clearance surveys for threatened flora (Yass Daisy, Small Purple-pea and Dwarf Bush-pea) in moderate to good (high diversity) condition woodland, forest and derived grasslands outside of the consented development envelope. If threatened flora species area identified in the construction footprint, they would be avoided by the project. If unavoidable, translocation would be implemented. Any residual impacts would be offset. • Pre-clearance surveys for threatened raptor nests in areas outside of (within 200m) the consented development envelope. If raptor nests are identified, surveys would be undertaken to determine if they are in use by threatened species for breeding. If in use by threatened raptor species, nests would not be impacted until breeding activities have ceased.
13	Additional clarification to be included in consent:
Proposed	CWFPL proposes to proactively commit to the preparation of an appropriate Decommissioning and Rehabilitation Plan within 5 years of the project becoming operational. The Decommissioning and Rehabilitation Plan would be updated every 5 years and would include: • Environmental management controls for decommissioning; • Estimated costs of decommissioning and funding arrangements (including residual value of turbines and infrastructure at end of life); and • In the event of any shortfall between the estimated costs of decommissioning and funding arrangements, the provision for an appropriate funding mechanism (such as a decommissioning bond or the like).

17 CONCLUSIONS

17.1 COPPABELLA WIND FARM MODIFICATION REPORT

This report has been prepared to support an application to modify Development Consent SSD-6698 (Modification Application) for the Coppabella Wind Farm (CWF) (previously known as the Yass Valley Wind Farm). This Modification Application is being lodged under Section 96(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Report provides context and detailed assessment to support the modification application. The Modification Application has been prepared in the context of consultation with involved landowners and the local community.

17.2 MODIFICATIONS BEING SOUGHT

They key modifications sought to the Development Consent include:

- Increasing the vegetation clearing limit to address changes to the civil design footprint having regard to the steep and challenging terrain (as well as required clearing for transmission connection and a larger turbine model).
- The installation of a larger turbine model with an overall tip height of approximately 171 metres and blade length of approximately 70 metres.
- Minor changes to the location of ancillary infrastructure including additional temporary facilities to improve constructability and workforce safety.
- Minor clarifications to the project description. These include:
 - Reuse of excavated material onsite;
 - Upgrade of a 2km section of Coppabella Road and use of Coppabella Road for standard vehicles (not over mass or over dimensional vehicles);
 - The project would be developed in stages; and
 - The project would require subdivision of land.

17.3 JUSTIFICATION FOR THE MODIFICATION

The proposed modifications to the Development Consent are required to deliver an efficient, constructible and commercially viable project utilising current wind farm technology while minimising impacts to the extent practically and reasonably feasible.

The changes proposed reflect technological improvements in the wind farm industry, improved site knowledge and understanding of the construction process following detailed design, additional site investigations and pre-construction planning.

The key benefits of the modifications to the project will be:

- An improved design that realistically reflects the construction requirements;
- A more efficient development, reflected in enhanced viability over the operational life of the project; and
- Reduced cost of renewable energy power generation.

The detailed information collected during this assessment now provides for greater certainty regarding levels of impact and management strategies than was available for the approved project.

17.4 IMPACT ASSESSMENT AND MANAGEMENT

The modification would result in some specific changes to the level of impacts assessed for the approved project.

Visual impacts

The increase in turbine size would be discernible for some surrounding view locations. This would be limited to up to eight turbines (tips only, no additional turbine hubs would be visible). The magnitude of the increase would not be significant. The implementation of landscape works for a number of dwellings would provide mitigation, in accordance with existing consent conditions. No changes to the consent conditions are required.

Shadow flicker

The increase in turbine size would not result in any receivers exceeding the allowable exposure of 30 hours of shadow flicker per year. Mitigation of impacts will be in accordance with the approved project's mitigation strategy. No changes to the consent conditions are required.

Biodiversity – bird and bat collision risks

The increased turbine size would result in negligible additional risk to birds and is unlikely to increase effects on bats during operation. Existing mitigation strategies (bird and bat management plan including removal of prey and carcasses) are appropriate to mitigate the impact. No changes to the consent conditions are required.

Indigenous heritage impacts

The heritage impacts of the modified project have reduced compared to the approved project. The mitigation strategies proposed as part of the approved project are adequate and addressed in the Aboriginal Heritage Management Plan. No changes to the consent conditions are required.

Telecommunications impacts

Modelling the increased turbine size has resulted in one additional wind turbine (7 wind turbines in all) impacting on existing point to point links compared to the original. The mitigation strategies proposed as part of the approved project are adequate to address the additional impact. No changes to the consent conditions are required.

Traffic and transport impacts

The increased turbine size and associated dimensions of transport vehicles has been taken into account by the civil design for access from the Hume Highway and, access tracks within the project area. Mitigation strategies proposed remain in accordance with the approved project. No changes to the consent conditions are required.

Aviation hazard impacts

It is anticipated that additional impacts can mostly be mitigated using the same mitigation measures proposed as part of the approved project. An additional task will involve consultation with Airservices Australia in respect of Turbine 9 to raise the potentially impacted obstacle limitation surface. Consultation is in progress based on the assessment. No change to consent conditions is required.

Noise impacts

Operational noise modelling for the increased turbine size shows all neighbouring receivers except one (C04) would be compliant when assessing against conservatively assumed base criteria. In relation to C04, further assessment is warranted to assess compliance and consultation is underway regarding a neighbour agreement. Should further mitigations be required, then several solutions have been assessed to result in compliance against the conservative base criteria and these could be applied. Further to this, a change to consent conditions is sought to allow for updated background noise testing which will ensure greater accuracy and confidence in the operational compliance assessment.

Regarding construction noise, one change to consent conditions is required to allow for an Out-Of-Hours Work (OOHW) Protocol. This would provide flexibility for out of hours construction work, subject to prior review of the potential impacts.

Biodiversity – impacts to native vegetation, Biodiversity - offsets

The increased vegetation clearing required to address changes to the civil design footprint (having regard to steep terrain as well as the required clearing for the 132kV connection and a larger turbine model) would result in a substantially increased impact to native vegetation; 95.5 ha more impact on Box Gum Woodland Endangered Ecological Community (EEC) or 112% of the clearing limit allowed in the consent conditions. The majority of the clearing remains in low diversity native pasture, as a result of iterative design with input from ecologists and additional site surveys.

Existing mitigation strategies (minimisation of impacts and offsets) will be adequate to address the impacts. However, the strategies would benefit from additional preclearance surveys (hollow bearing trees, specific threatened flora, raptor nests) in areas that fall outside the consented development corridor.

While the management strategies proposed to manage these impacts would remain generally in accordance with the approved project, changes to the consent conditions are required to ensure the additional impacts are accurately reflected, including:

- An increase in the Box Gum Woodland EEC clearing limit to 180.9 ha.
- Targeted surveys to assist minimisation and ensure accurate offsets for the final project in areas outside the consented development corridor (specifically, (hollow bearing trees, specific threatened flora, raptor nests).
- An increase in the offset credit requirement; the required ecosystem and species requirements under the modification are 1578 and 3396, respectively.
- Allowance of staging of offsets, so the offsets are implemented as they are incurred.

17.5 CHANGES SOUGHT TO CONSENT CONDITIONS

Based on this Modification Assessment, 13 modifications to the consent conditions are sought which together will address:

- Requirements for a more constructable project – larger clearing limit, minor alterations to the layout, reuse of any excavated material, upgrade of a 2km section of Coppabella Road, staging, subdivision and decommissioning;
- The use of larger turbines as the consequence of improved technology;
- The additional mitigation measures required for construction noise, biodiversity clearing and offsetting.

All proposed modifications to the consent are set out in Table 16-1. It is requested that these be incorporated into the modified consent for the project.

On balance, the modification proposed is considered justifiable and the identified impacts are considered manageable with the effective implementation of specific strategies that form commitments of the modified project.

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NSW Department of Planning and Environment (2015) State Significant Development Assessment: Yass Valley Wind Farm (SSD08_0246).

NSW Department of Planning and Environment (2016a) Yass Valley Wind Farm (SSD-6698) Assessment Report.

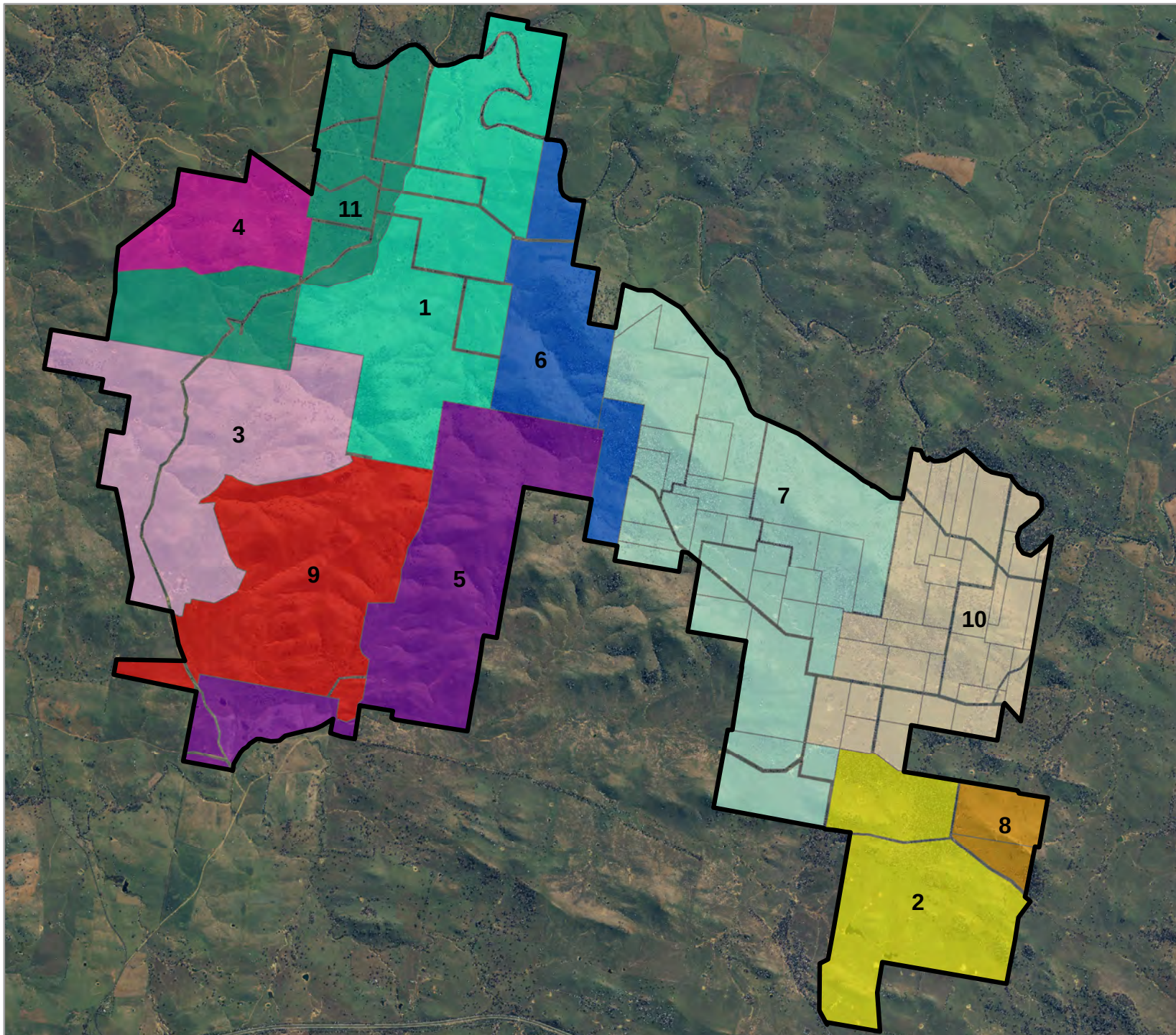
NSW Department of Planning and Environment (2016b) NSW Noise Assessment Bulletin.

Planning and Assessment Commission (2016) NSW Planning Assessment Commission Determination Report.

WSP Parsons Brinckerhoff (WSP|PB) (2017) Shadow Flicker Assessment.

APPENDIX A MAP SETS

A.1 INVOLVED LANDOWNER MAP



INVOLVED LANDOWNERS

Coppabella Wind Farm

Project area

Landowner

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

Notes:

- Data courtesy of Goldwind, received July 2017
- Aerial imagery courtesy of Epuron 2012

0 0.5 1 2 Kilometres

A4 @ 1:66000
Ref: 16440 25072017
Author: JB

ngh environmental

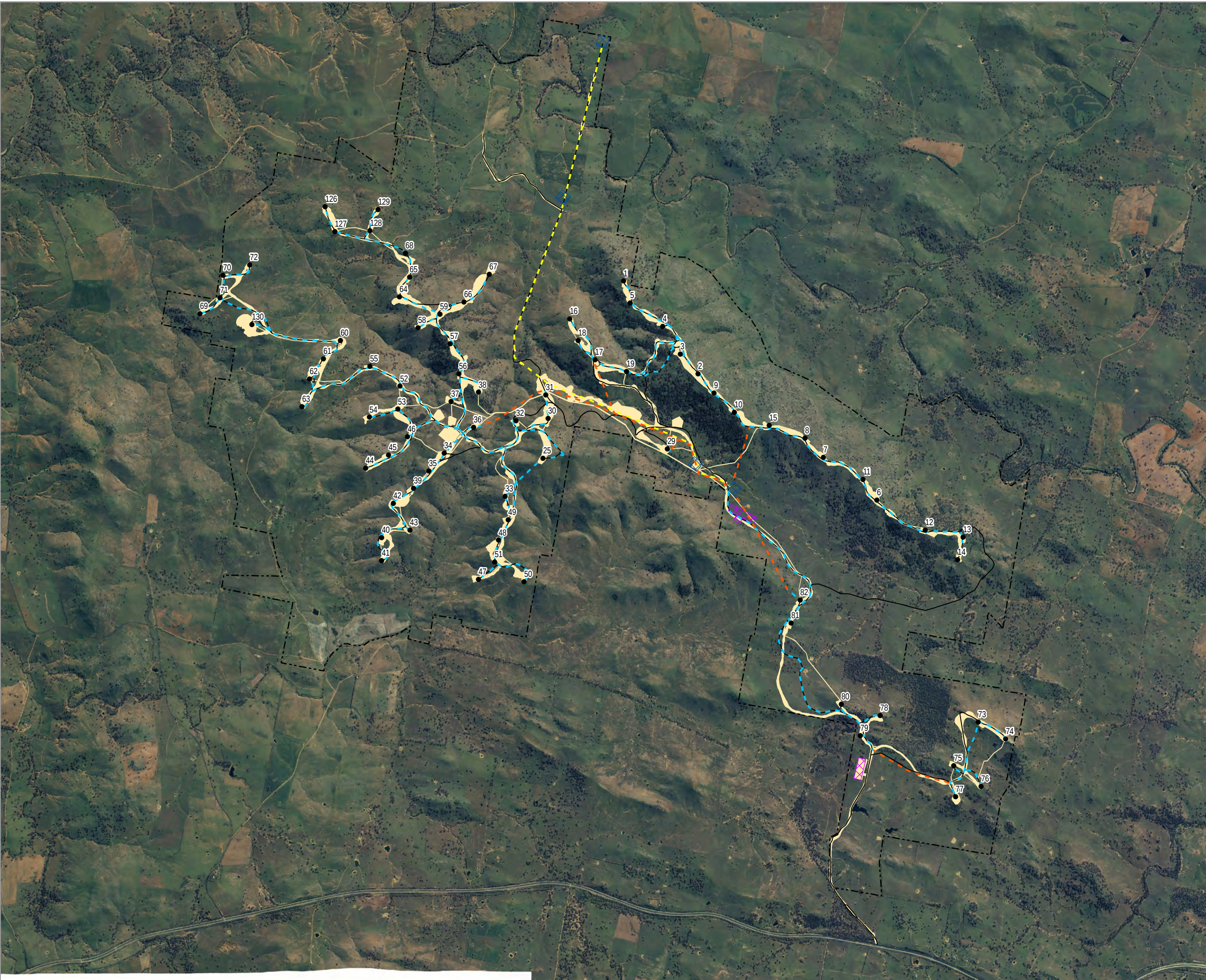
www.nghenvironmental.com.au

A.2 APPROVED VERSUS MODIFIED PROJECT - including detailed vegetation mapping

MODIFIED CONSTRUCTION FOOTPRINT
VERSUS APPROVED INFRASTRUCTURE

Coppabella Wind Farm

- Turbine locations - Approved
- - Overhead Reticulation - Approved
- - Underground Reticulation - Approved
- ⊠ Batch Plants and Construction Compounds - Approved
- ⊠ Switchyards and Substations - Approved
- - 132kV Powerline - Approved
- Access Tracks - Approved
- Modified Construction Footprint
- ⊠ Wind Farm Project Boundary



Notes:
- Approved Infrastructure provided by Epuron,
received June 2016
- Aerial imagery courtesy of Epuron 2012

0 0.5 1 2 Kilometres

A3 @ 1:50000
Ref: Coppabella Wind Farm -
Modified Construction Footprint versus
Approved Infrastructure
Author: TH

FINAL DESIGN JUNE 2017 -
OVERVIEW MAP

Coppabella Wind Farm

- Detailed Map Extents
 - 132kV Powerline
 - Turbine locations
 - Modified Construction Footprint
- Vegetation Type**
- Box-Gum woodland - Low
 - Box-Gum woodland - Moderate to good (high)
 - Box-Gum woodland - Moderate to good (low)
 - Box-Gum woodland derived grassland - Low
 - Box-Gum woodland derived grassland - Moderate to good (high)
 - Box-Gum woodland derived grassland - Moderate to good (low)
 - Long-leaved Box dry forest - Moderate to good (high)
 - Long-leaved Box dry forest - Moderate to good (low)
 - Long-leaved Box dry forest derived grassland - Moderate to good (low)
 - Riparian - Moderate to good (low)
 - Exotic - NA
- Wind Farm Project Boundary

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:50000
Ref: Coppabella Wind Farm -
Final Design June 2017 Overview
Author: TH

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Coppabella Wind Farm

- Turbine locations
 - - 132kV Powerline
 - Modified Construction Footprint
- Vegetation Type**
- Box-Gum woodland - Low
 - Box-Gum woodland - Moderate to good (high)
 - Box-Gum woodland - Moderate to good (low)
 - Box-Gum woodland derived grassland - Low
 - Box-Gum woodland derived grassland - Moderate to good (high)
 - Box-Gum woodland derived grassland - Moderate to good (low)
 - Long-leaved Box dry forest - Moderate to good (high)
 - Long-leaved Box dry forest - Moderate to good (low)
 - Long-leaved Box dry forest derived grassland - Moderate to good (low)
 - Riparian - Moderate to good (low)
 - Exotic - NA
 - Wind Farm Project Boundary

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012

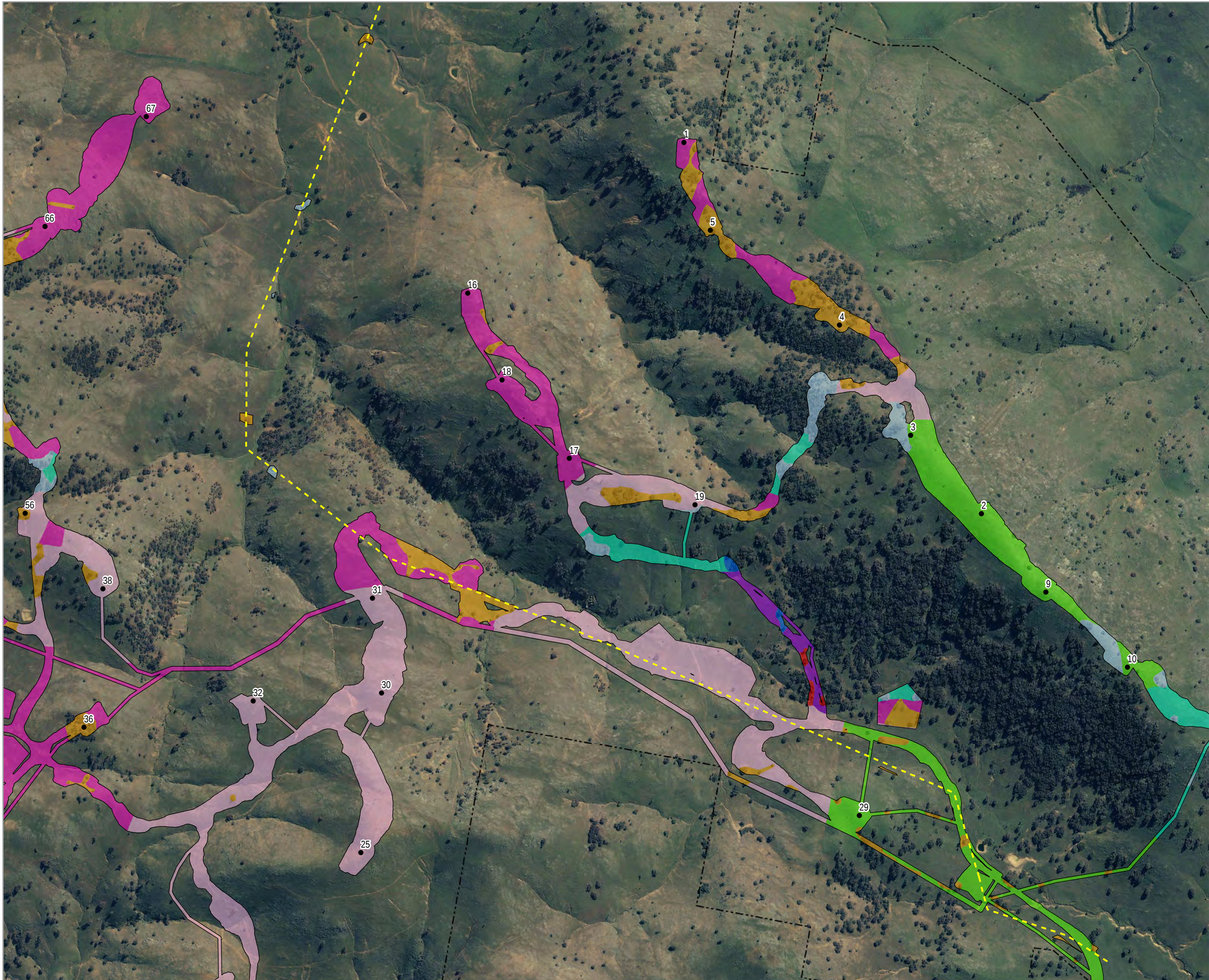
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A3 @ 1:12500
Ref: Coppabella Wind Farm -
Final Design June 2017 Detailed
Author: TH

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FINAL DESIGN JUNE 2017 -
DETAILED MAP 2

Coppabella Wind Farm

- Turbine locations
- - 132kV Powerline
- Modified Construction Footprint
- Vegetation Type**
- Box-Gum woodland - Low
- Box-Gum woodland - Moderate to good (high)
- Box-Gum woodland - Moderate to good (low)
- Box-Gum woodland derived grassland - Low
- Box-Gum woodland derived grassland - Moderate to good (high)
- Box-Gum woodland derived grassland - Moderate to good (low)
- Long-leaved Box dry forest - Moderate to good (high)
- Long-leaved Box dry forest - Moderate to good (low)
- Long-leaved Box dry forest derived grassland - Moderate to good (low)
- Riparian - Moderate to good (low)
- Exotic - NA
- Wind Farm Project Boundary

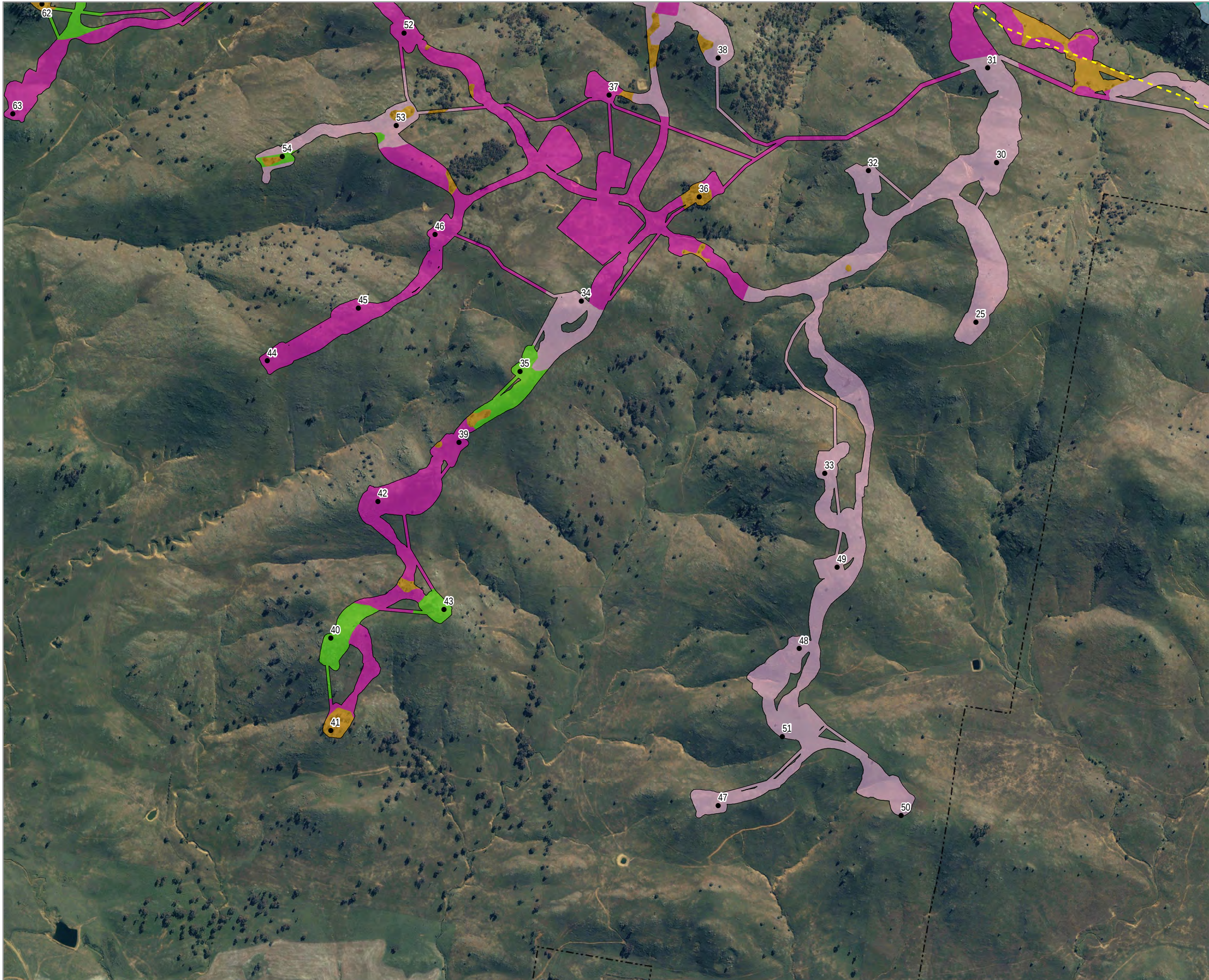
Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm -
Final Design June 2017 Detailed
Author: TH

ngh environmental





FINAL DESIGN JUNE 2017 -
DETAILED MAP 3

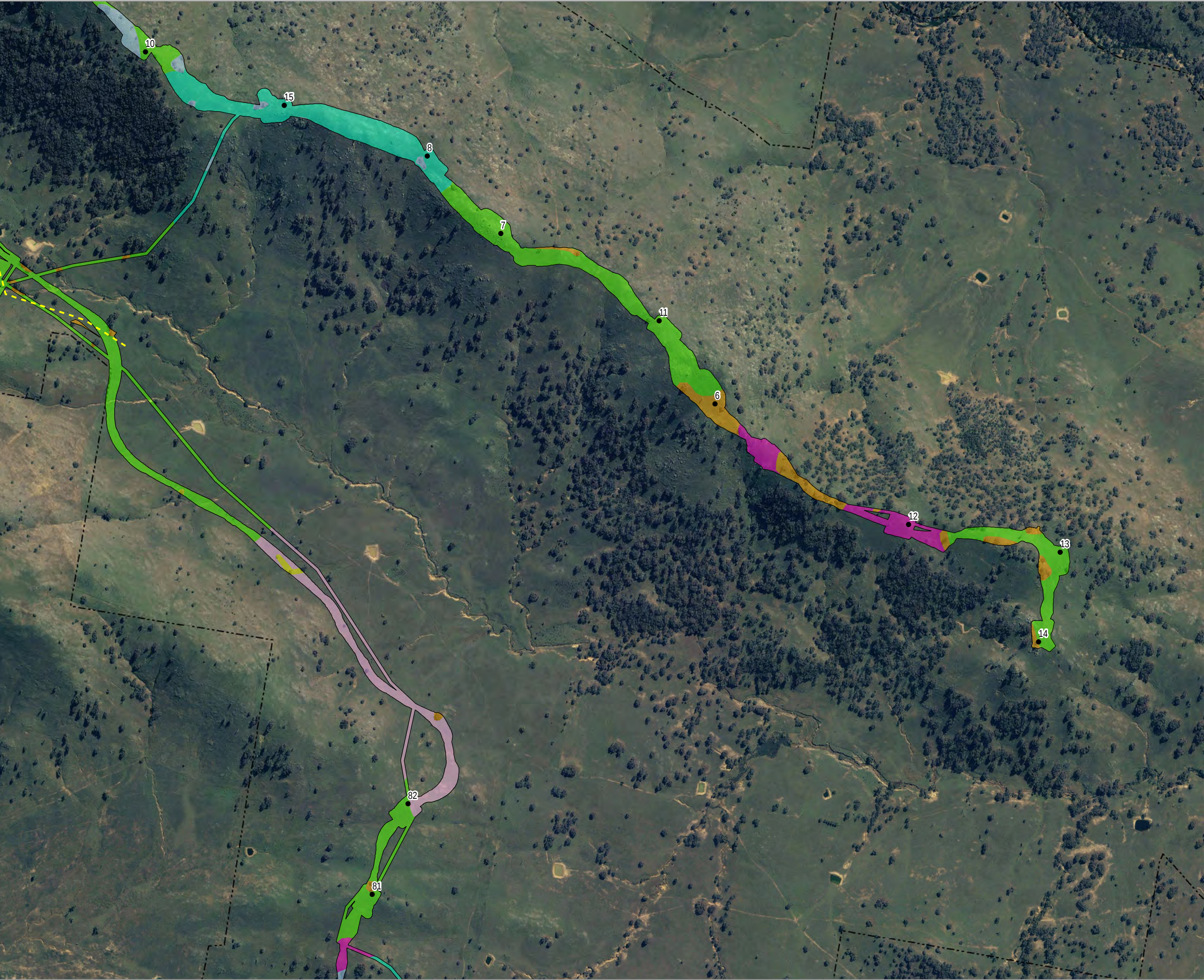
Coppabella Wind Farm

- Turbine locations
 - - 132kV Powerline
 - Modified Construction Footprint
- Vegetation Type**
- Box-Gum woodland - Low
 - Box-Gum woodland - Moderate to good (high)
 - Box-Gum woodland - Moderate to good (low)
 - Box-Gum woodland derived grassland - Low
 - Box-Gum woodland derived grassland - Moderate to good (high)
 - Box-Gum woodland derived grassland - Moderate to good (low)
 - Long-leaved Box dry forest - Moderate to good (high)
 - Long-leaved Box dry forest - Moderate to good (low)
 - Long-leaved Box dry forest derived grassland - Moderate to good (low)
 - Riparian - Moderate to good (low)
 - Exotic - NA
- Wind Farm Project Boundary

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm -
Final Design June 2017 Detailed
Author: TH



FINAL DESIGN JUNE 2017 -
DETAILED MAP 4

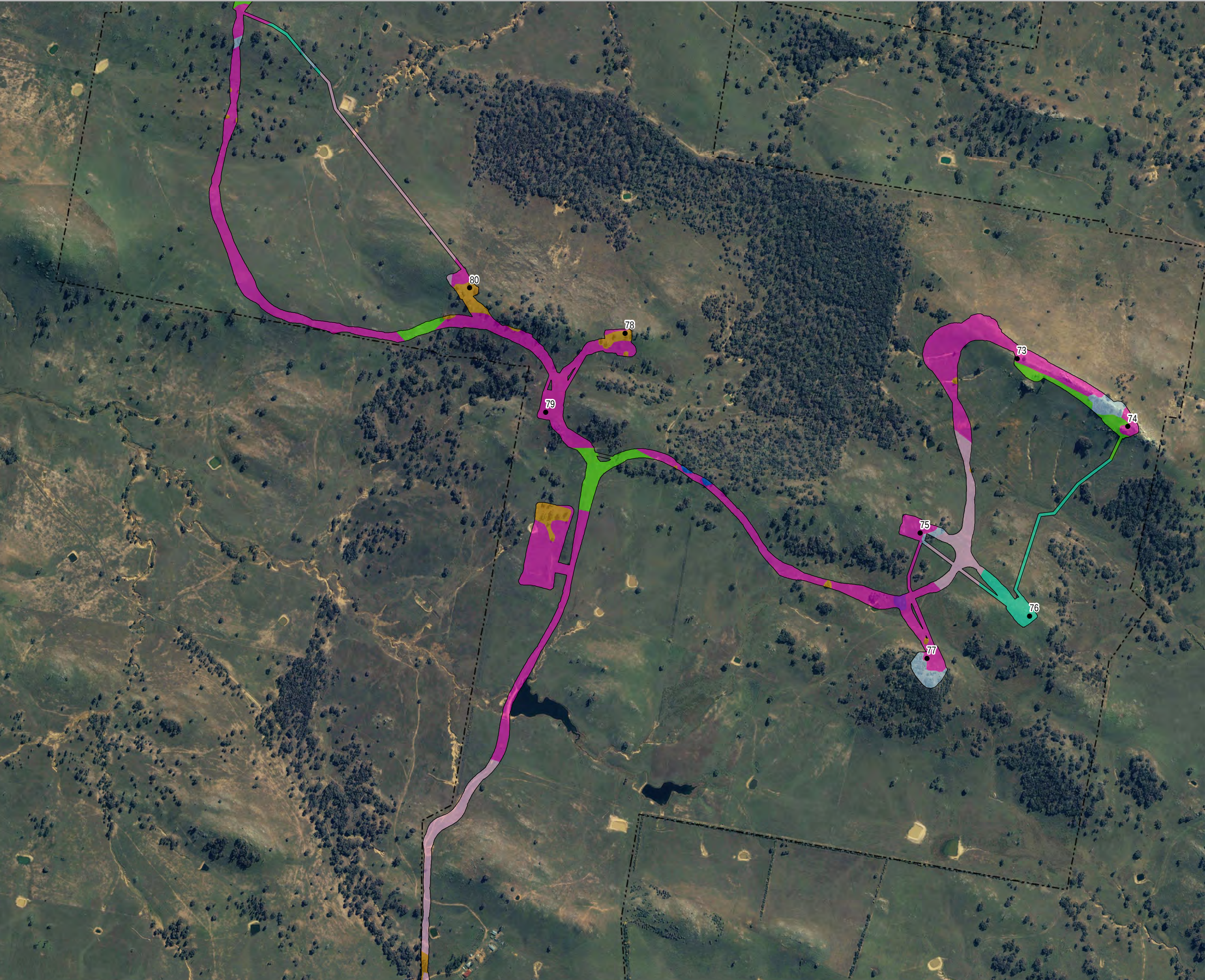
Coppabella Wind Farm

- Turbine locations
- - 132kV Powerline
- Modified Construction Footprint
- Vegetation Type**
 - Box-Gum woodland - Low
 - Box-Gum woodland - Moderate to good (high)
 - Box-Gum woodland - Moderate to good (low)
 - Box-Gum woodland derived grassland - Low
 - Box-Gum woodland derived grassland - Moderate to good (high)
 - Box-Gum woodland derived grassland - Moderate to good (low)
 - Long-leaved Box dry forest - Moderate to good (high)
 - Long-leaved Box dry forest - Moderate to good (low)
 - Long-leaved Box dry forest derived grassland - Moderate to good (low)
 - Riparian - Moderate to good (low)
 - Exotic - NA
- Wind Farm Project Boundary

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm -
Final Design June 2017 Detailed
Author: TH



FINAL DESIGN JUNE 2017 -
DETAILED MAP 5

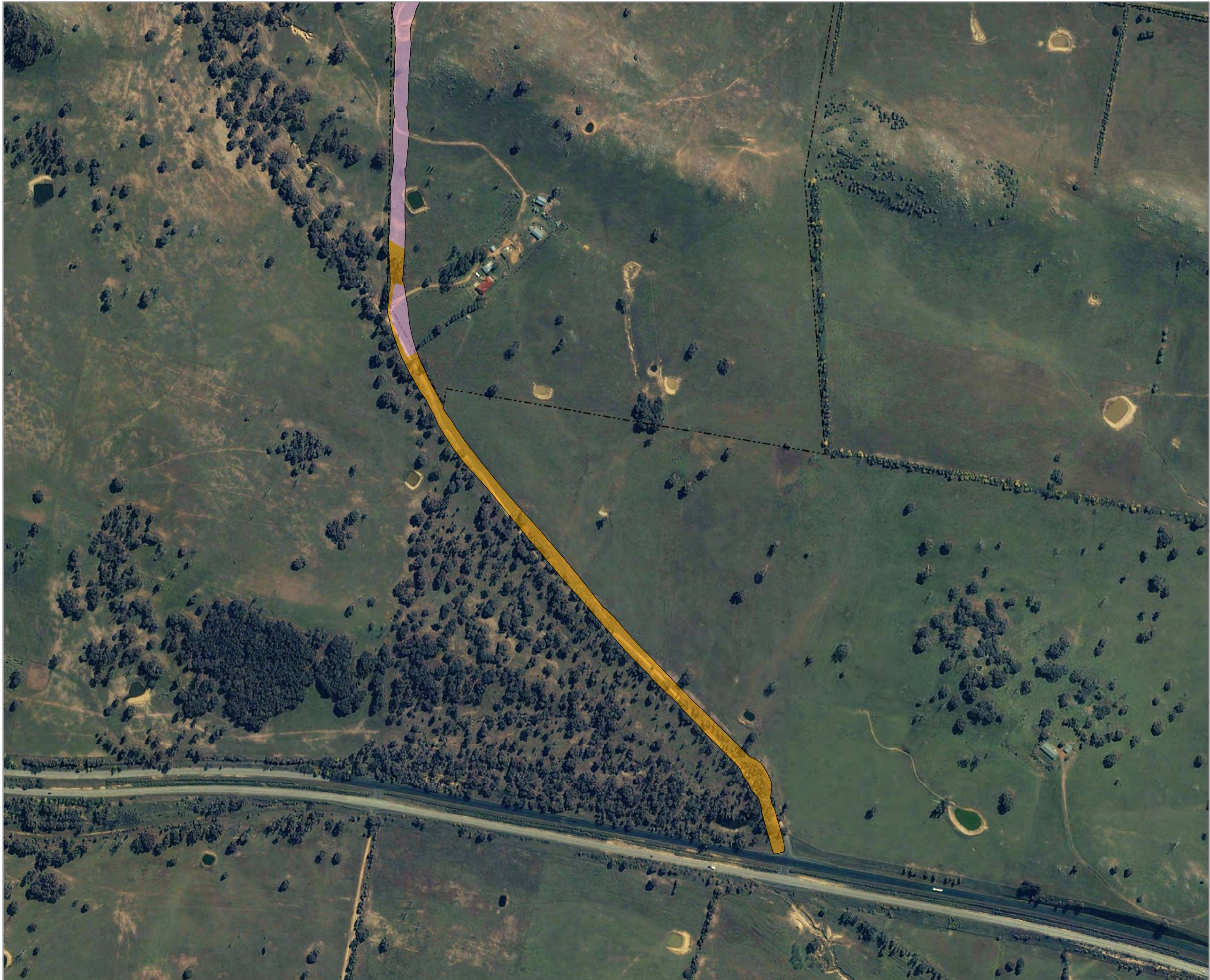
Coppabella Wind Farm

- Turbine locations
- - 132kV Powerline
- Modified Construction Footprint
- Vegetation Type**
 - Box-Gum woodland - Low
 - Box-Gum woodland - Moderate to good (high)
 - Box-Gum woodland - Moderate to good (low)
 - Box-Gum woodland derived grassland - Low
 - Box-Gum woodland derived grassland - Moderate to good (high)
 - Box-Gum woodland derived grassland - Moderate to good (low)
 - Long-leaved Box dry forest - Moderate to good (high)
 - Long-leaved Box dry forest - Moderate to good (low)
 - Long-leaved Box dry forest derived grassland - Moderate to good (low)
 - Riparian - Moderate to good (low)
 - Exotic - NA
- Wind Farm Project Boundary

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm -
Final Design June 2017 Detailed
Author: TH



FINAL DESIGN JUNE 2017 -
DETAILED MAP 6

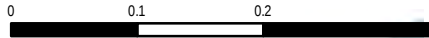
Coppabella Wind Farm

- Turbine locations
- - 132kV Powerline
- Modified Construction Footprint

Vegetation Type

- Box-Gum woodland - Low
- Box-Gum woodland - Moderate to good (high)
- Box-Gum woodland - Moderate to good (low)
- Box-Gum woodland derived grassland - Low
- Box-Gum woodland derived grassland - Moderate to good (high)
- Box-Gum woodland derived grassland - Moderate to good (low)
- Long-leaved Box dry forest - Moderate to good (high)
- Long-leaved Box dry forest - Moderate to good (low)
- Long-leaved Box dry forest derived grassland - Moderate to good (low)
- Riparian - Moderate to good (low)
- Exotic - NA
- Wind Farm Project Boundary

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:6000
Ref: Coppabella Wind Farm -
Final Design June 2017 Detailed
Author: TH



FINAL DESIGN JUNE 2017 -
DETAILED MAP 7

Coppabella Wind Farm

- Turbine locations
- - 132kV Powerline
- Modified Construction Footprint

Vegetation Type

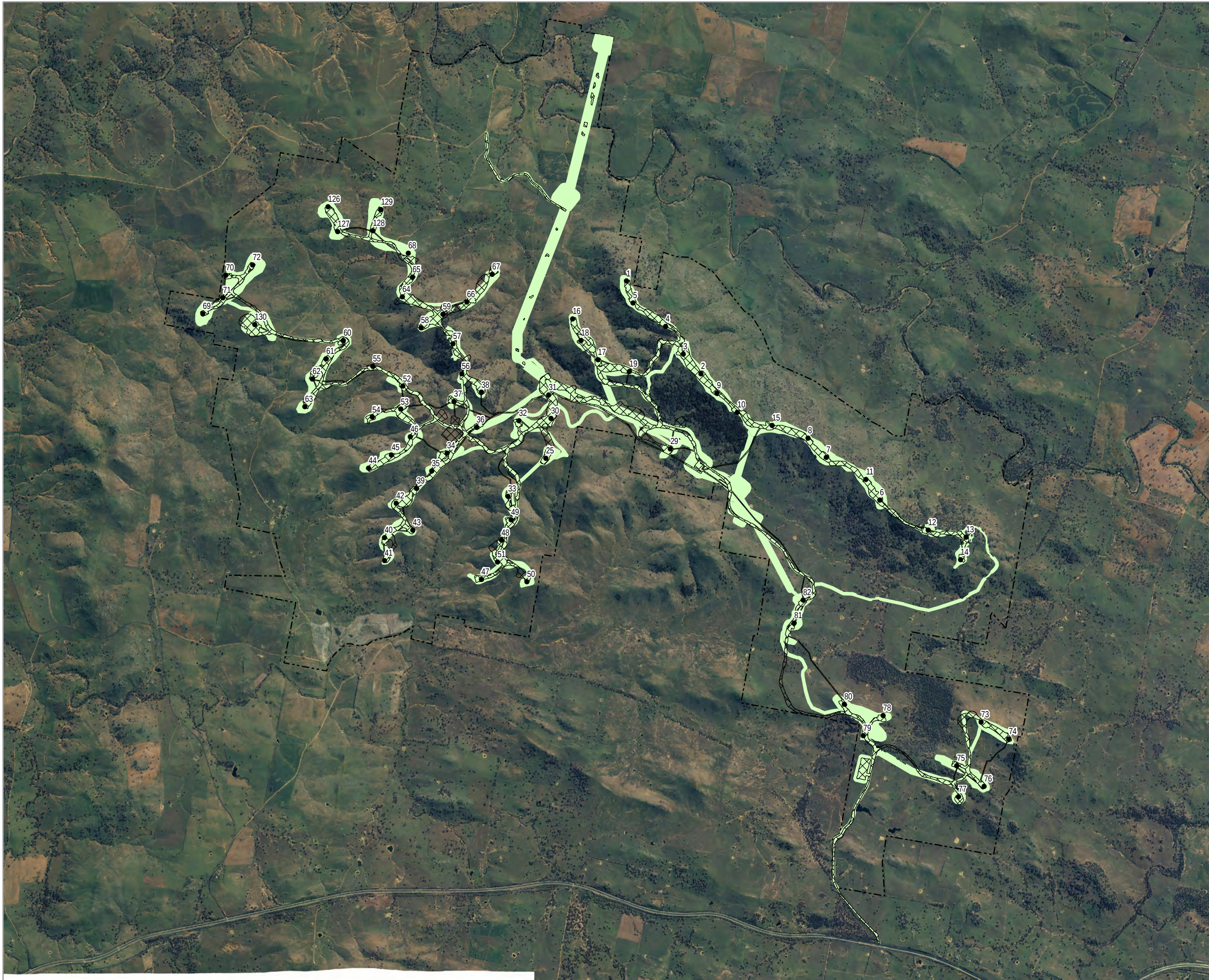
- Box-Gum woodland - Low
- Box-Gum woodland - Moderate to good (high)
- Box-Gum woodland - Moderate to good (low)
- Box-Gum woodland derived grassland - Low
- Box-Gum woodland derived grassland - Moderate to good (high)
- Box-Gum woodland derived grassland - Moderate to good (low)
- Long-leaved Box dry forest - Moderate to good (high)
- Long-leaved Box dry forest - Moderate to good (low)
- Long-leaved Box dry forest derived grassland - Moderate to good (low)
- Riparian - Moderate to good (low)
- Exotic - NA
- Wind Farm Project Boundary

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm -
Final Design June 2017 Detailed
Author: TH

A.3 APPROVED INFRASTRUCTURE CORRIDOR VERSUS MODIFIED PROJECT



MODIFIED CONSTRUCTION FOOTPRINT
VERSUS APPROVED DEVELOPMENT
ENVELOPE

Coppabella Wind Farm

- Turbine locations
- ⊠ Modified Construction Footprint
- Approved Development Envelope
- Wind Farm Project Boundary

Notes:
- Approved Development Envelope provided by Epuron,
received June 2016
- Aerial imagery courtesy of Epuron 2012

0 0.5 1 2 Kilometres

A3 @ 1:50000
Ref: Coppabella Wind Farm -
Modified Construction Footprint versus
Approved Development Envelope
Author: TH

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A.4 MINIMISATION OF BIODIVERSITY IMPACTS DURING THE DETAILED DESIGN PROCESS (KEY LOCATIONS)

UPDATED BIODIVERSITY AND
ABORIGINAL HERITAGE
OVERVIEW MAP

Coppabella Wind Farm

- Reference Areas
- Detailed Map Extents
- Turbine locations - Approved
 - Overhead Reticulation - Approved
 - Underground Reticulation - Approved
 - 132kV Powerline - Approved
 - Access Tracks - Approved
 - Batch Plants and Construction Compounds - Approved
 - Switchyards and Substations - Approved
 - Modified Construction Footprint
- Previously identified biodiversity high constraints
- Hollow-bearing trees (HBTs)
 - Yass Daisy records
 - Moderate to good condition (NGH classes) woodland EEC
- Additional biodiversity high constraints
- Potential HBTs based on field DBH assessment
 - Desktop HBT assessment (PAC Submission)
 - Important Superb Parrot Habitat (Coppabella BA)
 - Moderate to Good Condition (NGH classes) Woodland EEC (Based on validated vegetation mapping)
 - EPBC listed Box-Gum woodland CEEC
- Aboriginal heritage constraints*
- Verh high constraint
 - High constraint
 - Wind Farm Project Boundary

* Note Aboriginal site data is in point form and sites may extend beyond these areas

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012

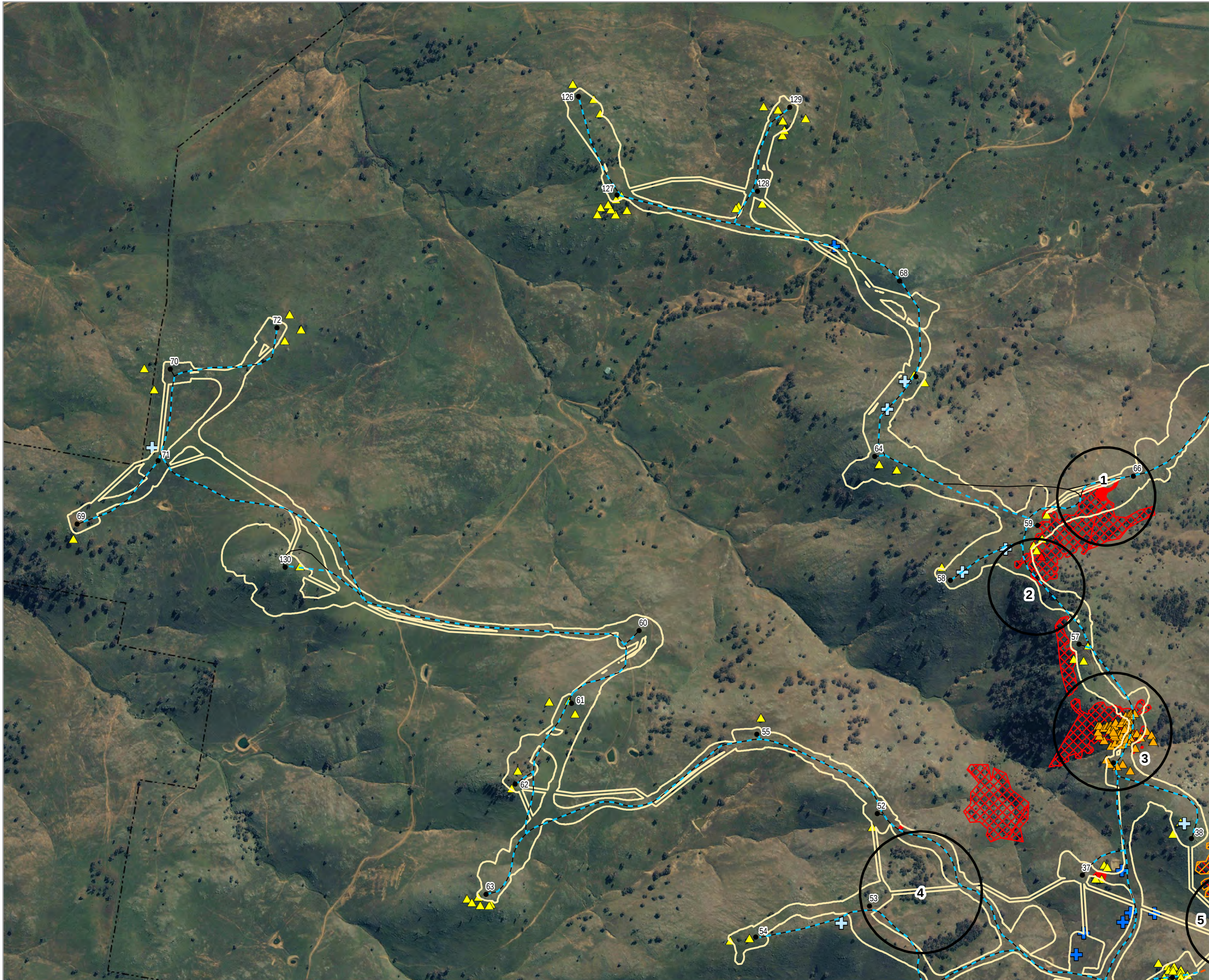
0 0.5 1 2 Kilometres

A3 @ 1:50000
Ref: Coppabella Wind Farm - Updated
Biodiversity and Aboriginal Heritage Overview
Author: TH

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UPDATED BIODIVERSITY AND
ABORIGINAL HERITAGE
DETAILED MAP 1

Coppabella Wind Farm

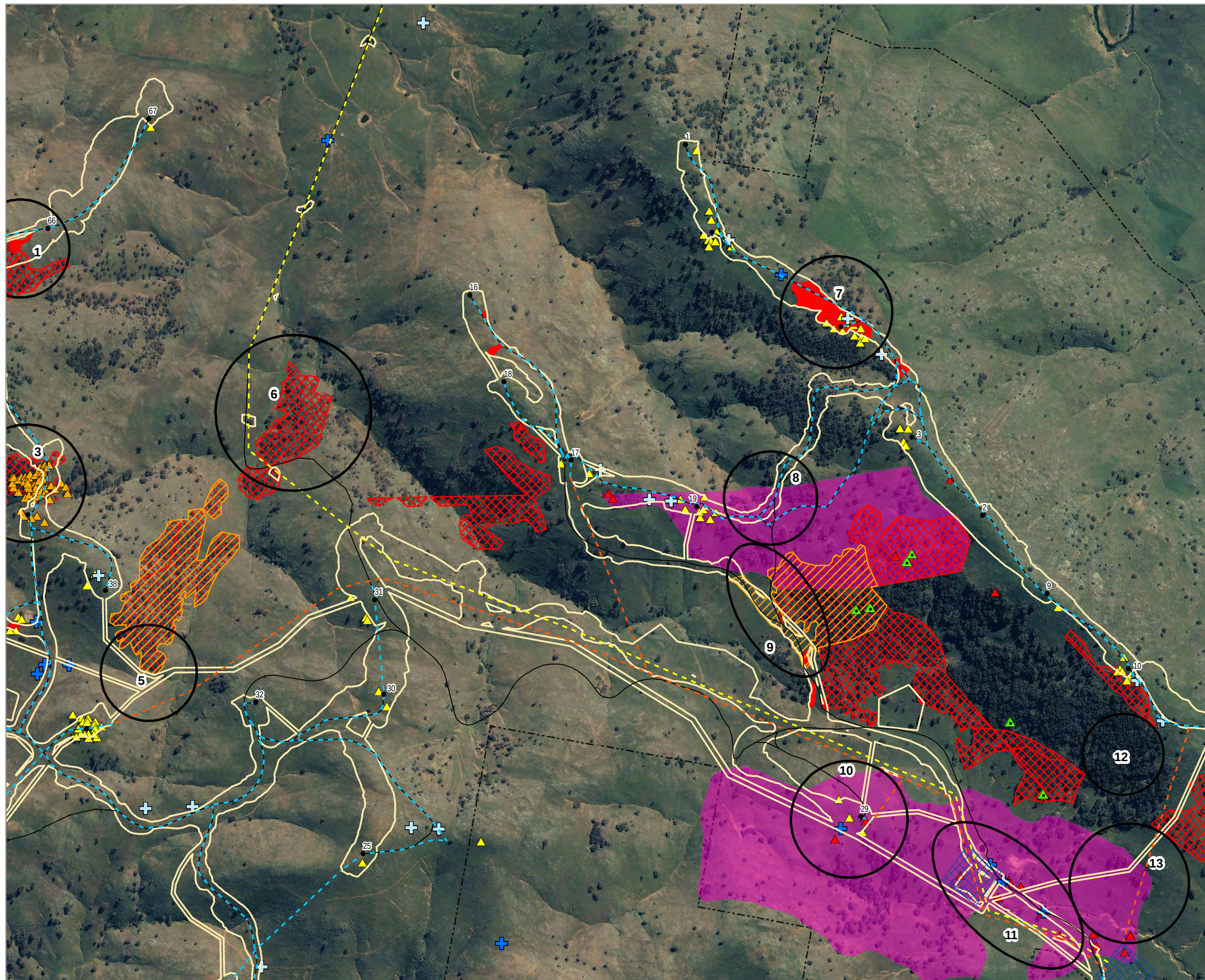
- Reference Areas
- Turbine locations - Approved
 - Overhead Reticulation - Approved
 - Underground Reticulation - Approved
 - 132kV Powerline - Approved
 - Access Tracks - Approved
 - Batch Plants and Construction Compounds - Approved
 - Switchyards and Substations - Approved
 - Modified Construction Footprint
- Previously identified biodiversity high constraints
- Hollow-bearing trees (HBTS)
 - Yass Daisy records
 - Moderate to good condition (NGH classes) woodland EEC
- Additional biodiversity high constraints
- Potential HBTs based on field DBH assessment
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 - Important Superb Parrot Habitat (Coppabella BA)
 - Moderate to Good Condition (NGH classes) Woodland EEC (Based on validated vegetation mapping)
 - EPBC listed Box-Gum woodland CEEC
- Aboriginal heritage constraints*
- Verh high constraint
 - High constraint
 - Wind Farm Project Boundary

* Note Aboriginal site data is in point form and sites may extend beyond these areas

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm - Updated
Biodiversity and Aboriginal Heritage Detailed
Author: TH



UPDATED BIODIVERSITY AND ABORIGINAL HERITAGE DETAILED MAP 2

Coppabella Wind Farm

- Reference Areas
 - Turbine locations - Approved
 - Overhead Reticulation - Approved
 - Underground Reticulation - Approved
 - 132kV Powerline - Approved
 - Access Tracks - Approved
 - Batch Plants and Construction Compounds - Approved
 - Switchyards and Substations - Approved
 - Modified Construction Footprint
- Previously identified biodiversity high constraints
 - Hollow-bearing trees (HBTS)
 - Yass Daisy records
 - Moderate to good condition (NGH classes) woodland EEC
- Additional biodiversity high constraints
 - Potential HBTs based on field DBH assessment
 - Desktop HBT assessment (PAC Submission)
 - Important Superb Parrot Habitat (Coppabella BA)
 - Moderate to Good Condition (NGH classes) Woodland EEC (Based on validated vegetation mapping)
 - EPBC listed Box-Gum woodland CEEC
- Aboriginal heritage constraints*
 - Verh high constraint
 - High constraint
 - Wind Farm Project Boundary

* Note Aboriginal site data is in point form and sites may extend beyond these areas

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm - Updated
Biodiversity and Aboriginal Heritage Detailed
Author: TH



UPDATED BIODIVERSITY AND
ABORIGINAL HERITAGE
DETAILED MAP 3

Coppabella Wind Farm

- Reference Areas
 - Turbine locations - Approved
 - Overhead Reticulation - Approved
 - Underground Reticulation - Approved
 - 132kV Powerline - Approved
 - Access Tracks - Approved
 - Batch Plants and Construction Compounds - Approved
 - Switchyards and Substations - Approved
 - Modified Construction Footprint
- Previously identified biodiversity high constraints
 - Hollow-bearing trees (HBTS)
 - Yass Daisy records
 - Moderate to good condition (NGH classes) woodland EEC
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 - Desktop HBT assessment (PAC Submission)
 - Important Superb Parrot Habitat (Coppabella BA)
 - Moderate to Good Condition (NGH classes) Woodland EEC (Based on validated vegetation mapping)
 - EPBC listed Box-Gum woodland CEEC
- Aboriginal heritage constraints*
 - Verh high constraint
 - High constraint
 - Wind Farm Project Boundary

* Note Aboriginal site data is in point form and sites may extend beyond these areas

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm - Updated
Biodiversity and Aboriginal Heritage Detailed
Author: TH

UPDATED BIODIVERSITY AND
ABORIGINAL HERITAGE
DETAILED MAP 4

Coppabella Wind Farm

- Reference Areas
- Turbine locations - Approved
 - Overhead Reticulation - Approved
 - Underground Reticulation - Approved
 - 132kV Powerline - Approved
 - Access Tracks - Approved
 - Batch Plants and Construction Compounds - Approved
 - Switchyards and Substations - Approved
 - Modified Construction Footprint
- Previously identified biodiversity high constraints
- Hollow-bearing trees (HBTS)
 - Yass Daisy records
 - Moderate to good condition (NGH classes) woodland EEC
- Additional biodiversity high constraints
- Potential HBTs based on field DBH assessment
 - Desktop HBT assessment (PAC Submission)
 - Important Superb Parrot Habitat (Coppabella BA)
 - Moderate to Good Condition (NGH classes) Woodland EEC (Based on validated vegetation mapping)
 - EPBC listed Box-Gum woodland CEEC
- Aboriginal heritage constraints*
- Verh high constraint
 - High constraint
 - Wind Farm Project Boundary

* Note Aboriginal site data is in point form and sites may extend beyond these areas

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012

0 0.1 0.2 0.4 0.6 Kilometres

A3 @ 1:12500
Ref: Coppabella Wind Farm - Updated
Biodiversity and Aboriginal Heritage Detailed
Author: TH



UPDATED BIODIVERSITY AND
ABORIGINAL HERITAGE
DETAILED MAP 5

Coppabella Wind Farm

- Reference Areas
 - Turbine locations - Approved
 - Overhead Reticulation - Approved
 - Underground Reticulation - Approved
 - 132kV Powerline - Approved
 - Access Tracks - Approved
 - Batch Plants and Construction Compounds - Approved
 - Switchyards and Substations - Approved
 - Modified Construction Footprint
- Previously identified biodiversity high constraints
 - Hollow-bearing trees (HBTs)
 - Yass Daisy records
 - Moderate to good condition (NGH classes) woodland EEC
- Additional biodiversity high constraints
 - Potential HBTs based on field DBH assessment
 - Desktop HBT assessment (PAC Submission)
 - Important Superb Parrot Habitat (Coppabella BA)
 - Moderate to Good Condition (NGH classes) Woodland EEC (Based on validated vegetation mapping)
 - EPBC listed Box-Gum woodland CEEC
- Aboriginal heritage constraints*
 - Verh high constraint
 - High constraint
 - Wind Farm Project Boundary

* Note Aboriginal site data is in point form and sites may extend beyond these areas

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm - Updated
Biodiversity and Aboriginal Heritage Detailed
Author: TH



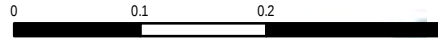
UPDATED BIODIVERSITY AND
ABORIGINAL HERITAGE
DETAILED MAP 6

Coppabella Wind Farm

- Reference Areas
- Turbine locations - Approved
 - Overhead Reticulation - Approved
 - Underground Reticulation - Approved
 - 132kV Powerline - Approved
 - Access Tracks - Approved
 - Batch Plants and Construction Compounds - Approved
 - Switchyards and Substations - Approved
 - Modified Construction Footprint
- Previously identified biodiversity high constraints
- Hollow-bearing trees (HBTS)
 - Yass Daisy records
 - Moderate to good condition (NGH classes) woodland EEC
- Additional biodiversity high constraints
- Potential HBTs based on field DBH assessment
 - Desktop HBT assessment (PAC Submission)
 - Important Superb Parrot Habitat (Coppabella BA)
 - Moderate to Good Condition (NGH classes) Woodland EEC (Based on validated vegetation mapping)
 - EPBC listed Box-Gum woodland CEEC
- Aboriginal heritage constraints*
- Verh high constraint
 - High constraint
 - Wind Farm Project Boundary

* Note Aboriginal site data is in point form and sites may extend beyond these areas

Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:6000
Ref: Coppabella Wind Farm - Updated
Biodiversity and Aboriginal Heritage Detailed
Author: TH



UPDATED BIODIVERSITY AND
ABORIGINAL HERITAGE
DETAILED MAP 7

Coppabella Wind Farm

- Reference Areas
 - Turbine locations - Approved
 - Overhead Reticulation - Approved
 - Underground Reticulation - Approved
 - 132kV Powerline - Approved
 - Access Tracks - Approved
- Batch Plants and Construction Compounds - Approved
- Switchyards and Substations - Approved
- Modified Construction Footprint
- Previously identified biodiversity high constraints
 - Hollow-bearing trees (HBTs)
 - Yass Daisy records
 - Moderate to good condition (NGH classes) woodland EEC
- Additional biodiversity high constraints
 - Potential HBTs based on field DBH assessment
 - Desktop HBT assessment (PAC Submission)
 - Important Superb Parrot Habitat (Coppabella BA)
 - Moderate to Good Condition (NGH classes) Woodland EEC (Based on validated vegetation mapping)
 - EPBC listed Box-Gum woodland CEEC
- Aboriginal heritage constraints*
 - Verh high constraint
 - High constraint
 - Wind Farm Project Boundary

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Notes:
- Design data courtesy of Goldwind, received May 2017
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:12500
Ref: Coppabella Wind Farm - Updated
Biodiversity and Aboriginal Heritage Detailed
Author: TH

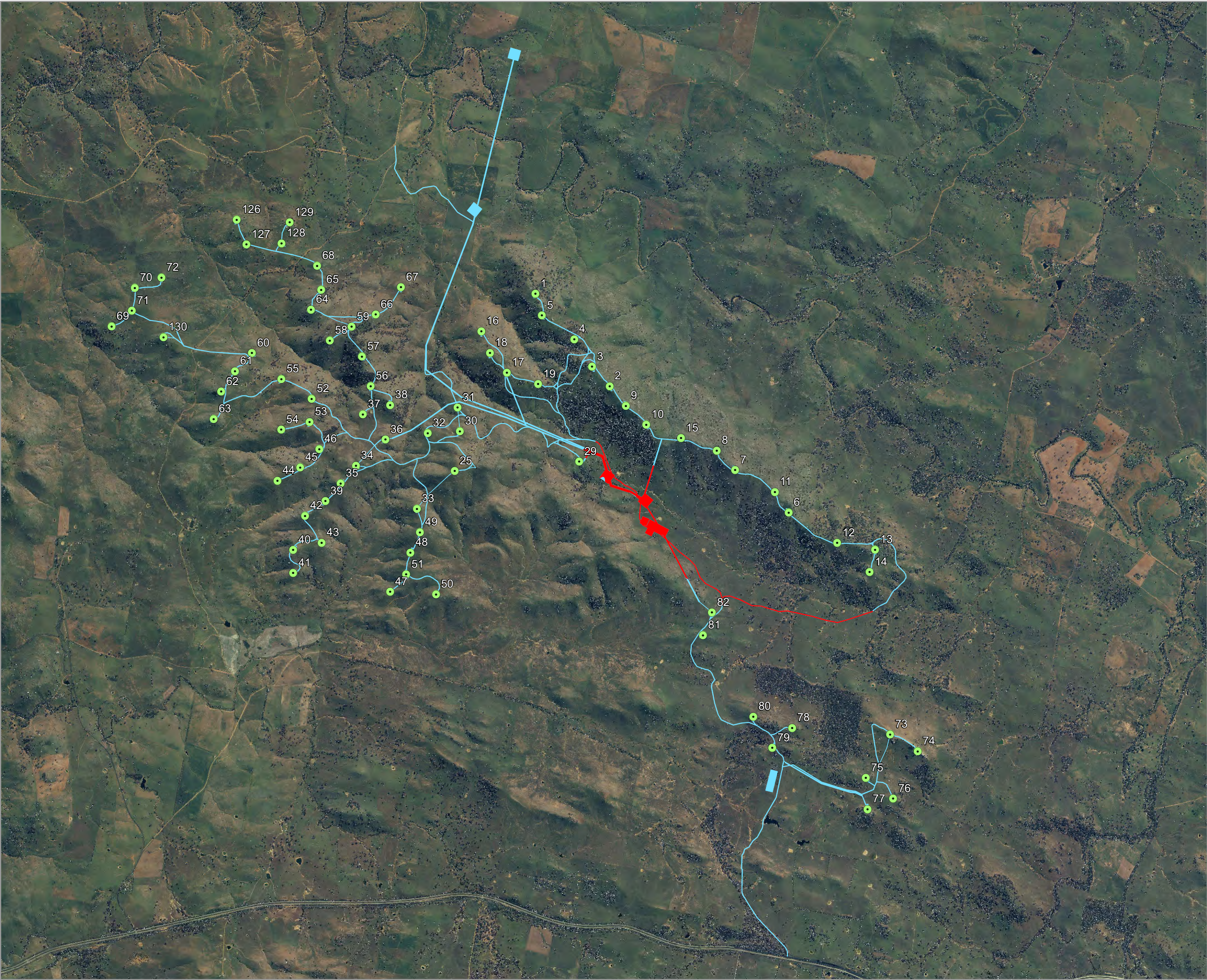
A.5 COPPABELLA, MARILBA AND THE 330KV GRID CONNECTION PRECINCTS

The Yass Valley Wind Farm proposal included clearing estimates for five separate precincts: Coppabella, Marilba (east and west), Conroy's Extension and the 330kV Grid Connection (identified as 'Transmission') to connect the wind farm south. When only the Coppabella precinct was consented, the clearing allowance omitted some infrastructure elements required for this precinct. This was due to the assignment of these infrastructure elements to the Transmission 330kv Grid Connection precinct in the project's GIS files. Refer to Appendix A, Map A.5. This result is that the clearing limit in Condition 19 does not include the additional 18 ha of Box Gum Woodland required to construct the Coppabella precinct.

Red areas shown are those required for the Coppabella precinct but not included in the clearing allowance due to their assignment to the 330kV grid connection precinct. The additional amount totals 18 ha of Box Gum Woodland

YASS VALLEY WIND FARM
APPROVED IMPACT AREAS
RELAVENT TO THE COPPABELLA
PRECINCT

Coppabella Wind Farm



- Approved turbines/hardstands
- Approved Coppabella precinct (83.0 ha)
- Infrastructure assigned to the tramission line precinct required for Coppabella but not included in the approval (18.1 ha)

Notes:
- Precinct data prepared by Epuron March 2015
- Aerial imagery courtesy of Epuron 2012



A3 @ 1:50000
Ref: 16-440
Author: DM



APPENDIX B SPECIALIST ASSESSMENTS

B.1 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

B.2 SHADOW FLICKER ANALYSIS

B.3 OPERATIONAL NOISE ASSESSMENT

B.4 HOLLOW BEARING TREE SURVEY JULY 2017

B.5 OPERATIONAL BIRD AND BAT IMPACT ASSESSMENT

B.6 BIODIVERSITY OFFSET STRATEGY – SUPPORTING DOCUMENTS

Biobanking credit calculations

Areas being investigated for offsets

B.7 INDIGENOUS HERITAGE ASSESSMENT

B.8 AVIATION IMPACT ASSESSMENT

B.9 TELECOMMUNICATIONS ASSESSMENTS