

White Rock Wind Farm

MP10_160 - Stage 2

Modification Application No. 6

Environmental Assessment Report



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For: White Rock Wind Farm Pty Ltd (WRWFPL)



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EXECUTIVE SUMMARY

This document provides the Environmental Assessment to support Modification Application No. 6 (Mod 6) for Project Approval MP10_0160, applicable to White Rock Wind Farm (WRWF).

This modification application is made under section 75W of the *Environmental Planning and Assessment Act 1979* (NSW) (now repealed) which continues to apply to transitional Part 3A Projects by virtue of Schedule 6A to the EP&A Act.

This modification application relates to proposed variations to Stage 2 of the WRWF as well as amendments sought in relation to several conditions of approval.

This Environmental Assessment has been prepared by Goldwind Capital (Australia) Pty Ltd (GWCA) on behalf of the proponent, White Rock Wind Farm Pty Ltd (WRWFPL).

Project Approval MP10_0160 was granted for the WRWF on 10 July 2012 under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The WRWF project approval authorises the construction and operation of a wind farm with up to 119 wind turbines and associated infrastructure in the Northern Tablelands region of NSW, 20 km west of Glen Innes, 40 km east of Inverell and approximately 500 km north of Sydney. Stage 1 of the WRWF involves development of 70 turbines. A further 49 turbines may be constructed as part of a subsequent stage or stages.

The Project Approval was modified on 24 July 2015 (Mod 2), on 1 April 2016 (Mod 3), on 31 May 2017 (Mod 4) and on 11 October 2017 (Mod 5). Modification Application No. 1, which concerned an alternative grid connection at 330 kV was withdrawn by the proponent in January 2015.

This Modification Application seeks to modify the Project Approval in relation to Stage 2 of the WRWF including the following:

- a reduction in the number of Stage 2 turbines from 49 to up to 48 turbines;
- minor changes to 9 of the 48 Stage 2 turbines;
- relocation of 20 of the 48 Stage 2 turbines;
- increased turbine dimensions including:
 - a maximum tip height of up to approximately 200 m;
 - larger turbine rotors of up to approximately 170 m diameter;
 - blades up to approximately 85 m in length; and
 - hub heights of up to approximately 130 m.
- changes to the project area:
 - to include four additional properties (+2,004 hectares) within the project area. Three of these properties will host wind turbine and one will involve an access easement;
 - to remove a property (-289 hectares) originally included in the project area in response to the landowner's request (the removal of the land results in the removal of the associated wind turbines and a relocation of an access track to neighbouring land); and
 - resulting an overall increase in the project area to 15,078 hectares. The Mod 6 on-ground footprint is approximately 160 hectares, or 1% of the project area.
- additional access tracks for the relocated turbine sites;
- minor modifications to approved access track routes to improve constructability and reduce impacts;

- additional 33 kV collection circuits for the relocated wind turbine sites, including revised overhead cable routes to minimise impacts;
- variations to the collection circuits layout for turbine sites and potential cable or line routes;
- construction of additional temporary construction facilities to allow efficient construction of Stage 2. These facilities include construction compounds, laydown areas, rock crushing and concrete batching plants;
- additional hub height monitoring masts (up to two permanent and three temporary) to enable more detailed wind modelling of the southern and eastern areas included in Stage 2; and
- variation to specific conditions of the Project Approval to enable the modified Stage 2 development. This includes:
 - increase in the clearing limit defined in Condition C1(b);
 - update Appendix 1 figure and schedule of land;

This Environmental Assessment for Mod 6 provides details of the key potential environmental impacts for the proposed WRWF Stage 2 development. The impact assessments include landscape and visual impact assessment, construction and operational noise impact assessment, biodiversity impact assessment and offset assessment, Aboriginal and non-Aboriginal cultural heritage impact assessment and review of other issues.

A summary of outcomes of these and other assessments is provided below:

- **Visual.** The visual impact of the modification has been assessed as acceptable, resulting in a low-level change in visibility. This outcome is a result of location of the infrastructure in a sparsely settled area with significant proportion of associated landowners, suitable setbacks from non-associated residences and the ability of the landscape to visually absorb the development. One approved turbine has been removed and some approved turbine sites have been relocated to give increased set back from non-involved landowners to minimise visual impact;
- **Noise.** The noise impact of the modified project has been assessed as acceptable. The construction noise impacts will be managed through the Stage 1 CEMP, updated as necessary for Stage 2 and which addresses the Interim Construction Noise Guidelines. Operational noise for the Stage 2 development has been assessed, together with Stage 1 infrastructure, using relevant methodology as consistent with the Project Approval requirements. The project will comply with applicable noise criteria;
- **Biodiversity.** The project is required to avoid or minimise ecological impacts and this is achieved through a number of management measures. However, vegetation clearance requirements for Stage 1 and 2 are greater than were estimated for the original project application. The increase is due to the availability of more detailed earthworks civil design for the steep and challenging terrain that provides better estimates of the impacts for the type of construction equipment involved for Stage 2. As a result, an increase in the clearing limit (Ribbon Gum-Mountain Gum EEC) stated in Condition C1 of the Project Approval was approved under the MOD 4 application for Stage 1 (from 22 ha to 28 ha).

A further increase in the C1 clearing limit from 28 ha to 90 ha is sought to enable the Stage 2 development. Construction of Stage 2 would be undertaken in accordance with the WRWF Construction Flora and Fauna Management Plan (required by Condition E22) updated as necessary in respect the modified Project Approval. Offsets for biodiversity impacts will also be increased to reflect the greater impact and be implemented through extension of the existing WRWF Biodiversity Offset Package (BOP) for the modified Stage 2. The approval by DPE will be required for the updated BOP;

- **Indigenous Heritage.** An archaeologist has assessed the additional impact areas for Stage 2 in conjunction with Aboriginal stakeholders. No increase in impact on indigenous or non-indigenous heritage is anticipated for the modified project due to avoidance of identified sites and the existing approval conditions are considered suitable for Stage 2. The WRWF Stage 1 Construction Heritage Management Plan will be updated to include Stage 2;
- **Traffic and Transport.** The proposed Stage 2 infrastructure is predominantly located in the southern half of the project area and most of the access for construction of Stage 2 will be from the southern access routes. Available access routes will include those from the Gwydir Highway via the WRWF northern entrance or Ilparran Road access route, five site entry points from Kelley's Road and two from Maybole Road. The items to be transported to the site are similar to deliveries for Stage 1 but do include an increase in the length of some loads particularly for the turbine blades for the proposed turbine model. The modification application seeks approval for an increased blade length of up to 85 m.

A Transport Contractor will assess the proposed route for this purpose and, as necessary, obtain approvals for delivery of the selected turbine components. As the transport activities are similar to those for Stage 1, it is not anticipated that the modified project will give rise to any significant increase in impacts for the proposed transport routes and safety of users. Nevertheless, further transport permits will be needed from the relevant road authorities for transport of the selected equipment. In addition updated agreements with Councils for Dilapidation assessments and arrangements to repair any degradation of local road assets due to the Stage 2 project will be arranged. The WRWF Stage 1 Construction Traffic and Access Management Plan would also be updated in consultation with the relevant road authorities to address Stage 2, including the Mod 4 330 kV connection. Should any upgrades be required to local roads these would be arranged in consultation and approval from the relevant road authority.

- **Soil and Water Management.** The Project Approval includes conditions for Soil and Water Management and the WRWF CEMP Sub-Plan, Construction Soil and Water Management Plan (CSWQMP) required by Condition E22, sets out appropriate mechanisms to manage erosion and sediment transfer. These measures are complemented by, preparation and implementation of Progressive Erosion and Sediment Control Plans (PESCPs) and, progressive rehabilitation of disturbed areas. The modified project will be managed similarly to Stage 1 and will not significantly increase impacts for erosion or water quality;
- **Other Assessments.** A review of other potential issues such as, telecommunications interference, aviation safety risks, bushfire risk management, interaction with land uses such as agricultural or mineral resource activities and electric and magnetic fields (EMF) has not indicated any significant increase in impacts due to the modification and the issues arising are manageable.

This Environmental Assessment describes the proposed modifications in respect of WRWF Stage 2, provides the justification for the modifications, sets out the environmental impacts and proposes suitable mitigation measures. It concludes that this sustainable energy project, as modified, can be constructed and operated without significant additional impact to the environment.

Implementation of the modified Stage 2 development will enable increased renewable energy generation at this location and almost double the output of the project due to the higher generation capacity of the selected turbine model. The approved Mod 4 Alternative Grid Connection infrastructure enables Stage 2 connection and its potential use for both Stage 1 and 2 will reduce the total project electrical losses associated with the grid connection providing for a more efficient project.

The additional mitigation measures described in this report will be incorporated into updated management plans required for project implementation.

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ABBREVIATIONS

AHIMS	Aboriginal Heritage Information Management System
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
BOP	Biodiversity Offset Package
CEMP	Construction Environmental Management Plan
CCC	Community Consultative Committee
CTAMP	Construction Traffic Access Management Plan
DALP	Design and Landscape Plan
DCP	Development Control Plan
DPE	Department of Planning and Environment
EA	Environmental Assessment
EEC	Endangered Ecological Community (under NSW TSC Act)
EMF	Electric and Magnetic Fields
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act
EP&A Act	Environmental Planning and Assessment Act
EPL	Environment Protection Licence
ER	Environmental Representative
ESD	Ecologically Sustainable Development
EWMS	Environmental Work Method Statement
GISC	Glen Innes Severn Council
GIWF	Glen Innes Wind Farm
GWCA	Goldwind Capital (Australia) Pty Ltd
Ha	Hectare
IC	Inverell Council
ICNIRP	International Commission on Non-Ionising Radiation Protection
ILEP	Inverell Local Environmental Plan
kV	kilovolt
kV/m	Kilovolt/meter (units of electric field)
LGA	Local Government Area
mG	milliGaus (units of magnetic field)
ML	Mining Lease
MP	Major Project
MW	megawatt
OEH	Office of Environment and Heritage

O&M	Operations and Maintenance
PA	Project Approval
POEO Act	Protection of the Environment Operations Act
RFS	Rural Fire Service
RMS	Roads and Maritime Services
ROTAP	Rare or Threatened Australian Plants
SEPP	State Environmental Planning Policy (NSW)
SWF	Sapphire Wind Farm
TEC	Threatened Ecological Community (under EPBC Act)
TL	Transmission Line
TSC Act	Threatened Species Conservation Act
VIA	Visual Impact Assessment
WRSF	White Rock Solar Farm
WRWF	White Rock Wind Farm
WRWFPL	White Rock Wind Farm Pty Ltd

1 INTRODUCTION

1.1 Purpose and content of this document

This Environmental Assessment (EA) provides supporting information for Modification Application No. 6 (Mod 6) for the White Rock Wind Farm (WRWF).

This EA includes:

- details of the proposed modifications being sought;
- statutory requirements and consultation;
- details of the environmental issues and impacts associated with the proposal;
- details of proposed mitigation measures;
- justification for the proposed modification;
- conclusions; and
- appendices that provide relevant specialist assessments.

1.2 Details of Proponent

This report has been prepared by Goldwind Capital (Australia) Pty Ltd (GWCA) on behalf of the proponent, White Rock Wind Farm Pty Ltd (WRWFPL). In 2014, Goldwind Capital Australia (GWCA) acquired WRWFPL and the WRWF project from Epuron Pty Ltd which obtained the planning approval in July 2012. In 2016, CECEP Wind-Power Corporation (CECWPC) acquired 75 % interest in WRWFPL with GWCA retaining a 25 % interest.

1.3 WRWF Project Background

1.3.1 Project Approval

The proposed White Rock Wind Farm (WRWF) received planning approval on 10 July 2012, from the NSW Minister for Planning under Section 75J of the *Environmental Planning and Assessment Act, 1979* (EP&A Act). The Project Approval was subsequently modified under Section 75W, on 24 July 2015 (Mod 2), on 01 April 2016 (Mod 3), on 31 May 2017 (Mod 4) and on 11 October 2017 (Mod 5). Modification No. 1 was withdrawn before determination.

The current Project Approval MP10_0160, as modified, allows for:

- construction of up to 119 wind turbines, each with three blades mounted on a tubular steel tower and concrete foundation
- the Project Approval allows for the development to be undertaken in stages;
- access tracks required for the installation and maintenance of the wind turbines;
- electrical connection (at 33 kV), between the turbines and an on-site substation, using a combination of underground and overhead transmission lines;
- a 132 kV transmission line (approximately 8 km) connecting the on-site substation to the existing TransGrid, Glen Innes to Inverell, 132 kV transmission line adjacent to the Gwydir Highway;
- an alternative grid connection at 330 kV including 13 km of 132 kV transmission line and a 132 kV / 330 kV substation (Mod 4). The alternative grid connection enables development of Stage 2;

- an onsite operation and maintenance (O&M) facility near the northern site entrance from Gwydir Highway and an additional O&M facility at the southern entry from Kelley's Road (constructed as part of Stage 1);
- temporary facilities for WRWF construction, construction compounds, laydown areas, rock crushing and batch plants (currently used for Stage 1); and
- permanent wind monitoring masts (two have been installed as part of Stage 1 construction and a further 2 are required for Stage 2).

The WRWF Staging Report describes the proposed staging of the WRWF implementation, comprising Stage 1 (70 turbines) and Stage 2 (up to 49 approved turbine sites).

1.3.2 Overview of Stage 1 and Construction progress

WRWF Stage 1 involves the installation of 70 Goldwind GW 121–2.5 MW wind turbines, grid connection components including a 33 kV / 132 kV substation approximately 1.5 km south of White Rock Mountain and 8 km of 132 kV double circuit transmission line connecting to TransGrid's existing 132 kV Glen Innes – Inverell transmission line, an operations and maintenance facility, access tracks, 33 kV collection circuits and temporary construction facilities. Two permanent monitoring masts were installed as pre-construction components. The WRWF Stage 1 layout is shown in Figure 1.1.

Construction of WRWF Stage 1 commenced on 25 May 2016 and is nearing completion. Turbine component deliveries commenced in December 2016 and continued through until August 2017. The substation was energized in June 2017. Erection of Stage 1 turbines commenced in January 2017 and all turbines have now been installed and are being progressively commissioned. WRWF Stage 1 is expected to commence full operation in Q1, 2018.

1.3.3 Overview of Stage 2 development planning

Review of options for development of Stage 2 (to follow Stage 1) initially considered the remaining 49 approved turbine sites that are not part of Stage 1 and in the context of an alternative grid connection at 330 kV as approved under Mod 4. The detailed review process has shown that the Stage 2 development can be optimized using higher output turbines and changes to the layout including additional host landowners. This document describes the detail of the proposed variations for Stage 2 and modified approval sought.

Planning for the Stage 2 development has involved reviews of the suitability of the turbine model and individual turbine siting based on potentially available wind turbine equipment and more detailed review of site characteristics and landowner preferences. The Stage 2 planning reviews benefited from experience gained during Stage 1 design and construction implementation.

The reviews have identified a constructible, least impact arrangement that refines the detail of the Stage 2 design as described in more detail in Section 2. The reviews have identified 48 suitable turbine locations that are addressed by this application, one less than the 49 sites under the existing approval. The selected turbines consist of 19 approved turbine locations, 9 minor changes to turbine locations and 20 relocated turbine locations;

1.3.4 Project location

White Rock Wind Farm is located between Glen Innes and Inverell, on privately owned rural land, within the Great Dividing Range of NSW. WRWF is about 20 km west of Glen Innes, 40 km east of Inverell and approximately 500 km north of Sydney. Stage 2 turbine sites are primarily located in the southern part of the project area. Details of land associated with the project are provided in Section 3 and 4.

1.4 Document structure

Section 0	Executive Summary
Section 1	Introduction – Purpose, background to WRWF project and overview of modification application
Section 2	Description of the Proposed Modification
Section 3	Property details for the modified project
Section 4	Describes consultation undertaken for the proposed modifications
Section 5	Outlines statutory requirements for WRWF and the modification application
Section 6	Outlines the environmental assessment for the proposed modifications
Section 7	Changes sought for the Conditions of Approval
Section 8	Sets out the justification for the modification
Section 9	Lists the conclusions of this EA Report.
Section 10	Lists relevant references for preparation of this EA.
Section 11	Lists the appendices providing specialist reports relevant to the modification application

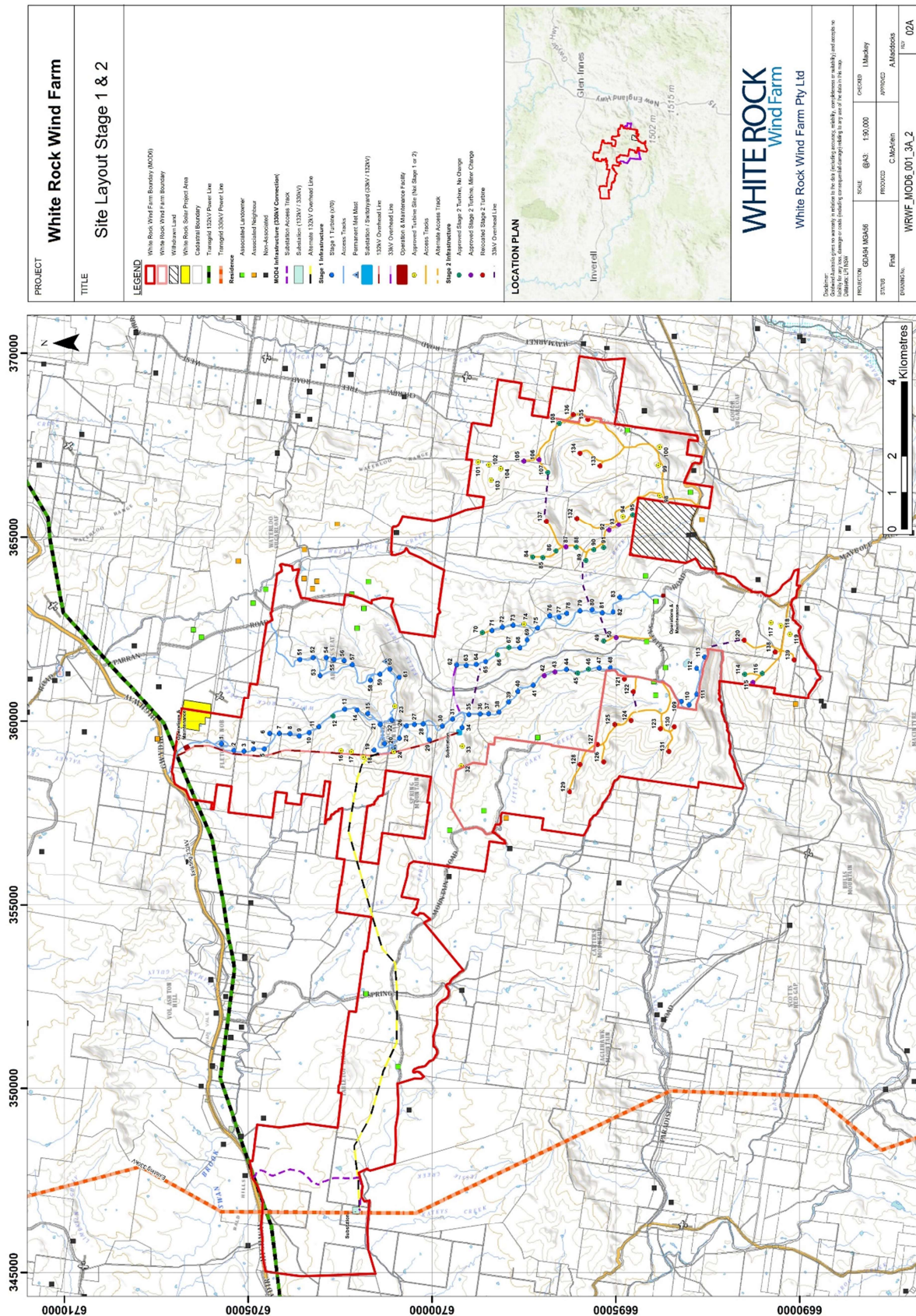


Figure 1.1 White Rock Wind Farm – Site Layout Stage 1 and Stage 2 including Alternative Grid Connection

2 DESCRIPTION OF PROPOSED MODIFICATION

2.1 Overview of the modifications sought

Modification Application No. 6 seeks approval for a modified WRWF Stage 2 that comprises up to 48 wind turbines with increased dimensions compared to the current approval and other variations to the design and conditions of approval. This modification follows on from prior approval of Modification Application No. 4 that provides adequate grid connection capacity to enable the full potential of an optimised WRWF renewable energy project to be realised.

The modification application seeks to vary the following:

- a reduction in the number of Stage 2 turbines from 49 to 48 turbines;
- minor changes to 9 of the 48 Stage 2 turbines;
- relocation of 20 of the 48 Stage 2 turbines;
- increased turbine dimensions including:
 - a maximum tip height of up to approximately 200 m;
 - larger turbine rotors of up to approximately 170 m diameter;
 - blades up to approximately 85 m in length; and
 - hub heights of up to approximately 130 m.
- changes to the project area:
 - to include four additional properties (+2,004 hectares) within the project area. Three of these properties will host wind turbine and one will involve an access easement;
 - to remove a property (-289 hectares) originally included in the project area in response to the landowner's request (the removal of the land results in the removal of the associated wind turbines and a relocation of an access track to neighbouring land); and
 - resulting an overall increase in the project area to 15,078 hectares. The Mod 6 on-ground footprint is approximately 160 hectares, or 1% of the project area.
- additional access tracks for the relocated turbine sites;
- minor modifications to approved access track routes to improve constructability and reduce impacts;
- additional 33 kV collection circuits for the relocated wind turbine sites, including revised overhead cable routes to minimise impacts;
- variations to the collection circuits layout for turbine sites and potential cable or line routes;
- construction of additional temporary construction facilities to allow efficient construction of Stage 2. These facilities include construction compounds, laydown areas, rock crushing and concrete batching plants;
- additional monitoring masts (two permanent and three temporary) to enable more detailed wind modelling of the southern and eastern areas included in Stage 2; and
- variation to specific conditions of the Project Approval to enable the modified Stage 2 development. This includes:
 - increase in the clearing limit defined in Condition C1(b);
 - update Appendix 1 figure and schedule of land;

2.2 WRWF Stage 2 modified layout

The current project approval includes 49 turbine locations that could be developed as Stage 2.

This modification application:

- Proposes a modified Stage 2 layout with a reduced total number of turbine sites, comprising 48 Stage 2 turbine sites (Figure 2.1);
- 19 of the proposed Stage 2 turbine sites are at locations that have been previously approved (Table 2.1 and Figures 2.1 and 2.2). These sites retain their original site numbering;
- 9 of the proposed Stage 2 turbine sites have been moved only a minor distance from the approved locations for constructability purposes, to minimise environmental impacts, minimise wake effects or a combination of these. These 5 sites retain the same numbers as for the approved turbines and are shown in Table 2.2 and Figures 2.1 and 2.2; and
- 20 of the proposed Stage 2 turbine sites are relocated from the approved sites. To differentiate them from the approved locations, the relocated turbines have been numbered 120 to 139 and are shown in Table 2.3 and Figures 2.1 and 2.2. The currently approved Stage 2 sites are shown in Figure 1.1 and revised numbering in Figures 2.1 and 2.2.

Table 2.2 includes a brief explanation of the main reasons for the relocations of the 20 turbines that have been moved more than a minor distance from an approved site, the original turbine reference number and, the revised turbine number for the modified location.

All turbines are proposed to be constructed generally at the Stage 2 locations shown in Tables 2.1, 2.2 and 2.3 (compiled listing for all 48 sites is provided in Appendix A). While the turbines are proposed to be constructed in the locations shown in this Report, there is potential for adjustments due to final design considerations and site conditions that become evident during construction but with variations not exceeding the 100 m allowance for micro-siting or, impacts increasing as assessed in accordance with Condition C4 and described in the CEMP.

Figure 2.1 shows the locations of the modified Stage 2 turbine sites and Figure 2.2 shows the locations of Stage 1 turbine sites together with the modified Stage 2 turbine sites.

Specific elements of the modified layout that reduce impact for neighbouring properties include:

- Three turbines (117 to 119) located towards the south of the wind farm have been relocated to Turbine sites 120, 138 and 139 to be further away from neighbouring residences;
- Eleven turbines (T121-131) are relocated onto two additional properties (not currently part of the approved project area) at the southwestern extent of the wind farm and west of Kelley's Road. These changes significantly increase setbacks from neighbouring residences and avoid potential impacts that may have occurred for some of the approved sites; and
- Six turbines (T132-T137) have been located on three existing and one additional property in the southeastern area north of Maybole Road. These changes have increased setbacks for 4 of the turbines that are now of the order of 2 km for two of the turbines 135 and 136.

The review of the suitability of turbine locations has required consideration of a range of siting factors, including landowner preferences, wind resource, constructability, environmental issues and positioning with respect to other turbine sites. The selection of the larger rotor turbine has also required a review of spacing of the turbine sites. Overall the modified design (layout and turbine model) has reduced the Stage 2 impacts (Section 6).

Table 2.1 WRWF Stage 2 Turbine Locations which are the same as the original EA position

Stage 2 Turbine Reference	Wind Turbine Coordinates (MGA)		Elevation m (AHD)	Location Status
	Easting (m)	Northing (m)		
12	360138	6702698	1,113	As approved
45	361320	6696046	1,223	As approved
46	361422	6695759	1,232	As approved
49	362185	6695344	1,314	As approved
66	361818	6698224	1,239	As approved
67	362015	6697923	1,228	As approved
70	362413	6698645	1,202	As approved
84	364459	6697276	1,220	As approved
85	364442	6697003	1,258	As approved
86	364626	6696645	1,338	As approved
88	364727	6696088	1,302	As approved
89	364365	6695828	1,340	As approved
90	364655	6695615	1,377	As approved
91	364716	6695348	1,396	As approved
95	365618	6694558	1,391	As approved
107	366767	6696860	1,277	As approved
108	368091	6696553	1,288	As approved
114	361291	6691510	1,308	As approved
116	361311	6691034	1,332	As approved

Table 2.2 WRWF Stage 2 Turbine Locations moved slightly from the original EA position

Stage 2 Turbine reference	Wind Turbine Coordinates (MGA)		Elevation m (AHD)	Change from Approved Location	
	Easting (m)	Northing (m)		Distance (m)	Direction
42	361251	6696961	1,200	120m	SSE
43	361347	6696676	1,214	101m	NW
50	362280	6695007	1,316	89m	SSE
87	364730	6696374	1,307	15m	E
92	365190	6695204	1,372	91m	SSE
93	365344	6694933	1,336	125m	SE
105	367074	6697516	1,274	43m	WNW
106	367109	6697097	1,282	9m	SE
115	361070	6691289	1,341	39m	E

Table 2.3 WRWF Stage 2 Turbine Locations relocated from the original EA position

Stage 2 Turbine Reference	Wind Turbine Coordinates (MGA)		Elevation m (AHD)	Approved Turbine Reference	Reasons for relocation
	Easting (m)	Northing (m)			
120	362214	6691519	1,308	117	Noise, visual, further from neighbours
121	361160	6694785	1,307	74	Relocated due to unsuitable wake effects
122	360813	6694536	1,321	98	Noise, visual, further from neighbours
123	359796	6693798	1,338	99	Noise, visual, further from neighbours
124	360018	6694601	1,273	100	Noise, visual, further from neighbours
129	358087	669270	1,129	16	Difficult access, away from 132kV OHL
128	358828	6695986	1,180	17	Difficult access, away from 132kV OHL
127	359366	6695518	1,192	18	Difficult access, away from 132kV OHL
125	359906	6695045	1,291	23	Relocated due to unsuitable wake effects
126	358893	6695350	1,192	24	Relocated due to unsuitable wake effects
130	359846	6693425	1,336	33	Noise, visual, further from neighbours
131	359180	6693573	1,314	32	Noise, visual, further from neighbours
132	365521	6696075	1,260	97	No land access, further from neighbours
133	366943	6695444	1,296	104	Noise, visual, further from neighbours
134	367284	6695985	1,289	103	Noise, visual, further from neighbours
135	368202	6695772	1,301	102	Noise, visual, further from neighbours
136	368327	6696168	1,280	101	Noise, visual, further from neighbours
137	365440	6696898	1,253	96	No land access, further from neighbours
138	361893	6690681	1,346	118	Noise, visual, further from neighbours
139	361677	6690162	1,336	119	Noise, visual, further from neighbours

2.3 Turbine model used for assessment purposes

For the purposes of the assessments for this modification application, a Goldwind turbine, model GW140 3S has been used as an indicative and suitable turbine model. The GW140 3S turbine model that could be implemented for WRWF Stage 2 has the following approximate dimensions:

- Maximum tip height up to 200 m.
- Hub height: 100 to 130 m.
- Rotor diameter: 140 m (alternative models may have rotor diameters up to 170 m).
- Blade length: 70 m (the largest model contemplated has a blade length up to 85 m).
- Clearance below rotor to ground level: 30 to 60 m.

Due to the time between the planning application and project implementation and with the rapid advances in wind turbine technology and commercial availability of new models, WRWFPL seeks a modified approval allowing up to 200 m tip height and rotor diameter of up to approximately 170 m (Figure 2.3).

This modification application also references a typical turbine, the GW140 3S turbine utilising a 70 m blade on a 130 m tower, which is considered as the greatest impact for noise and visual assessment purposes. A schematic representation of the Stage 1 turbines and potential Stage 2 turbines is shown in Figure 2.3.

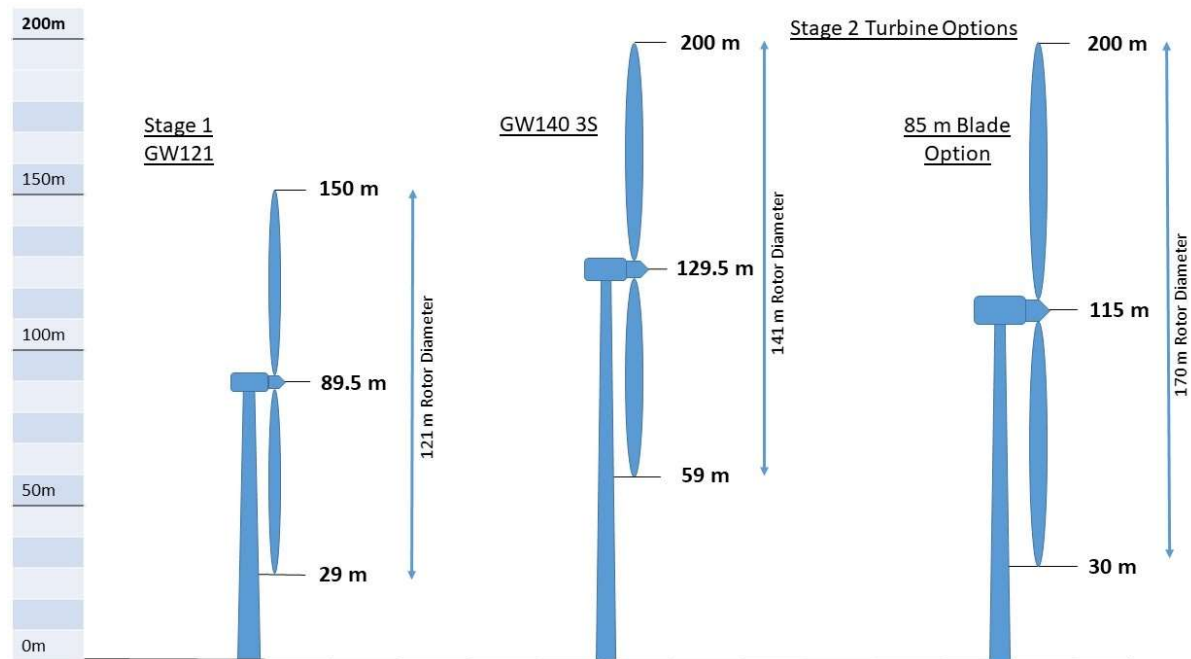


Figure 2.3 Schematic Stage 1 and potential Stage 2 Turbine dimensions

2.4 Stage 2 access track layout

The design review has also considered locations of access track routes, grades of the tracks and widths based on anticipated design and extent of likely cut and fill works. The relocated sites will require additional access tracks. However, approved tracks for sites that will no longer be constructed as part of Stage 2 will no longer be required. In some cases where Stage 2 turbines are located amongst Stage 1 turbine sites, access tracks will have been established as part of Stage 1, e.g. Turbine 12 site on existing access track from Turbine 1 to 21.

More detail on the likely impacts of wind farm construction in the steep challenging terrain has confirmed that the original impact calculations underestimated the vegetation clearance impacts for access tracks particularly without the benefit of design details for cut and fill and batter structures on steep slopes.

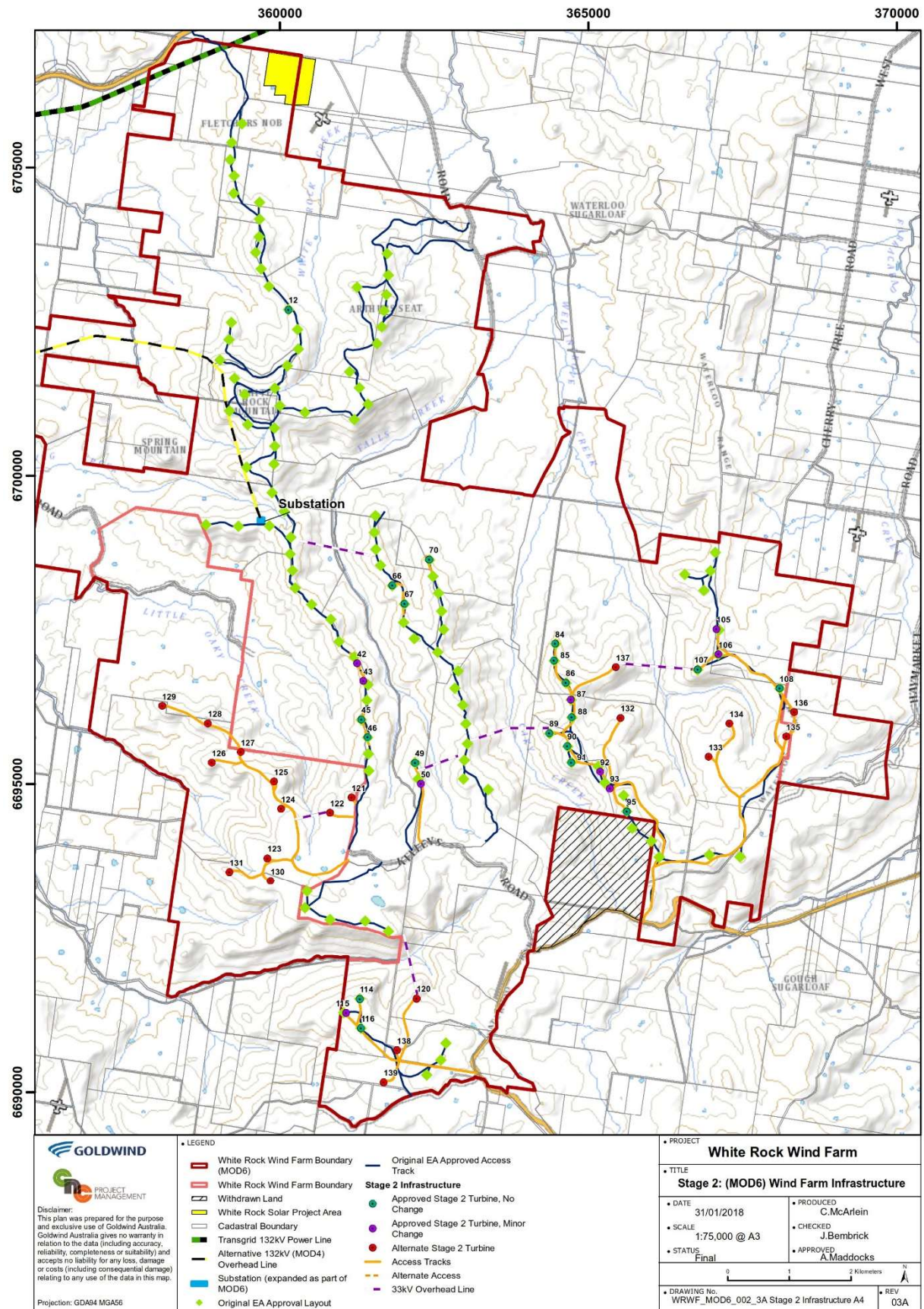


Figure 2.1 WRWF Indicative Stage 2 layout

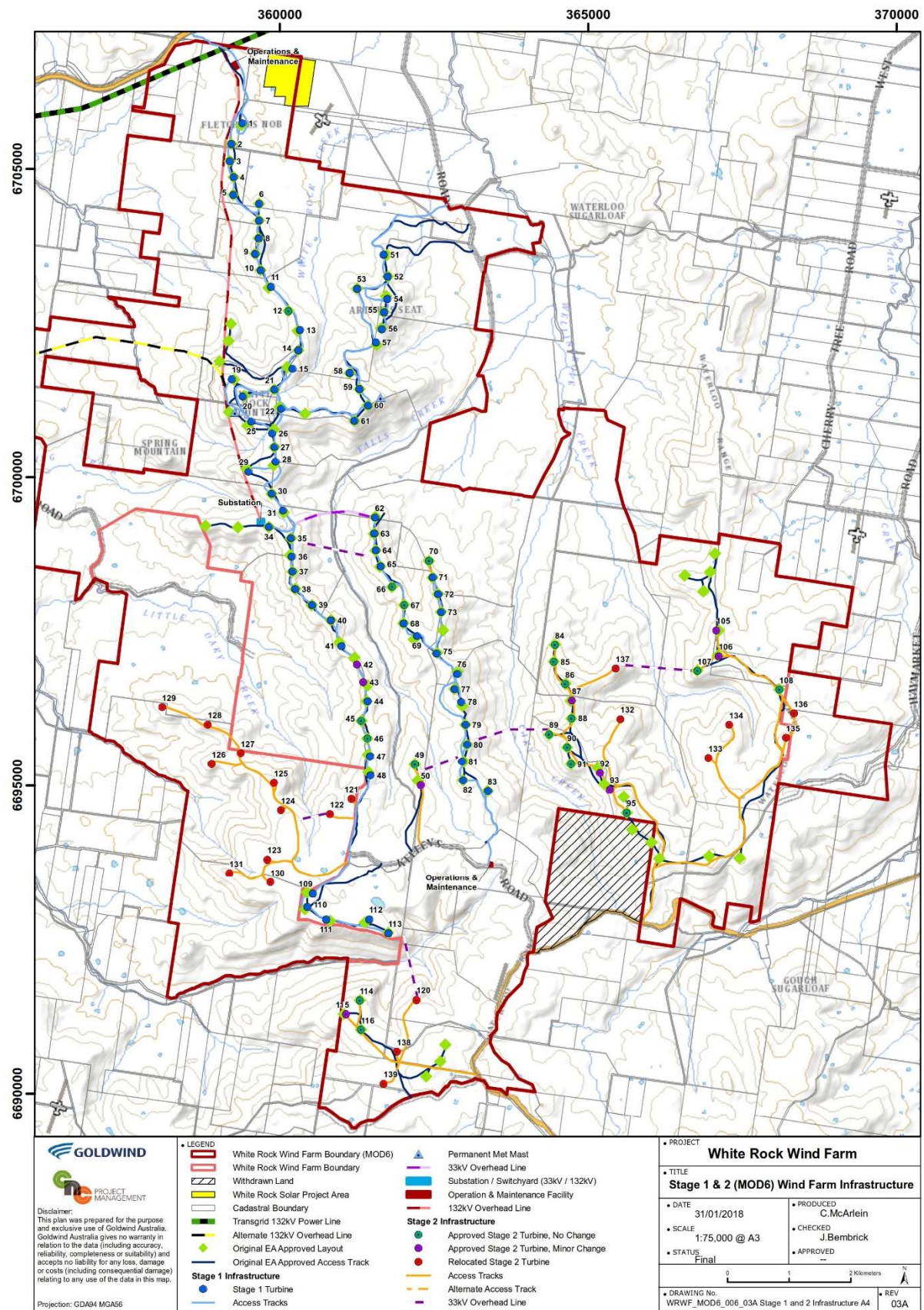


Figure 2.2 WRWF Stage 1 and Indicative Stage 2 Layout

WRWFPL has confirmed that it would not be possible to implement the full WRWF Stage 1 and 2 without further increase in the vegetation clearing limit specified in Project Approval Condition C1. Increased estimates of vegetation impacts are provided in this EA, due to:

- more detailed indicative civil design;
- changes in the methodology for mapping and classification of vegetation relevant to the assessments for the WRWF project approval in 2012;
- larger wind turbine equipment; and
- knowledge/experience gained during Stage 1 construction works.

The increased vegetation impact requires an increase in the clearing limit prescribed in Condition C1. Impacts will be offset under a revised Biodiversity Offset Package (BOP) (or equivalent) based on a modification of the Stage 1 BOP as submitted to OEH in December 2016.

2.4.1 Alternate Track at Turbine 136

One of the relocated turbines (Turbine 136) is on an additional property and has involved realignment of the access track from Turbine 135 to Turbine 108 to include the additional turbine site. However, should the proponent not proceed with relocated Turbine 136, then the access track between Turbines 135 and 108 will need to follow the route approved under the original EA (Figure 2.4). This approved route has had an updated ecological assessment so it is consistent with the FBA requirements. A cultural heritage assessment has also been carried out.

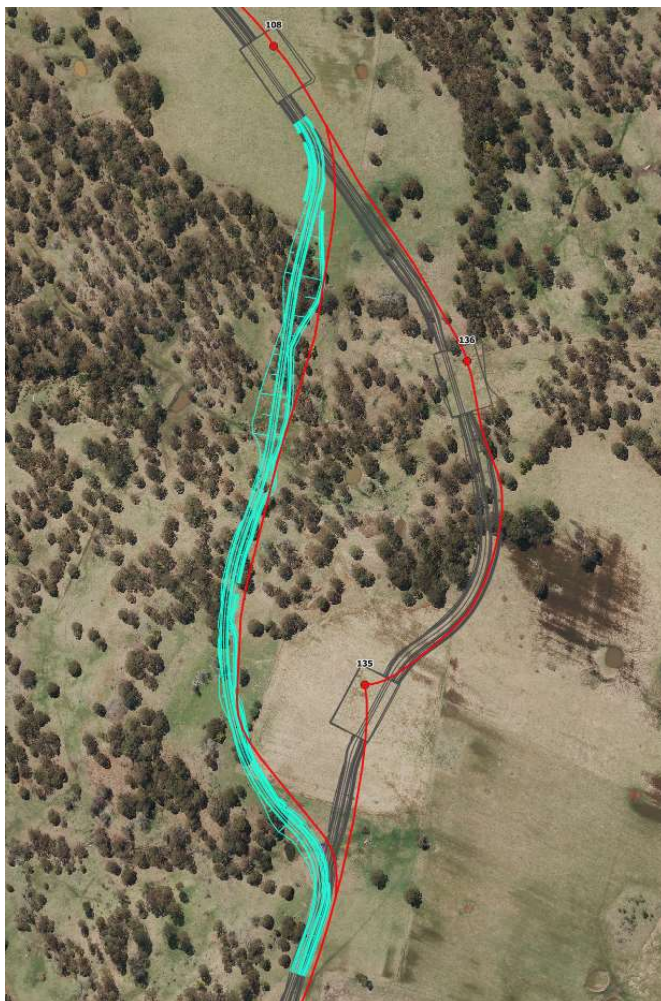


Figure 2.4 Alternate track route between Turbines 135 and 108

Micrositing of Turbine 135 may be required to remove any construction impacts and to prevent over sail of the neighbouring property should it not be included in the project lands and the original route be used. Given the flat, open area in which the turbine is situated no additional ecological or heritage impacts would be required.

This assessment considers the worst-case impact, being the EA approved route, for the purposes of considering vegetation clearance limits. Should the preferred route be used, the resulting impact would be lower.

2.5 Stage 2 33 kV collection circuits

The Stage 2 wind turbines will be connected to the WRWF substation by a mix of 33 kV underground cables and 33 kV overhead powerlines. The connection routes will be generally as indicated for the original assessment but have been varied marginally and may be further adjusted during detailed design phase to minimise cabling routes and/or environmental impacts or, to increase the capacity of the collection circuits.

The design review has assessed feasible 33 kV cable routes and aims to reduce environmental impacts as far as practically and feasibly possible. However, details of optimal cabling routes are normally only finalized during the detailed design stage after consideration of engineering design requirements and environmental constraints. Where Stage 2 cabling aligns with Stage 1 cable installation, the additional cables will be situated within, or as close as possible to, the disturbance footprint created during the construction of Stage 1 to minimise vegetation clearance.



Plate 2.1 33 kV Tower

33 kV Transmission tower for internal collection circuit.

A large tower is used as an end-point for a span of about 1.3 km across a deep valley. The single span reduces the extent of vegetation clearing, removing the need for multiple spans and towers closer to the ground resulting in more clearing.

Up to six spans of 33 kV overhead line are proposed for Stage 2 as shown in Figure 2.2. The ends of each span correspond with the change from overhead line to underground cabling.

2.6 WRWF substation upgrade for Stage 2

Grid connection for Stage 2 relies on the approved Mod 4 application (alternative grid connection at 330 kV). Mod 4 allows additional infrastructure to the west of WRWF including 13 km of 132 kV transmission line and a 132 kV/330 kV substation approximately 13 km west of White Rock Mountain (Figure 1.1). No changes are proposed to the Mod 4 infrastructure as part of the Mod 6 Application.

The Stage 2 development requires expansion of the WRWF 33 kV/132 kV substation that was installed as part of the Stage 1 construction. The substation is located approximately 1.5 km south of White

Rock Mountain. The substation capacity is sufficient for Stage 1 but the capacity needs to be approximately doubled to enable grid connection for the Stage 2 development. The increase in the substation capacity through a marginal increase in its footprint (50 x 100 m) is not inconsistent with the Project Approval that already allows for Stage 2 development.

Changes that will be required for the expanded substation include the following:

- Additional components for 132 kV switchyard, involving marginal extension to existing structures;
- Addition/upgrade of the harmonic control building (if required);
- Additional 33 kV/132 kV transformer; and
- Additional 33 kV switchgear for the Stage 2 33 kV collection circuits.

A large underground oil/water separation tank is located on the western side of the Stage 1 Transformer and would ultimately be between the Stage 1 and Stage 2, 33 kV/132 kV transformers.

An indicative arrangement for the expanded 33 kV/132 kV Substation shown in Figure 2.5.

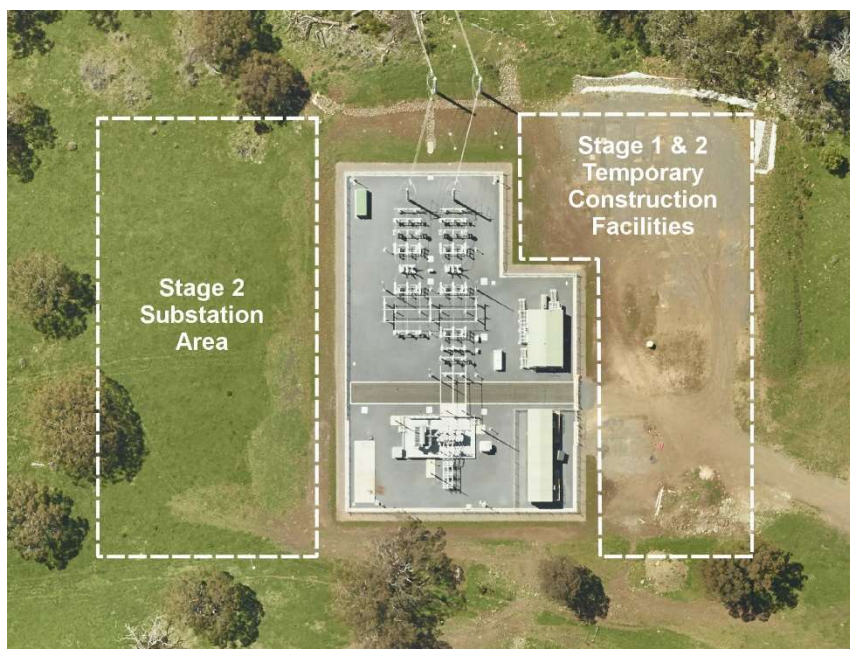


Figure 2.5 Indicative expanded substation layout to integrate Stage 2 facilities

The assessment of the alternative 132 kV transmission line for connection at 330 kV has been described in the Modification Application No. 4 and is unchanged by the Mod 6 Application. The actual power to be exported via the 330 kV connection is subject to the modified approval and details of the turbines selected for implementation.

2.7 WRWF Stage 2 Ancillary facilities

The Stage 2 construction will follow the construction of Stage 1 and some ancillary facilities may be able to be reused for Stage 2 thereby limiting the additional impacts for development of Stage 2. However, due to the greater construction effort required in the southern area and additional properties there will be a need for alternate ancillary facility locations additional to those for Stage 1 to provide better access to the Stage 2 construction locations.

Ancillary facilities for Stage 2 will include:

- Construction compound, laydown areas and site offices (additional to existing Stage 1 facilities);

- Concrete batching plant(s);
- Rock crushing facilities and stockpile sites; and
- Possible additional maintenance facility.

Use may be made of the Stage 1 southern construction compound and facilities building as required for some construction activities. Construction of the Stage 2 substation expansion will use the same Stage 1 temporary construction facilities area, minimising the need for additional clearing.

Rock crushing and concrete batching plants may be located on turbine hardstands during the construction phase to minimise the number of vehicle movements on public roads and within the site. Such siting could help reduce noise and visual impact at neighbouring properties and the surrounding area. Siting of such facilities will be subject to assessment by the BOP contractor for design and during the construction phase and is likely to require an update to the Construction Compound and Ancillary Facilities Management Plan (CCAFMP) to address and temporary construction facilities.



Plate 2.2 Access past Stage 1 substation



Plate 2.3 Area for extension of substation

2.8 Decommissioning

The proposed wind turbines are anticipated to have an operational lifespan of approximately 25 to 30 years. Following this timeframe, the Project infrastructure may, subject to gaining of relevant approvals, be upgraded, repowered or replaced with new wind turbines and may continue operation for a further specified period. Alternatively, the wind turbines and associated infrastructure within the Project area will be decommissioned and the Project footprint rehabilitated.

If the wind farm were decommissioned, TransGrid may, to the satisfaction of the Secretary, also wish to retain the grid components and one or both substations.

As required by Condition G10, WRWFPL has prepared a Decommissioning and Rehabilitation Plan (DRP) in April 2016 that has been approved by DPE on 26 April 2016. The approved DRP addressed Stage 1 only and it will be necessary to update the DRP to include Stage 2 components. It is noted that there may be a short interval between the timing for decommissioning of the two stages due to the different times for their construction and operational life.

In addition and, as required by Condition B8, WRWFPL has lease agreements with host landowners that have adequate provisions to require that decommissioning occurs in accordance with this approval. DPE approved the provisions for decommissioning in WRWFPL lease agreements on 20 August 2015.

2.9 Indicative WRWF Stage 2 timeframe

An indicative timeline for the WRWF Stage 2 construction is shown in Figure 2.6. The timeline distinguishes the various associated project components and the indicative construction periods and commencement of operations. Associated project components include WRWF Stage 1, Stage 2, the approved WRSF and the alternative 330 kV grid connection project as discrete project elements. Indicative timing of these components is as follows but may vary depending on actual timing of Stage 2 commencement:

- WRWF Stage 1 construction from May 2016 and operational Q1 2018;
- WRSF construction from July 2017 and operational Q1 2018;
- WRWF Mod 4 Alternative Grid Connection construction Q3 2018 and operational Q2 2019; and
- WRWF Mod 6 Stage 2 construction Q3 2018 and operation Q1 2020.

Stage 2 commencement can proceed using the approved alternative grid connection (Mod 4). Construction of alternative grid connection facilities needs to be completed in time to enable parts of Stage 2 to commence commissioning once constructed. Without the alternative grid connection approval, Stage 2 would have been unable to proceed.

	2016		2017				2018				2019				2020	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
WRWF Stage 1	Construction	Construction	Construction	Construction	Construction	Construction	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Operation
WRSF					Construction	Construction	Construction	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Operation
WRWF 330 kV TL									Construction	Construction	Construction	Operation	Operation	Operation	Operation	Operation
WRWF Stage 2									Construction	Construction	Construction	Construction	Construction	Construction	Operation	Operation

Construction
 Operation

Figure 2.6 Indicative timeline for project construction and operation

3 PROPERTY DETAILS FOR THE MODIFIED PROJECT

This section describes the lands relevant to WRWF Stage 2, additional property for the modifications relating to WRWF Stage 2 and revision required to Appendix 1 of the Project Approval for the modified project. In addition it addresses issues such as details of Crown lands impacted by the modified project, access to the project area and requirements for subdivision of land required for grid connection facilities.

3.1 Details of land on which the project is located.

Stage 2 facilities are located on freehold land as indicated in Table 3.1 and shown on Figure 3.1. Four lots are additional to those listed in Project Approval MP10_160, Appendix 1, *Schedule of Land* and are relevant to Modification Application No. 6. One lot included in Appendix 1 (Lot 2/DP1130567) no longer forms part of the project lands and it will need to be removed from Appendix 1.

Table 3.1 Property details relevant to the Stage 2 project and Mod 6 application

Lot	DP	Stage 2 Turbine IDs	Other permanent Stage 2 above ground facilities	Status for MP10_160
1	873080	12	132 kV OHL	Included
153	753260	Nil Stage 2	Expanded Substation, 132 kV OHL	Included Subdivision sought
2	228716	42	existing access track	Included
107	753292	43, 45, 46, 49, 50, 66, 67	access track to T50, 33 kV OHL	Included
4	225300	70	access track	Included
1	600093	Nil	33 kV OHL	Included
2	600093	120	access and 33 kV OHL	Included
116	705152	114, 115, 116	access track	Included
65	753292	138	access track	Included
1	865325	139	access track	Included
2	225300	84, 85, 86, 137	33 kV OHL	Included
2	883837	87, 88, 93, 95, 132	access track-	Included
1	883837	89, 90, 91, 92	33 kV OHL	Included
2	1187044	Nil Stage 2	2 sections of 33 kV OHL	Included
49	753292	Nil	access easement only	Included
1	1005607	Nil	access easement only	Included
101	753292	107, 108, 133, 134, 135	33 kV OHL	Included
76	753292	106	access track	Included
94	753270	105	access track	Included
Land added for the alternative grid connection at 330 kV (Mod 4 approval)				
1	624913	Nil	Substation and 132 kV line	Included

Lot	DP	Stage 2 Turbine IDs	Other permanent Stage 2 above ground facilities	Status for MP10_160
141	753305	Nil	132 kV line	Included
142	753305	Nil	132 kV line	Included
3	1104129	Nil	132 kV line	Included
108	753260	Nil	132 kV line	Included
109	753260	Nil	132 kV line	Included
1	873080	Nil	132 kV line	Included
Additional land to be added for the modified Stage 2 (Mod 6 Application)				
99	753292	121, 122, 123, 124, 125, 126, 127, 128, 129	33 kV OHL or 33 kV UG cable if no increase in clearing	Additional
154	753260	Nil	Access easement only	Additional
91	753292	130, 131	access track	Additional
4	713127	136	access track	Additional
Land no longer forming part of the project and to be removed from Appendix 1 of Project Approval				
2	1130567	Nil	Nil	To be deleted

Subject to approval of the modification application, WRWFPL would, finalise lease arrangements with landowners for access to any required additional land and, enter into agreements with Crown lands where infrastructure crosses Crown Lands (as required by existing Condition C32).

Figure 3.1 provides details of the proposed Stage 2 layout relative to individual properties.

Lease agreements with additional landowners include provisions for decommissioning as required by existing Condition B8. Similar provisions are already incorporated in the lease agreements for the wind farm site and those provisions for decommissioning, have been reviewed and approved by DPE on 20 August 2015.

Neighbour agreements have been signed between WRWFPL and some of the landowners for properties neighbouring the WRWF project. The neighbour agreements give rise to changed responsibilities for WRWFPL in respect of impacts addressed by various approval conditions.

Residences in the areas surrounding the Stage 2 infrastructure are shown in Figure 3.1. Subject to approval of this modification, further consultation would consider the potential impacts for neighbours and, where warranted, WRWFPL would discuss the potential for additional neighbour agreements to be established.

The land for WRWF Stage 2 is located within either Glen Innes Severn or Inverell Local Government Area (LGA) and is on land that is within Zone RU1 - Primary Production within the applicable LGA's.

3.2 Access to the Stage 2 infrastructure

WRWF Stage 2 will comprise the wind farm design described in this Mod 6 application for wind farm components as well as the 330 kV grid connection facilities that were approved under Mod 4.

Two access routes were described in the Mod 4 application to provide for:

- Access to the proposed 330kV substation in the Swan Vale locality

- Access via Spring Mountain Road for the construction of the 132 kV line

There are eight access points as follows:

- two entries from Gwydir Highway to substation and northern site T12;
- two entries from Kelley's Road to western sites T12, T42, T43, T45, T46 and T121-T131;
- entry from Kelley's Road to sites T49 and T50;
- entry from Kelley's Road to sites T66, T67 and T70;
- entry from Maybole Road to southern sites T114-T116, T120, T138, T139; and
- entry from Maybole Road to south eastern sites T84-T93, T95, T105-T108, T132-T137.

The southern access routes that provide access to the latter six entry points from Kelley's or Maybole Road involve the following routes:

- New England Highway to Grahams Valley Road, Maybole Road and Kelley's Road; and
- New England Highway to Ben Lomond Road, Maybole Road and Kelley's Road.

Use of the latter route (via Ben Lomond) has been subject of consultation, from late 2016, with RMS and Glen Innes Severn, Inverell and Armidale Councils and approved for Stage 1. This route will be reviewed further in consultation with RMS and local Councils to account for the increased size and dimensions of the Stage 2 turbines. The blades for the 140 metre diameter rotor are expected to be able to negotiate the route without with minor change to the route. However, further investigations will be required for blades for the 170 metre rotor should it be selected for implementation.

Traffic and transport issues are discussed in more detail in Section 6.8.

3.3 Crown Land

The WRWF impacts on various Crown land where legal access and use of the land is required. The required licences or agreements have been obtained for WRWF Stage 1 and further agreements may be need for Stage 2. Details of existing Licences and agreements for Stage 1 are shown in Table 3.2.

Table 3.2 WRWF Crown Land licences or agreements for use

Licence/Document Number	Description	Lot	DP	Purpose of Use
LI 523495	Right of Carriage Way 20 Wide	7001	93978	Access
LI 563196	Part of Crown Road intersecting Lot/DP	1	455212	Access
Deposited Plan (DP)1214209	Right of Carriage Way 20 Wide & Right of Carriage Way Variable Width	157	726527	Access & over sail

The main northern entry from Gwydir Highway passes through a Crown Land Reserve, Lot 7001/DP93978 to reach privately owned land that is part of the WRWF Project Area. WRWFPL has obtained Licence RI 523495, (under Section 34A of the Crown Lands Act 1989) in April 2014 for access across the Crown Land.

Approval of Crown Lands has also been obtained for access (Right of Carriage Way) across part of Lot 157/DP 726527 (White Rock Mtn Reserve) as indicated in Table 3.2. Should further licences be required to facilitate Stage 2 infrastructure crossing Crown Land / Roads, these will be sought prior to the commencement of construction.



3.4 Subdivision of Land

Parts of the infrastructure associated with the WRWF project will be owned by the Transmission Network Service Provider (TNSP), Transgrid, and the land on which the infrastructure will be located is intended to be owned by the operator. Subdivision of specific parcels of land is proposed in relation to substation facilities and was approved under Modification Application 5 (11 December 2017) as follows:

- 33 kV/132 kV substation located south of White Rock Mountain within Lot 153/DP 753260; and
- 132 kV/330 kV substation located adjacent the 330 kV transmission line within Lot 1/DP 624913.

Should it be necessary to increase the area of the current 132 kV substation by the addition of a further 50 x 100 m area, then subdivision consent is also sought for the expanded area as shown in Figure 2.5. The subdivision to create an additional lot of the size indicated is inconsistent with minimum lot sizes defined under the Inverell LEP 2012, however approval is sought under Part 3A of the EP&A Act. Should the subdivision be rejected, then work will proceed under a long-term lease arrangement between WRWFPL, the landowner and TransGrid.

3.5 Correction to Appendix 1 of Project Approval

This modification application also notes an error in Appendix 1 of the Project Approval where four lots should be excluded from within the project area shown by the red line. These are Lots 42, 113, 140 and 143 of DP 753260. A corrected drawing (Figure 1.1) is provided with this modification application that distinguishes the area that is not part of the WRWF Project Area.

4 STAKEHOLDER CONSULTATION

4.1 Agency consultation

Approval of the WRWF Project Application in July 2012 followed a rigorous review process including agency review and a detailed submissions report. That determination and subsequent modifications have been subject to detailed review and tailoring of project approval conditions by DPE based on risks to be managed and environmental performance objectives.

Details of project and modification applications in respect of WRWF (MP10_160) are shown in Table 4.1.

Table 4.1 History of Project Approval and Modifications

Application	Lodged	Determined	Scope of application
Project Application	10 Sept 2010	10 July 2012	WRWF 119 turbines approved
Modification 1	01 Sept 2012	Withdrawn Jan 2015	Alternative grid connection at 330 kV
Modification 2	15 June 2015	24 July 2015	Minor amendments to conditions
Modification 3	04 Dec 2015	01 April 2016	Minor adjustments to Stage 1 layout
Modification 4	16 Dec 2016	31 May 2017	Alternative grid connection at 330 kV
Modification 5	08 Sept 2017	11 October 2017	Subdivision – 330 kV and 132 kV substations
Modification 6	This document	Review by DPE	Amendments to Stage 2 layout (this application)

In August and December 2016, meetings were held between DPE and Goldwind to discuss planning path options and processes for modifications of the project approval in respect of the alternative grid connection and Stage 2 and to seek any assessment requirements needed for the modification applications. While general guidance was outlined, no documented requirements were provided. Modified approval for the alternative grid connection has since been obtained under Mod 4.

Consultation has been undertaken or arranged in respect of Mod 6. This has included:

- Consultation with relevant local, state or commonwealth government authorities, infrastructure and service providers, community groups and affected landowners; and
- Consultation with involved landowners, neighbours surrounding the development and relevant local Council(s).

This EA describes the consultation that has been carried out, identifies the issues raised during this consultation, and explains how these issues have been, or will be addressed. Specific consultation with specific Government agencies that has occurred during the development of the EA is summarised below.

4.1.1 Department of Planning and Environment

WRWFPL has consulted with the DPE on two occasions during 2016 where the subject of Stage 2 has been discussed as follows:

- At a meeting in August general discussion related to Stage 2 in the context of the alternative grid connection proposal. At that stage DPE advised WRWFPL to discuss any modifications proposed for Stage 2 before proceeding with an application for a Stage 2 modification.
- WRWFPL subsequently met with DPE in December 2016 to specifically discuss Stage 2. No SEARs were proposed by DPE as a result of the meeting but general guidance was provided resulting in the submission of this modification.

In response to DPE advice and issues arising for the Stage 2 modification application generally, this EA report has addressed the following requirements and issues:

- Targeted key planning issues identified for the WRWF Project Application in 2010/2011;
- Addressed DPE's advice to consider recently issued wind farm guidelines;
- Addressed DPE's advice to ensure consultation is up to date; and
- Addressed any other issues considered relevant by the proponent given the current project status, strategic planning context and evolution of the NSW Planning System and requirements.

DPE Compliance Team has visited WRWF Stage 1 on four occasions during 2017 to review performance and compliance.

4.1.2 Inverell Shire Council

The proposed Stage 2 modification (including the additional property) occurs partly within Inverell LGA and this part is subject to zoning under the Inverell LEP 2012 as Rural Zone RU1 – Primary Production.

Inverell Council (IC) has previously been consulted in regard to the proposal for an alternative grid connection for WRWF and is aware of the Stage 2 development. Consultation with IC has included the following:

- Previous consultation for the Mod 1 and 4 applications for the alternative grid connection;
- An IC representative regularly attends the WRWF Community Consultative Committee (CCC); and
- Inverell Council has indicated support for the WRWF Stage 2 development and alternative grid connection based on its potential for additional contribution to the regional economy.

4.1.3 Glen Innes Severn Council

The Stage 2 modifications are partly located within Glen Innes LGA and provide for increased scale of wind farm development in the locality and further use of access roads.

Consultation with the Glen Innes Severn Council (GISC) has included the following:

- Informal discussions with GISC development planning representatives;
- A GISC representative regularly attends the WRWF Community Consultative Committee (CCC); and
- Discussions and agreements relating to use of local roads.

4.1.4 Office of Environment and Heritage

The NSW Office of Environment and Heritage (OEH) has responsibility for management of issues associated with Biodiversity and Aboriginal Heritage. OEH provides advice to DPE in respect of biodiversity and heritage aspects for Modification Applications. This has included review of the WRWF Modification Application Nos. 1, 2, 3 and 4 and the processes for preparation and approval of the WRWF Biodiversity Offset Package and WRWF Bird and Bat Adaptive Management Plan.

Consultation with OEH has included the following:

- OEH response to previous Modification Applications as documented in the OEH submissions and proponent response to the OEH submissions (Submissions Reports). The specialist

assessments provided with this Modification Application have taken account of OEH previous comments and recent discussions between the biodiversity specialist and OEH.

- Recent consultation between OEH and WRWFPL in respect of associated matters,
 - WRWF Biodiversity Offset Package;
 - WRSF DA 7487, EIS, March 2016, Appendix B - Biodiversity Assessment Report; and
 - WRWF Mod 4 Application and consideration of increased clearing and revised offsets.
- Teleconferences between OEH and NGH Biodiversity and heritage specialists for WRWF Stage 2, in relation to the biodiversity assessment methodology, previous surveys and mapping, basis for vegetation categories, reference to NSW Scientific Committee determinations.

4.1.5 Department of Primary Industries

Agriculture

Consultation with Department of Primary Industries (DPI) has been previously undertaken in respect of the WRSF development to assess the potential impacts of the solar farm proposal on pastoral land use in the locality and key sensitivities from an agricultural perspective. The advice obtained is considered applicable for this Modification Application for WRWF Stage 2. The grazing activities near the turbine locations can continue despite the installation of the turbines. The access roads do marginally reduce grazing area but also provide improved farm access and better infrastructure for fire-fighting should that be required.

Maps of Strategic Agricultural Land (SAL) are provided by DPE but are general and have not been fine-tuned or ground truthed. DPI previously recommended that in relation to the WRSF location on SAL, that discussions should be undertaken with the landowner on their land value, in the context of loss of agricultural productivity for the subject land.

DPI also raised the importance of using the guideline *Primefact 1063: Infrastructure proposals on rural land (DPI)* to guide the assessment of land use impacts.

Overall, WRWF Stage 2 will have minor impact in relation to agricultural activities due to the small footprint spread over a wide area and due to the reversibility of impacts post operations.

Impacts to agricultural land use have been discussed in Chapter 7 of this EA.

Water

The NSW Office of Water was previously consulted in 2016 regarding the impact on water courses for the WRSF development. The WRSF did require some structures placed in the watercourses however, the design of Stage 2 has limited potential impacts. The internal transmission lines are likely to span watercourses with structures set back from the watercourses. Cables and tracks mostly follow ridgelines where turbines are located. As such, the modification is not likely to significantly impact watercourses.

All streams are either within the McIntyre or Severn Catchments.

Drainage lines classified as a 'river' under the *Water Management Act 2000* may require a Controlled Activity Approval (CAA) to undertake any works within 40 metres of the watercourse. Even where development under the Project Approval exempts the work from being a Controlled Activity (CAA), WRWFPL was still encouraged by DPI to reference to the DPI document, '*Guidelines for watercourse crossings on waterfront land*'. WRWFPL commits to consideration of the Guidelines.

Crown Lands

The WRWF Project Approval, Condition C32, includes requirements in respect of Crown Land as follows:

Prior to the commencement of construction of the project, the Proponent shall consult with and comply with the requirements of the Department of Lands in relation to any Crown land affected by the project to enable the lawful use of that land by the project.

WRWFPL has fulfilled requirements of Condition C32 for the WRWF Stage 1 development (Section 3.3) and subject to Stage 2 proceeding, WRWFPL would satisfy C32 requirements in respect of relevant parts of the development.

Where infrastructure crosses Crown waterway and Crown roads, the proponent will need to seek and obtain appropriate easements or access licences from Crown Lands. Further consultation in respect of specific activities on Crown Lands would occur following an approval of this modification application.

4.1.6 Environment Protection Authority

An Environment Protection Licence (EPL) is required for WRWF, as it constitutes a scheduled activity. Subject to positive determination of the modification application, WRWFPL would consult with EPA regarding the updated Stage 2 design and need for further variation to EPL 20665 to address both Stage 1 and Stage 2 and in respect of further construction and operations phases for Stage 1 and 2. EPA has visited Stage 1 on several occasions and reviewed project performance and compliance. EPA also undertakes risk reviews to assess the category for licensing.

4.1.7 Rural Fire Service

A Bushfire Risk Management Plan (BRMP) has been developed for WRWF in consultation with Rural Fire Service (RFS). The Plan forms part of the approved WRWF Stage 1 CEMP. The BRMP has been updated as part of the Stage 1 OEMP. Subject to approval of this modification application, further consultation would be undertaken with RFS in respect of Stage 2 and it is expected that based on the consultation with RFS that an updated Bushfire Risk Management Plan would be developed to cover both WRWF Stage 1 and 2 and respective development phases.

4.1.8 Roads and Maritime Services

The modification for Stage 2 does not involve any significant additional changes to the road access network. Access for larger turbine components will require a review of pinch-points along the access routes used for Stage 1, due to the longer blade length, but is expected to require minimal change to public roads and road infrastructure.

Access for Stage 2 will predominantly involve the southern access routes, Grahams Valley Road, Maybole Road and Kelley's Road or for over-dimensional transport via the Ben Lomond route. It may also include a lesser proportion of access by the existing northern access points from Gwydir Highway and Ilparran Road.

Where necessary, WRWFPL would consult with Roads and Maritime Service (RMS) to discuss the proposed access routes and based on intersection analyses, any potential for further upgrade works for entry / exit points for State Highways. Subject to this modification being approved and the project proceeding, any approved upgrade works would be implemented, in Q2 2018 at the earliest, in accordance with requirements of the relevant road authority.

RMS will be consulted with regards to the modified Stage 2 development and any additional road works or management of impacts on the State Highways. RMS have already advised on the Gwydir

Highway road upgrades required to allow construction of the 330 kV transmission line connection addressed by the Mod 4 approval.

4.1.9 Civil Aviation Safety Authority (CASA)

Details of the modified Stage 2 project and an aviation safety assessment were provided to CASA and their comments sought on the proposal. CASA reiterated its previous response that

- there is *'no requirement for the turbines as previously assessed at 150 m AGL to be lit'*.
- In regard to 200 m high wind turbines it recommended that they be, *'lit with steady red medium intensity lighting at night as per NASF Guideline D – Managing Wind Turbine Risk to Aircraft.'*

Aviation Projects has assessed the risk as acceptable and WRWFPL will need to confirm its position on this matter.

4.2 Aboriginal stakeholder consultation

Consultation with Aboriginal stakeholders regarding the White Rock Wind Farm has occurred from 2010. Aboriginal groups and individuals were notified and invited to register interest in the WRWF project. At that stage five Aboriginal Community Stakeholders registered their interest in the project. Field work for the WRWF project area was undertaken by an archaeologist from RPS Group and an Aboriginal community representative Hilda Connors from 18 October 2010 to 22 October 2010. The results were reported in the WRWF Environmental Assessment, April 2011 and formed a basis for the Project Approval in July 2012.

Following the granting of the project approval, Epuron commenced a process to modify the Project Approval to include an alternative grid connection to the 330 kV line, 13 km to the west of the WRWF project area. The alternative grid connection infrastructure lies within the Anaiwan Local Aboriginal Land Council jurisdiction.

A further registration of Interest by Aboriginal stakeholders was sought in relation to the alternative grid connection through advertisement on 18 December 2012.

Subsequently members of the Anaiwan Local Aboriginal Land Council were selected for involvement in field surveys occurring over three days including, 18 July 2012 and 9 and 10 August 2012. Records of consultation with Aboriginal stakeholders are provided in the Modification Application No. 1 Supporting Document, January 2013.

The consultation for Stage 2 is additional to recent Aboriginal stakeholder consultation undertaken for:

- Development of a WRWF Aboriginal Heritage Management Plan (part of the Stage 1 CEMP) in 2015;
- Aboriginal heritage assessment prepared by ERM in 2015 for WRWF Modification Application No. 3;
- Aboriginal heritage assessment by NGH Environmental for White Rock Solar Farm in early 2016; and
- Aboriginal heritage assessment prepared by Environmental Assessments in 2016 for WRWF Modification Application No. 4.

For the current modification application for Stage 2, WRWFPL placed further advertisements in three newspapers (Glen Innes Examiner, Inverell Times and Koori Mail) in February 2017 to seek updated expressions of interest for Aboriginal Community Stakeholders.

As a result, Aboriginal representatives participated in further site survey work undertaken during May 2017 and for review of the assessment report that is appended (Appendix 7) to this EA. The assessment report also includes the Representative's report.

Details of heritage consultation are provided in Appendix 7.

4.3 Community consultation for Stage 2

4.3.1 Landowner agreements

In 2010 and 2011, Epuron, as the WRWF project applicant, initially consulted with landowners for the project in respect of the WRWF Project Application and secured the agreement of landowners for the proposed wind farm. In the context of WRWFPL proceeding with Stage 1, agreements were confirmed for WRWF and the grid connection to the existing Glen Innes to Inverell 132 kV transmission line.

For Stage 2, WRWFPL has again approached landowners in relation to the modified project on properties within the project area and for those additional properties now proposed to be included with Stage 2. There are four additional properties to be included in the project area and one property that has been part of the project lands to be removed. Consultation is ongoing to finalise the details of lease agreements for the applicable properties listed in Table 3.1.

4.3.2 Neighbour consultation

There are 30 rural residences located within 3 km of the Stage 2 infrastructure (see Figure 3.1 and Table 4.2). The owners of the neighbouring properties that have not already become associated with the project are being contacted in relation to the proposed Stage 2 and where relevant, the non-associated neighbours have been invited to participate in the project through entering into a neighbour agreement with WRWFPL.

Of the 59 residences within 4 km of the entire wind farm site (Stage 1 and 2), 35 are associated landowners and 24 are non-associated landowners. Nine of the 25 non-associated residences have been given draft agreements for their consideration and may still enter into agreements with WRWFPL. The non-associated residences have been considered by the specialist assessments such as noise and visual impact.

Table 4.2 Details of residence status with respect to distance from the nearest turbine

Distance (km)	Associated	Non-Associated	Total
WRWF Stage 2 only			
0 to 1	3	0	3
1 to 2	9	8	17
2 to 3	6	4	10
3 to 4	11	7	18
Total	29	19	48
WRWF Stage 1 and Stage 2			
0 to 1	6	0	6
1 to 2	10	9	19
2 to 3	14	4	18
3 to 4	5	11	16
Total	35	24	59
Note: Distance is from residence to closest turbine.			

A distribution of associated and non-associated residences with distance from the nearest turbine is shown in Table 4.2 and their locations are shown on Figure 3.1.

To date, no objections have been raised by any of the neighbouring landowners to the Stage 2 development.

Mechanisms for contact with the local community in respect of WRWF included:

- telephone calls;
- written correspondence (newsletters, email messages) outlining the project status and future events including layout or route maps, representative photos;
- website updates including news items, CCC minutes; and
- personal visits.

The program of community consultation has extended over more than five years and increased with the progression of Stage 1 construction works from May 2016.

The public exhibition of the original Project Application and subsequently the modification applications as well as project information sessions has provided a strong basis for building community awareness of the project and engagement with the community.

A further period of public exhibition is expected to be arranged by DPE for this modification application.

4.3.3 Community Consultation in 2016 and 2017

WRWFPL has undertaken targeted consultation for Stage 2 facilities as addressed in this EA.

Recently, WRWFPL has undertaken the following community consultation:

- Explanation of Stage 2 proposal and outline of potential impacts to all CCC Members and community observers at the CCC meetings on the 04 May 2017, 3 August 2017 and 9 November 2017;
- Explanation of the Stage 2 proposal and outline of potential impacts within the August 2017 and earlier editions of the WRWF Newsletter. This newsletter is distributed to all residents within 10 km of the project and also local community members that have self-selected to receive the newsletter. Copies of the newsletter are available on the project website, at the WRWF shop front, Glen Innes Severn Council office and Glen Innes Visitor information Centre;
- Explanation of the Stage 2 proposal and outline of potential impacts on the project website; and
- Provision of further information by the local project representative for any specific questions related to the proposal available at the WRWF local shop front (located at 303C Grey Street, Glen Innes, open 10am-3:30pm Monday to Wednesday). Since its inception in April 2016, there have been over 5,000 visitors to the shop front inquiring about the project.
- Mentioning the potential for the development of Stage 2 during the WRWF Open Day held on the 4 November 2017, which was attended by over 1,500 people from the local and wider community.

4.3.4 WRWFPL Stakeholder and Community Engagement Strategy

WRWFPL is committed to engaging the local community and ensuring information is available for the proposed development. A Stakeholder and Community Engagement Plan (the Plan) has been developed for WRWF to guide all engagement activities. The Plan identifies objectives and aims, project stakeholders, proposed consultation strategies, challenges and opportunities, and specific engagement tools.

The objectives of the Plan include:

- To establish and maintain a level of acceptance or approval of the project within the local community;
- To have a culture of openness, inclusiveness, responsiveness and accountability;
- To enable better community integration of the project;
- For WRWF to be considered as an integrated and valued component of the social and economic fabric of the community; and
- For a low or infrequent level of complaints and conflicts and few regulatory issues.

In line with the Plan, a range of engagement tools have been used for the WRWF Project to date. These include:

- Establishment of a shop front in Glen Innes to provide a drop-in point for the local community;
- Establishment of dedicated telephone line, email address and postal address;
- Development of project factsheets for distribution as required to the community;
- Development of a project website to provide information and updates;
- Direct engagement with all potentially involved landowners;
- Direct engagement with neighbours through phone calls, email and face to face meetings;
- Media release to the local Glen Innes and Inverell newspapers;
- Regular provision of information to Federal and State politicians, through briefing, site visits, media releases etc.; and
- Presentations to the WRWF CCC and Newsletters to local community.

During the public exhibition period, community information sessions would be held in Glen Innes, Inverell and/or Ben Lomond. The sessions will provide all stakeholders the opportunity to find out more about the project, talk one-on-one with the project staff and provide feedback.

Engagement activities will continue throughout the determination period, as set out in the Plan.

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 in line with good practice.

4.3.5 Community Consultative Committee (CCC)

Condition D1 of the Project Approval MP10_160, requires the Proponent to establish a Community Consultative Committee (CCC) for the life of the project. The Proponent established a CCC for the project and the first meeting was held on 19th November 2012. The most recent meeting was 9 November 2017. The CCC enables information to be exchanged between the Proponent and the Community through the CCC process and its appointed members. The objectives of the CCC include enabling information about the wind farm to be provided to the community and providing an opportunity for the community to express any feedback regarding the potential impacts. Minutes of the CCC meetings are available on the WRWF website.

The potential for Stage 2 development has been presented at recent CCC meetings to keep attendees informed of the progress of submitting the modification application.

4.3.6 Community Fund

WRWFPL has committed to providing a community fund for WRWF Stage 1, which is currently being set up prior to the commencement of Operations. Stage 1 of WRWF will provide \$175,000 per annum (\$2,500 per turbine) for the life of the wind farm.

If Stage 2 is approved, the Fund will be increased by an equivalent per turbine amount up to \$120,000. This would bring the total community fund to a maximum of \$295,000 per annum following completion of construction of Stage 2.

5 STATUTORY REQUIREMENTS

5.1 Overview of statutory requirements

WRWF is authorised by Project Approval MP10_160 and Environment Protection Licence EPL 20665.

This modification to the Project Approval is being sought under Section 75W of the EP&A Act (which continues to apply to 'transitional Part 3A Projects') by virtue of Clause 3 of Schedule 6A of the EP&A Act.

Provisions of specific planning and environmental legislation or associated instruments relating to the project are provided in the following sections.

5.2 Environmental Planning and Assessment Act 1979 (NSW)

5.2.1 EP&A Act

The Project was originally approved under Part 3A of the EP&A Act in July 2012 (Project Approval MP10_0160). Although Part 3A was repealed on 1 October 2011, the Project is a 'transitional Part 3A project'. By virtue of clause 3 of Schedule 6A of the EP&A Act, Part 3A of the EP&A Act continues to apply to 'transitional Part 3A projects' including section 75W.

While certain environmental planning instruments do not apply to Part 3A projects (see section 75R), for completeness, relevant instruments are considered below.

5.2.2 Objects of the EP&A Act

The objects of the EP&A Act and their application to Mod 6 are shown in Table 5.1.

The objects of the EP&A Act have been considered in the preparation of the modification application and within this environmental assessment report. The project, including this proposed modification:

- aims to promote the orderly and economic use of the land through the provision of utility services (electricity generation from a renewable energy resource);
- has been located and designed such that it would minimize impact on protected areas to the extent reasonably and feasibly possible and generally minimises the use of natural and artificial resources while still promoting the social and economic welfare of the local community; and
- has been the subject of consultation with the local community.

Given the Project (as modified) would support a number of the objects of the EP&A Act, and is not inconsistent with the remaining objects of the Act, the modification is considered appropriate in the context of the EP&A Act.

Table 5.1 Objects of the EP&A Act and consideration for the Modification Application

Ref	Specific Objects of the EP&A Act (as per Clause 5 of the Act)	Consideration
(a)	To encourage:	
i	the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,	Consistent. Infrastructure for export of renewable energy development with due consideration to environmental impacts.
ii	the promotion and co-ordination of the orderly and economic use and development of land	Consistent
iii	the protection, provision and co-ordination of communication and utility services	Consistent

iv	the provision of land for public purposes	Not applicable
v	the provision and co-ordination of community services and facilities	Not applicable
vi	the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and	Consistent. Comprehensive EIA conducted and mitigation measures are proposed.
vii	ecologically sustainable development	Consistent
viii	the provision and maintenance of affordable housing	Not applicable
(b)	to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and	Not applicable
(c)	to provide increased opportunity for public involvement and participation in environmental planning and assessment	Consistent through consultation and public exhibition of the modification application

5.2.3 State Environmental Planning Policies

5.2.3.1 State Environmental Planning Policy (Infrastructure) 2007

The project (and this modification) is permissible with consent under State Environmental Planning Policy (Infrastructure) 2007 (**Infrastructure SEPP**). Clause 34 states that:

“Development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone.”

5.2.3.2 State Environmental Planning Policy 44 (Koala Habitat Protection)

State Environmental Planning Policy 44 (Koala Habitat Protection) was considered as part of the Biodiversity Assessment Report (Appendix 4 to this Report).

One of the dominant overstorey species within the proposal site, Ribbon Gum (*E.viminalis*), is listed as a primary food tree species for the Koala by the NSW OEH within the New England Tablelands. Ribbon Gum is also listed as a feed tree species on Schedule 2 of State Environmental Planning Policy (SEPP) 44 – Koala Habitat Protection. Numerous secondary feed trees including Snow gum (*E. pauciflora*) and Yellow box (*E. melliodora*) occur in abundance throughout the proposal site.

Due to the size of the survey area, random inspections of koala feed trees for scats and activity were undertaken, as well as inspections for scats and other Koala evidence where primary and secondary feed trees were located within biometric plot survey areas.

No Koala's or evidence of Koala activity were detected during the surveys. Although there are historical records surrounding the proposal site, none of these are recorded within the last 20 years and therefore shows a lack evidence that the proposal site contains a significant population. As such, the area is not considered to comprise *Core Koala Habitat* under SEPP44. However, as the dominant overstorey vegetation within the proposal site contains a high abundance of primary and secondary feed trees, it would be considered under Schedule 2 of SEPP44 and as *Potential Koala Habitat* under SEPP44.

Due to the lack of evidence that a significant koala population exists within or near the proposal site and the linear nature of the clearing areas, it is unlikely that a population of Koalas or the Koalas ability to inhabit the area in future would be impacted by the proposal.

5.2.4 Local Environmental Plans

5.2.4.1 Glen Innes Severn Council

Half of the WRWF Stage 2 Development Envelope is located within the Glen Innes Severn Local Government Area and is subject to the Glen Innes Severn Local Environmental Plan 2012 (Glen Innes Severn LEP). Under the Glen Innes Severn LEP, this land is zoned RU1 Primary Production. The Glen Innes Severn LEP aims (Clause 1.2(2)):

- a) *to encourage the proper management, development and conservation of natural and human resources in Glen Innes Severn by protecting, enhancing and conserving the following:*
 - i. *land of significance to agricultural production*
 - ii. *timber, minerals, soil, water and other natural resources*
 - iii. *areas of significance for nature conservation*
 - iv. *areas of high scenic or recreational value*
 - v. *landscapes, places and buildings of archaeological or heritage significance including aboriginal relics and places*
 - vi. *communities and settlements*
- b) *to facilitate growth and development that:*
 - i. *minimises the cost to the community of fragments and isolated development of rural land, and*
 - ii. *facilitates the efficient and effective delivery of amenities and services, and*
 - iii. *facilitates stimulation of demand for a range of residential, enterprise and employment opportunities and promotes agricultural diversity, and*
 - iv. *maximises the efficient use of existing infrastructure*

The Stage 2 development is not inconsistent with the aims of the Glen Innes Severn LEP. It is co-located with existing agricultural activities and is supported by the respective landowners that will continue their pastoral activities. No mineral resource titles or conservation areas are affected and the required environmental management plans address protection of biodiversity, soil and water quality and heritage sites as well as the acoustic and visual amenity.

5.2.4.2 Inverell Shire Council

Half of the WRWF Stage 2 Development Envelope is located within the Inverell Local Government Area (Inverell LGA) and on land zoned, RU1 - Primary Production, under the Inverell Local Environmental Plan 2012 (ILEP).

The particular aims of ILEP are (Clause 1.2(2)):

- a) *to encourage sustainable economic growth and development;*
- b) *to protect and retain productive agricultural land;*
- c) *to protect, conserve and enhance natural assets;*
- d) *to protect built and cultural heritage assets; and*
- e) *to provide opportunities for growth.*

The objectives of ILEP Zone RU1 – Primary production are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

The WRWF and the proposed Stage 2 modification are consistent with the above aims and objectives.

For its operational life, the project (as modified), would further these aims and objectives by, among other things, harnessing and converting a natural resource (ie wind energy).

While the project (as modified) would impact on land availability for primary production, the land would meet the aims and objectives of the ILEP and Zone RU1 in the following ways:

- the project (as modified) would allow for diversity in primary industry enterprises and systems appropriate for the area;
- the project (as modified) would not fragment resource lands; and
- the project (as modified) being fully reversible and involving limited ground disturbance, would not remove the potential to use the land for primary production in the long term.

Under the ILEP, electricity generation is prohibited in the RU1 Zone. However, the project (as modified) is permissible with consent under the ISEPP (see 5.2.3.1 above). To the extent that there is an inconsistency between a SEPP and an LEP, a SEPP prevails.

5.3 Other NSW Environmental legislation

Other potentially applicable environmental legislation is discussed below.

5.3.1 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides an integrated system of licensing for polluting activities within the objective of protecting the environment. An Environment Protection Licence (EPL) is required to be held for the project. EPL 20665 was issued in April 2016 and varied on several occasions with the most recent variation in September 2017. Further variation of EPL 20665 will be required prior to commencement of construction for Stage 2. Subject to approval of Mod 6, a variation application for EPL 20665 will be made detailing the modified project and any required amendments to the EPL.

By virtue of section 75V of the EP&A Act, an EPL required for the project cannot be refused and must be issued on terms that are substantially consistent with the Project Approval.

The EPA inspected the WRWF Stage 1 construction works on 12 January 2017 and have undertaken risk reviews in respect of licensing.

5.3.2 Biodiversity Conservation Act 2016

The Biodiversity Conservation Act 2016 (BCA) commenced on 25 August 2017. The BCA replaces the *Threatened Species Conservation Act 1995* and *Native Vegetation Act 2003*.

The BCA imposes requirements to obtain biodiversity conservation licences to carry out acts that would otherwise constitute an offence. However, biodiversity conservation licences are not required for the project due to:

- the transitional provisions contained in Part 2 of Schedule 9 to the BCA; and
- section 2.8(1)(a)(v) of the BCA which provides that it is a defence to an offence under the BCA if the relevant act was necessary for the carrying out of an approved transitional Part 3A project.

Additionally, the biodiversity assessment requirements contained in Part 7 of the BCA do not apply to transitional Part 3A projects. Despite this, WRWFPL has prepared updated ecological assessments as part of Modification 6 to assess the impacts of the project as modified on matters protected by the BCA.

The project infrastructure has, as far as practically and feasibly possible, been located to minimise impacts on remnant vegetation.

The WRWF Project Approval includes conditions to protect biodiversity including:

- Conditions C1 to C5 to minimise impacts on native vegetation and habitat;
- Condition C6 relating to preparation and implementation of a Bird and Bat Adaptive Management Plan;
- Condition C7 requiring the proponent to prepare a Biodiversity Offset Package (BOP); and
- Condition E22 requiring a Construction Flora and Fauna Management Plan as sub-plan of CEMP.

Approval of Modification Application No. 4 included an increased vegetation clearing limit for Ribbon Gum – Mountain Gum – Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion EEC on site from 22 ha to 28 ha.

The WRWF Stage 1 CEMP has been approved by DPE and would be updated to address the approved Stage 2 works and further approval of DPE sought.

A BOP has also been prepared for WRWF Stage 1 and subject to approval of the modification, the BOP would be extended to address the additional vegetation impacts for the modified Stage 2. This issue is addressed further in Section 6.5 of this EA Report.

5.3.3 Fisheries Management Act 1994 (FM Act)

The Fisheries Management Act 1994 (FM Act) sets out to conserve fish stocks and key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation and biological diversity. Further, it aims to promote viable commercial fishing, aquaculture industries and recreational fishing opportunities. Threatened species, populations and ecological communities and key threatening process are listed in the FM Act's Schedules.

The FM Act is not relevant to this modification application because, transitional Part 3A projects are exempted (under section 75U of the EP&A Act) from needing permits under sections 201, 205 or 219 of the FM Act.

Table 5.2 Classification of waterways applicable for WRWF Stage 2 development

Classification	Characteristics of Waterway Type	Minimum Recommended Crossing Type
CLASS 4 Unlikely fish habitat	Named or unnamed waterway with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free-standing water or pools after rain events (e.g. dry gullies or shallow floodplain depressions with no permanent aquatic flora present).	Culvert, causeway or ford.

The Project area is in the upper reaches of the McIntyre and Severn River catchments. Drainage for part of the Stage 2 area is to the west to the McIntyre Catchment and otherwise to the Severn River catchment to the north. The wind turbine sites are located on elevated land, plateau and ridgelines where watercourses are first order and have intermittent flow without residual pools. Access tracks crossing the mostly ephemeral creeks on the elevated ridges would be designed and constructed

generally in accordance with the DPI guidelines and would not impede fish passage. Based on the characteristics of the waterway set out in the Table below watercourses, on the ridgelines where Stage 2 turbines are located, are likely to be classified as 'Unlikely Fish Habitat'.

On the basis of the watercourses being unlikely fish habitat, they are not expected to represent Key Fish Habitat under the FM Act.

The modified Project is not expected to affect fish stocks, key fish habitats, or threatened species, populations or ecological communities of fish or marine vegetation.

5.3.4 Biosecurity Act 2015

The former Noxious Weeds Act 1993 (NW Act) was directed towards controlling noxious weeds in NSW. The NW Act was repealed by the Biosecurity Act 2015 with effect from 01 July 2015.

The broad objectives for biosecurity in NSW are to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants by:

- preventing their entry into NSW;
- quickly finding, containing and eradicating any new entries; and
- effectively minimising the impacts of those pests, diseases, weeds and contaminants that cannot be eradicated through robust management arrangements.

Several weeds of national significance are present within the study area as follows:

- Blackberry *Rubus fruticosus* (exotic);
- Fireweed *Senecio madagascariensis* (exotic);
- Prickly Pear *Opuntia stricta* (exotic); and
- Chilean Needle Grass *Nassella neesiana* (exotic).

Weeds are discussed further in Section 6.4.6 of this EA and Appendix 4.

The WRWF Stage 1 Construction Flora and Fauna Management Plan addresses weed management and will, as part of the approved CEMP, be updated for the activities to be undertaken for WRWF Stage 2 and in respect of any change in statutory requirements.

5.3.5 National Parks and Wildlife Act 1974

Under the *National Parks and Wildlife Act 1974* (NPW Act), the Chief Executive of OEH is responsible for the care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal areas and state game reserves. The Chief Executive of OEH is also responsible under this legislation for the protection and care of native fauna and flora, and Aboriginal places and objects throughout NSW.

The provisions of the NPW Act have been considered for the Project. The Project site is not in or, in the vicinity of, any protected areas as defined in the Act.

A summary of the assessment of impacts to Aboriginal Heritage is provided in Section 6.7 of the EA (and in full, Appendix 7). An Aboriginal Heritage Impact Permit (AHIP) under section 90 of the NPW Act is not required for this project (section 75U of the EP&A Act).

An Aboriginal Heritage Management Plan (AHMP) has been prepared for WRWF Stage 1 construction and would be extended to include any Stage 2 facilities as part of the CEMP update for Stage 2.

5.3.6 Heritage Act 1977

The Heritage Act 1977 aims to conserve heritage values. It defines 'environmental heritage' as those places, buildings, works, relics, moveable objects and precincts of State or local heritage significance.

A property is a heritage item if it is listed in the heritage schedule of the local Council's LEP or listed on the State Heritage Register, a register of places and items of particular importance to the people of NSW. By virtue of Section 75U of the EP&A Act, any excavation permit under Section 139 of the Heritage Act 1977 is not required.

Section 7.5 of this EA and Appendix 4 address potential impacts on heritage items or places.

5.3.7 Roads Act 1993

The Roads Act provides for the classification of roads and for the declaration of the RMS and other public authorities as roads authorities for both classified and unclassified roads. It also regulates the carrying out of various activities in, on and over public roads. This includes the erection or removal of structures, the excavation or disturbance to a public road surface, the pumping of water into a public road from any land adjoining the road or the connection of a road to a classified road.

The WRWF Stage 2 project involves direct access from public roads including Kelley's Road and Maybole Road.

Access to the bulk of the Stage 2 project would be via roads that have been used for the construction and operation of WRWF Stage 1 construction works particularly the southern access route and over-dimensional (OD) transport route via Ben Lomond.

Any required upgrading of roads (widening works and bridge upgrade works) would only take place after consultation and approval of the relevant road authority (RMS or respective Councils (Glen Innes Severn, Inverell and Armidale)) either prior to the construction works or, at a timing agreed with the relevant road authority. Road repair works due to dilapidation arising from additional impacts from construction traffic would also be assessed and arranged in accordance with the process described in the Project Approval Conditions and agreements made with the respective road authority.

Approvals under Section 138 of the Roads Act may be required for parts of the southern access routes and any upgrades of classified or unclassified roads associated with deliveries of project components to the site. By virtue of Section 75V of the EP&A Act, any approval required under Section 138 of the Roads Act cannot be refused and is to be substantially consistent with the Project Approval (as modified).

Traffic and Transport issues, potential impacts and their mitigation are discussed in Section 6.8.

5.3.8 Crown Lands Act 1989

The objective of the Crown Lands Act is to ensure that Crown land is managed for the benefit of the people of New South Wales. The Department of Industry – Crown Land and Water Division is responsible for the sustainable and commercial management of Crown land. This involves the management of state-owned land, linking with other agencies, local government, the private sector and communities to provide social and economic outcomes for NSW.

The northern entry to the WRWF site from the Gwydir Highway utilises an existing farm entry point across a Crown Reserve where a Licence has been obtained. No further upgrade to this access is needed for the modification activities and no further approval is expected to be required for that access. Other licences have been obtained for crossings of Crown Road reserves.

Any additional crossing(s) of Crown land by the WRWF Stage 2 infrastructure would require agreements from Crown Lands and/or relevant Council.

It is expected that this modification application will be referred to Crown Lands. Subject to approval of the modification and decision to proceed to the implementation, all necessary Crown Land approvals would be obtained as required by Condition C32.

5.3.9 Mining Act 1992

The main objective of the *Mining Act 1992* is to encourage and facilitate the discovery and development of mineral resources in New South Wales, having regard to the need to encourage ecologically sustainable development. The Department of Trade and Investment, Resources and Energy Branch (now DPE Division of Resources and Geoscience) responded to referral of the WRFW Project Application and raised the matter of impact on potential mineral resources, exploration licences and mining leases.

A recent search of Department of Industry's MinView database (Department of Industry, August 2017) found that there are no existing Mineral Exploration Licences within the Stage 2 development area however, there is a Mineral Lease (ML1505) in the vicinity of the route of the 132 kV line for the alternative grid connection (Section 6.12.3).

5.4 Commonwealth Legislation

5.4.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Environment (DoE). Under the EPBC Act, if an action is a 'controlled action' which has, will have or, is likely to have a significant impact on a Matter of National Environmental Significance (MNES) or Commonwealth land, then the action may not be undertaken without prior approval of the Minister.

The EPBC Act identifies nine MNES:

- World Heritage properties.
- National heritage places.
- Ramsar wetlands of international significance.
- Threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water resource, in relation to coal seam gas development and large coal mining development.

When a person proposes to take an action that they believe may be a 'controlled action' under the EPBC Act, they must refer the Project to the Department for a decision about whether the proposed action is a 'controlled action'. The WRFW Project was previously referred by Eupron Pty Ltd (08 February 2011, Ref. No. 2011/5834) and was declared 'Not a Controlled Action' on the 08 March 2011.

A recent search for MNES and other matters protected by the EPBC Act was carried out within a 50 km radius of the Stage 2 Project area using the Commonwealth online Environmental Reporting Tool (report created 07 August 2017). A summary of the findings is provided in Table 5.3.

Relevant biodiversity matters are discussed within Section 6.4 Biodiversity.

The Biodiversity Assessment for Modification Application No. 6 concluded that Stage 2 may have a significant impact on threatened species and endangered ecological communities that are listed under the TSC Act or significant impact on Matters of National Environmental Significance listed under the EPBC Act.

Table 5.3 Summary of MNES and other Protected Matters

A - Matters of National Environmental Significance	No.
World Heritage Properties	0
National Heritage Places	0
Wetlands of International Significance	5
Great Barrier Reef Marine Park	0
Commonwealth Marine Areas	0
Threatened Ecological Communities	6
Threatened Species	60
Migratory Species	13
B - Other Matters Protected by the EPBC Act	No.
Commonwealth Lands	5
Commonwealth Heritage Places	1
Listed Marine Species	19
Whales and Other Cetaceans	0
Critical Habitats	0
Commonwealth Reserves	0
C - Extra Information	No.
State and Territory Reserves	19
Regional Forest Agreements	1
Invasive Species	37
Nationally Important Wetlands	2
Key Ecological Features (Marine)	0

Due to the potential for significant impact of the project changes proposed by Modification Application No. 6, a referral will be made under the EPBC Act to obtain a decision as to whether the modified project constitutes a controlled action. WRWFPL will submit the referral in parallel with the modification application review process and keep the DPE and OEH informed of the process as it progresses with the DoEE.

5.4.2 Native Title Act 1993

The *Native Title Act 1993* provides a legislative framework for the recognition and protection of common law native title rights. Native title is the recognition by Australian law that Indigenous people had a system of law and ownership of their lands before European settlement. Where that traditional connection to land and waters has been maintained and where government acts have not removed it, the law recognises the persistence of native title.

People who hold native title have a right to continue to practise their law and customs over traditional lands and waters while respecting other Australian laws. This could include visiting to protect important places, making decisions about the future use of the land or waters, hunting, gathering and collecting bush medicines. Further, when a native title claimant application is registered by the

National Native Title Tribunal, the people seeking native title recognition gain a right to consult or negotiate with anyone who wants to undertake a project on the area claimed.

Native title may exist in areas such as:

- Vacant Crown land;
- Some national parks, forests and public reserves;
- Some types of pastoral lease;
- Some land held for Aboriginal communities; and
- Beaches, oceans, seas, reefs, lakes, rivers, creeks, swamps and other waters that are not privately owned.

A search of the Register of National Native Title Claim Details, for the Inverell Council LGA, returned one result as follows, NC2011/006 – Gomeroi People. Details are set out in Table 5.4 and the extent of the Claim is shown in Figure 5.1. The eastern extent of the Claim partly overlaps the WRWF Stage 2 project area. The eastern part of the Stage 2 area is not subject to any existing Registered Native Title Claims.

Table 5.4 Native Title Claims for the Inverell and Glen Innes Severn LGAs

NC2011/006 - Gomeroi People

Tribunal file no.	NC2011/006
Federal Court file no.	NSD2308/2011
Application name	Gomeroi People
State or Territory	New South Wales;
Representative A/TSI body area(s)	New South Wales
Local government area(s)	Armidale Regional Council, Coonamble Shire Council, Gilgandra Shire Council, Glen Innes Severn Shire Council, Gunnedah Shire Council, Gwydir Shire Council, Inverell Shire Council, Liverpool Plains Shire Council, Mid-Western Regional Council, Moree Plains Shire Council, Muswellbrook Shire Council, Narrabri Shire Council, Tamworth Regional Council, Upper Hunter Shire Council, Uralla Shire Council, Walcha Council, Walgett Shire Council, Warrumbungle Shire Council
Date filed	20/12/2011
Date claim entered on Register	20/01/2012

Register extract and attachments

Register extract RNTCEXtract_NC2011_006.pdf

Register extract attachment/s NC2011_006 1. Map of the area covered by the application.pdf

NC2011_006 2. Description of area covered by the application.pdf

NATIVE TITLE DETERMINATION APPLICATION

Gomeri People

 Gomeri People

RNTC Attachment:
NSD2308/2011 (NC2011/006)
Map of the area covered by the application
Attachment C of the Application
Page 1 of 1, A3, 20/12/2011

NOTE: To determine areas subject to claim within the external boundary, reference to the application description is necessary.
Application boundary data compiled by the NNTT from data sourced from DOL (NSW).

Topographic image data is © Commonwealth of Australia and is used under licence from Geoscience Australia 2008
NOTE: Topographic images should be used as a guide only.

Map created by: Geospatial Services, National Native Title Tribunal (09/12/2011)

NORTH
0 25
KILOMETRES
Latitude and Longitude based on Geocentric Datum of Australia 1994
Non Projection
© Commonwealth of Australia 2011



The Registrar, the National Native Title Tribunal and its staff, members and agents and the Commonwealth (collectively the Commonwealth) accept no liability and give no undertakings, guarantees or warranties concerning the accuracy, completeness or fitness for purpose of the information provided. In return for you receiving this information you agree to release and indemnify the Commonwealth and third party data suppliers in respect of all claims, expenses, losses, damages and costs arising directly or indirectly from your use of the information and the use of the information you obtained by any third party.

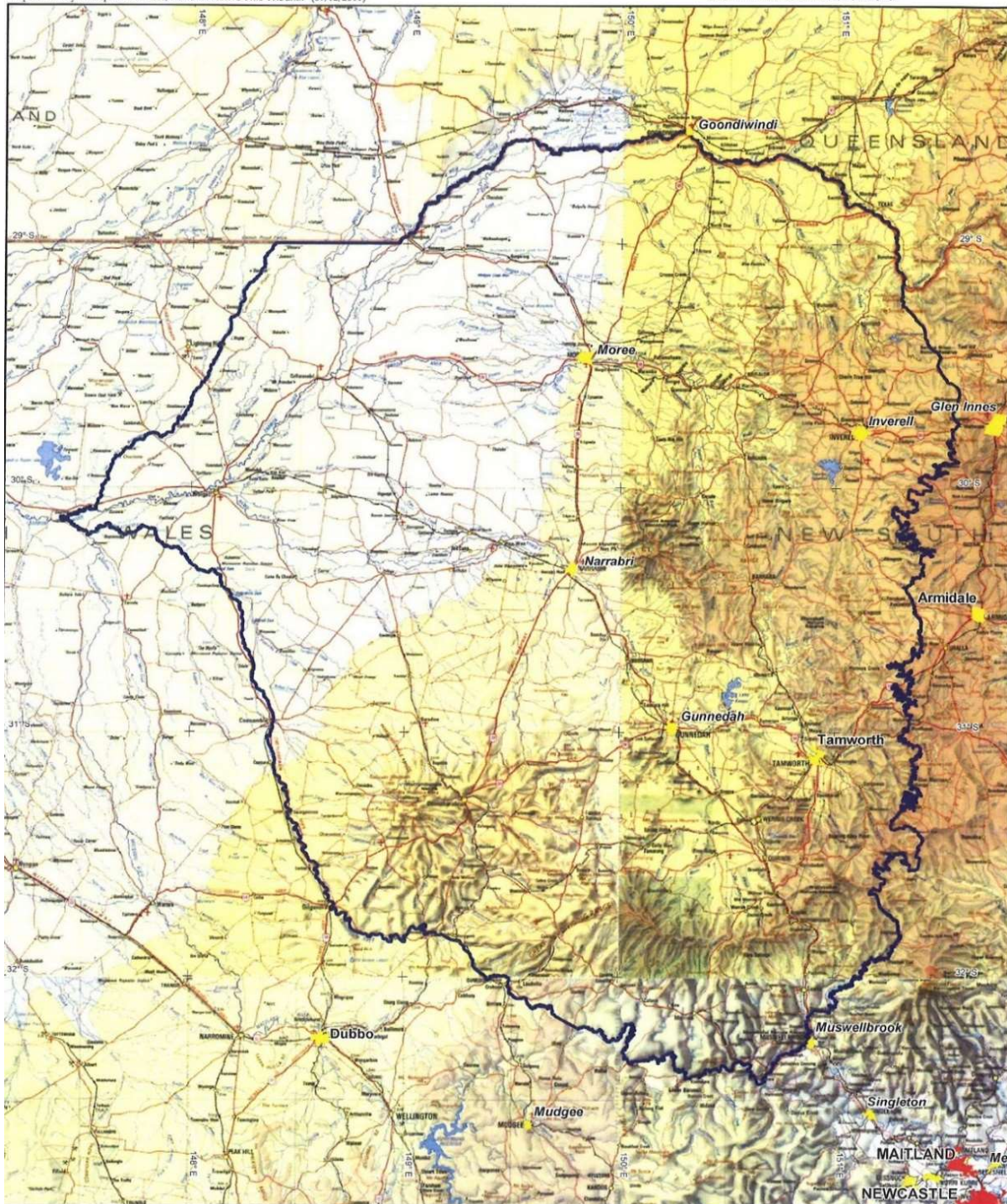


Figure 5.1 Extent of Native Title Claim 2011/06 – Gomeri People

5.4.3 Renewable Energy (Electricity) Act 2000

The *Renewable Energy (Electricity) Act 2000* (RE Act) aims:

- to encourage the additional generation of electricity from renewable sources.
- to reduce emissions of greenhouse gases in the electricity sector.
- to ensure that renewable energy sources are ecologically sustainable.

Section 17 of the RE Act defines renewable energy sources eligible under the Commonwealth government's Renewable Energy Target (RET). This includes wind and solar energy as eligible renewable energy sources. Certificates are generated for energy produced from renewable energy and are distinguished as Large Scale Generation Certificates or Small Scale Technology Certificates under the Renewable Energy Target Scheme.

Large-scale generation certificates are created for the generation of electricity by accredited power stations using eligible renewable energy sources. White Rock Wind Farm is able to create Large-Scale Generation Certificates.

The certificates are used to avoid or reduce the amount of renewable energy shortfall charge that liable entities who acquire electricity have to pay. The liable entities will generally acquire the certificates by purchasing them. The purchasers (liable entities) surrender a specified number of certificates for the electricity that they acquire.

White Rock Wind Farm Pty Ltd (WRWFPL) has been accredited as a Renewable Energy Generator and is able to create Large Scale Renewable Energy Certificates.

5.5 Other relevant policies and plans

5.5.1 Ecologically Sustainable Development (ESD)

Ecologically Sustainable Development (ESD) involves the effective integration of social, economic and environmental considerations in decision - making processes. In 1992, the Commonwealth and all state and territory governments endorsed the *National Strategy for Ecologically Sustainable Development*.

In NSW, the concept has been incorporated in legislation such as the EP&A Act and Regulation. For the purposes of the EP&A Act and other NSW legislation, the Intergovernmental Agreement on the Environment (1992) and the *Protection of the Environment Administration Act 1991* outline principles which can be used to achieve ESD. These principles are presented below along with a description of how the WRWF and this EA have considered each principle.

- a) **The precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
- i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
 - ii. an assessment of the risk-weighted consequences of various options.

The precautionary principle has been adopted in the assessment of impact; all potential impacts have been considered and mitigated where a risk is present. Where uncertainty exists, measures have been included to address the uncertainty.

- b) **Inter-generational equity**, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The majority of potential impacts of the WRWF are likely to be localised and would not diminish the options regarding land and resource uses and nature conservation available to future generations. Importantly, the Project would address the need to minimise the risk of climate change to current and future generations by reducing carbon emissions intensity for electricity generation.

- c) **Conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

The impacts of the Project on biodiversity, including EPBC listed species, have been assessed in Appendices 4, 5 and 6 and are summarised in Section 6.4. This has included avoidance of areas of higher conservation value and management prescriptions to minimise, manage and offset residual impacts.

- d) **Improved valuation, pricing and incentive mechanisms**, namely, that environmental factors should be included in the valuation of assets and services, such as:
- i. polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
 - ii. the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
 - iii. environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Attributes of the Project site such as the existing native vegetation, soil and hydrology have been valued in terms of their broader contribution to the catchment and catchment processes.

The aims, structure and content of this EA have incorporated these ESD principles. Mitigation measures are described in the Sections addressing the respective environmental issues. The existing Project Approval conditions and the CEMP updated to address the Modified Approval form an appropriate basis for management of potential impacts. Based on the social and environmental benefits accruing from the Project at a local and broader level, and the assessed impacts on the environment and their ability to be managed, it is considered that the development would be ecologically sustainable within the context of ESD.

5.5.2 Strategic Regional Land Use Plan – New England North West

The New England North West Strategic Regional Land Use Plan represents one component of the Government's broader Strategic Regional Land Use Policy which comprises multiple initiatives being staged over time to address land use conflict in regional areas. The primary aim of the plan is to provide greater protection for valuable agricultural land and better balance competing land uses.

The plan is particularly focused on managing coal and coal seam gas issues (DP&I 2012), however is relevant to all developments within the New England North West region as it identifies land that is considered to be Strategic Agricultural Land. Strategic agricultural land is defined as highly productive land that has both unique natural resource characteristics (such as soil and water resources) as well as socio-economic value (such as high productivity, infrastructure availability and access to markets). Two categories of strategic agricultural land have been identified:

1. biophysical strategic agricultural land
2. critical industry clusters.

Biophysical strategic agricultural land is land with a rare combination of natural resources highly suitable for agriculture. These lands intrinsically have the best quality landforms, soil and water

resources which are naturally capable of sustaining high levels of productivity and require minimal management practices to maintain this high quality.

Critical industry clusters are related to the lands importance to a highly significant agricultural industries (eg, wine making, horse breeding etc). There are no critical industry clusters in the New England North West.

The Project is partly located on land that is mapped as Biophysical Strategic Agricultural Land. Potential impacts to this high value land are considered in this EA Section 6.12.1 along with management measures to minimise the impact.

5.6 Summary of licenses and approvals

Table 5.5 provides a summary of licences and approvals required for the modified Stage 2 development. Note, if it is determined that additional licenses or approvals are required, WRWFPL would obtain these prior to commencement of relevant activities.

Table 5.5 Summary of Licences and Approvals required

Legal Instrument or Organisation	Approval, Licence, Permit or Agreement
EP&A Act, 1979, Part 3A	Modified Project Approval (Mod 6)
Crown Lands Act 1989	Licence for works within Crown road reserves
Protection of the Environment Operations Act 1997	Licence variation (EPL 20665) based on updated Licence Application for Stage 1 and 2.
Roads Act 1993	Works Authorisation Deed (WAD) if any upgrade to State Highways It is not expected that any upgrades will be required for State Highways.
Roads Act 1993	Section 138 Approval from Inverell Council, Armidale Regional Council or GISC for any works in local roads (Kelley's Road, Maybole Road, Ben Lomond or Grahams Valley Road)
Armidale, Glen Innes Severn or Inverell Council	Dilapidation Agreement where the project uses local roads and the use could result in wear beyond normal usage of the road(s).

6 ASSESSMENT FOR THE PROPOSED MODIFICATION

6.1 Assessment Requirements and Key Issues

The key issues for assessment in respect of WRWF as taken from the Director-General's Requirements, October 2010 for the original WRWF Environmental Assessment (2011) are listed below:

- visual impact;
- noise impact;
- biodiversity impact and offsets; and
- indigenous & non-indigenous heritage impact.

The above issues have been considered for this Modification Application. This EA also considers other potential environmental issues such as:

- Traffic and Transport;
- Soil and Water Management;
- Land use conflict such as for rural residential, agriculture or mining activities;
- Telecommunications interference;
- Aviation Safety;
- Bushfire Risk Management; and
- Electric and Magnetic Fields.

Relevant assessments for the approved Stage 2 components were previously provided in the WRWF Project Application and Submissions Report and additional information was supplied for Stage 1 components for Mod 3. Those assessments have been referenced and as necessary updated for the modified Stage 2 in the preparation of the assessments provided with this EA for the Mod 6 Application.

6.2 Visual Impact

6.2.1 Scope of assessment

A Visual Impact Assessment (VIA) of the proposed WRWF Stage 2 modifications has been prepared by Green Bean Design landscape architects in October 2017 and is provided in Appendix 2. An overview of the VIA and its conclusions is provided in this section.

The Visual Impact Assessment report has been prepared with regard to the visual assessment process outlined in the New South Wales State Government Wind Energy: Visual Assessment Bulletin December 2016 (the Guidelines) as applicable to the modification application.

The White Rock Wind Farm has been subject to a number of previous Landscape and/or Visual Impact Assessments. These include the:

- White Rock Wind Farm Project Application Landscape and Visual Impact Assessment (Green Bean Design, March 2011)
- White Rock Wind Farm Stage 1 - Design and Landscape Plan, December 2015 (Revised December 2017)
- White Rock Wind Farm Mod 1, 132 kV transmission line modification, Summary Landscape and Visual Impact Assessment (Green Bean Design, July 2012)

- White Rock Wind Farm Mod 3, 132 kV transmission line modification, Summary Report (Green Bean Design, November 2015)
- White Rock Wind Farm Mod 4, Alternative Grid Connection, Visual Impact Assessment (Green Bean Design July 2016).

The VIA for the modification application provides a review of the changes to the visual impact of the modified Stage 2 project, the proposed mitigation measures and an assessment of the acceptability of the changes.

6.2.2 Summary of project changes relating to VIA.

6.2.2.1 Turbine dimensions

The modified Stage 2 infrastructure includes 48 wind turbines, one less than the 49 allowed for by the current approval. While 28 turbine sites are generally consistent with the existing approval, 20 turbines have been relocated. All the proposed Stage 2 turbines are larger than the 70 Stage 1 turbines. The modified application seeks allowance for a maximum tip height of up to approximately 200 metres for Stage 2 turbines while the current approval provides for a maximum tip height of 150 metres. Maximum turbine blade length is also increased and up to approximately 85 metres.

The wind turbine hub height may be up to approximately 130 metres. A lesser hub height (115 m) would be used for the largest rotor diameter considered (170 m) as indicated in Figure 2.3 and Table 6.1.

Each of the assessments in this report has considered the most impacting tower height and blade length configuration, whilst maintaining a consistent tip height. This application, therefore, seeks approval for tower heights up to 130 m and blade lengths up to 85 m, with an overall maximum tip height of 200 m.

Table 6.1 Turbine dimensions for Stage 1 and potential Stage 2 Turbine models

Wind Turbine Parameter	GW121 – 2.5MW (Stage 1)	GW140 – 3.0-3.5MW (Stage 2)	GW170 Indicative (Stage 2)
Max Tip Height (approx.)	150 m	200 m	200 m
Max Hub Height (approx.)	89.5 m	130 m	115 m
Rotor diameter (approx.)	121 m	140 m	170 m

6.2.2.2 Visibility of Wind Turbine Layout, civil works and internal overhead 33 kV lines

The civil design for the Stage 1 and 2 projects has required increased scale of earthworks for the project that in places may result in increased visibility of the earthwork components including access tracks and hardstands. This is generally a temporary impact becoming less noticeable as rehabilitation of the site progresses. Many locations will have limited views of parts of the wind farm access tracks and the changes to visual impact of modified access tracks and hardstands is expected to be a minor issue. Internal overhead 33 kV transmission lines generally span valleys within the area of the project layout and will have limited or no views from areas surrounding the project area.

6.2.2.3 Substation design

There are relatively minor changes for the substation layout through a marginal expansion to incorporate an additional 33 kV/132 kV transformer and associated electrical items. The substation location is concealed from much of the surrounding country and there will be limited views to the substation and minor visual impact from the substation expansion.

6.2.3 Setting for the modified project

The modified Stage 2 infrastructure would extend through a rural landscape of pastoral grazing land with interspersed areas of cultivated arable crops and patches of remnant woodland vegetation. The landform is undulating to gently sloping with steeper hillside sections falling away from the wind farm site. There are a variety of topographical features within the local and regional landscape and an overall moderate landscape scale with a range of distant to mid distance views into neighbouring landscapes. More distant views are often subject to screening by ridges and/or trees depending on the position of the viewer in the landscape and extent of clearing in the mostly semi-cleared locality.

The Stage 2 development would be located in a landscape with a moderate to high visual absorption capability, and the existing physical characteristics of the landscape (undulating topography and scattered groups of trees and forested areas) surrounding and within the Stage 2 development would tend to reduce the overall visibility and visual impact of the Stage 2 development.

6.2.4 Residences and residential viewpoints

There are 48 residences within 4 km of a proposed Stage 2 wind turbine (Table 6.2, Table 6.3 and Figure 6.1), of which 29 are associated residences and 19 non-associated with the project.

Considering the existing Stage 1 and proposed Stage 2 combined turbine locations, there are 59 residential dwellings located within 4 km (Table 6.3). Of the 59 residences, 35 are associated and 24 are non-associated.

There are a low number of people who travel through or reside in the locality surrounding the Stage 2 development. There may be a moderate to high visual impact to views from non-associated residential dwellings within 4 km of WRWF Stage 2. Some residential dwellings may have restricted views toward the Stage 2 infrastructure resulting from topography and vegetation screening but where there are partial views of the wind farm these may include a number of large wind turbine structures.

Table 6.2 Residential dwellings within 4 km of Stage 2 and association status

Residence Reference Code	Association Status	Closest Stage 2 Turbine	Distance (m) Turbine to residence
I180	Associated	122	616
J180	Associated	122	623
K170	Associated	50	844
J181	Associated	122	1,097
P170	Associated	135	1,117
I210	Associated Neighbour	139	1,214
I221	Non-associated	139	1,341
H140	Associated	128	1,361
L170	Associated	91	1,378
L220	Non-associated	139	1,457
L180	Associated	50	1,470
I222	Non-associated	139	1,507
Q170	Non-associated	135	1,556
N180	Non-associated	95	1,631
L200	Non-associated	120	1,679

O190	Associated	95	1,690
N190	Non-associated	95	1,764
F132	Associated Neighbour	129	1,860
N191	Associated Neighbour	95	1,899
S160	Non-associated	136	1,968
S170	Non-associated	135	2,007
O191	Non-associated	95	2,061
E140	Non-associated	129	2,235
M221	Associated	139	2,304
F131	Associated	129	2,389
M220	Associated	138	2,438
R130	Associated	108	2,454
L230	Non-associated	139	2,486
S130	Associated	108	2,895
R121	Associated	105	2,988
P190	Non-associated	95	3,031
R190	Non-associated	135	3,048
L100	Associated	12	3,053
T170	Non-associated	135	3,083
R120	Associated	105	3,204
S180	Non-associated	135	3,268
L90	Associated	12	3,355
L101	Associated	70	3,384
F120	Associated	129	3,412
Q191	Non-associated	135	3,479
L80	Associated Neighbour	12	3,515
N100	Associated	70	3,576
Q110	Non-associated	105	3,679
L82	Associated Neighbour	12	3,694
L70	Associated	12	3,773
L83	Associated Neighbour	12	3,820
N230	Non-associated	139	3,859
L71	Associated	12	3,908

Table 6.3 Details of residence status with respect to distance from the nearest turbine

Distance (km)	Associated	Non-Associated	Total
WRWF Stage 2 only			
0 to 1	3	0	3
1 to 2	9	8	17
2 to 3	6	4	10
3 to 4	11	7	18
Total	29	19	48
WRWF Stage 1 and Stage 2			
0 to 1	6	0	6
1 to 2	10	9	19
2 to 3	14	4	18
3 to 4	5	11	16
Total	35	24	59
Note: Distance is from residence to closest turbine.			

Table 6.4 Non-associated residences and changes in turbine separation distance

Residence Reference Code	EA Approved Turbine		Proposed Stage 2 Turbine		Change in Separation Distance (m)
	Original Reference	Distance (m)	Stage 2 Reference	Distance (m)	
I221	119	2,000	139	1,341	-659
L220	119	845	139	1,457	612
I222	119	2,174	139	1,507	-667
Q170	100	1,057	135	1,556	499
N180	96	1,400	95	1,631	231
L200	120	1,215	120	1,679	464
N190	95	1,409	95	1,764	355
S160	136	2,271	136	1,968	-303
S170	135	2,435	135	2,007	-428
O191	95	960	95	2,061	1,101
E140	129	2,611	129	2,235	-376
L230	139	2,101	139	2,486	385
P190	95	1,365	95	3,031	1666
R190	135	1,878	135	3,048	1,170
T170	135	3,514	135	3,083	-431
S180	135	3,045	135	3,268	223
Q191	135	1,804	135	3,479	1,675
Q110	105	2,693	105	3,679	986
N230	139	3,236	139	3,859	623

Table 6.4 shows the changes in separation distance to non-associated residences from the original EA approved layout to the layout proposed in this modification. In general, turbines have been moved further away from 13 of the 19 residences which reduces the level of impact. For 6 of the 19 residences turbines have been moved closer to the residence and the impacts assessed accordingly, though no turbine is positioned closer than 1.3 km. This EA considers that the change in positions are acceptable and comply with the conditions of approval.

6.2.5 Aviation Night Lighting

CASA have recommended that aviation lighting should be installed at WRWF due to the increase in turbine tip height to 200m. Aviation Projects were commissioned to review air safety risk around WRWF and have concluded that night lighting is not required. The recent cancellation of the Glen Innes Flight Training School (December 2017) further reduces the aviation safety risk.

Should night lighting be required, then CASA (Guideline D, section 35) recommend a medium-intensity obstacle light be installed:

- (a) *to identify the perimeter of the wind farm;*
- (b) *respecting a maximum spacing of 900m between lights along the perimeter, unless an aeronautical study shows that a greater spacing can be used;*
- (c) *where flashing lights are used, they flash simultaneously; and*
- (d) *within a wind farm, any wind turbines of significantly higher elevation are identified wherever located.*

Partial shielding (Guideline D, section 36) can be used so long as it doesn't impact the operation of the lighting.

Use of night lighting would increase the visual impact of the proposed Stage 2 turbines within the local area and would also need to be considered in relation to Stage 1, whose turbines are 150m to tip height and therefore do not require night lighting. Even shielded lights may create a visual 'glow' some distance from the turbines, but not to the extent that it creates a significant impact.

Further consultation will be undertaken with CASA prior to the start of construction to determine the need for night lighting at WRWF given, the requirements to consider Stage 1 and Stage 2 turbine heights and locations and, in the context of decisions for other wind farms with height greater than 150 metres.

6.2.6 Components of the VIA

The VIA preparation has included:

- a desktop study of visual character;
- identification of the visual catchment for Stage 2 (Zone of Visual Influence – ZVI);
- reference to site inspection and site photography;
- preparation of visual simulations (five photomontages and 19 wireframe diagrams);
- assessment of the various information sources including assessment of visual impact from publicly accessible view points and residential dwellings; and
- discussion of mitigation measures and how they may reduce levels of potential visual impact.



6.2.7 Zone of Visual Influence

The Zone of Visual Influence (ZVI) (Figure 6.2) illustrates the area of land within which the approved White Rock Wind Farm and the modified wind farm (Mod 6) would be theoretically visible (as well as overall number of wind turbines being visible at tip height). Generation of the ZVI does not take into account all of the local screening that may be present, such as trees and buildings and may overstate the actual extent.

Appendix 2 provides two ZVI figures to enable review of changes in extent of the ZVI from the approved project to the modified project proposed under the application. Overall the Zone of Visual Influence diagrams demonstrate that the extent of wind turbine visibility would remain similar surrounding the northern portion of the White Rock Wind Farm. This is expected due to minor changes to the northern part of WRWF for Stage 2 and the distance from the northern extent to the southern part of the wind farm.

The number of wind turbine rotor blades and tips visible from residential dwellings within 4 km of the modified Stage 2 White Rock Wind Farm (Mod 6) would increase slightly where amended wind turbine locations, and an increased wind turbine tip height, result in changes to wind turbine visibility. However, the visual impacts at a number of locations are reduced by relocation of some of the turbines that were close to non-associated residences. Changes in the wind farm visibility are primarily associated with areas surrounding the southern portions of the project area.

Previously approved ancillary wind farm infrastructure would not result in a change in the level of visual impact from surrounding key receiver locations. However, there are some additional locations proposed for Stage 2 ancillary facilities but as these are localised and of low height they are likely to have limited additional visual impact.

This VIA included an assessment of nineteen non-associated residential dwellings within 4 km of a modified WRWF Stage 2 turbine location (Table 6.3). The proposed wind turbine modification is not considered to be of a magnitude that would significantly increase visual effects associated with the approved White Rock Wind Farm development and has reduced visual impact for a number of neighbouring non-associated residence locations.

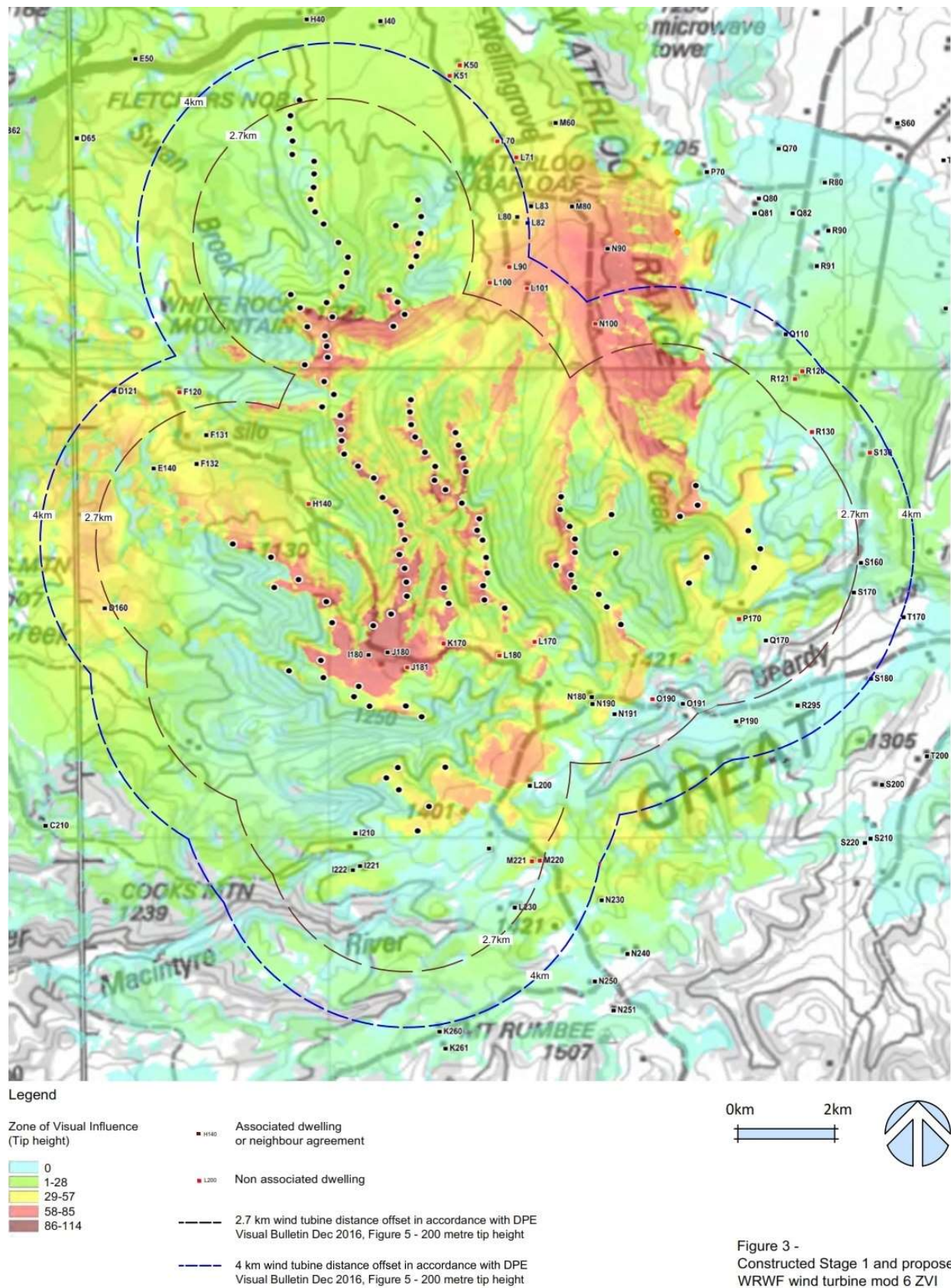


Figure 6.2 WRWF Stage 1 and modified Stage 2 Zone of Visual Influence (ZVI)

6.2.8 Visual Simulations

Visual simulations of the modified Stage 2 wind farm prepared as part of the GBD VIA (Oct 2017) include:

- Nineteen wire frame models
- Five photomontages

The wireframe models and photomontages are provided in Appendix 2. Four representative photomontages are provided in Plates 6.1 to 6.4, as follows:

Plate 6.1 View to south east from Spring Mountain Road towards Stage 1 and modified Stage 2	Plate 6.1 shows the turbines as prominent features on the elevated ridges viewed from lowlands to the west of the elevated plateau area. On the right hand side there are ten relocated turbines on a southwestern property that is now included with the project area. Given the remote rural location with low settlement density there will be limited numbers of the public having close views of the relocated turbines in the vicinity of this viewpoint. Most relocated turbines will be more distant from non-associated neighbouring residences.
Plate 6.2 View north to north east from Maybole Road towards Stage 1 and modified Stage 2	The viewpoint shows turbines on the southeastern ridge of the wind farm, most of which are at or close to existing approved sites. A small number of relocated turbines are included in the view but mostly only partly visible. Some close approved sites have been relocated further away from non-associated residences.
Plate 6.3 View north to north west towards southern part of the wind farm (Stage 2) from Maybole Road	Views to turbines are in part screened by topography. This viewpoint also has a reduced visual impact due to relocation of three turbines near Maybole Road.
Plate 6.4 View south to south west from Cherry Tree Road towards Stage 1 and modified Stage 2	This viewpoint is from the southern end of the Furracabad Valley showing turbines on ridgelines to the southwest. Overall, there is considered to be a reduced visual impact as some of the closer approved turbine locations have been relocated to sites more distant from the viewpoint.

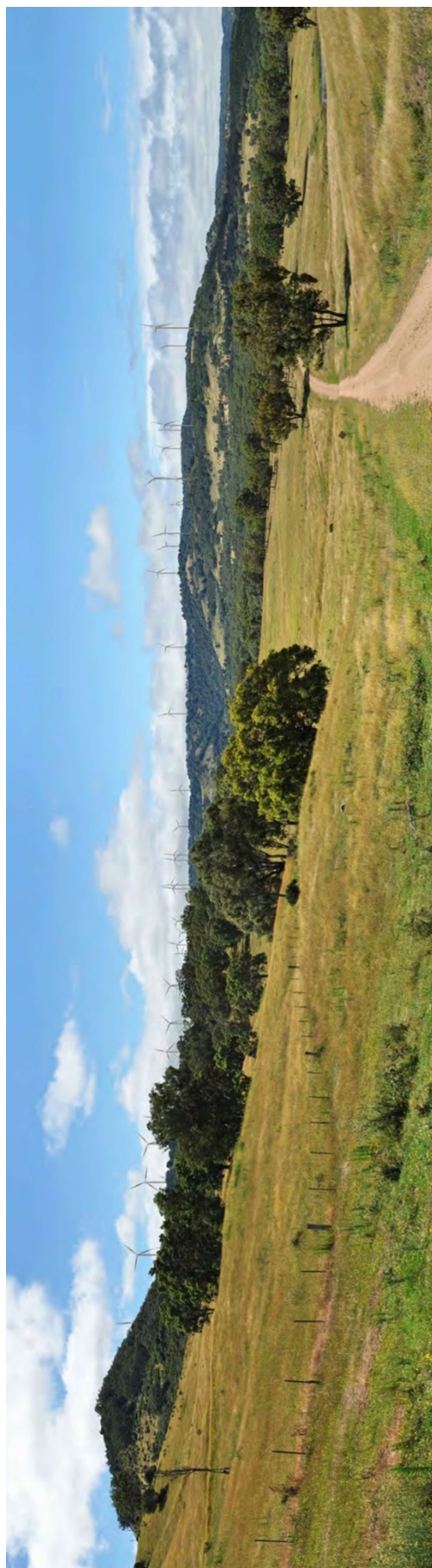


Plate 6.1 Photomontage – View to south east from Spring Mountain Road towards Stage 1 and modified Stage 2

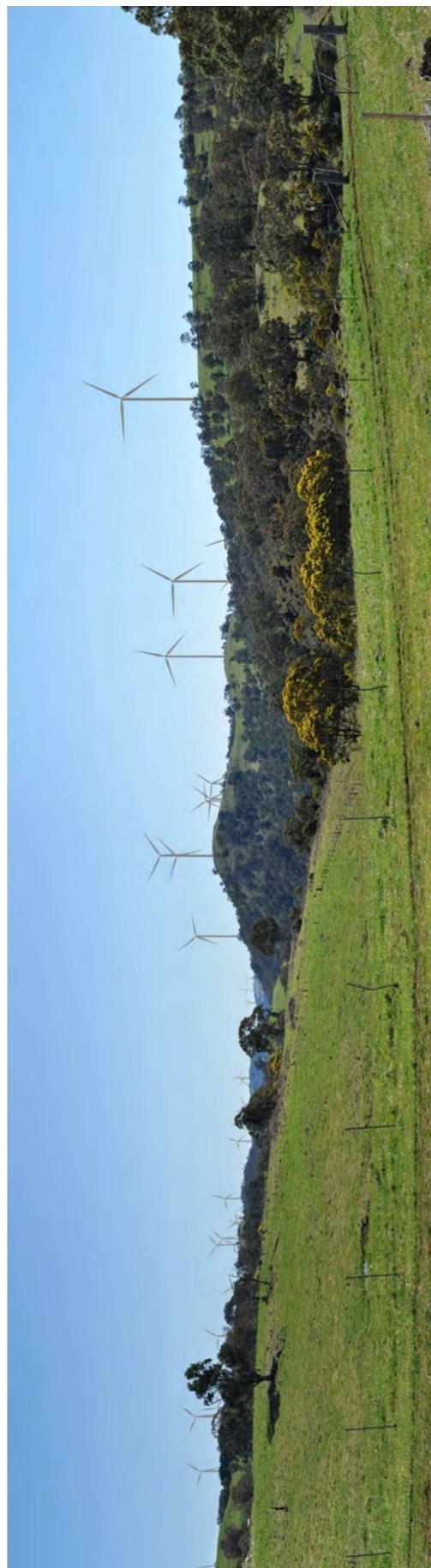


Plate 6.2 Photomontage – View north to north east from Maybole Road towards Stage 1 and modified Stage 2



Plate 6.3 Photomontage – View north to north west towards southern part of the wind farm (Stage 2) from Maybole Road



Plate 6.4 Photomontage – View south to south west from Cherry Tree Road towards Stage 1 and modified Stage 2

6.2.9 Conclusion for Visual Impact

The proposed Stage 2 modification utilises larger turbines but counters a potential increase in visual impact by relocating some of the approved turbines to increase set back distances to non-associated residences. The modified Stage 2 would not introduce elements that are any more prominent or out of character with the approved White Rock Wind Farm project and the as-constructed Stage 1. The potential for the proposed wind turbine modifications to result in any additional significant cumulative visual effects is considered to be low. The proposed Stage 2 modification would result in a largely unchanged visual impact rating in accordance with the approved White Rock Wind Farm project.

The overall assessment of magnitude of visual effect associated with the modified WRWF Stage 2 wind turbines is summarised as Low to Medium. A small number of non-associated dwelling would experience some increase in magnitude where relocated WRWF Stage 2 wind turbines would result in closer view distances; however, the relocation of wind turbines would also reduce the magnitude of visual effect on a greater number of non-associated dwellings.

Whilst the WRWF approved and modified Stage 2 wind turbines would be visible (in whole or in part) from some residential dwellings within 4 km 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 Landscape and Visual Impact Assessment prepared by Green Bean Design landscape architects is provided in Appendix 2.

The WRWF Design and Landscape Plan (DALP) required by Condition C30 would also be updated for the modified project.

6.2.10 Shadow Flicker

An assessment of shadow flicker has been undertaken by Goldwind using potential turbine dimensions (rotor dimensions 140 m and 170 m) and 'windPro' software.

For the largest rotor diameter of 170 m, six residences have worst case estimates for shadow flicker greater than 30 hours/year as shown in Table 6.5. After application of factors that reduce the period of shadow flicker effect, all have estimated shadow flicker effect of less than 30 hours/year and are compliant with requirements of Condition C27 that applies for non-associated residences.

Table 6.5 WRWF shadow flicker at residences greater than 30 hours

Residence Reference	Association Status	Distance closest turbine	GW140 (h:m)		GW170 (h:m)	
			Worst Case	Expected	Worst Case	Expected
I180	Associated	616	27:59	16:48	35:01	19:33
I210	Assoc. Neighbour	1,214	20:48	12:35	30:44	17:17
I221	Non-associated	1,341	26:51	14:48	33:35	17:06
J180	Associated	623	47:38	26:07	52:26	26:58
K170	Associated	844	31:54	14:35	36:49	16:13
L170	Associated	1,378	25:56	14:00	33:47	17:11

For the 140 m rotor with 130 m hub height, estimates for shadow flicker effect show that there are no non-associated residences that have worst case estimate exceeding 30 hours per year. Again, after application of factors that reduce the period of shadow flicker effect, estimated shadow flicker effect is well less than 30 hours/year and is compliant with requirements of Condition C27.

6.3 Noise Impact Assessment

Modification Application No. 6 reviews the likely changes to noise impacts associated with modified Stage 2 relative to the approved Stage 2 project and confirms that the project can be implemented in compliance with relevant conditions of approval. An Environmental Noise Assessment of the proposed WRWF Stage 2 modification was prepared by Sonus Pty Ltd (January 2018) and is provided in Appendix 3.

The WRWF Project Approval allows for construction and operation of 119 wind turbines in accordance with Conditions of Approval. The conditions relating to noise impacts include:

- Construction – Conditions E5, E9, E10, and E21 and E22(b); and
- Operation – Conditions F6, F7, F8, F9 and E21 and E22(b).

Environment Protection Licence (EPL) 20665 also includes licence conditions for noise as follows:

- Specific licence conditions for noise and vibration are: L3.1 to 3.7, L4.1 to L4.9 and L5.1 to L5.2.

An overview of the noise assessment and its conclusions is provided in this section. The assessment has considered construction and operation of the modified Stage 2 in relation to relevant Project Approval Conditions.

6.3.1 Construction Noise

The relevant conditions for the construction of Stage 2 are E5 (Construction Hours) and E21/E22 (CEMP and Construction Noise and Vibration Management Plan (CNVMP)).

Condition E5 of the Project Approval limits the hours of construction activities to the standard hours of the Interim Construction Noise Guidelines (ICNG) and as shown below. Circumstances allowing construction activities outside these hours are also prescribed in Condition E5.

- a) 7am to 6pm Mondays to Fridays
- b) 8am to 1pm Saturdays
- c) At no time on Sundays or NSW public holidays

An Out of Hours Work (OOHW) Protocol forms part of the approved CEMP and been effectively applied for Stage 1 construction activities. Justification would be provided for any proposed OOHW work and approval obtained during the construction of Stage 2, as required by the protocol.

The ICNG sets goal levels and an upper limit that should only be exceeded in exceptional circumstances and for short periods.

The construction noise for Stage 2 will progress across the site as installation progresses and have a short term impact at any location adjacent to the Stage 2 infrastructure. The closest residences are associated landowners. The closest non-associated residences are at 1,341 and 1,457 metres. Six other non-associated residences are at 1.5 to 2 km from the closest Stage 2 turbine. For construction works in proximity to these non-associated residences the contractors will need to review the impacts of any noise generating activities and provide appropriate controls.

Subject to the modification being approved, the WRWF CNVMP would be updated to address the feasible and reasonable work practices and noise reduction measures for Stage 2 including the alternative grid connection facilities.

6.3.2 Operational Noise

The Sonus noise assessment considered the operational noise from the WRWF Stage 2 as integrated with the constructed Stage 1.

Relevant project approval conditions are:

- **Condition F6.** This requires reporting of background noise monitoring and predicted noise levels for residences surrounding the wind farm. This reporting was provided in respect of Stage 1 and for Stage 2, further predictions of operational noise for Stage 2 will be required;
- **Condition F7.** Sets out the Criteria to be complied with for WRWF based on background monitoring taken prior to commencement of construction;
- **Condition F8.** (Operational Noise Criteria-Ancillary Infrastructure); and
- **Condition F9.** (Operating Conditions). This requires that noise generated by the operation of ancillary infrastructure does not exceed 35dB(A) LAeq(15 minute) at any non-associated residence.

Noise generated by the project is to be measured in accordance with the relevant requirements of the South Australian *Wind Farms: Environmental Noise Guidelines 2009 (Modified)* (as may be updated from time to time) as outlined in Appendix 2 of the Project Approval.

The noise from the wind farm based on the operation of the Stage 1 development and the modified Stage 2 was modelled using the CONCAWE propagation model within the SoundPlan noise modelling software using the worst case meteorological conditions (Category 6). The sound power levels for the likely turbines (GW121 for Stage 1 and GW140 3S for Stage 2) relative to the Project Approval were used in the modelling.

Modelling of the GW121 used the 2.5 MW wind turbine with a hub height of 89.5 m and included the use of serrations on 11 turbines (52, 54, 55, 56, 59, 60, 109, 110, 112 and 113). Modelling of the GW140 3S used a hub height of 130 m and considered the 3 MW and 3.57 MW versions of that model. Figure 6.3 shows the predicted noise contours based on this combined noise assessment for Stage 1 and 2.

The predicted noise levels at residences where background noise logging was conducted achieved the criteria for the available wind speed data ranges at these residences. The noise associated with the operation of the wind farm was also predicted at all non-associated residential locations located within 5 km. The combined Stage 1 and Stage 2 wind farm would potentially be marginally non-compliant at residences I221, N180 and N190.

Noise compliance can be achieved by implementing one or more of the following:

- Replacing a portion of the Stage 2 3.57 MW turbines with the 3 MW variant which has a lower sound power level;
- The addition of blade serrations on some turbines to reduce the generated noise, in a similar manner to the treatment of 11 Stage 1 turbines;
- Sector management to bring the noise profile at the affected residences within acceptable levels;
- Noise agreements with the affected landowners granting consent for the predicted noise levels; and/or
- The removal of some or all of turbines 93, 95 and 139 which allows the remaining 3.57MW turbines to be noise compliant.

Noise compliance for Stage 2 would be demonstrated prior to the start of construction in conjunction with updated reporting in respect of Condition F6. Sonus have confirmed the project noise criteria are consistent with the NSW Wind Energy: Noise Assessment Bulletin for State significant wind energy development (December 2016).

Details of the environmental noise assessment prepared by Sonus are provided in Appendix 3.

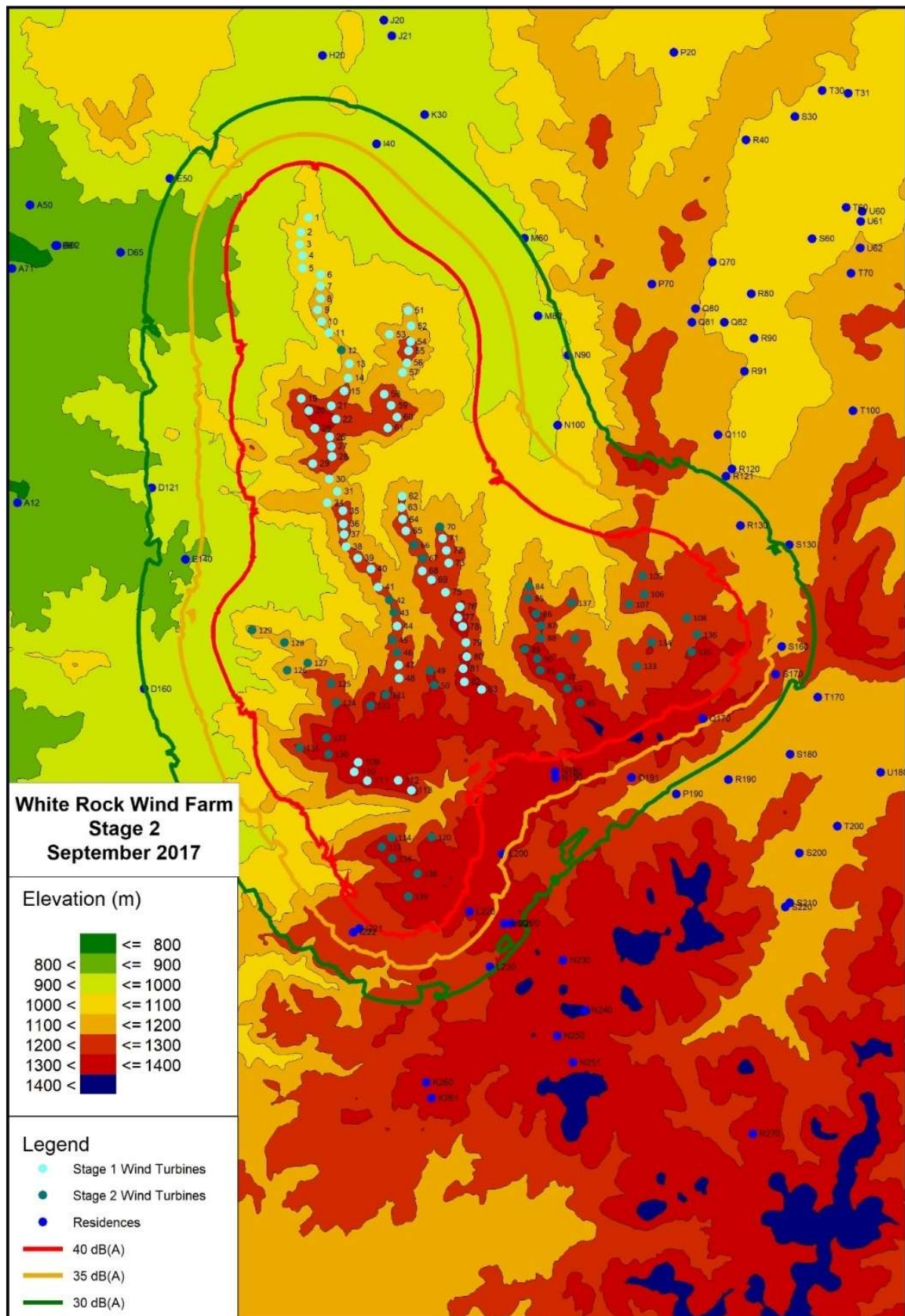


Figure 6.3 WRWF Stage 1 and 2 predicted operational noise level contours

Subject to approval of the modification, the preparation of the Operational Environmental Management Plan will address noise compliance monitoring and any need for operational noise reduction measures.

6.4 Biodiversity

6.4.1 Overview of Biodiversity assessments for the modified Stage 2

Biodiversity Assessments for the proposed Stage 2 development (not including the Alternative Grid Connection addressed by the Mod 4 Approval) have included assessments by NGH Environmental Pty Ltd, Eco Logical Australia (ELA) and Brett Lane and Associates Pty Ltd as listed below:

- White Rock Wind Farm Biodiversity Assessment Report, December 2017 prepared by NGH Environmental is provided in Appendix 4 and its findings referenced in Sections 6.4 and 6.5 as relevant.
- White Rock Wind Farm Biodiversity Offset Package Stage1 and modified Stage 2 Offsets, prepared by Eco Logical Australia (ELA) December 2017 provides updated offset provisions for the WRWF Biodiversity Offset Package (required under Condition C7). The ELA Letter Report is attached as Appendix 5 and summarised in Section 6.5.
- White Rock Wind Farm Stage 2, Modification Application No. 6, Impacts on Birds and Bats, Brett Lane & Associates (BLA), August 2017. BLA provided an assessment of the impact of modified Stage 2 including increased wind turbine dimensions on birds and bats. BLA's report is provided as Appendix 6 and summarised in Section 6.6.

Summaries of these assessments are described in Sections 6.4, 6.5 and 6.6. Section 6.4 provides a summary of the findings of the Biodiversity Assessment Report (BAR) prepared by NGH Environmental. Section 6.5 is focussed on the offsets required for the modified Stage 2 and Section 6.6 addresses the potential impacts on birds and bats.

6.4.2 Surveys undertaken for the Biodiversity Assessment Report

The NGH Environmental Biodiversity Assessment Report (BAR) December 2017 addresses the requirements of the Framework for Biodiversity Assessment (FBA) developed for Major Projects, including requirements under the NSW Biodiversity Offsets Policy for Major Projects.

Initial surveys for the WRWF project were undertaken by RPS in 2010 and these formed the basis for the Project Approval in July 2012. Further surveys were undertaken by RPS in 2015 prior to commencement of construction for WRWF Stage 1. The collective RPS biodiversity assessments were used for Modification Application No. 3 that related to WRWF Stage 1.

The biodiversity assessment for the Alternative Grid Connection (Mod 4) was undertaken by Environmental Assessments Pty Ltd. It addresses an area to the west of the wind farm site and does not overlap the Stage 2 project area but is likely to be constructed in conjunction with Stage 2.

NGH Environmental arranged a further nine days of field survey for the Biodiversity Assessment Report (2017) that addresses the application for a modified Stage 2. The additional surveys were undertaken as follows:

- 21 November 2016 to 23 November 2016;
- 16 January 2017 to 18 January 2017; and
- 20 January 2017 to 22 January 2017.

The biodiversity surveys and assessments included vegetation mapping and collection of plot data as well as addressing relevant threatened species, populations and ecological communities (Plates 6.5 to 6.12). In addition to the vegetation mapping and collection of plot data, 25 person hours were directed

to targeted flora surveys and 12 person hours on targeted fauna/fauna habitat surveys. Pre-construction bird and bat utilisation were separately undertaken by BLA and as outlined in Section 6.6.

Consultation was undertaken between NGH and OEH on 28 November 2016 and 20 December 2016 regarding the biodiversity assessment, landscape assessment approach and mapping of Endangered Ecological Communities (EECs). OEH advised that it would best for NGH to conduct the landscape assessment of impacts according to the methodology for 'multiple fragmentation impact development' provided at Appendix 5 of the FBA.

The following information sources were used in the preparation of the BAR by NGH Environmental:

- Aerial maps, proposal layers and environmental layers provided by Epuron and OEH.
- Australian Government's Species Profiles and Threats database (SPRAT)
<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 2.
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Species Profiles and Threats Database (SPRAT).
- NSW OEH's BioBanking credit calculator (BCC)
<http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx>.
- NSW OEH's threatened species database
<http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>.
- OEH Threatened Species Profiles.
- Office of Environment and Heritage (OEH) (2007). Mitchell Landscapes with per cent cleared estimates.
- OEH Vegetation Information System (VIS) Classification Database (OEH 2016).
- Office of Environment and Heritage (OEH) (2014). Framework for Biodiversity Assessment: NSW Biodiversity Offsets Policy for Major Proposals. Published by Office of Environment and Heritage for the NSW Government.

The vegetation communities identified by the surveys and reported in the BAR are listed in Table 6.6.

Table 6.6 Vegetation communities identified for Stage 2 project area

Zone ID	Vegetation Zones (EEC shown in <i>italics</i>)	Condition Class	Amount to be cleared (ha)	Survey Effort (Plots)
1	<i>PCT #510</i> <i>BVT BR272 Blakely's Red Gum – Yellow Box grassy woodland of the New England Tableland Bioregion</i>	<i>Moderate - good</i>	7.95	6
2	<i>PCT #510</i> <i>BVT BR272 Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion</i>	<i>Low</i>	0.51	3
3	<i>PCT #554</i> <i>BVT BR329 Ribbon Gum - Mountain Gum - Snow Gum grassy open forest or woodland of the New England Tableland Bioregion</i>	<i>Moderate - good</i>	61.92	12

4	PCT #554 BVT BR329 Ribbon Gum - Mountain Gum - Snow Gum grassy open forest or woodland of the New England Tableland Bioregion	Low	77.70	8
5	PCT #565 BVT BR352 Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	Moderate - good	12.33	8
6	PCT #84 BVT BR194 River Oak - Rough - barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	Moderate - good	0.14	1
7	<i>PCT #507 BVT269 Black Sallee - Snow Gum grassy woodland of the New England Tableland Bioregion</i>	<i>Moderate - good</i>	2.69	4
8	PCT #507 BVT269 Black Sallee - Snow Gum grassy woodland of the New England Tableland Bioregion	Low	5.34	3
Total			168.57	45

Representative photographs of the vegetation communities identified are provided in Plates 6.5 to 6.12.



Plate 6.5 Moderate to good condition Ribbon Gum – Mountain Gum – Snow Gum grassy open forest of the New England Tableland Bioregion in the proposal site. (PCT 554)



Plate 6.6 Low condition Ribbon Gum – Mountain Gum – Snow Gum grassy open forest in the proposal site. (PCT 554)



Plate 6-7 Moderate to good condition Blakely's Red Gum – Yellow Box grassy woodland of the New England Tableland Bioregion in the proposal site. (PCT 510)



Plate 6.8 Low condition Blakely's Red Gum – Yellow Box grassy woodland in the proposal site. (PCT 510)



Plate 6.9 Moderate to good condition Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion in the proposal site. (PCT 565)

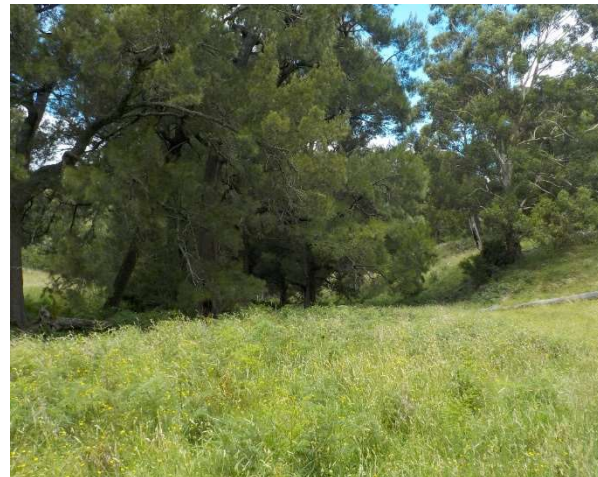


Plate 6.10 River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion (Limited extent, only 0.14 ha to be impacted). (PCT 84)

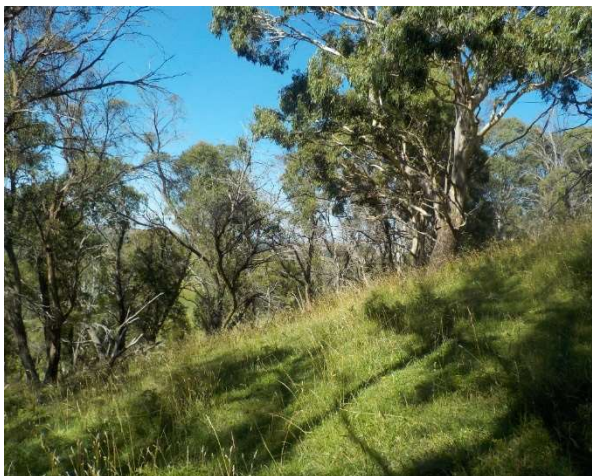


Plate 6.11 Moderate to good condition Black Sallee - Snow Gum grassy woodland of the New England Tableland Bioregion in the proposal site. (PCT 507)



Plate 6.12 Low condition Black Sallee - Snow Gum grassy woodland of the New England Tableland Bioregion in the proposal site. (PCT 507)

Mapping of locations of PCTS and EECS for the modified Stage 2 are shown in Figures 3.9 and 3.10 respectively within the BAR (NGH 2017).

Seven geographic/habit features were generated by the BCC and three were found to be relevant to the impact areas as follows.

- Austral Toadflax - *Thesium austral*
- Hawkweed – *Picris evae*
- Narrow-leaved Black Peppermint - *Eucalyptus nicholii*

A total of 45 hollow-bearing trees were also identified within and adjacent to the proposed site. The number of hollows to be impacted is assessed within the BCC.

6.4.3 Threatened Species

Ecosystem Credit Species predicted by the BCC were also considered by the BAR but assessed as 'Unlikely' to be affected by the modification. Results of targeted surveys are provided in the BAR and summary of assessment for specific species is provided below.

Targeted surveys were undertaken for Bluegrass (*Dichanthium setosum*), Austral toadflax (*Thesium austral*), Hawkweed (*Picris evae*), Silky Swainson-pea (*Swainsona sericea*), McKies stringybark (*Eucalyptus mckieana*), Narrow goodenia (*Goodenia macbarronii*) and Narrow-leaved black peppermint (*Eucalyptus nicholii*).

Within the Stage 2 site, where habitat was deemed most suitable for the above listed threatened species, targeted searches were carried out by conducting parallel transects at distances of 10 m (depending on vegetation density), covering as much of the vegetation patch as was accessible. This predominantly included areas that would be impacted by proposed access tracks, turbine locations and ancillary facilities. Three persons were involved in the searches giving a coverage of 30 m per pass.

Additionally, random meander searches (after Cropper 1993) were undertaken on foot throughout the proposal site where habitat was deemed less than optimal for the above mentioned threatened species. This method provides a comprehensive approach in terms of detecting the species and variation within vegetation types, and improves opportunities for detecting significant or sparsely distributed plant species.

Targeted surveys were not undertaken for Small Snake Orchid (*Diuris pedunculata*) and Prasophyllum sp. Wybong as survey timing was unsuitable. The assessment of those species was informed by results of the targeted surveys, local records and the nature of the development.

Approximately 25 hours were spent surveying for threatened flora species.

Targeted survey results

None of the candidate species were identified in the targeted surveys. Three threatened species listed under the NSW TSC Act were detected during the survey, including:

- Scarlett robin *Petroica boodang* – Vulnerable (TSC Act)
- Little lorikeet *Circus assimilis* - Vulnerable (TSC Act)
- Brown treecreeper *Climacteris picumnus victoriae* - Vulnerable (TSC Act)

These species are ecosystem credit species which are already accounted for in the assessment and do not generate species credits. The results of targeted surveys for the species requiring survey are detailed below.

Austral Toadflax

Austral toadflax (*Thesium australe*) has been recorded throughout the northern tablelands and is listed as vulnerable under the TSC Act and EPBC Act. The nearest record of Austral toadflax is along a travelling stock route (TSR) approximately 17 km south west of the proposal site. Austral toadflax is often found in habitat containing open woodland and grassland dominated by a predominately native understorey, including a Kangaroo grass (*Themeda australis*), which does occur on occasion within the proposal site.

While the proposal site does contain some suitable habitat for Austral toadflax to occur and a number of individuals have been recorded approximately 17 km to the southwest of the proposal site, considering the extensive survey effort with no plants recorded, and the narrow clearing footprint proposed over a broader area, it is unlikely that a population of Austral toadflax would be impacted by the proposal.

Bluegrass

Bluegrass (*Dicanthium setosum*) is listed as vulnerable under the TSC Act and EPBC Act. This species is associated with basaltic soils, Yellow Box (*E. melliodora*) and disturbed woodlands and open pastures on the New England Tablelands. Therefore, habitat for this species occurs within the proposal site. This species has been previously recorded approximately three (3) kilometres to the west of the proposal site. Extensive parallel transects were undertaken through the proposal site as it was determined that this species contained the highest risk of being present however this species was not recorded. In addition to this, this species was not recorded in similar habitat in previous surveys for WRWF (RPS, 2011).

While the proposal site does contain some suitable habitat for this species and an individual has been recorded approximately three (3) kilometres to the west of the proposal site, considering the extensive survey effort with no plants recorded, and the narrow clearing footprint proposed over a broader area, it is unlikely that a population of Bluegrass would be impacted by the proposal.

Hawkweed

Hawkweed (*Picris evae*) has been recorded within the New England Tablelands, predominately in areas around Inverell, as well as within the northwest slopes and plains and is listed as vulnerable under the TSC Act and EPBC Act. The nearest record of Hawkweed is along the Gwydir Highway approximately 17 km north west of the proposal site. Hawkweed is often found in habitat containing open Eucalypt forest including a canopy of yellow box (*E. melliodora*) as well areas dominated with a *Dichanthium* grassy understory which occurs within the proposal site.

While the proposal site does contain some suitable habitat for Hawkweed to occur and a small number of individuals have been recorded approximately 17 km to the northwest of the proposal site, considering the extensive survey effort with no plants recorded, and the narrow clearing footprint proposed over a broader area, it is unlikely that a population of Hawkweed would be impacted by the proposal.

Koala

One of the dominant overstorey species within the proposal site, Ribbon Gum (*E.viminalis*), is listed as a primary food tree species for the Koala by the NSW OEH within the New England Tablelands. Ribbon Gum is also listed as a feed tree species on Schedule 2 of State Environmental Planning Policy (SEPP) 44 – Koala Habitat Protection. Numerous secondary feed trees including Snow gum (*E. pauciflora*) and Yellow box (*E. melliodora*) occur in abundance throughout the proposal site.

Due to the size of the survey area, random inspections of koala feed trees for scats and activity were undertaken, as well as inspections for scats and other Koala evidence where primary and secondary feed trees were located within biometric plot survey areas. Approximately six person hours were

spent on surveys for the Koala, however surveys undertaken do not meet the draft threatened species survey guidelines.

No Koala's or evidence of Koala activity were detected during the surveys. Although there are historical records surrounding the proposal site, none of these are recorded within the last 20 years and therefore shows a lack evidence that the proposal site contains a significant population. As such, the project area is not considered to comprise *Core Koala Habitat* under SEPP 44. However, as the dominant overstorey vegetation within the proposal site contains a high abundance of primary and secondary feed trees, it would be considered under Schedule 2 of SEPP 44 and as *Potential Koala Habitat* under SEPP44.

Due to the lack of evidence that a significant koala population exists within or near the proposal site and the linear nature of the clearing areas, it is unlikely that a population of Koalas or the Koalas ability to inhabit the area in future would be impacted by the proposal.

McKies Stingybark

McKies stringybark (*E. mckieana*) has been recorded within the New England tablelands, predominately in the drier western areas of the tablelands. This species is listed as vulnerable under the TSC Act and EPBC Act and often occurs in grassy open forest of poor soils and often along gentle sloping sites. This species is often associated with other Eucalypt species such as New England Blackbutt (*E.andrewsii*), Narrow-leaved peppermint (*E.nicholii*), Blakely's red gum (*E.blakeyi*) and Rough-barked apple (*Angophora floribunda*). Although these associated species occur sporadically throughout the proposal site, none dominate any areas of vegetation. The nearest record to the proposal site is approximately 14 km southwest of the proposal site.

While the proposal site may contain some suitable habitat for McKies stringybark to occur and this species has been recorded approximately 14 km to the southwest of the proposal site, considering the extensive survey effort with no plants recorded, it is unlikely that a population of McKies stringybark would be impacted by the proposal.

Narrow Goodenia

Although generated by the BCC as requiring survey, this species is no longer listed as threatened under the TSC Act or EPBC Act. Therefore, no targeted surveys were undertaken for this species and no impact was recorded for it.

Narrow leaved Black Peppermint

Narrow-leaved black peppermint (*E.nicholii*) has been recorded within the New England tablelands, predominately in the dry grassy woodland of infertile derived volcanic soils. This species is listed as vulnerable under the TSC Act and EPBC Act. The nearest record to the proposal site is approximately 18 km southwest, however a small number as individuals were observed 10 km east of the proposal site along Maybole Road. However, these individuals were most likely planted within some private revegetation works.

While the proposal site may contain some suitable habitat for Narrow-leaved black peppermint to occur and this species has been recorded approximately 18 km to the southwest of the proposal site, considering the extensive survey effort with no plants recorded, it is unlikely that a population of Narrow-leaved black peppermint would be impacted by the proposal.

Prasophyllum sp. Wybong

Prasophyllum sp. Wybong is a terrestrial orchid and is listed as critically endangered under the EPBC Act. It is known to sporadically occur within NSW with main records within the Hunter Valley (Denman region) and north west slopes and plains (Manilla region) however, it is predicted to occur within the New England region, particularly the Ashford areas, north of Inverell. This species is often associated within open eucalypt woodland and grassland.

Targeted surveys were not undertaken for this species in February 2017, as it was not in flower during the surveys (October only) which makes the species almost undetectable. While marginal habitat for this species was recorded within the proposal site, it is considered very unlikely that the species would occur due to:

- Historic land use at the site that includes improved pasture, cropping of areas and a history of grazing.
- No known recordings within 50 km of the proposal site.

Based on the assessment above, it is considered unlikely that a population of the *Prasophyllum sp. Wybong* would be impacted by the proposal.

Regent Honeyeater

This species is highly nomadic and may occur on very rare occasions during periods of heavy eucalypt flowering within remnant woodland areas. This species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak.

Four transect surveys as well as opportunistic observations during targeted flora surveys were supplemented by song meter surveys, specifically targeting the Regent Honeyeater. Two song meters were placed in suitable habitat, where Yellow box dominated patches of remnant woodland in good/moderate condition occurred. The song meters recorded during dawn and dusk periods over three nights. Approximately 30 hours was spent on the songmeter recording time and analysis in total. Additionally, approximately six person hours of survey was undertaken on 2ha transects and opportunistic surveys.

Despite targeted surveys in areas of potential habitat, this species was not recorded in the proposal site, nor were any potential nests. Furthermore, this species was not recorded in similar habitat in the recent and nearby WRSF southern potential sites or WRWF surveys (RPS, 2011) or Brett Lane and Associates (2016). The results of these surveys have been considered in evaluating the presence and potential for impact on this species.

The removal of approximately 7.61 ha habitat suitable for the regent honeyeater in a linear pattern within the proposal site when compared to the amount within the broader area means it is unlikely that the Regent Honeyeater would be impacted by the proposal. Additionally, previous construction and operational impact assessments for the Regent Honeyeater by RPS (2011) and Brett Lanes and Associates (2016) determined the impact to be low due to their rare occurrence.

Silky Swainson-pea

The Silky Swainson-pea (*Swainsona sericea*) has been recorded on New England grassy woodlands which occur in the proposal site and is listed as vulnerable under the TSC Act. However, it has not been previously recorded within 40 km of the proposal site. Although targeted, this species was not recorded during the current surveys. In addition to this, this species was not recorded in similar habitat in previous surveys for WRWF (RPS, 2011).

While the proposal site may contain some marginal habitat for this species, considering the extensive survey effort with this species not being recorded and no previous recordings within 40 km of the proposal site, it is unlikely that a population of a Silky Swainson-pea (*S. sericea*) would be impacted by the proposal.

Small Snake Orchid

The Small Snake Orchid (*Diurus pedunculata*) is listed as endangered under the TSC Act and the EPBC Act. This conspicuous orchid is confined to northeast NSW on grassy slopes or flats between 50 and 900 metres altitude (Quinn *et al.* 1995). Targeted surveys were not undertaken for this species in February 2017, as it was not in flower during the surveys (flowers from August to October only) which

makes the species almost undetectable. The closest previous recording of the Small Snake Orchid is approximately 50 km to the south of the proposal site. While marginal habitat for this species was recorded within the proposal site, it is considered very unlikely that the species would occur at the proposal site due to:

- Proposal site is above 900m sea level (1,000 to over 1,300 metres);
- Historic landuse at the site that includes improved pasture, cropping of areas and a history of grazing; and
- No known recordings within 50km of the proposal site.

Based on the assessment above, it is considered unlikely that a population of the Small Snake Orchid (*Diurus pedunculata*) would be impacted by the proposal.

Conclusion - Threatened Species

NGH applied the findings for Threatened Species to the BCC for the surveyed areas and reported that *No species credit species will be impacted or generate species credits.*

6.4.4 EPBC Matters of National Environmental Significance

An EPBC Protected Matters Search (PMS) was undertaken by NGH on 6 April 2017 (50 km buffer) to identify Matters of National Environmental Significance (MNES) with potential to occur on the site. The potential for MNES to occur at site and a significant impact to occur is discussed below.

Wetlands on International Significance: Five wetlands of international importance were identified from the PMS, within 50km of the proposal site and the nearest, Little Ilangothlin nature reserve occurs approximately 30km southeast of the proposal site. Additionally, the Gwydir wetlands is approximately 150km northwest of the proposal site. Both of these sites are listed as RAMSAR and would not be impacted by the proposal.

Threatened Ecological Communities: Six threatened ecological communities were returned from the PMS. One of these, the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC occurs within the proposal site and would be impacted. Assessment of significance pursuant to the EPBC Act concluded that a total of 6.99 ha of this CEEC meets the EPBC determination. As this CEEC occurs within the proposal site as small to moderate patches of intact vegetation with large contiguous patches absent, may be considered likely to exacerbate impacts to the point that it would constitute a substantial reduction in the quality or integrity of the CEEC within the proposal site and therefore referral to the Commonwealth is required. A referral under the EPBC Act, for the Stage 2 development, is being prepared. As the NSW EEC listing includes all areas of CEEC that would be impacted, all impacts in these areas would be offset under the NSW Biobanking scheme.

Another threatened ecological community is the New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands. Although the New England peppermint was recorded on occasion within the proposal site, it did not dominate areas and where located, was within areas of highly abundant exotic groundcover and therefore would not meet the criteria of the threatened ecological community listing.

Threatened Species: 61 threatened flora and fauna species were returned from the PMS and habitat assessments were undertaken. As a result, no EPBC referral is being undertaken for Threatened Species and no Commonwealth offsets are proposed for this project for threatened species.

Migratory Species: Ten listed migratory species were returned from the PMS. Some migratory species are considered likely to occur at the site on occasion however impacts from the proposal are considered negligible due to the linear nature of the impacts, suitable habitat for these species in the study area generally occurring outside the impact areas and that breeding habitat for these species is unlikely to occur within the impact areas. A referral to the Commonwealth is therefore not considered to be warranted in relation to migratory species.

As indicated above, a referral will be made under the EPBC Act in relation to Stage 2.

6.4.5 Mitigation of Biodiversity Impacts

The BAR sets out measures to avoid and minimise impacts for the Stage 2 project. These measures will be implemented relative to the phase of development and in accordance with the existing Conditions of Approval. It is noted that Condition C1(b) requires that the Proponent not clear more than 28 hectares of the *Ribbon Gum – Mountain Gum – Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion EEC* on site. As much of the 28 ha has been cleared for the Stage 1 development, an increase in the clearing limit is being sought for the Stage 2 project based on a more detailed civil design in conjunction with experience gained from the recent Stage 1 construction works.

The design phase by the appointed contractor, will be undertaken with consideration of constraints identified from vegetation and habitat mapping and seek to minimise impacts on these aspects.

While a micro-siting allowance of 100 metres has been included in the approval this is subject to impacts remaining consistent with those assessed. Appendix I of the Stage 1 CEMP provided the assessment of impacts of micro-siting for Stage 1. A similar assessment would be undertaken for any micro-siting proposed for Stage 2 turbine locations.

Stage 2 construction would also require an update of the Construction Flora and Fauna Management Plan, required by Condition E22, as a part of the CEMP. The CEMP for Stage 2 will also need approval of DPE prior to construction commencing.

During construction, mitigation measures will include protection of vegetation and habitat to be retained, inspections to assess adherence to management measures, weed control measures, vehicle wash down, treatment of disturbed areas and, progressive rehabilitation.

Condition C6 of the Project Approval requires the preparation of a Bird and Bat Adaptive Management Plan (BBAMP) to address the WRWF impact on birds and bats. A BBAMP has been approved by DPE and is able to be applied for Stage 1 and Stage 2, if necessary with revisions in respect of adaptive management (Section 6.6). Monitoring under the approved BBAMP commenced in November 2017.

Condition C7 of the Project Approval requires the preparation of a Biodiversity Offset package (BOP) to address the WRWF impact on native vegetation. A BOP has been submitted to DPE/OEH in respect of WRWF Stage 1 and expansion of the BOP is proposed to address the requirements for the modified Stage 2 (see Section 6.5)

6.4.6 Weeds and their management

Several noxious weeds are present, or potentially present, within the WRWF project area or surrounds. These weed species include:

- African Love Grass *Eragrostis curvula* (exotic);
- Sweetbriar *Rosa rubiginosa* (exotic);
- Blackberry *Rubus fruticosus* (exotic);
- Coolatai Grass *Hyparrhenia hirta* (exotic);
- Fireweed *Senecio madagascariensis* (exotic);
- Prickly Pear *Opuntia stricta* (exotic); and
- Chilean Needle Grass *Nassella neesiana* (exotic).

The above species are listed as Class 4 species under the *Noxious Weeds Act, 1993*. Class 4 species under the Noxious Weeds Act means these plants pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are

likely to spread in the area or to another area. Chilean Needle Grass is also listed as a Weed of National Significance.

The WRWF Flora and Fauna Management Plan includes measures for weed management and would be updated as necessary for Stage 2 construction works. Such measures include pre-clearance mapping of weed affected areas, weed free certification for vehicles arriving at the site, installation of weed wash down areas at site entry and/or property boundaries and transition points between weed infested and weed-free areas as well post disturbance monitoring and treatment of emergent weeds.

6.5 Biodiversity Offset Assessment

This section outlines the contributions of NGH Environmental and Eco Logical Australia in respect of the assessments of the Stage 2 biodiversity impacts, Biodiversity credits required to offset the impacts and, the availability of suitable credits to fulfil requirements of the Biodiversity Offset Package required by Condition C7.

The NGH Environmental BAR sets out details of biodiversity impacts and credits required in respect of the identified impacts. This has included vegetation mapping and collection of biometric plot data to enable biobanking calculations to generate the credit profile.

The ELA Letter Report (Appendix 5) identifies the sourcing of the offsets that are proposed to address the Stage 2 impacts identified by NGH Environmental. ELA prepared the WRWF Biodiversity Offset Package that was submitted to OEH in December 2016 and is under review by OEH.

6.5.1 NGH Assessment of Biodiversity Credits Requirement

NGH, 2017 has quantified (Table 7.1 of the BAR) the extent of impacts on vegetation communities as shown in Table 6.7. The BAR also identified 12 threatened ecosystem credit fauna species but indicated that no species credits are required to be offset.

Table 6.7 Extent of impacts of modified Stage 2 on Vegetation Communities, Biometric Condition and Site Value Score

Vegetation Community	Threatened Ecological Community (TSC Act or EPBC Act)?	PCT ID	Biometric vegetation condition	Site value score	Extent of vegetation (ha) impacted in proposal site
Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	YES	PCT #510	Moderate – good	72.4	7.95
Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	NO	PCT #510	Low	17.19	0.51
Ribbon Gum - Mountain Gum - Snow Gum grassy open forest or woodland of the New England Tableland Bioregion	YES	PCT #554	Moderate – good	67.21	61.92
Silvertop Stringybark – Mountain Gum grassy open forest of the New England Tableland Bioregion	NO	PCT #565	Moderate – good	42.53	12.33
River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	NO	PCT #84	Moderate – good	41.15	0.14

Vegetation Community	Threatened Ecological Community (TSC Act or EPBC Act)?	PCT ID	Biometric vegetation condition	Site value score	Extent of vegetation (ha) impacted in proposal site
Black Sallee - Snow Gum grassy woodland of the New England Tableland Bioregion	YES	PCT #507	Moderate – good	71.04	2.68
Total Vegetation	-	-	-	-	85.53

The BAR states that 4,547 ecosystem credits have been generated for the proposal site (BCC Major Project 0035/2016/4082MP). The ecosystem credits required are summarised in the Table 6.8 below. No species credits are required.

Table 6.8 Credit conversion: Stage 2 offset area estimate

Vegetation Management Zone	Biometric veg code / PC type code	Plant community type name	Management zone area (ha)	Ecosystem credits required	Area estimate (using credit conversion tool) (ha)
1	PCT #510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	7.95	473	51.9
2	PCT #510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	0.51	9	
3	PCT #554	Ribbon Gum - Mountain Gum - Snow Gum grassy open forest or woodland of the New England Tableland Bioregion	61.92	3,445	370.4
5	PCT #565	Silvertop Stringybark – Mountain Gum grassy open forest of the New England Tableland Bioregion	12.33	458	49.2
6	PCT #84	River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	0.14	5	1
7	PCT #507	Black Sallee - Snow Gum grassy woodland of the New England Tableland Bioregion	2.68	157	16.9
Total (rounded)			85.53	4,547	498.4

6.5.2 Identification of potential offsets that can be used to retire the required credits

The offsets for Stage 2 are considered in the context of the overall WRWF Project offset requirements and the Biodiversity Offset Pack required by Condition C7 of the Project Approval. ELA has prepared and submitted the BOP to OEH based on offset areas on the Tangari property owned by WRWFPL. Table 6.9 shows the allocation of ecosystem credits to the specific components of WRWF impacts.

The Biodiversity Offset Package (BOP) that has been submitted to DPE and OEH provides 1,816 ecosystem credits sourced within the Tangari Biobank site and based on seven PCTs that meet the FBA requirements for the calculated Stage 1 impacts (refer ELA Letter Report, December 2017, Appendix

5). OEH has previously been requested to formalise the Tangari Stage 1 Biobank site, but following updated discussions this will be modified and increased in size to incorporate additional Stage 2 impacts. This will create a single, larger biobank site on Tangari rather than two separate sites, resulting in reduced management costs and improved efficiencies. The combined Tangari site will increase the number of credits generated in the Stage 1 area from 1,816 to an estimated 2,396, with credit calculations to be completed in January 2018.

Table 6.9 Allocation of Ecosystem Credits to the specific components of WRWF impacts

Project Component	Approval Modification	Impact Area (ha)	Ecosystem Credits	Credits / ha
Stage 1 – Construction	Mod 3	27.24	767	28.15
Stage 1 – Increased Clearing to 28 ha RG-MG	Mod 4	9.56	251	26.25
Alternate 330 kV Grid Connection	Mod 4	17.12	251	14.66
Stage 2 (Mod 6) (FBA)	Mod 6	85.53	4,547	53.16
	Totals	116.35	5,816	49.99

The combined Tangari Biobank Site therefore provides sufficient credits to offset impacts for:

- the Stage 1 project (70 turbines);
- the increased clearing allowed under Condition C1; and
- the alternative grid connection at 330 kV (Mod 4).

After accounting for each of the impacts, the Tangari Biobank site has a surplus of 547 credits but this is insufficient to meet the combined Stage 1 and Stage 2 total of 5,816 credit requirements. In order to meet the shortfall of approximately 3,420 ecosystem credits, WRWFPL will extend the Tangari Biobank Site by 250 ha (potentially up to 3,250 FBA 'matching' ecosystem credits at 13 credits per hectare).

WRWFPL therefore proposes to undertake the following actions:

- Complete the assessment for the expanded Tangari Biobank site and submit the application for registration by 25 February 2018.
- Once the Tangari Biobank site has been registered by OEH (expected to be by mid to late 2018, WRWFPL will retire:
 - 1,018 FBA matching ecosystem credits to complete the commitments for Stage 1 impacts as shown in Table 4 (767 credits for original Stage 1 impacts and an additional 251 credits for the additional clearing);
 - 251 credits for the additional powerline (Mod 4); and
 - 4,547 credits for the calculated Stage 2 impacts (Mod 6).
- Commence the active management of the entire expanded BioBank site from 1 Jan 2019.
- Subject to the number of 'matching' credits generated by the proposed extension to the Tangari Biobank site, WRWFPL will enter into an agreement or agreements to purchase and retire any additional credits required to fully comply with the Stage 2 offset requirements from either the Matheson Block 1 Biobank site, other Biobank sites or the Biodiversity Conservation Trust.

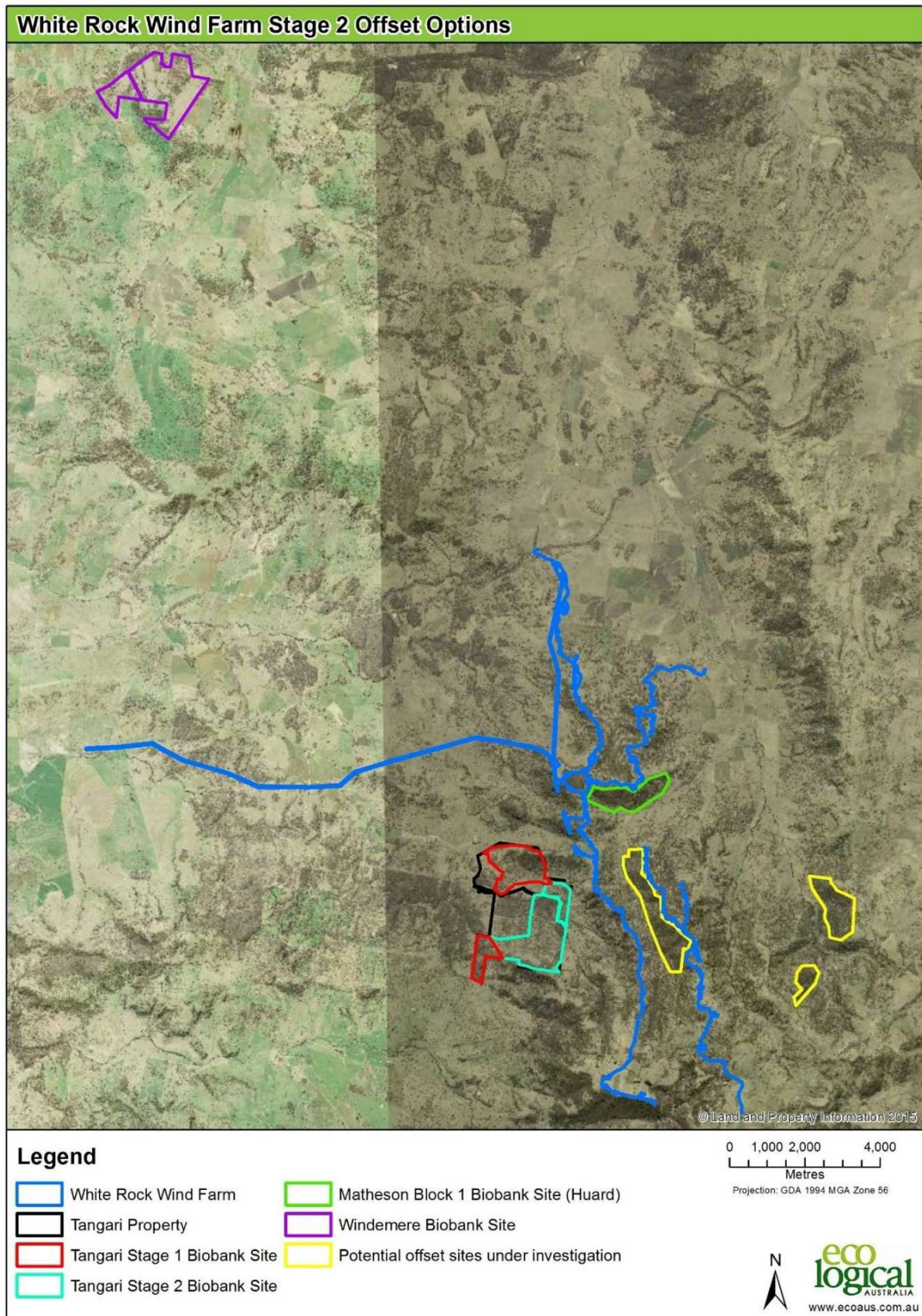


Figure 6.4 Location of proposed offset sites to meet offset requirements for Stage 2 impacts

Further discussions will be held with OEH to determine the specific requirements for a combined Stage 1 and 2 offset area early in 2018.

6.5.3 Conclusion – Offsets

WRWFPL has with the assistance of NGH Environmental and ELA identified adequate offset options for the modified Stage 2 project and the expanded BOP. Subject to approval being gained for Mod 6, WRWFPL would arrange an update for the BOP and its re-submission to DPE and OEH by the 25 February 2018 to gain approval of the Package before seeking formal registration of the revised or additional Biobank options by OEH in compliance with requirements of Condition C7.

6.6 Impact on Birds and Bats

The potential impacts of the modified WRWF Stage 2 development on birds and bats have been assessed by Brett Lane and Associates and are reported in *White Rock Wind Farm Stage 2, Modification Application No. 6, Impacts on Birds and Bats, Brett Lane & Associates (BLA), August 2017*. The report is provided in full in Appendix 6 and an overview is provided below.

A Bird and Bat Adaptive Management Plan (BBAMP) has also been prepared by Brett Lane and Associates and has been approved by DPE as required by Condition C6 of the Project Approval. The development of the BBAMP included additional surveys for birds and bats including the Stage 2 area as follows:

- Intensive bat survey using echolocation monitoring during November/December 2015 and providing over 40,000 records of which approximately 37,000 were bat calls;
- Bird Utilisation Survey (BUS) Spring 2016; and
- Bird Utilisation Survey (BUS) Autumn 2017.

The additional monitoring for bats and bird utilisation surveys have increased the confidence in prediction of species present and risks presented to birds and bats for the modified Stage 2 project.

6.6.1 BLA Assessment of Impact on Birds

BLA's report (Appendix 6) concludes that the larger and higher turbines are unlikely to lead to effects on bird populations of conservation concern given that:

- Most bird species observed at White Rock Wind Farm were common, widespread species in agricultural landscapes in north eastern NSW;
- Two threatened species listed under TSC Act are unlikely to be at increased risk from the modification:
 - Dusky Woodswallow - occurred at a low frequency such that it was considered at low risk of a collision;
 - Varied Sittella - is a tree dwelling species considered unlikely or rarely to fly at RSA height;
- The Wedge-tailed Eagles (WTE) and other high-flying raptors may be at increased in risk of collision from the larger and higher turbines. However, overall the risk to the WTE from collision with turbines was considered to be low given the low population assessed as using the area, the low frequency with which these flights occur and the non-threatened status of the mainland Australian sub-species of the eagle; and
- The White-throated Needletail (WTNT) listed as a marine and migratory species listed under the EPBC Act (non-threatened) may be at increased risk from the larger turbine rotor swept area. However, the incremental change in risk is low given that the species is common and widespread, and its frequency at the wind farm is likely to be low.

The species of birds recorded at WRWF involved common, widespread species in wooded agricultural landscapes in south eastern Australia. No species listed under EPBC Act as rare or threatened were recorded and two woodland species listed under the TSC Act were considered unlikely to be negatively impacted. Therefore the majority of bird species at White Rock are at minimal risk. Given that total area of rotor-swept area (RSA) will increase substantially above 60 metres, (97% of birds were flying at under 40 metres height during BUS), the added impacts of the larger turbines are unlikely to lead to effects on the populations of birds of conservation concern.

There may be an increase in risk of collision by Wedge-tailed Eagles, other high flying raptors and White-throated Needletails. Overall, the risk to the WTE and WTNT from collision with turbines was considered to be low given the low number of birds likely to be using the area and/or the low frequency with which these flights occur and the non-threatened status of these species in mainland Australia (WTNT is non-threatened throughout Australia).

6.6.2 Assessment of Impact on Bats

BLA's report concludes that the larger and higher turbines are unlikely to lead to effects on bat populations of conservation concern given that:

- Most bats species are known to fly below 50 metres in height;
- The vast majority of recorded bat calls during the field survey (>99%) involved species of bats common and widespread in wooded agricultural landscapes in south eastern Australia;
- Four listed threatened species under the TSC Act (Eastern Bent-wing Bat, Eastern Cave Bat, Eastern False Pipistrelle and possibly Little Pied Bat) were all recorded at very low frequencies (i.e. less than 0.1% of all bat calls recorded at White Rock Wind Farm). No species listed on the Commonwealth EPBC Act were recorded;
- There has been a small amount of change in RSA area up to 40 metres and between 18-21% RSA change between 40-60 metres (up to 60 metres). Beyond 60 metres there is a large change in RSA. Any added impacts of the larger turbines above 60 metres are unlikely to lead to effects on bat populations of conservation concern; and
- Bat species potentially at increased risk are high flying species such as White-striped Freetail Bat *Tadarida australis* and Gould's Wattled Bat *Chalinolobus gouldii*, both species that are not of conservation concern.

The proposed modification with larger and higher turbines is unlikely to cause significant adverse impacts to the populations of bat species, both threatened and non-threatened, at WRWF for the following reasons:

- The species of bats recorded during spring 2015 survey work overwhelmingly (>99%) comprised common, widespread species of wooded agricultural landscapes in south-eastern Australia;
- Four bat species listed under TSC Act (Eastern Bent-wing Bat, Eastern Cave Bat, Little Pied Bat and Eastern False Pipistrelle) are confirmed to occur, mostly likely at very low numbers, and are unlikely to be adversely affected at regional level if at all, because they are likely to fly mostly at or below the increased RSA height minimum;
- No bat species listed on the EPBC Act as rare or threatened was recorded at WRWF; and
- There has been a small amount of change in RSA area up to 40 metres and between 18-21% RSA change between 40-60 metres (up to 60 metres). Beyond 60 metres there is a large change in RSA. Any added impacts of the larger turbines above 60 metres are unlikely to lead to effects on bat populations of conservation concern.

6.7 Indigenous and Non-Indigenous Heritage

An Aboriginal Cultural Heritage Assessment Report (ACHAR) for the proposed modifications for WRWF Stage 2 has been prepared by NGH Environmental Pty Ltd (NGH) in report dated December 2017. The assessment is provided in Appendix 7. An overview of the assessments and its conclusions is provided in this section.

Previous assessments including indigenous consultation undertaken for WRWF project application, modification applications and the Construction Heritage Management Plan that provide context for this assessment include:

- RPS 'Aboriginal Heritage Impact Assessment. White Rock Wind Farm', (Dec, 2010);
- Environmental Assessments Pty Ltd, ACHAR (Mod 1), (Jan, 2013);
- ERM Australia Pty Limited. 'Heritage Survey for Modification Areas-White Rock Wind Farm (Mod 3)' (Nov, 2015);
- NGH Environmental Pty Ltd, *Heritage Assessment for WRSF*, (Feb, 2016);
- Environmental Assessments Pty Ltd, ACHAR (Mod 4), (Oct 2016); and
- Anaiwan Local Aboriginal Land Council. 'White Rock Wind Farm Power Line Easement Cultural Heritage Assessments', (2012 & 2016).

A heritage assessment was carried out in order to assess the potential impact of the modified Stage 2 on both indigenous and non-indigenous heritage. This addressed additional impact areas described in this document. The assessment (NGH December 2017) was carried out in accordance with the 'Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW', (OEH 2010).

Consultation with Aboriginal stakeholders was carried out in accordance with the above Code of Practice. The consultation included notification and an invitation for registration of interest via advertisements in several local print media (Glen Innes Examiner, Inverell Times and Koori Mail in February 2017). It also included consultation with the Aboriginal stakeholders who were contacted as part of the original heritage assessment carried out for the wind farm site.

The indigenous heritage site assessment was carried out in conjunction with a representative of the Anaiwan people and a member of the Anaiwan Traditional Owners Aboriginal Corporation. The assessment methodology was circulated to registered stakeholders prior to the survey work undertaken over 4 days from 9 to 12 May 2017. The survey focussed on the additional turbine locations and infrastructure not previously assessed as part of the original Project Application.

Three Aboriginal heritage sites and areas of Potential Archaeological Deposit (PAD) were identified within the project area. These included:

- WRWF 1 – Possible scarred tree (Plate 6.13);
- WRWF 2 – Artefact scatter (Plate 6.14); and
- WRWF 3 – Artefact scatter (Plate 6.15 and 6.16).

NGH Environmental concluded that mitigation measures will be required at the three heritage sites if impacts cannot be avoided. Subsurface investigations are also recommended at the identified areas of PAD at turbine locations. The subsurface investigations may consist of test excavations or monitoring of topsoil removal by a heritage team. WRWFPL favours review of the final design against areas of Indigenous heritage potential to determine whether the identified PADs are likely to be impacted and where potentially impacted, arranging pre-construction investigation rather than deferring that to monitoring activities during construction. Monitoring during construction activities introduces additional safety risks and also potential disruption to contract works with significant schedule and or cost impacts.

The ACHAR contains the following recommendations (based on the field survey and consultation with the local Aboriginal community):

1. Heritage sites have been identified within the proposed access corridors for the Turbine locations. These sites are WRWF1, WRWF2 and WRWF3. Avoidance of impacts should be undertaken where possible by modifying the design and placement of the access alignment.
2. WRWF1 (Plate 6.13) consists of a possible scarred tree and impacts to this site should be avoided. Barrier fencing will be required during construction in the vicinity.
3. If impacts cannot be avoided to the identified heritage site WRWF2 (Plate 6.14) and WRWF3 (Plates 6.15 and 6.16) mitigation measures will be required. Mitigation measures would consist of collection of surface artefacts.
4. Areas of PAD have been identified at three turbine locations (123, 124, 129). These areas of PAD require investigation as part of the post approvals process. The investigation may consist of subsurface testing prior to construction or controlled monitoring of topsoil removals by the heritage team during the initial phase of construction.
5. In all areas other than those listed above the development proposal should be able to proceed with no additional archaeological investigations. In the event of any chance finds being discovered during the construction process the protocol in the CHMP for the project should be followed.
6. All Aboriginal objects are protected under the NSW *National Parks and Wildlife Act 1974*. It is an offence to disturb an Aboriginal site without a permit issued by the Office of Environment and Heritage (OEH). Should any Aboriginal objects be encountered during works then works must cease and the find should not be moved until assessed by a qualified archaeologist. Adherence to the unexpected finds protocol in the CHMP is required.
7. In the unlikely event that human remains are discovered during the construction, all work must cease. OEH, the local police and the appropriate Local Aboriginal Land Council (LALC) should be notified. Further assessment would be undertaken to determine if the remains are Aboriginal or non-Aboriginal.
8. Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation. This would include consultation with the RAPs for the project and may include further field survey.
9. Continued consultation with the Registered Aboriginal Parties for the project should be undertaken. RAPs should be informed of any major changes in project design or scope, further investigations or finds.

Existing conditions of Approval relating to Heritage include E2, E3, E4 and E22(d):

- E2. In undertaking the project, impacts to heritage, shall to the greatest extent practicable, be avoided and minimised. Where impacts are unavoidable, works shall be undertaken in accordance with the strategy outlined in the Construction Heritage Management Plan required by condition E22.*
- E3. If during the course of construction the Proponent becomes aware of any previously unidentified heritage object(s), all work likely to affect the object(s) shall cease immediately and the Heritage Council of New South Wales shall be notified immediately in accordance with section 146 of the NSW Heritage Act 1977. Relevant works shall not recommence until written authorisation from the OEH advising otherwise is received by the Proponent.*

- E4. If during the course of construction the Proponent becomes aware of any previously unidentified Aboriginal object(s), all work likely to affect the object(s) shall cease immediately and the OEH informed in accordance with section 89A of the National Parks and Wildlife Act 1974. Relevant works shall not recommence until written authorisation from the OEH advising otherwise is received by the Proponent.*

The WRWF Stage 1 Construction Heritage Management Plan (CHMP) (responds to Condition E22(d)) would be updated to address the potential impacts of both Stage 1 and 2 including the alternative grid connection facilities (Mod 4) and management of the potential impacts during construction and operation.



Plate 6.13 WRWF1 Possible Aboriginal scar tree



Plate 6.14 WRWF 2 Artefact scatter view south



Plate 6.15 WRWF 3 Location of artefact scatter



Plate 6.16 WRWF 3 Some of the artefacts found

6.8 Traffic and Transport Impacts

Construction of the modified Stage 2 wind farm infrastructure (apart from the 330 kV grid connection) will use the same access routes used for the Stage 1 construction works (from port to site), and predominantly those routes to the southern part of WRWF Project Area, where Stage 2 is mostly located. Access routes for the 330 kV grid connection are as described for the MOD 4 application.

The Stage 2 wind farm access route to be used for transport of the over-dimensional turbine components involves the Ben Lomond route that was used to transport the GW121 over-dimensional turbine components for Stage 1. The Ben Lomond route has been further reviewed to assess its suitability for the turbine components, particularly the transport of the blades, and has been assessed as generally suitable for the purpose but potentially needing further upgrades depending on the length of blades to be delivered to the site.

The longer blades for the turbine option using the 170 m rotor will require further analysis of transport options and could require an alternative route or modifications to parts of the route used for Stage 1. This transport analysis for the longer blades would only be undertaken, if the 170 m rotor option was selected for implementation. Typical transportation arrangements are shown in Figure 6.5.

There are up to nine access points that can be used to access the Stage 2 project area as follows. The construction and operation of Stage 2 will use five of the existing on-site access routes in Stage 1 and include three additional site entry points as shown on the map in Figure 6.6 and outlined in Table 6.10.

The magnitude and frequency of construction traffic (Table 6.11) is comparable with Stage 1, though there will be a reduced number of over size and over dimension loads due to fewer turbines (48 instead of 70) to be installed.

Table 6.10 Access and Entry Points to the Stage 2 infrastructure

Entry Point	Status	Entry from	Infrastructure	Comment
1	Exists	Gwydir Hwy	T12 and Substation	Low use
2	Exists	Ilparan Rd	Alternate Substation	May not be needed
3	Exists	Kelleys Rd	T66, T67 and T70	Entry past southern O&M building
4	Exists	Kelleys Rd	T42, T43, T45, T46	Can also access substation and T12
5	Exists	Kelleys Rd	33 kV OH line	No Stage 2 turbines
6	New	Kelleys Rd	T121 to T131	11 alternate turbine sites
7	New	Kelleys Rd	T49, T50	Existing entry for residence
8	New	Maybole Rd	T84-T93, T95, T105-T108, T132-T137	21 Stage sites. Design of entry needs consultation with GISC.
9	New	Maybole Rd	T114-T116, T120, T138, T139	Six sites via route used for farm entry

Glen Innes Severn, Inverell and Armidale Regional Councils have been previously consulted about the WRWF Stage 1 development and the Construction Traffic and Access Management Plan (CTAMP) and will be further consulted to obtain any further approvals and route use agreements. Additional consultation will also be undertaken for update of the WRWF CTAMP and endorsement by the respective road authorities, prior to the commencement of the Stage 2 construction.

Southern access routes

The southern access routes that provide access to the six entry points (3 to 9) from Kelley's or Maybole Road involve the following routes:

- New England Highway to Grahams Valley Road, Maybole Road and Kelley's Road (no OD vehicles).
- New England Highway to Ben Lomond Road, Maybole Road and Kelley's Road (OD vehicles only).

Use of the latter route via Ben Lomond has been subject of consultation, from late 2016, with RMS and Glen Innes Severn, Inverell and Armidale Councils and approved and used for Stage 1. This route will be reviewed further in consultation with RMS and local Councils to account for the increased size and dimensions of the Stage 2 turbines. It is understood that the blades for the 140 m diameter rotor are able to be transported via the existing southern OD route. Further investigation would be needed for the 170 m rotor model.

Both southern routes are accessed from the New England Highway as has been done for Stage 1. If any upgrades are required to either of the intersections with the New England Highway, these will be

designed and developed in consultation with the RMS. The WRWF Traffic and Access Management Plan would also be updated accordingly in consultation with RMS and relevant Councils.

Stage 1 has already upgraded the Kelley's Road and Maybole Road intersection (Plate 6.19).

Details of two new site entry points from Maybole Road are considered further in this section and will need further consultation with the relevant Council to agree on the entry point design and any required mitigation measures. Aerial views of the intersections are shown in Figures 6.7 and 6.8.

New Entry to southeastern group of turbines (Entry 8) from Maybole Road is shown in Figure 6.7 and photographs are provided in Plates 6.17 and 6.18. Design of the entry will need to consider the narrow width of Maybole road at this point, the steep grade from the roadway and the limited options to locate the entry for access onto the ridge. The design would be developed in consultation with GISC.

New entry to southern turbine sites (Entry 9) from Maybole Road shown in Figure 6.8 and Plates 6.20 and 6.21. The location is close to an intersection with a minor local road (Durkins Road) but is otherwise well located and it is expected its design can be readily developed in consultation with Council.

The Ben Lomond route was used for over-dimensional turbine component deliveries for Stage 1. Further approvals in respect of Stage 2 would be sought prior to use of the Ben Lomond route for that purpose.

Traffic and Transport mitigation measures

The project has sought approval for rotor dimensions up to 170 m. While transport of blades for rotor dimensions of 140 m can mostly be accommodated on the existing routes with minimal upgrades, the transport of blades for the 170 m rotors is indicated to require further investigation and potentially upgrades or alternate transport routes.

The existing Conditions of Project Approval, relating to traffic and transport include:

- Condition E17 – Road Dilapidation;
- Condition E17A – Road Upgrades (relating to the alternative grid connection at 330 kV; and
- Condition E22 (c) and (d) – Construction Traffic and Access Management Plan;

The above conditions provide for suitable and effective management of Traffic and Transport. It is not envisaged that any additional conditions would be necessary for implementation of the modified WRWF Stage 2.

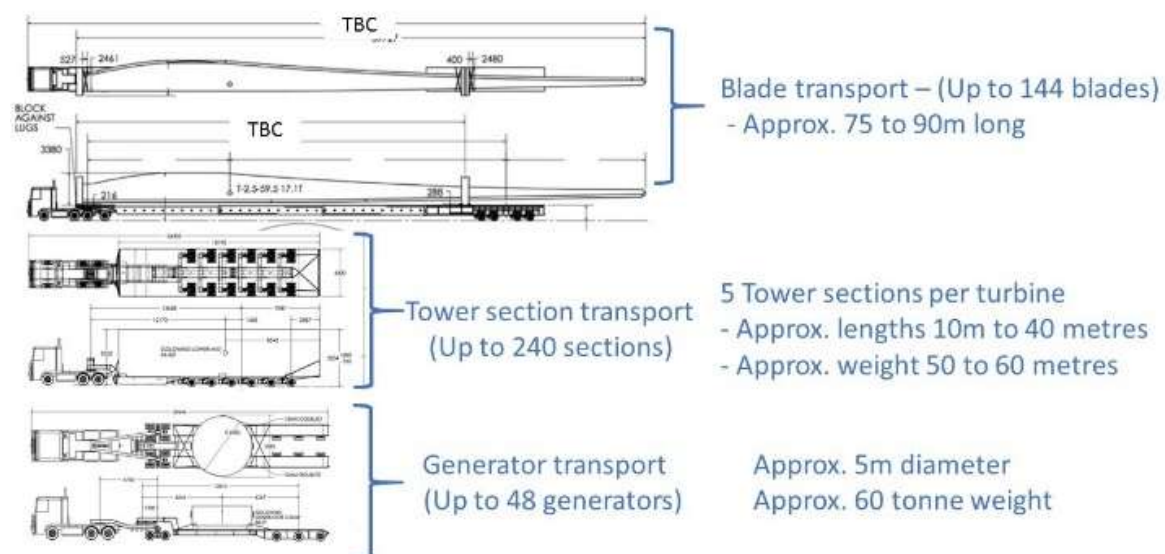


Figure 6.5 Schematic – Transport arrangements and indicative dimensions

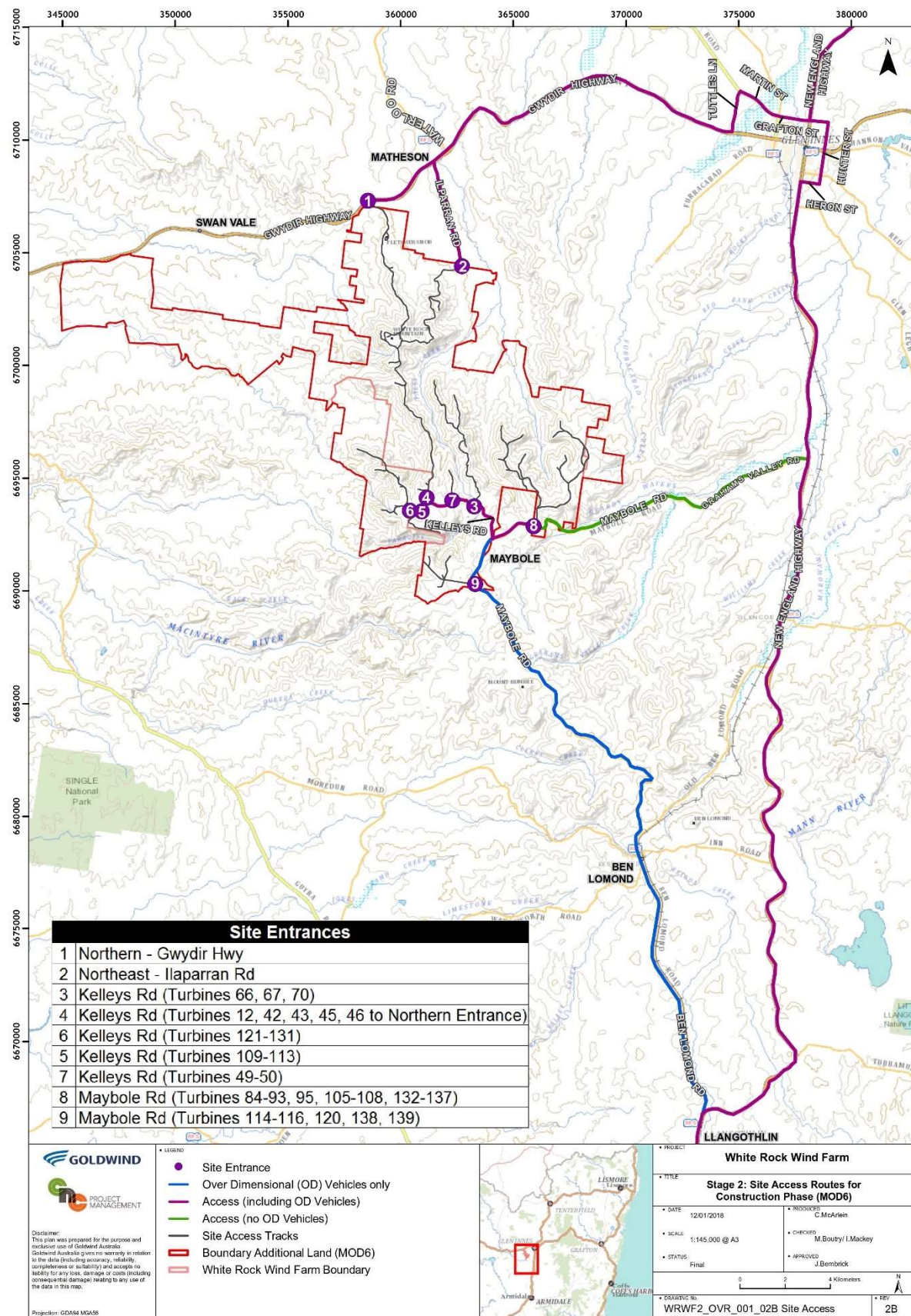


Figure 6.6 Transport access routes for Stage 2

Table 6.11 Indicative Traffic Volumes for Stage 2 construction phase

Construction Activities	Tonnage per Vehicle (tonne)	Total No of Trips	Max No of Trips/Day	Duration (months)	Vehicle Type
Construction staff	2	900	6	12	LV
Construction workers	2	2,000	20	12	LV
Site Inspections and Surveys	2	50	4	18	LV
Site establishment – buildings, etc	30	5	2	1	HV
Deliver Temporary Office buildings	20	3	1	1	HV
Internal access track construction and easement clearing	25	700	10	3	HV
Turbine Footings (Concrete)	48 Turbine footings at 500m³/footing (20,000m³) and ancillaries (3,00m³) Concrete is proposed to be batched on-site – Materials delivered to site.				
<i>Cement</i>	30	144	4	6	HV
<i>Steel</i>	20	144	3	6	HV
<i>Gravel/Aggregate</i>	30	960	4	6	HV
<i>Sand/Fines</i>	30	960	4	6	HV
<i>Admixture</i>	30	24	1	6	HV
<i>Water</i>	20	144	3	6	HV
Concrete truck on Kelley's or Maybole Roads	30	30	5	4	HV
Turbine Components (48 Turbines)	Towers, nacelles, blades, rotors, generators, kiosk transformers				
Tower sections (5/Tower)	100-130	240	2-3	6	OD
Nacelles (1/Turbine)	55	48	2-3	6	OD
Blades (3/Turbine)	60	144	2-3	6	OD
Rotor Hubs	55	48	2-3	6	OD
Generators	100	48	2-3	6	OD
33 kV Kiosk transformer	30	48	2-3	6	HV
Turbine coolers	30	96	2-3	6	HV
33 kV Collections and substation	33 kV underground cables, overhead lines, poles, sand, 33 kV / 132 kV transformer				
Underground cabling (66km), sand backfill	30	200	4	6	HV
Overhead 33 kV conductors (7m)	30	4	1	6	HV
Poles for 33 kV overhead lines	30	30	2	6	HV
33 kV Insulators for OH lines	30	5	1	3	HV
33 kV / 132 kV Transformer	OD/OM Permit 200	1	1	1 Day	OD HV
Deliver Transformer accessories	30	3	1	1 week	HV
Substation expansion items					
Dust suppression – water supplies	30	70	2	3	HV
Deliver Steel infrastructure/substation buildings	OD/OM Permit 30	20	2	3	HV
Deliver Switchyard items	30	10	4	4	HV
Deliver Cranes to site	30	10	2	6	HV
TOTAL		110	10		
Indicative figures for Stage 2 not including Mod 4 Alternative Grid Connection which was treated separately					

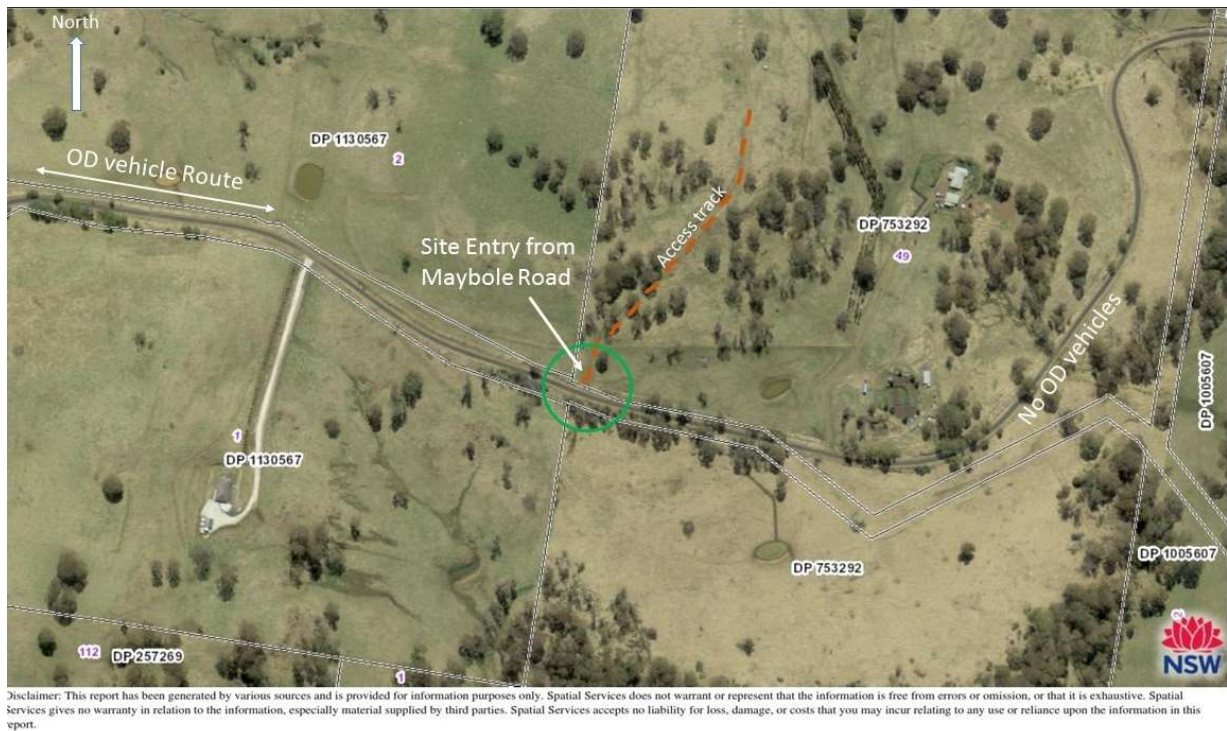


Figure 6.7 Aerial view of entry point 8 from Maybole Road to south eastern group of turbines

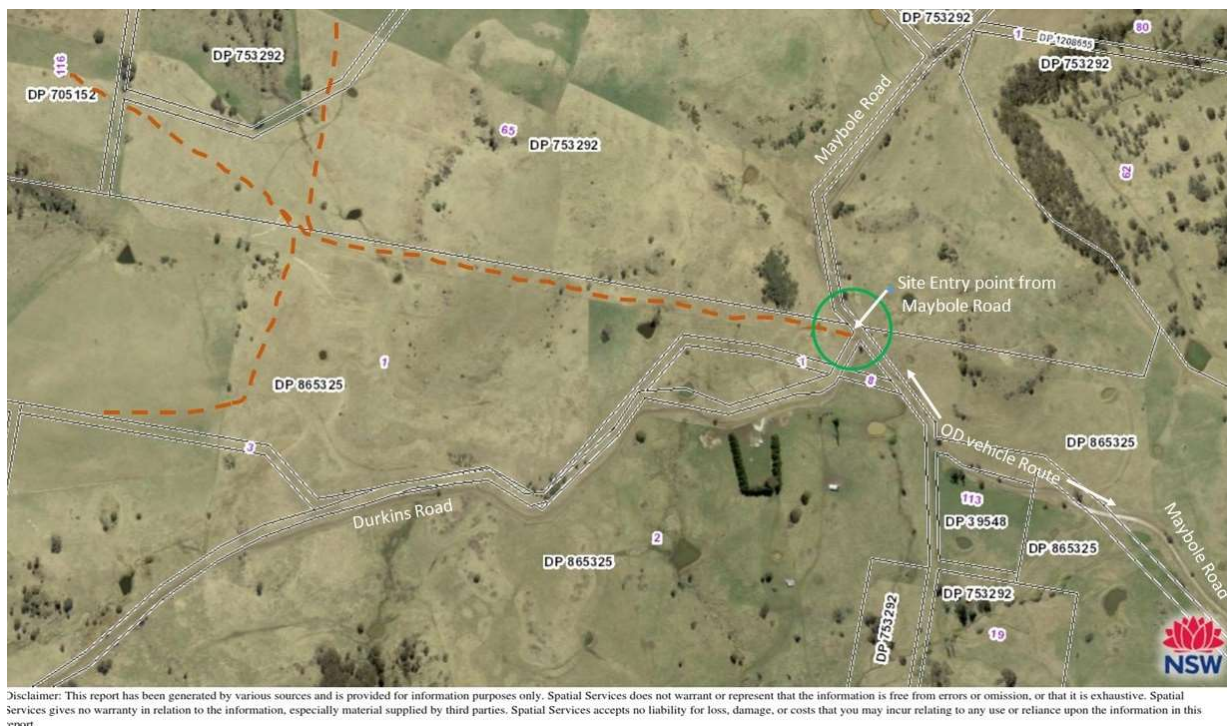


Figure 6.8 Aerial view of entry point 9 from Maybole Road (near Durkins Road) to southern group of turbines



Plate 6.17 Proposed entry point to southeastern turbine group from Maybole Road



Plate 6.18 View to east on Maybole Road to entry point to southeastern turbine group



Plate 6.19 Intersection of Maybole and Kelleys Road – Upgraded as part of Stage 1 for OD transport



Plate 6.20 Intersection of Maybole and Durkins Road adjacent alternate site entry point



Plate 6.21 View of entry point from Maybole Road to Turbine 138 in southern part of Stage 2

6.9 Soil and Water Management

The construction of the modified Stage 2 facilities is similar to Stage 1 construction activities and includes earthworks for turbine sites, hardstands, access tracks, collection circuits (33 kV underground cables and overhead lines) and expansion of the existing substation site. This has potential for causing erosion and sediment transfer and requires management of all activities that involving clearing of vegetation and/or disturbance to soil and rock to avoid or minimize the potential risks.

Areas on steep slopes, concentrated water flows, or unstable soils will pose higher risk and require greater attention to management of the risks.

The Project Approval conditions (E21/22) include the requirement for a Construction Environmental Management Plan (CEMP) and Construction Soil and Water Quality Management Sub-Plan (CSWQMP). A CEMP incorporating a CSWQMP has been approved by DPE for the Stage 1 construction works and will be extended to the alternative grid connection and Stage 2 prior to those works proceeding. Progressive Erosion and Sediment Control Plans would also be developed for sub-areas of the works and reviewed and updated as necessary. Regular inspections of earthworks will assess the adequacy of controls and any need for improvements. In addition, progressive rehabilitation of disturbed areas will occur as soon as practicably possible. This package of measures will ensure that the risks for erosion and sediment transfer are appropriately managed.

The existing requirements in the Project Approval are appropriate.

6.10 Telecommunications Interference

6.10.1 Assessments for the initial Project Approval and Conditions of Approval

Previous assessments for potential Telecommunications interference have been undertaken as follows:

- White Rock Wind Farm Environmental Assessment Epuron, April 2011, Section 10.2 Communication Impacts; and
- White Rock Wind Farm Submissions Report November 2011 – Updated analysis of the potential impact of the proposed White Rock Wind Farm on the NBN TV signal from Mt Dowe to Carpenters Hill – July 2011

In response to assessments provided, the WRWF Project Approval MP10_160 included Conditions of Approval as follows:

- C16. *If the project results in the disruption to radio or telecommunications services in the area, then the Proponent shall make good any disruption to these services as soon as practicable following the disruption.*

If there is a dispute about the mitigation measures to be implemented or the implementation of these mitigation measures, then either party may refer the matter to the Secretary for resolution.

- F2. *Prior to the commencement of commissioning of the project, the Proponent shall undertake an assessment of the existing quality of the television/radio transmission available at a representative sample of receivers located within 5 kilometres of any wind turbine.*

- F3. *In the event of a complaint from a receptor located within 5 kilometres of a wind turbine regarding television/radio transmission during the operation of the project, the Proponent shall investigate the quality of transmission at the receptor compared with the pre-commissioning assessment and where any transmission problems can be reasonably attributable to the project, rectify the problems within three months of the receipt of the complaint, through the implementation of measures including:*

- (a) modification to or replacement of receiving antenna;*
- (b) installation and maintenance of a parasitic antenna system;*
- (c) provision of a land line between the affected receptor and an antenna located in an area of favourable reception; and/or*
- (d) other feasible measures.*

If interference cannot be overcome by the measures outlined in (a) to (d), the Proponent shall negotiate with the impacted landowner(s) about installing and maintaining a satellite receiving antenna. The Proponent shall be responsible for all costs associated with any such mitigation measures.

6.10.2 Mitigation measures for implementation of WRWF Stage 1

As part of the planning and implementation of Stage 1 the following actions were undertaken:

- Review of point to point services in vicinity of the WRWF. This indicated one link that may be impacted which was part of Transgrid communications network. Consultation with Transgrid indicated that this was not of concern to Transgrid who were also involved with the Stage 1 development and will own and operate the WRWF Substation. The link paths identified by that analysis are shown in Figures 6.9 and 6.10.
- Review of potential interference for the link between Mt Dawe to Carpenters Hill. The link provided the feed for television services supplied to Glen Innes township and the locality. Interference to that link could have resulted in degraded or disrupted reception at the Glen Innes locality and affecting a large number of receivers. It was therefore imperative to implement a timely solution prior to the wind farm commencing operation. A solution has been implemented that replaces the Mt Dawe to Carpenters Hill link that was a very long path and indicated as occasionally disrupted by atmospheric conditions. The solution involves a fibre transmission of the TV services to Glen Innes and then transmission by microwave from Martins Hill to Carpenters Hill, where it is transmitted to the surrounding area as has occurred previously, but without the risk of future interference due to wind farm operation.
- Pre-construction surveys were also undertaken for residences surrounding the WRWF Stage 1 site and where potential for impact on television reception was indicated then mitigation measures were applied where the relevant landowners were amenable to the modifications available. All locations where modifications have been requested have been addressed.

Further review of reception will be undertaken when the Stage 1 Project is fully operational and if necessary, additional mitigation measures will be provided.

6.10.3 Stage 2 impacts

Stage 2 involves 48 turbines located mainly in the southern part of the project area and on some additional lands included for the modified Stage 2 (Table 3.1). The mitigation measures undertaken for WRWF Stage 1 reduce the risk of impacts on telecommunications services. Further mitigation measures would also be implemented for WRWF Stage 2 in accordance with the existing Conditions of Approval and procedures applied for WRWF Stage 1.

The existing conditions of approval are regarded as suitable for addressing this issue.



6.11 Aviation impacts

Several phases of aviation safety assessment and notification have been undertaken for the WRWF project as follows:

- Initial assessment for the WRWF Project Application Section 10.1 of WRWF EA, 2011;
- Pre-construction assessments and consultation with ASA and CASA in 2014/2015;
- WRWF Stage 1 pre-construction notifications to relevant stakeholders;
- WRWF Stage 1 construction notifications to stakeholders (December 2016 prior to turbine erection and July 2017 details of as-built locations); and
- WRWF Stage 2 Aviation Impact Assessment, Aviation projects, June 2017 and associated consultation.

A review of the WRWF approved project involving 119 turbines with maximum height of 150 m was undertaken in late 2014 and Airservices Australia (ASA) advice sought as to whether any of the 119 turbines intersected any of the Inverell or Glen Innes approach procedures.

In addition, an Obstacle Lighting Risk Assessment was undertaken for the 119 approved turbine sites in January 2015 based on turbines not exceeding 150 m in height above ground level. On the basis of the assessment and in association with consultation with CASA, aviation obstacle lighting was not required on any of the 150 m high wind turbines.

Pre-construction notifications, as required by the Project Approval, were provided in April 2016, prior to the construction commencing on 25 May 2016. An update for the as-built locations was provided in July 2017.

A further Aviation Impact Assessment (AIS) (Appendix 8) of the modified WRWF Stage 2 project has been prepared by Aviation Projects Pty Ltd in September 2017. The additional study was required due to the additional turbines sites proposed and higher maximum tip height (up to 200 m) proposed for the Stage 2 wind turbines. The AIS reviewed the potential impact of the modified Stage 2 project on aviation safety in the context of air safety regulations and procedures and with consultation with regulatory authorities that is ongoing. The AIS also includes a risk assessment as to whether aviation safety lighting is required to be installed on selected turbines. The AIS has been submitted to regulators for comment and some of the responses are expected during the time that the modification application is under review.

Details of the modified Stage 2 project and an aviation safety assessment were provided to CASA and their comments sought on the proposal. CASA responded by letter dated 14 August 2017 and reiterated its previous response that there is *'no requirement for the turbines as previously assessed at 150 m AGL to be lit'*. In regards to 200 m high wind turbines CASA recommended that they be, *'lit with steady red medium intensity lighting at night as per NASF Guideline D – Managing Wind Turbine Risk to Aircraft.'*

Private airstrips, primarily enabling aerial agriculture operations are located in the vicinity of the Stage 2 development and are identified below and shown on Figure 6.11:

- Nugent;
- McLeod;
- Burey; and
- Putland.

The impact of the Stage 2 turbines and the internal 33 kV transmission lines in respect of safety of aerial agricultural operations is not likely to be significant as local aerial agricultural operators with familiarize themselves with the WRWF infrastructure.

Any planned aerial operations in the immediate vicinity of the Stage 2 facilities will need to be assessed by the aerial agricultural operator(s) once they have been constructed. Impacts on aerial agriculture operations have also been addressed by the Project Approval conditions.

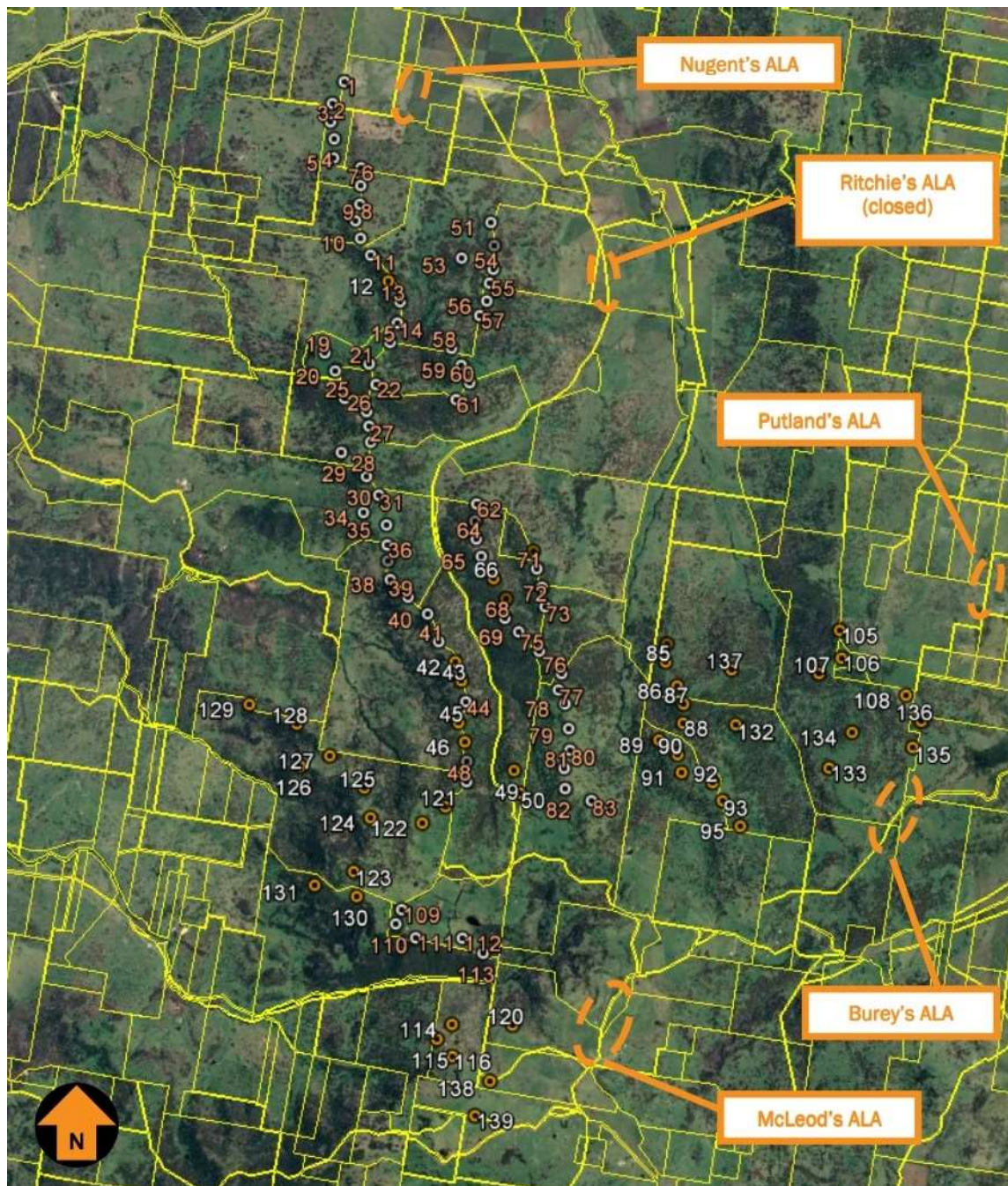


Figure 6.11 Aircraft Landing Areas (ALAs) surrounding WRWF Stage 1 and Stage 2

Existing Conditions of Approval C11, C12 and C13 address aviation obstacles and hazards.

The assessments and consultation undertaken for this Mod 6 Application address the requirements of Condition C11 and mitigation measures for the modified Stage 2 shall be confirmed in consultation with the respective groups mentioned in Condition C11, prior to the commencement of construction.

Condition C12 requires prescribed information being provided to CASA, AirServices Australia, Royal Australian Air Force as well as known users of privately owned local airfields. The required notifications and most recently, supply of as-built details for Stage 1 turbine locations have been provided as required by Condition C12.

Condition C13 of the Project Approval addresses potential for increases to cost of aerial spraying as follows:

“Should increases to the costs of aerial agricultural spraying on any non-associated property surrounding the site be attributable to the operation of the project, the Proponent shall fully fund to the affected landowner, the reasonable cost difference between pre-construction aerial agricultural spraying and the increased cost, as agreed between the relevant parties.”

WRWF Stage 1 commenced construction after consideration of risks to aviation, any need for aviation safety lighting on turbines and with notification to aviation stakeholders providing details of locations and dimensions of wind turbines and meteorological masts. The notifications are required by Condition C12.

The Project Approval Conditions are equally relevant to Stage 2 and to Stage 1. Further advice has been obtained (Appendix 8) in respect of aviation safety risks and any need for lighting on turbines. Consultation has been occurring with CASA.

The CASA document, Manual of Standards (MOS) 139 would require that the turbines are lit based on their height unless an aeronautical study assesses they are of no operational significance. CASA has recommended that the 200m high turbines be lit. Aviation Projects has also assessed (Appendix 8) that there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision with a wind turbine, without obstacle lighting on the turbines of the Project. The recent cancellation (December 2017) of the proposed Glen Innes Flight Training School has significantly reduced the number of aircraft likely to operate in the area and likewise reduced aviation risk.

In relation to the monitoring masts (towers), Aviation Projects has suggested that consideration be given to marking any permanent wind monitoring towers (WMTs) according to the requirements set out in MOS 139 Section 8.10 Obstacle Markings (as modified by the guideline in NASF Guideline D).

The 33 kV transmission lines internal to the Stage 2 layout and with heights (30 to 35 m) that are much lower than the wind turbine structures are mostly at lower levels in the terrain and are not expected to increase safety risks to aviation but will be brought to the attention of local aviation operators.

Conditions C12 and C13 are considered appropriate for the project, therefore additional conditions relating to aerial spraying and aviation safety are not required as a result of the modification.

6.12 Land use implications

The Stage 2 modifications will not significantly change the current land use due to the small footprint of the project within the extensive pastoral areas. The project footprint of the modified Stage 2 will be marginally greater than for the approved Stage 2 project despite there being one less turbine site but due to larger turbine equipment and realistic civil designs that have increased the footprint.

Although there may be some minor disruptions during the construction phase, existing grazing and crop cultivation will continue as before. Changes to agricultural methods could potentially occur for agricultural methods such as spray irrigation or low flying aerial agriculture. This potential impact has been addressed by Condition C13.

Stage 2 will have minimal impact on water usage and hydraulic flows across the site. WRWFPL will work closely with the landowners to ensure that construction activity and earthworks will not adversely impact the flow of water across their land.

6.12.1 Agricultural land use

The proposed facilities are located on land zoned as '*RU1 Primary Production*' under the Inverell and Glen Innes LEPs, 2012. The land has been extensively cleared for pastoral activities but retains areas of varying density woodland. Parts of the area where Stage 2 would be located are classified as '*Strategic Agricultural Land*' (SAL). Consultation with DPI Agriculture has encouraged reference to Primefact 1063 (June 2013) for infrastructure proposals on rural resource lands.

Figure 6.12 shows the location of Strategic Agricultural Land in the vicinity of Stage 2. The DPI publication, Primefact 1063 encourages the following considerations for planning and implementation in rural lands.

- Resource loss and fragmentation;
- Impacts on farming operations and livestock;
- Increased biosecurity, pest and weed risks and impacts on livestock; and
- Site rehabilitation.

Stage 2 requires only a small part of the current pastoral land and will not fragment agricultural lands. Impacts for farming are mainly relevant to construction and negligible once operational. Weed management is an integral part of construction management and has been implemented for WRWF Stage 1. Progressive rehabilitation is required by Approval Conditions F4 and F5 that are still relevant and appropriate for the modified project. It is also in the proponent's interest to implement timely rehabilitation to reduce ongoing maintenance costs. The availability of an improved access track network can also assist the landowner to manage their property.



Figure 6.12 Location of Strategic Agricultural Land for the Maybole locality (DPE Portal)

6.12.2 Residential land use

There are 48 residential dwellings located within 4 km of the Stage 2 wind turbine. Of these 29 are involved with the project referred to as associated landowners. The project design has included a set

back from neighbouring non-associated residences and some of the previously approved wind turbine locations have been omitted from the modified Stage 2 layout to increase set back distances and mitigate the project's impacts. The Stage 2 development does not limit the residential use of any of the neighbouring lands. Residences on land where the infrastructure is located can be closer to wind turbine locations and the impacts may be greater for these associated landowners. In these cases, the leases include provisions addressing the associated status for relevant residence locations and impacts such as wind farm noise or visual appearance.

6.12.3 Mineral Resources

A review of mineral resource exploration and mining titles from the NSW Mineral and Resources database using MINVIEW has been undertaken to identify any potential for conflicts between the development and mineral resource potential. No mining or exploration titles were identified in the vicinity of the modified Stage 2 proposal (Figure 6.14). ML 1505 has been previously identified in relation to the alternative grid connection facilities and was addressed during the review process for the Mod 4 Application and its Approval. ML 1505 is not relevant to the modifications addressed by the Modification No. 6 Application.

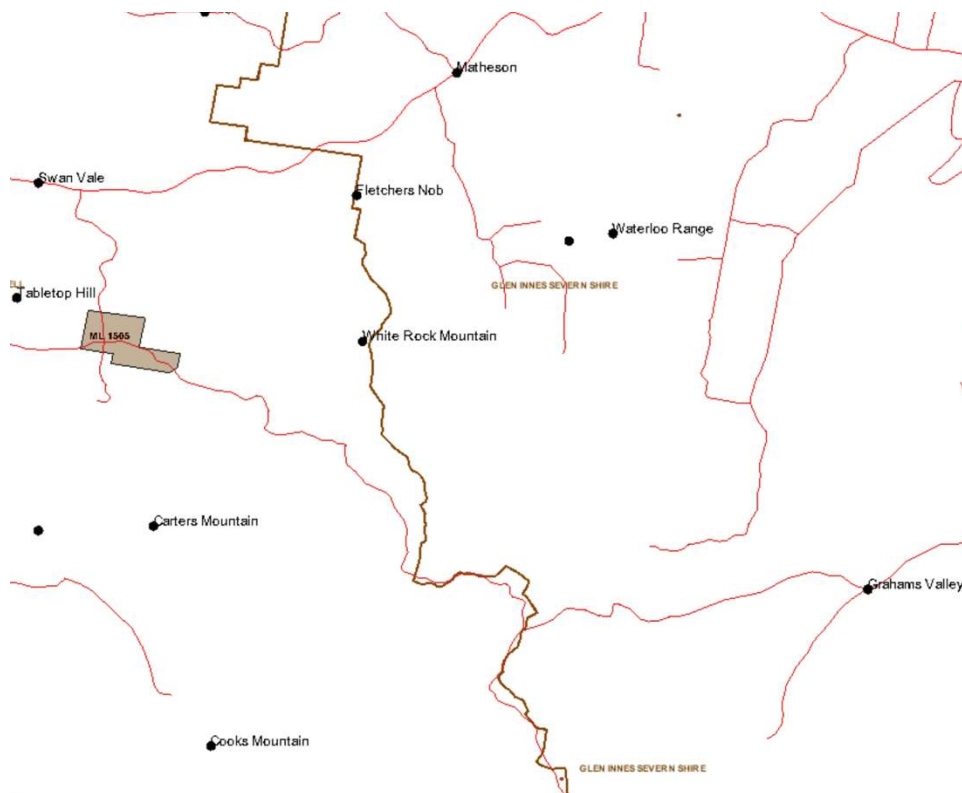


Figure 6.13 Mineral and Resources Titles for the vicinity of the WRWF project area

6.13 Bush fire risk

Construction and operational activities can introduce additional ignition sources that have the potential to increase bush fire risk and need to be managed. The Stage 2 layout has been selected to avoid trees wherever possible reducing the need for clearing of native vegetation. However, some vegetation clearing is required during construction and maintenance once operational to maintain safe electrical clearances. Stage 2 infrastructure would be periodically inspected to monitor regrowth and the condition of the infrastructure.

The substation transformer equipment includes a substantive volume of insulating oil in the 33 kV / 132 kV transformers. Each transformer has a bund to ensure the oil is contained in the event of a major leak. The equipment would be inspected and maintained regularly to ensure that the facility does not create a fire hazard. An asset protection zone would be maintained around the substation facility in accordance with the RFS guidelines to minimise the risk of a fire spreading in the event of a fire at the facility.

A Bushfire Risk Management Plan has been prepared for the WRWF Stage 1 construction works and has been updated for the operations phase. It would also be extended to the Stage 2 construction works in consultation with RFS. Relevant details on the assessment and mitigation of the risk of fire from Stage 2 infrastructure will be provided in that Plan.

6.14 Electric and Magnetic Fields

The Stage 2 facilities are similar to Stage 1 infrastructure and have low potential for giving rise to risks from Electric and Magnetic Fields (EMF) that may impact the public. The modification is unlikely to increase this risk. Previous reference has been made to material available from TransGrid for Modification Application No. 4 and provides guidance for Modification Application No. 6.

Electric and Magnetic Fields (EMF) are part of the natural environment and electric fields are present in the atmosphere and static magnetic fields are created by the earth's core. EMF is also produced wherever electricity or electrical equipment is in use. Transmission lines, electrical wiring, household appliances and electrical equipment all produce power frequency EMF.

An electric field is the force that fills the space around every electric charge, including any powered electrical appliance or conductor (e.g. a transmission line). Electric fields are measured in volts per metre (V/m) or kilovolts per metre (kV/m). They occur both naturally and as a result of power generation, and are produced every time voltage runs through a wire. The higher the voltage, the stronger the electric field. Electric fields are strongest closest to the wires and their level reduces quickly with distance. Most materials act as a shield or barrier to electric fields.

Magnetic fields are produced by the flow of an electric current through a wire and are measured in milligauss (mG). The higher the current, the greater the magnetic field. Like electric fields, magnetic fields are highest closest to the wire and their level reduces quickly with distance. Most materials would not act as a shield or barrier to magnetic fields. Together, the electric and magnetic fields are referred to as EMF.

All types of electrical equipment, including transmission lines, produce EMF. For a transmission line, the strength of the electric field varies generally with the operating voltage of the line (measured in volts), while the magnetic field strength is related to the current flowing in the line (measured in amps). The current flowing in the line is dependent upon the load or power flow, and would vary with consumer demand (which varies on a daily and seasonal basis). The EMF strengths at ground level below the conductors, are also dependent on the height of the wires above the ground and their geometric arrangements as supported by the transmission structures.

The scientific literature on EMF exposure is extensive, complex and inconclusive. In addressing the question of adverse health effects, WRWFPL will rely on expert advice on EMF available from competent health authorities in Australia and from around the world. This includes the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is the Federal Government agency responsible for providing health assessments and recommendations to the Government on matters relating to EMF.

ARPANSA has adopted the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines for limiting exposure to EMF, published in 2010. The ICNIRP Guidelines express limits in terms of 'Reference Levels' and 'Basic Restrictions' under general public and occupational exposure conditions.

The Basic Restriction values are expressed as the internal electric fields which can be induced in the body without adverse health outcomes, these must be met. As the Basic Restriction values apply within body tissue, it is difficult and impractical to measure them. For that reason, Reference Levels, which are simpler to measure, are provided as an alternative means of showing compliance with the Basic Restrictions.

If desktop study and/or direct field measurements show that the EMF is below the Reference Levels, the EMF is well within the Basic Restrictions. The reference levels may be exceeded if it can be demonstrated that the basic restrictions are still met.

EMF Reference Levels

The Reference Levels contained in the ICNIRP Guidelines are listed in Table 6.12.

Table 6.12 ICNIRP EMF Reference Levels*

Exposure Characteristic	Electric Field	Magnetic Field
Public Exposure	5 kV/m	2,000 mG
Occupational Exposure	10 kV/m	10,000 mG
* Reference level limits are taken as instantaneous root mean squared values.		

The proposed modifications for Stage 2 increase the number of turbines, expand the 33 kV / 132 kV substation and include several short sections of 33 kV transmission lines in rural areas distant from rural residences. While, these would be additional sources of electric and magnetic fields, their remoteness and limited extent of the fields results in negligible risk. The proposed 33 kV transmission lines would be designed and built to ensure that exposure levels are within the limits recommended by the ICNIRP Guidelines (2010).

TransGrid would design the switchyard / substation layout in accordance with guidelines and standards to ensure that exposure levels remain below the ICNIRP limits, thus minimising the risk of EMF exposure for staff and members of the public. The substation site is at significant distance from publicly accessible locations.

Typical levels of magnetic field under a 132 kV transmission line are indicated to range from 2 – 50 mG at a distance of 15 – 35 m from the centreline of the transmission line. The magnetic field falls away rapidly as the distance increases. These figures are significantly less than the 2,000 mG ICNIRP Reference Level. Levels are expected to be less for the 33 kV lines that are part of the Stage 2 collections circuits and the lines are distant from public areas or residences.

As the nearest neighbouring residence is 500m away from a 33 kV transmission line and at least 2.5 km from the WRWF substation location, there will be no adverse impact from electric or magnetic fields.

6.15 Cumulative Impacts

The Stage 2 modifications do not substantially vary the impacts of the approved WRWF project (comprising the installed Stage 1 and the proposed Stage 2). This modification removes one turbine from the original layout, but turbine dimensions and the project footprint have increased. Cumulative impacts warrant consideration where the changes arising for key issues could be significant.

The Wind Energy Bulletin states that in relation to cumulative impacts:

“The consent authority will give consideration as to whether any other proposed, approved or operating wind energy projects in the vicinity are likely to increase the impacts of the wind energy projects the subject of the DA,” (in this case modification application) “especially in regard to landscape, noise, biodiversity and traffic impacts.”

The additional impacts of the modified project relate to variations of the Stage 2 layout and turbine model selected. The design of the modified Stage 2 project has resulted in a marginal increase in project footprint and larger turbine dimensions, but has sought to reduce further impacts by relocating turbines away from neighbouring residences where feasible.

The New England area has attracted a significant number of renewable energy projects due to its high elevation and good wind/solar resources. WRWF is one of three wind farm projects contemplated for the area, with the Sapphire Wind Farm (SWF) under construction and Glen Innes Wind Farm (GIWF) seeking modifications to its planning consent. Figure 6.14 provides an indicative timeframe for the construction and start of operation of the neighbouring wind farm projects.

PROJECT	2018				2019				2020				2021	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
WRWF Stage 1														
WRWF Stage 2														
WRSF														
SWF														
GIWF (Estimated)														

Construction
 Operation

Figure 6.14 Indicative WRWF Timeline for WRWF and nearby renewable energy projects

Consideration of the cumulative impact for the issues of landscape, noise, biodiversity and traffic impacts as they relate to neighbouring wind farms is described below.

Visual impact: The visual impacts of the modified Stage 2 wind farm have been assessed by Green Bean Design and represent a marginal change overall. This has been achieved through the relocation of some turbines in order to increase overall setbacks to neighbouring residences. The relocation of turbines has been to locations in areas of lower rural residential settlement density. This has improved siting from a visual impact perspective relative to the previously approved turbine sites that they replace. Specifically, cumulative impact with neighbouring wind farms varies due to:

- Relocation of 4 turbines (101 to 104) increasing the separation distance between the GIWF and the closest Stage 2 turbines by 1.2 km, from 3.8 km to 5.0 km.
- No decrease in the separation of WRWF and SWF (at least 4.4 km) with the bulk of WRWF Stage 2 turbines being more than 10 km to the south.

Noise impact: Noise impacts have been assessed by Sonus (taking into account the installed Stage 1 and proposed Stage 2 turbines) and it has been demonstrated that compliance can be achieved. WRWFPL has options to vary the turbine model used for the project or individual turbine operation to ensure compliance with the noise criteria. As the noise assessment has considered the WRWF project as a whole, rather than separate stages, it addresses cumulative impacts of Stage 1 and 2. The entire WRWF project will continue to comply with the criteria applicable to the approved project.

When considering the nearby GIWF and SWF and potential cumulative noise impacts, it is noted that:

- The separation between the GIWF and closest WRWF Stage 2 wind turbine has increased by 1.2 km as a result of the Stage 2 modification, reducing impacts at any intervening locations.
- The closest Sapphire Wind Farm turbine is approximately 4.4 km to the northwest of the WRWF Stage 1 wind turbines. The Stage 2 modification places turbines no closer than Stage 1 turbines, with the closest individual Stage 2 wind turbine 6.8 km from a SWF turbine. The vast majority of turbines are over 10 km away.

Construction noise impacts are temporary and considered manageable within acceptable criteria. The WRWF Stage 1 and Stage 2 construction phases do not overlap, so there will be no cumulative construction noise impacts for the modified WRWF project.

With regard to GIWF and SWF, the latter project is already under construction and it is unlikely there will be any overlap in construction activities with WRWF Stage 2. The construction of GIWF is currently unknown, so an overlap in construction activities is possible. However, the bulk of WRWF Stage 2 construction will happen in the south, more than 5 km from the southerly extent of GIWF. Other proposed renewable energy projects are located much further to the west and north west, so no cumulative construction activity noise impacts are expected.

Cumulative impact from noise related to vehicle movements during construction is likewise unlikely, given that these projects are not situated on the same local road network.

Biodiversity impacts: Additional biodiversity impacts are applicable due to the greater emphasis placed on a more detailed civil design footprint, coupled with more rigorous ecological impact assessment requirements which were not present during the original application process. Due to the increase in the calculated ecological impact it is necessary to seek an increase in the vegetation clearing limit for Ribbon Gum-Mountain Gum EEC. This increase will be offset through revision of the Biodiversity Offset.

WRWF, GIWF and SWF each have their own assessment requirements, but consideration needs to be given to the broader ecological impacts resulting from multiple projects. Assessment requirements ensure that each project calculates its ecological impact and associated offsets. Given each project has been consented, the cumulative impacts have been deemed acceptable to date. WRWF Stage 2 has attempted to minimise further ecological impact whilst maximising turbines placement, identifying suitable offset sites to compensate for the vegetation loss. Other neighbouring wind farm projects will likewise be required to ensure the offsets are commensurate with the level of construction impact.

Traffic impacts: Traffic and transport impacts are primarily temporary during construction, and once the project is operational will involve low traffic volumes and low impact.

The construction transport will substantially use the same routes that have been used for Stage 1. As the bulk of Stage 2 is in the southern part of the project area, delivery of over dimensional components is expected to be via the Ben Lomond route. There will not be a cumulative impact for WRWF Stage 1 and 2 as the respective stages will not overlap.

There is not expected to be a cumulative traffic impact for WRWF Stage 2 in relation to GIWF and SWF as the transport for WRWF Stage 2 uses a different site access route over local roads. Construction is expected to have finished for SWF before WRWF Stage 2 construction commences. Transportation of components may overlap for GIWF but only in the use of the New England Highway up to the Llangothlin turn off.

Other Impacts: There are no cumulative impacts with other renewable projects on Indigenous heritage values as a result of the modification.

Soil and water impacts can occur mainly associated with construction but are manageable through the required CEMP and CSWQMP as amended to address experience gained from Stage 1 and strengthening of controls where warranted. There are not expected to be any significant cumulative impact on soil and water quality as a result of construction of the modified Stage 2 facilities and any impacts will be localised and not cumulative with any other projects in the area. There may be an overlapping demand for water should construction activities across different renewable projects coincide and this will need to be managed.

Potential telecommunications interference has partly been addressed by mitigation measures applied for Stage 1. Further mitigation measures have been identified for Stage 2 and can be implemented in

accordance with the current approval conditions. The modification does not result in any increase in cumulative impacts for potential telecommunications interference, with each individual project required to ensure no interference is caused in the area.

An Aviation Safety Assessment has been prepared for the Stage 2 development and further consultation is occurring in parallel with the Modification Application process. The modification has assessed the increased height and bulk of the wind turbine structures and has found the impacts are acceptable. GIWF and SWF present additional obstacles but have been assessed as no greater risk as a result of the increased height.

7 CHANGES SOUGHT FOR CONDITIONS OF APPROVAL

This assessment report provides details of the changes to impacts as a result of the proposed modifications. In general, the currently proposed mitigation strategies and Conditions of Project Approval are suitable for Stage 2 implementation. However, in a number of cases, changes are sought to the Conditions of Approval to align with the details of the modified project and appropriate Conditions.

Table 7.1 sets out the potential changes to the Conditions of Approval for consideration by the Secretary.

Table 7.1 Changes sought to Project Approval Conditions

Condition	Current form of Condition	Proposed revised form of Condition
C1(b)	Not clear more than 28 hectares of the Ribbon Gum – Mountain Gum – Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion of the New England Tableland Bioregion EEC on site	Not clear more than 90 hectares of the Ribbon Gum – Mountain Gum – Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion of the New England Tableland Bioregion EEC on site
Appendix 1	Project Layout	Update map to address properties described in Section 3 of this report.
Appendix 1	Schedule of Land	Update schedule of land to address properties described in Section 3, Table 3.1 of this report.

8 JUSTIFICATION

The modifications for the Stage 2 development offer an improved project design that optimizes the use of the renewable energy resource at the location without significantly increasing the project impacts relative to the impacts applicable to the approved turbine locations and a realistic design.

The modified Stage 2 could generate up to 171 MW using the Goldwind 3S 3.57 MW turbine. With connection of WRWF at 330 kV rather than 132 kV (approved under Mod 4), there is no constraint on output, there are reduced electrical losses for the output to the Grid and the second stage of WRWF is able to utilize larger more efficient turbines which provides a more productive, efficient and optimized project. The combined Stage 1 and 2 wind farm generation capacity is potentially up to 346 MW using 3S turbines for Stage 2.

The WRWF Epuron Environmental Assessment, 2011 took a conservative approach to the potential output of the wind farm using a 2 MW wind turbine as the basis of output and emissions savings calculations. This conservative approach was appropriate for 2011 and could have delivered 238 MW for the 119 turbine project. The installed Stage 1 and modified Stage 2 (with Goldwind 3S turbines) increases the total project output by either 108 MW.

This modification application proposes a higher capacity wind farm and lower electrical losses thereby delivering a more economically viable wind farm. On the understanding of no capacity constraints on the 330 kV transmission line the benefits of the project have been recalculated using the higher capacity of the Goldwind 3S wind turbine for Stage 2 (turbines rated at either 3.0, 3.4 or 3.57 MW). To be able to cover the costs of the approved 132 kV / 330 kV substation, Stage 2 has been resized to ensure a viable project and more competitive power pricing.

Table 8.1 shows that the resultant modified wind farm performance relative to Stage 1 development only and for the approved 119 turbine wind farm. The modified Stage 2 project could deliver substantially increased output and associated emissions savings.

Table 8.1 Development outcomes and benefits of a modified WRWF Stage 2

Wind Farm Performance Criteria	Wind Farm EA (2011)	WRWF Stage 1 (2016)	Stage 1 and 2 (as approved)	Stage 1 and Mod 6 Stage 2	
Number of turbines	119	70	119	70	48
Turbine rating (MW)	2.0	2.5	2.5	2.5	3.57
Wind farm output capacity (MW)	238	175	297.5	346.36	
Emissions avoided (tonnes/year CO ₂ -e)	754,000	554,411	942,500	1,097,290	
Electricity generation (MWh/yr)	830,000	610,050	1,037,500	1,207,410	
Households Supplied (Number)	130,000	95,550	162,500	189,110	
Note: Households supplied is based on average consumption.					

8.1 Summary of Benefits of the WRWF Stage Modifications

The modified WRWF Stage 2 allows an optimised and more efficient development of WRWF enabling increased renewable energy output, increased greenhouse gas emissions savings, reduced electrical losses, increased landowner involvement in the project and the opportunity for lower priced electricity into the grid. The modified White Rock Wind Farm provides the following primary benefits:

- Directly increases the potential renewable energy capacity at the location by up to 172 MW, more than doubling the WRWF generation capacity;
- A majority of the relocated Stage 2 turbine sites are further from non-associated residence locations.
- Compared to coal fired electricity (the bulk of generation in NSW) WRWF represents clean energy from a renewable wind resource. Wind energy avoids the impacts of coal fired generation including; coal mining impacts, large volumes of carbon dioxide, sulphur oxide and nitrous oxide emissions, large volumes of ash production much of which goes to landfills with leachate management requirements, water demands at inland sites, cooling water management involving thermal discharges for coastal sites and salinity of cooling waters at inland sites as well as range of other oil and waste management issues.
- With full development, generation output would almost double from 610,050 MWh of electricity per year for Stage 1 to 1,207,410 MWh per year for Stage 1 and 2;
- Based on average consumption per home, the number of homes served increases from 95,550 to 189,110;
- Improves the security of NSW electricity supply through diversification of NSW generation locations;
- It would allow further greenhouse gas emissions savings increasing from an indicative 554,411 to 1,097,290 tonnes of carbon dioxide equivalent (CO_{2e}) per annum. (The emissions savings are scaled up from Epuron calculations using NSW Wind Farm Greenhouse Gas Savings Tool developed by DECCW);
- The emissions savings are an important element of Climate Change mitigation responses that are promoted for a range of beneficial reasons:
 - Climate Change has potential to affect biodiversity in various ways (see following item);
 - Climate Change has been identified by the 'Threatened Species Scientific Committee' (TSSC) under the EPBC Act, as a Key Threatening Process (KTP) as follows, "*Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases*". This KTP consists of reductions in the bioclimatic range within which a given species or ecological community exists due to emissions induced by human activities of greenhouse gases.
 - Climate Change can be associated with increase in extreme weather events
 - Climate Change can require significant adaptation imposing significant cost on the global and national economies. Inadequate mitigation is indicated to require greater adaptation.
- The project would contribute to the State and Federal Government targets of providing at least 20 % of consumed energy from renewable sources by 2020;
- WRWF would contribute to the NSW Government's target of reducing greenhouse gas emissions by 60 % by the year 2050;
- WRWF Stage 2 would create further local employment opportunities and represents a capital investment of over \$300 million into the Australian economy; and
- In addition to these primary benefits there are also significant secondary benefits which include opportunities for tourism and ecology and improvement to existing infrastructure.

9 CONCLUSIONS

The proposed modifications for WRWF Stage 2 project provide for an optimized, more efficient wind farm with increased output of up to 346 MW. This involves connection to the existing 330 kV transmission line, approximately 13 km west of WRWF through the alternative grid connection described for the Mod 4 Approval.

The development of WRWF is being staged, as set out in the WRWF Staging Report, November 2017. The staging is summarized below.

- Stage 1 of the WRWF commenced construction in May 2016 and involves the installation of 70 Goldwind GW121 2.5 MW wind turbines. These turbines have a total generation capacity of 175 MW and Stage 1 is scheduled to be operational in early 2018. Stage 1 utilises the full grid connection capacity of the existing Glen Innes to Inverell 132 kV transmission line.
- The previous Mod 4 approval allows for an alternative 330 kV grid connection to the west of the project that would have the capacity to enable unrestricted export of the combined generation of WRWF Stage 1, Stage 2 and WRSF.
- Stage 2 involves up to 48 turbines (one less than the existing Project Approval) consisting of 19 approved locations, 9 minor change locations and 20 relocated turbines.
- The modification proposes turbines with increased dimensions up to a maximum tip height of 200 m and maximum rotor dimension of 170 m.
- The potential Stage 2 turbine model for Stage 2 is the GW140 3S model with rating up to 3.57 MW per turbine.
- The Stage 2 project area involves four additional properties relative to the existing approval and removes one landowner previously involved. As a result the overall project area is increased to 15,078 hectares but the footprint is only 160 ha.
- The total output of WRWF Stage 1 and 2 could be up to 346 MW.

This Environmental Assessment for the Stage 2 Modification Application No. 6 has:

- identified and described the modified Stage 2 infrastructure, including turbine locations, access tracks, overhead transmission lines, underground cables and temporary construction facilities;
- provided an assessment of the potential environmental impacts for the construction and operation of the modified Stage 2 infrastructure;
- identified mitigation measures for the potential impacts including biodiversity offsets.

The following sections summarise the key changes in the impacts for the modified Stage 2 project:

- **Visual.** The visual impact of the approved project varied from Nil to High for 19 non-associated neighbouring viewpoints. The modified Stage 2 project has been assessed as comprising wind turbines of similar form, pattern and colour to the approved project. While the increase in rotor diameter and tip height would be discernible from some surrounding locations, the overall extent of visibility as shown in ZVI diagrams would be similar to the approved project. The Stage 2 location in a sparsely settled area with setbacks from non-associated residences and the ability of the landscape to visually absorb the development supports the acceptability of the project. Twenty turbines have been relocated and many of these have increased in setbacks for non-associated neighbouring residences to the Stage 2 development and, as a result, reduced visual impact for these view points;

- **Noise.** The noise impact of the modified Stage 2 project has been assessed as being able to comply with the relevant noise criteria for the approved project.

The construction noise impacts will be temporary at any location and will be managed through an update and further approval of the Stage 1 approved CEMP to be relevant for Stage 2. The CEMP addresses the Interim Construction Noise Guidelines.

Operational noise of Stage 2 is marginally increased but can still achieve the relevant noise criteria derived in accordance with Condition F7. An updated predicted noise report responding to Condition F6 would be submitted to DPE prior to commencement of construction of WRWF Stage 2;

- **Biodiversity – Vegetation and Habitat Impacts.** The Stage 2 layout has been re-configured to minimize ecological impacts where possible but does involve an increased extent of vegetation clearing. This is due to the application of a more detailed civil engineering design informed by experience from Stage 1 construction work. Construction would be undertaken in accordance with the required Construction Flora and Fauna Management Plan (CFFMP), updated as necessary and subject to further approval of the DPE.

Offsets of biodiversity impacts will also be implemented through extension of the WRWF Biodiversity Offset Package that will need to be approved by DPE in consultation with OEH;

- **Biodiversity – Birds and Bats –** The potential for change in impact on birds and bats due to larger turbines has been assessed. It is likely that there will be a reduced impact for low flying species due to increased minimum height of Rotor Swept Area if the GW 140 3S turbine is used. There is the potential for an increased risk for higher flying species due to the increased tip height, but overall that represents a low proportion of all birds present.
- **Indigenous Heritage.** The Stage 2 layout has been assessed by an archaeologist in conjunction with Aboriginal stakeholders. The design avoids identified indigenous heritage sites (artefacts scatters and scar trees). No increase in impact on indigenous or non-indigenous heritage is anticipated for the modification;
- **Traffic and Transport.** The Stage 2 site can be accessed from the New England Highway using local roads and existing WRWF access tracks. Prior to the transport of Stage 2 components, the access routes will be further reviewed in respect of the proposed transport dimensions. If necessary upgrades will be arranged with the relevant road authorities (as per the Project Approval Conditions) and consistent with the Construction Traffic and Access Management Plan (CTAMP) and subject to agreements with relevant road authorities. The modification does not give rise to significant increase in impacts for roads and safety of users, is generally consistent with the arrangements for Stage 1 construction and will be managed in a similar way to the Stage 1 transport activities;
- **Soil and Water Management.** The Project Approval and the CEMP set out appropriate mechanisms to manage erosion and sediment transfer. These measures are complemented and followed up by progressive rehabilitation of disturbed areas. The modification will not significantly increase impacts for erosion or water quality;
- **Telecommunications Interference.** A range of potential impacts on telecommunications services have been considered for the project implementation. Mitigation measures applied for Stage 1 have avoided the potential for interference to TV reception in the vicinity of the Glen Innes township. Mitigation measures undertaken for the areas surrounding Stage 1 would also be extended to areas neighbouring the Stage 2 project. The existing Conditions of Approval are regarded as suitable for the Stage 2 development.
- **Aviation Safety.** An Aviation Impact Assessment has been prepared for the project. While the maximum height of the turbines has increased from 150 m to 200 m, Aviation Projects

assessed that *“there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision with a wind turbine, without obstacle lighting on the turbines of the Project”*. However, they have recommended marking of wind monitoring masts (towers) due their lower visibility.

This document also describes:

- consultation undertaken to date for WRWF and the modified Stage 2 project. Consultation is ongoing and will be undertaken generally as set out in the WRWF Community Engagement Plan, which will be updated to reflect Stage 2. This will include community information sessions in Glen Innes, Inverell and Ben Lomond on commencement of the public exhibition period for the Modification Application; and
- Justification and benefits for the modified WRWF Stage 2 project were provided in Section 8.

Based on the information in this Environmental Assessment Report, the impacts of the modified Stage 2 are deemed acceptable for the nature of the development and given the benefits flowing from the renewable energy generation and associated emissions savings.

The modification results in an increased extent of the project area and marginal increase in actual land potentially impacted. The design has incorporated avoidance of environmentally sensitive features where possible and includes a range of mitigation measures to further reduce potential impacts. The current Project Approval Conditions support the management of potential impacts and are applicable to the modification.

To ensure any impacts from the proposed modification are minimised, mitigation measures identified in this EA report will be incorporated into updated management plans that are required for implementation of the WRWF project.

10 REFERENCES

DPE	Project Approval MP10_160 – White Rock Wind farm
DPI	Primefact 1063, June 2013
EPA	Environment Protection Licence (EPL) 20665, Environmental Protection Authority, April 2017
Epuron	White Rock Wind Farm, Environmental Assessment, April 2011
Epuron	White Rock Wind Farm, Submissions Report, November 2011
ERM	White Rock Wind Farm, Stage 1 - Construction Environmental Management Plan, April 2016
WRWFPL	White Rock Wind Farm, Modification Application, Environmental Assessment Report, Dec 2015
WRWFPL	White Rock Wind Farm, Modification Application, Environmental Assessment Report, Dec 2016
WRWFPL	White Rock Wind Farm, Mod 4, Submissions Report, April 2017
WRWFPL	White Rock Wind Farm, Modification Application for Subdivision, September 2017

11 APPENDICES

Appendix 1	WRWF Stage 2 Turbine Locations and Elevations
Appendix 2	White Rock Wind Farm – Mod 6 – Visual Impact Assessment, Green Bean Design, November 2017
Appendix 3	White Rock Wind Farm – Mod 6 –Noise Impact Assessment, Sonus, January 2018
Appendix 4	White Rock Wind Farm – Mod 6 – Biodiversity Assessment Report, NGH Environmental Pty Ltd, December 2017
Appendix 5	Biodiversity Offset Package – White Rock Wind Farm Stage 1 and modified Stage 2 Offsets, Eco Logical Australia, December 2017
Appendix 6	White Rock Wind Farm Stage 2 Modification Application No. 6 Impacts on Birds and Bats, Brett Lane and Associates, August 2017
Appendix 7	White Rock Wind Farm – Mod 6 – Cultural Heritage Impact Assessment, NGH Environmental Pty Ltd, December 2017
Appendix 8	Aviation Risk Assessment, Aviation Projects, September 2017

12 APPENDIX 1 WRWF STAGE 2 TURBINE LOCATIONS AND ELEVATIONS

Stage 2 WTG ID	Easting (m) AHD	Northing (m) AHD	Latitude (WGS84)	Longitude (WGS84)	AGL (m)	WTG Tip Height (m)	AGL + Tip Height (m)
12	360138	6702698	151.553	-29.798	1,113	200	1,313
42	361251	6696961	151.564	-29.850	1,200	200	1,400
43	361347	6696676	151.565	-29.853	1,214	200	1,414
45	361320	6696046	151.564	-29.858	1,223	200	1,423
46	361422	6695759	151.565	-29.861	1,232	200	1,432
49	362185	6695344	151.573	-29.865	1,314	200	1,514
50	362280	6695007	151.574	-29.868	1,316	200	1,516
66	361818	6698224	151.570	-29.839	1,239	200	1,439
67	362015	6697923	151.572	-29.842	1,228	200	1,428
70	362413	6698645	151.576	-29.835	1,202	200	1,402
84	364459	6697276	151.597	-29.848	1,220	200	1,420
85	364442	6697003	151.597	-29.850	1,258	200	1,458
86	364626	6696645	151.599	-29.853	1,338	200	1,538
87	364730	6696374	151.600	-29.856	1,307	200	1,507
88	364727	6696088	151.600	-29.858	1,302	200	1,502
89	364365	6695828	151.596	-29.861	1,340	200	1,540
90	364655	6695615	151.599	-29.863	1,377	200	1,577
91	364716	6695348	151.599	-29.865	1,396	200	1,596
92	365190	6695204	151.604	-29.866	1,372	200	1,572
93	365344	6694933	151.606	-29.869	1,336	200	1,536
95	365618	6694558	151.609	-29.872	1,391	200	1,591
105	367074	6697516	151.624	-29.846	1,274	200	1,474
106	367109	6697097	151.624	-29.850	1,282	200	1,482
107	366767	6696860	151.621	-29.852	1,277	200	1,477
108	368091	6696553	151.634	-29.855	1,288	200	1,488
114	361291	6691510	151.563	-29.899	1,308	200	1,508
115	361070	6691289	151.561	-29.901	1,341	200	1,541
116	361311	6691034	151.564	-29.904	1,332	200	1,532
120	362214	6691519	151.573	-29.899	1,308	200	1,508
121	361160	6694785	151.562	-29.870	1,307	200	1,507
122	360813	6694536	151.559	-29.872	1,321	200	1,521
123	359796	6693798	151.548	-29.879	1,338	200	1,538
124	360018	6694601	151.551	-29.871	1,273	200	1,473
125	359906	6695045	151.550	-29.867	1,291	200	1,491
126	358893	6695350	151.539	-29.864	1,192	200	1,392

Stage 2 WTG ID	Easting (m) AHD	Northing (m) AHD	Latitude (WGS84)	Longitude (WGS84)	AGL (m)	WTG Tip Height (m)	AGL + Tip Height (m)
127	359366	6695518	151.544	-29.863	1,192	200	1,392
128	358828	6695986	151.538	-29.859	1,180	200	1,380
129	358087	6696270	151.531	-29.856	1,129	200	1,329
130	359846	6693425	151.549	-29.882	1,336	200	1,536
131	359180	6693573	151.542	-29.880	1,314	200	1,514
132	365521	6696075	151.608	-29.859	1,260	200	1,460
133	366943	6695444	151.622	-29.864	1,296	200	1,496
134	367284	6695985	151.626	-29.860	1,289	200	1,489
135	368202	6695772	151.635	-29.862	1,301	200	1,501
136	368327	6696168	151.637	-29.858	1,280	200	1,480
137	365440	6696898	151.607	-29.851	1,253	200	1,453
138	361893	6690681	151.570	-29.907	1,346	200	1,546
139	361677	6690162	151.567	-29.912	1,336	200	1,536