

White Rock *Wind Farm*


Submissions Report | November 2011

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[Attachments](#)

1. **Vegetation type details and flora quadrat plot data**
 2. **Proposed biodiversity offset**
 3. **NBN Television signal analysis**
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 7. **Preliminary aviation impact assessment**
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1 Introduction

The White Rock Wind Farm proposal is for the development of a medium sized wind farm in the Northern Tablelands region of NSW, 20 km west of Glen Innes and around 500 km north of Sydney.

An application for the proposal was lodged with the Department of Planning on 10 September 2010 and Director General's Requirements were issued to the proponent on 13 October, 2010 to guide the work required in assessing the proposed wind farm. An Environmental Assessment for the White Rock Wind Farm, which addressed the issues raised in the Director General's Requirements, was lodged in April of 2011 and put on Exhibition on 27 May 2011 to 27 June 2011. Fifteen submissions were received in response to the exhibition of the Environmental Assessment of the wind farm, ten of which were from government agencies.

1.1 Purpose of this Report

The Department of Planning provided copies of the submissions from members of the public and government agencies and asked the proponent to respond to the issues in accordance with Section 75H of the NSW Environmental and Planning Assessment Act 1979. This Submissions Report considers and responds to the issues raised in the submissions on the White Rock Wind Farm Environmental Assessment.

1.2 Summary of the Proposal

As presented in the Environmental Assessment, the White Rock Wind Farm proposal would involve the construction and operation of a wind farm. The proposal includes:

- Up to 119 wind turbines, each with three blades mounted on a tubular steel tower and concrete foundation
- Access tracks required for the installation and maintenance of the wind turbines
- Electrical connection between the turbines and an on-site substation using a combination of underground and overhead power lines
- A 132kV power line connecting the on-site substation to the TransGrid Glen Innes to Inverell transmission line
- An onsite operation and maintenance facility

Additional temporary construction activities and infrastructure such as a temporary construction compound, concrete batching plant and storage areas would be required during the construction and refurbishment phases.

1.3 Project Benefits

The White Rock Wind Farm would provide the following primary benefits:

- In full operation, it would generate more than 830,000 MWh of electricity per year - sufficient for the average consumption of around 130,000 homes.
- It would improve the security of electricity supply through diversification of generation locations.
- It would reduce greenhouse gas emissions by approximately 754,000 tonnes of carbon dioxide equivalent (CO₂e) per annum¹ under the current system and approximately 743,000 tonnes of CO₂e if the currently proposed carbon tax / emissions trading scheme were introduced.

¹ Calculated using the NSW Wind Farm Greenhouse Gas Savings Tool developed by DECCW, accessible at <http://www.environment.nsw.gov.au/climatechange/greenhousegassavingstool.htm>

- It would contribute to the State and Federal Governments' target of providing 20% of consumed energy from renewable sources by 2020.
- It would contribute to the NSW Government's target of reducing greenhouse gas emissions by 60% by the year 2050.
- It would create local employment opportunities and inject funds of up to \$300 million into the Australian economy.

In addition to these primary benefits there are also secondary benefits and opportunities for improvement in infrastructure, tourism and ecology.

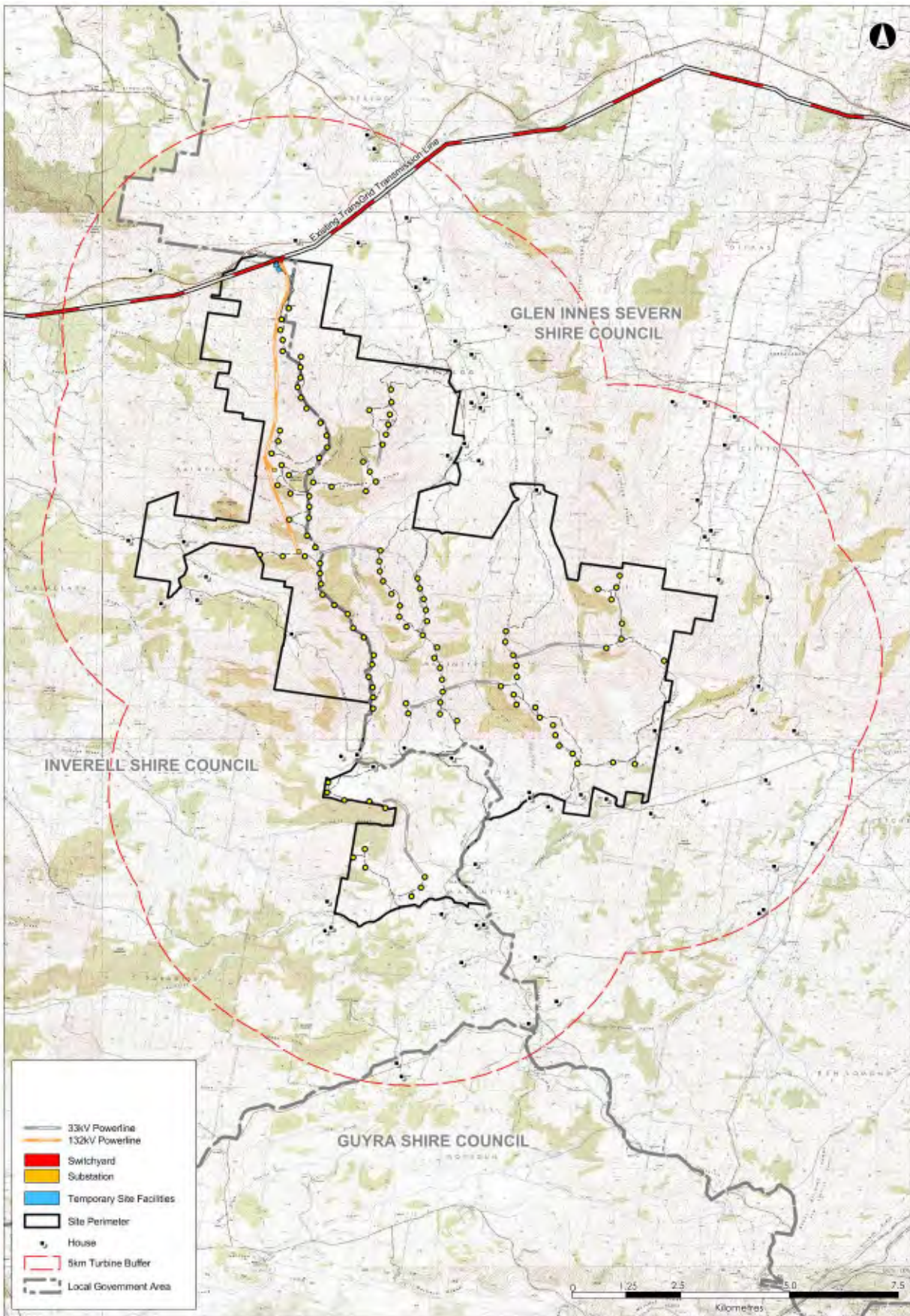


Figure 1-1 Proposed Wind Farm Layout

2 Consideration of Submissions

2.1 Public Exhibition

The White Rock Wind Farm Environmental Assessment was on public exhibition from 27 May 2011 to 27 June 2011 at:

- NSW Department of Planning, 23-33 Bridge St, Sydney;
- Nature Conservation Council, 301 Kent St, Sydney;
- Glen Innes Severn Council, 265 Grey St & 136 Church St, Glen Innes;
- Glen Innes Learning Centre, 71 Grey St, Glen Innes;
- Inverell Shire Council, 144 Otho St, Inverell;
- Guyra Shire Council, 158 Bradley St, Guyra and
- On the NSW Department of Planning website

Local residents were notified of the exhibition period through newspaper advertisements placed in the local papers by the Department of Planning and a newsletter was sent to residents within 5km of the project and those who had registered their interest in the project.

2.2 Submissions and Assessment of Submissions

The Department of Planning received a total of 15 submissions. Of the 15 submissions, 4 were from individual members of the community, 10 were from government agencies and 1 was from a private company. In accordance with section 75H of the Environmental Planning and Assessment Act 1979, this Submissions Report provides considered responses to the issues raised in submissions received in relation to the EA for the proposed White Rock Wind Farm.

The submissions were separated into those provided by community members and those provided by government authorities and private businesses. The government authority and private business submissions have been addressed individually for each submission as they reflect specific issues related to the particular technical expertise of the authority or business. The private submissions have been addressed by issues raised, rather than by submission.

The issues raised in each submission were summarized and tabulated in Figure 2-1 to identify the most frequently and infrequently raised issues.

2.3 Errors and clarifications to the Environmental Assessment

Issue	Response
Accuracy of maps on page 47 & 48 of the Noise Assessment	Epuron has checked and confirmed that Residence R56 <u>is</u> shown in the correct location and on the correct property on the maps on page 47 & 48 of the Environmental Noise Assessment.
Classification of residence R21 in the Noise Assessment	Residence R21 was incorrectly classified in the Environmental Noise Assessment. R21 is not a residence “Associated” with the wind farm. Updated sections of the Environmental Noise Assessment (Appendix F & G) showing the correct classification of R21 have been included Attachment 3 of this report. The predicted noise at R21 still meets the revised criteria and will comply with the noise guidelines.

Issue	Response																																																																																																																
Incorrect labelling of Table 1 on page 5 of the Environmental Noise Assessment	<p>Table 1 was incorrectly labelled as “Background Noise Levels” when it was in fact a table of the “Noise Criteria”. The noise criteria values are equal to the background noise level plus 5 dB(A). The tables have been repeated below for clarity.</p> <p style="text-align: center;">Table 1: Background Noise Levels (dB(A))</p> <table border="1"> <thead> <tr> <th>Wind Speed (m/s)</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> </tr> </thead> <tbody> <tr> <td>R1</td> <td>33</td> <td>33</td> <td>34</td> <td>34</td> <td>35</td> <td>36</td> </tr> <tr> <td>R21</td> <td>31</td> <td>33</td> <td>34</td> <td>36</td> <td>38</td> <td>40</td> </tr> <tr> <td>R27</td> <td>33</td> <td>33</td> <td>33</td> <td>33</td> <td>34</td> <td>35</td> </tr> <tr> <td>R35</td> <td>32</td> <td>32</td> <td>33</td> <td>34</td> <td>35</td> <td>37</td> </tr> <tr> <td>R44</td> <td>29</td> <td>30</td> <td>31</td> <td>33</td> <td>35</td> <td>37</td> </tr> <tr> <td>R56</td> <td>30</td> <td>31</td> <td>33</td> <td>35</td> <td>38</td> <td>40</td> </tr> <tr> <td>R64</td> <td>34</td> <td>35</td> <td>37</td> <td>39</td> <td>41</td> <td>44</td> </tr> </tbody> </table> <p style="text-align: center;">Table: Assessment Criteria (dB(A))</p> <table border="1"> <thead> <tr> <th>Wind Speed (m/s)</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> </tr> </thead> <tbody> <tr> <td>R1</td> <td>38</td> <td>38</td> <td>39</td> <td>39</td> <td>40</td> <td>41</td> </tr> <tr> <td>R21</td> <td>38</td> <td>38</td> <td>39</td> <td>41</td> <td>43</td> <td>45</td> </tr> <tr> <td>R27</td> <td>38</td> <td>38</td> <td>38</td> <td>38</td> <td>39</td> <td>40</td> </tr> <tr> <td>R35</td> <td>37</td> <td>37</td> <td>38</td> <td>39</td> <td>40</td> <td>42</td> </tr> <tr> <td>R44</td> <td>35</td> <td>35</td> <td>36</td> <td>38</td> <td>40</td> <td>42</td> </tr> <tr> <td>R56</td> <td>35</td> <td>36</td> <td>38</td> <td>40</td> <td>43</td> <td>45</td> </tr> <tr> <td>R64</td> <td>39</td> <td>40</td> <td>42</td> <td>44</td> <td>46</td> <td>49</td> </tr> </tbody> </table>	Wind Speed (m/s)	5	6	7	8	9	10	R1	33	33	34	34	35	36	R21	31	33	34	36	38	40	R27	33	33	33	33	34	35	R35	32	32	33	34	35	37	R44	29	30	31	33	35	37	R56	30	31	33	35	38	40	R64	34	35	37	39	41	44	Wind Speed (m/s)	5	6	7	8	9	10	R1	38	38	39	39	40	41	R21	38	38	39	41	43	45	R27	38	38	38	38	39	40	R35	37	37	38	39	40	42	R44	35	35	36	38	40	42	R56	35	36	38	40	43	45	R64	39	40	42	44	46	49
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Possible ambiguity on the investigation of bat caves	<p>No bat caves were identified within the study area or within the site perimeter. The nearest know roosts for Bent-wing Bats are located 30km from the site.</p> <p>The last paragraph in section 3.2.1 (page 29) of the Ecology Assessment currently reads “Some caves that may be utilised by cave-roosting microchiropteran bat species occur within the southern parts of the site perimeter but will not be affected by the project.”</p> <p>This statement was based on personal communication between a landowner and a member of the ecology survey team at the time of the field study (September/October 2010). Epuron has clarified this with the RPS ecologist and the landowner who have advised that they are not aware of the existence of any caves in the steep gorge to the south of the wind farm site.</p> <p>The last paragraph in section 3.2.1 (page 29) of the Ecology Assessment should be deleted.</p>																																																																																																																
Error in Landscape and Visual Impact Assessment Report	<p>The last sentence in the fourth paragraph on page 96 of the Landscape and Visual Impact Assessment states: “From the eight residential view locations with a high visual impact seven would associated landowners and three non-associated.”</p> <p>The sentence should read: “From the eight residential view locations with a high visual impact seven would associated landowners and <u>one</u> non-associated.”</p>																																																																																																																

2.4 Changes to the proposed wind farm infrastructure

Issue	Response
Additional alternate access to the site from Ilparan Road	Epuron has identified additional options for providing access to some turbine locations from the northern end of the site. The additional access points and tracks are shown in the maps in Attachment 5 of this Submissions Report.

2.5 Summary of Submissions

Figure 2-1 Summary of Submissions Received

Submission Number	Visual Impacts	Operational Noise Impacts	Community Impacts and Consultation	Land Value Impact	Health Impacts	Safety Impacts	Fire Hazards	Aviation Impacts	Communications Impacts	Soil Erosion	Ecology Impacts	Traffic & Transport Impacts	Surface & ground water Impacts	Social Impact & Community Fund
1	■	■		■	■									
2									■			■		
3													■	
4	■	■		■	■	■	■	■	■	■	■			
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12		■												
13														
14									■					
15							■							
	Indicates private submission													

3 Response to Community Submissions

3.1 Visual Impact Issues

The visual impact issues were addressed in section 9.1 of the EA and supported by a specialist report: Appendix 1 – Landscape and Visual Impact Assessment. The assessment concluded that the White Rock Wind Farm would have an overall low visual impact on the majority of non-associated residential and public view locations.

Issue	Response
Final turbine model may be larger than that used for modelling	The Visual Impact Assessment and modelling was based on the Vestas V112 model turbine which has a hub height of 84m, rotor diameter of 112m and tip height of 140m. This is the largest turbine model currently being considered in Australia. In addition, Epuron has committed (Statement of Commitment 1) to update the visual impact assessment in the event of any significant changes to turbine layout or turbine size.

3.2 Operational Noise Issues

Operational noise issues were addressed in section 9.2 of the EA and supported by a specialist report: Appendix 2 – Environmental Noise Assessment. The results of the assessment demonstrated compliance of the proposed turbine layout to the nominated criteria (Wind Farms Environmental Noise Guidelines, South Australian Environmental Protection Agency, 2003 (SA EPA Guidelines)).

Issue	Response
Operational noise levels have been predicted at dwelling locations, rather than at property boundaries	<p>The various noise guidelines (including the SA EPA Guidelines, NZ 6808 and the WHO Guidelines) are all based around protecting the amenity of people's houses and particularly avoiding disturbance to people's sleep. The SA Guidelines make particular reference to property boundaries not necessarily being valid measuring locations unless someone would regularly be there (any area within 20m of a house would be a valid measuring position). Similarly, the NSW Industrial Noise Policy (INP) is only applied to particular noise sensitive receivers.</p> <p>In terms of outdoor activities including agricultural work, higher background noise levels occur during the day. Farming activities usually involve machinery that produces far greater noise relative to receiver location than turbines (e.g. tractors, 4WD's and motorbikes) or in the presence of stock.</p> <p>Therefore assessment of noise impacts outdoors is not required in accordance with the SA Guidelines that considers noise sensitive relevant receivers. Farming activities undertaken outdoors are not considered noise sensitive. In any case farming occurs in environments with more significant background noise and in that context, noise impacts from wind turbines are anticipated to be negligible.</p>
Low frequency noise and atmospheric stability	<p>The Noise Impact Assessment explores low frequency noise and meteorological conditions including atmospheric stability and wind profile, the Van Den Berg effect and temperature inversions.</p> <p>Low Frequency noise - The frequency, or 'pitch', of a sound is measured in cycles per second (or 'Hertz' (Hz)) although most noise in the environment contains energy at many different frequencies combining together to give it its overall</p>

Issue	Response
	<p>character. A healthy young adult's range of hearing is often quoted as extending from 20Hz to 20,000Hz although the sensitivity of the ear varies significantly with frequency and is most sensitive to sounds with frequencies between around 500Hz and 4000Hz. The majority of information in speech signals is contained in this smaller range and above and below this, the ear becomes decreasingly sensitive and is very in-sensitive at very low frequencies.</p> <p>'Low frequency noise' is the term used to describe sound energy in the region below about 200Hz. The rumble of thunder and the throb of a diesel engine are both examples of sounds with most of their energy in this low frequency range and they both have very high sound levels for such sounds to be perceived.</p> <p>Wind turbines are not a significant source of low frequency noise. The Sonus Noise Assessment of the proposed White Rock Wind Farm states that "...the proposed layout can achieve the stringent requirements of the SA Guidelines" (p28)</p> <p>Van Den Berg/ Atmospheric Stability/ Temperature Inversions - The NSW INP has been referenced for guidance when considering temperature inversion effects. Table E3 from the INP indicates that for a moderate Class F temperature inversion to occur, the wind speed required is below the cut-in wind speed for the assessed turbines (3-5 m/s) and therefore will not be an issue.</p> <p>The hub height assessment was performed to assess the impact that hub height wind speeds would have on receiver noise levels. Wind speeds were converted from 10m Above Ground Level (AGL) to hub height. The assessment indicated that at hub height wind speeds, receivers close to the limit still complied with noise criteria. The Sonus Noise Assessment of the proposed White Rock Wind Farm states in relation to the Van Den Berg effect (Page 16) "... Compliance with the SA Guidelines will provide an adequate level of protection for the amenity of the surrounding area due to their stringency."</p>

3.3 Community Consultation

Issue	Response
<p>Limited community consultation</p>	<p>Epuron has contacted and continues to consult with the neighbouring landowners as noted in section 7.2 and set out in the consultation plan in Attachment 6 & 7 of the EA. The consultation program includes:</p> <ul style="list-style-type: none"> • Telephone contact • Individual meetings with landowners • Newsletters (3 to date) – distributed to landowners, neighbours and the broader community • Open House information day held on 4 November 2010 <p>During the early stage of the project representatives from Epuron made telephone calls to all neighbours within a 4 kilometre radius of the project and this was followed in most cases with a face to face meeting to provide any further information required and answer individual questions. All residents in this radius and beyond were sent information about the Open House and received newsletters. The Project Manager's contact details were on all correspondence and newsletters and the Project Manager responded to all individual enquiries.</p>

3.4 Land Value Impacts

Issue	Response
Decrease in value in neighbouring properties	<p>A number of studies in Australia and overseas have shown that wind farms do not generally have any negative impact on the value of surrounding land. The main finding in a report prepared for the NSW Valuer General in August 2009 was that “wind farms do not appear to have negatively affected property values in most cases.</p> <p>Forty (40) of the 45 sales investigated did not show any reductions in value. Five (5) properties were found to have lower than expected sale prices (based on statistical analysis). While these small number of price reductions correlate with the construction of a wind farm further work is needed to confirm the extent to which these were due to the wind farm or if other factors may have been involved.”</p> <p>The Study’s results also suggest that “...no reductions in sale price were evident for rural properties or residential properties located in nearby townships with views of the wind farm.”</p>

3.5 Ecology Impacts

Issue	Response
Potential impact on birds	<p>The specialist Ecology Assessment (EA Appendix 3, section 4.2) has adequately addressed the potential impact of the wind farm on birds and also proposed an adaptive management program and post-construction monitoring program to ensure that the actual impacts do not exceed the low level impacts predicted in the assessment.</p>

3.6 Health Impacts

Issue	Response
Human health impacts	<p>The impact of electromagnetic fields from wind farm infrastructure (powerlines, substation and turbines) was considered in section 10.3 of the EA. The assessment concluded that the wind farm would not impose any threat to the public, workers or property owners.</p> <p>Shadow flicker from turbine blades was assessed in section 10.4 of the EA and was found not to represent a risk to local residents in relation to flicker vertigo or photosensitive epilepsy.</p> <p>There are tens of thousands of wind turbines installed worldwide and no independent study has demonstrated any harm to people living in close proximity to wind farms despite a number of attempts to find evidence of such harm.</p> <p>The recent Australian report by the National Health and Medical Research Council (NHMRC) concluded that "there is currently no published scientific evidence to</p>

Issue	Response
	<p>positively link wind turbines with adverse health effects."</p> <p>A further study - 'Wind Turbine Sound and Health Effects, an Expert Panel Review*', concludes "There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences." This report astutely notes that:</p> <p style="text-align: center;"><i>"the large volume of media coverage devoted to alleged adverse health effects of wind turbines understandably creates an anticipatory fear in some that they will experience adverse effects from wind turbines. Every person is suggestible to some degree".</i></p> <p>* http://www.cleanenergycouncil.org.au/cec/technologies/wind/turbinefactsheets/mainColumnParagraphs/0/text_files/file3/AWEA_CanWEA_SoundWhitePaper_12-11-09.pdf</p>

3.7 Safety Impacts

Issue	Response
A safe workplace on neighbouring properties	Epuron does not consider that the operation of the wind farm will create any significant safety hazard to the neighbouring properties.
Turbine blade failure	The design and construction of modern wind turbines is tightly controlled to internationally recognised IEC standards. Although there have been very limited instances where turbine blades have failed in the past, the likelihood of a blade failure is very low and the overall risk is low.
Ice shedding from turbine blades	<p>Modern wind turbines are designed to operate to temperatures down to -20 °C and the IEC standard considers icing of the turbine blades. In order to avoid ice being catapulted from the blades and to ensure safe operation of the turbine icing detection is carried out by the following measurements at each turbine:</p> <ul style="list-style-type: none"> • Ambient temperature • Differential power curve • Vibration recording • Anemometer plausibility <p>The Operational Environmental Management (OEMP) will consider any specific safety procedures related to the specific turbine model selected for the project. This may include shutting down any turbines that are located less than 250m from public roads and buildings when the weather conditions could allow the possibility of icing on the rotor blades. Although temperatures below freezing are expected at the wind farm, conditions for significant icing will be rare. Large numbers of turbines operate safely in conditions significantly colder than those found anywhere in Australia.</p>

3.8 Fire Hazards

Issue	Response
Bush fire risks	<p>The bush fire risks associated with the construction and operation of the wind farm have been addressed in section 10.5 of the EA. The assessment concluded that although there would be an increased risk of bush fire from the wind farm, the cleared nature of the land and the improvements to access across the site would mitigate the risks of bush fire. Other recommended mitigation measures which will be implemented include:</p> <ul style="list-style-type: none"> • Providing asset protection zones consistent with RFS guidelines • Preparing a Bushfire Management Plan as part of the Construction Environment Management Plan • Holding appropriate fire fighting equipment on site during the construction phase when the fire danger is very high

3.9 Aviation Impacts

Issue	Response
Impact on aerial agriculture	<p>The impact on aerial agriculture operations was assessed in section 10.1.4 of the EA. Figure 10-2 in the EA shows the relatively small area surrounding the wind farm site that is likely to have constraints on aerial operations. Epuron has committed (Statement of Commitment 28) to consult with the affected landowners and investigate alternate measures for spreading in those areas.</p>

3.10 Communications Impacts

Issue	Response
Impact on mobile phone and wireless internet signal	<p>The transmission of mobile phone signals and wireless internet signals is not expected to be affected by the wind farm. Refer to Appendix 6 of the EA for more details.</p>
Impact on television reception	<p>Epuron has committed (Statement of Commitment 30) to undertake a monitoring program of houses within 5km of the wind farm and if any television reception interference is caused by the wind farm to rectify this.</p>

3.11 Soil Erosion

Issue	Response
Soil erosion from construction of wind farm infrastructure	<p>The infrastructure will be located on the ridges which are predominantly on basalt rock and are less prone to erosion risks. Areas disturbed during construction will be protected by the installation and maintenance of standard erosion and sediment control measures to avoid contributing to any soil and landform degradation.</p>

4 Response to Government Authority and Business Submissions

4.1 Guyra Shire Council

Guyra Shire Council advised that they have no specific environmental concerns relating to the proposed development, but provided the following comments:

Issue	Response
RFS communications from Mount Rumbee radio tower site	The Mount Rumbee radio tower is more than 5km from the nearest turbine location and at a higher elevation than that turbine location. The development is not expected to have any significant effect on the ability of the RFS to receive communications from this tower.
Changes to proposed primary site access route and use of Council's local roads	Epuron has committed (Statement of Commitment 34) to preparing a Traffic Management Plan in consultation with the RTA and councils prior to commencement of construction once the access and haulage routes have been finalised.

4.2 Office of Water

The NSW Office of Water has advised that they have no objection to project approval and identified two issues to be addressed prior to the commencement of construction:

Issue	Response
Interception or use of groundwater	The proponent is not planning to use any ground water during the construction or operation of the project, but in the event that any groundwater works are required, the relevant approvals will be obtained from the Office of Water prior to installation.
Review of Construction Environmental Management Plan (CEMP)	Epuron have committed (Statement of Commitment 2) to prepare and implement a CEMP in accordance with best practice guidelines prior to commencing any works. The CEMP would be provided to all relevant authorities, including the Office of Water, for review and comments prior to finalising the plan.

4.3 Border Rivers Catchment Authority

Issue	Response
Appropriate offsets or mitigating management actions to improve or maintain environmental outcomes associated with clearing native vegetation	Measures to avoid, minimise, mitigate or compensate impacts on flora and fauna have been considered for this project. Impacted areas of native vegetation will be offset as required by agreement with the Office of Environment & Heritage following the principle of improve or maintain. Potential areas within the wind farm site that would be suitable as offset areas have been identified. When the specific impacts are known by area and species these large identified offset areas will be further assessed for suitability as required Refer to page 127 & 128 of the EA and section 6.7 of Appendix 3 – Ecology Report for more details.

4.4 Airservices Australia

Issue	Response
Potential impact of some turbines on arrival procedures to the Glen Innes airport	<p>A preliminary assessment (Refer to Attachment 6) has identified that there are thirteen turbine locations on the wind farm site which penetrate the edge of the Obstacle Identification Surface (OIS) for the Sector A DME/GPS Arrival procedure for the Glen Innes airport. The limit for the initial segment (9 – 14 Nautical Miles from the airport) is current set at 5900ft.</p> <p>Epuron has discussed this potential impact of the wind farm with Airservices Australia and a specialist aviation consultant and have made the following commitment:</p> <ol style="list-style-type: none"> 1. Once the exact turbine locations and final turbine make/model (and hence tip height) have been finalised, the Proponent will submit an Aviation Impact Assessment and a request to Airservices Australia to modify the arrival procedures. eg to raise the Sector A DME/GPS Arrival (Initial Segment) from 5900ft to 6200ft. This modification would only apply to the area 9 – 14 nautical miles out from the airport. 2. If the arrival procedures are not able to be modified, the Proponent will either not build the turbines which have an impact on the procedures or alternately, build those turbines on shorter towers to ensure that their tip height does not impact on the arrival procedures.

4.5 NSW Department of Primary Industries - Crown Lands Division

Crown Lands Division does not have any objections to the wind farm proposal.

Issue	Response
A Crown Land Licence is required where the proposed turbine access tracks and underground cables intersect Crown road reserves.	The proponent will apply for the Licence once the infrastructure layout has been finalised and before any work commences.


4.6 Office of Environment & Heritage

Issue	Response
<p>Concern over level of description of vegetation communities, particularly for the vegetation type “Cleared Pasture with Scattered Trees”</p>	<p>A further assessment of the areas delineated as “Cleared Pasture with Scattered Trees” was carried out to ascertain whether this community may constitute ‘derived grassland’, which is a component of the endangered White Box Yellow Box Blakely’s Red Gum Woodland (Box Woodland)</p> <p>Within those areas where Yellow Box and Blakely’s Red Gum does or would have once occurred, the understorey was noted as being heavily improved and dominated by non-native pasture species and therefore <u>not</u> endangered Box Woodland. Please refer to Attachment 1 for the details of this additional assessment.</p> <p>Plot data for each of the sixteen flora quadrats studied on the site have also been included in Attachment 1.</p>
<p>Apparent underestimate of the potential occurrence of a number of threatened species and the impact on these species</p>	<p>The fauna and flora assessment was carried out by suitably qualified ecologists with significant experience in assessing the potential impact on threatened species, including the specific impact from wind farm developments. The assessment of threatened species was addressed in detail in section 6.2 (page 74 - 78) of the ecology assessment.</p> <p>The list of threatened species (Refer Table 6-1 on page 63 of the Ecology Assessment) considered for the study area was developed and refined based on a search of the DECCW Atlas of NSW Wildlife and the EPBC Act Protected Matters Database for threatened species. Species found or predicted to occur within a 30km radius of the study area were considered for inclusion in the assessment.</p> <p>The development of the list of threaten species included a review of the environmental assessments of the proposed Ben Lomond Wind Farm and Glen Innes Wind Farm located in the vicinity of the White Rock site.</p> <p>The environmental assessment for the neighbouring Sapphire Wind Farm is not yet publically available, however OEH were able to provide a list of twenty one threatened birds and bats present or predicted in Sapphire study area. All twenty one species were considered by our ecologists RPS as part of developing the list of threatened species considered for the White Rock study area. Sixteen of the twenty one species were included and assessed in the White Rock assessment (Refer to Table 6-1 on page 63 of the Ecology Assessment). The other five species from the Sapphire study area weren’t identified in the database searches for the White Rock study area.</p> <p>The assessment included consideration of the cumulative impacts on threatened species of the proposed White Rock wind farm together with the other know wind farm proposals: Glen Innes, Sapphire and Ben Lomond wind farms (page 51 of the Ecology Assessment).</p>
<p>Investigation of bat caves within the site perimeter</p>	<p>No bat caves were identified within the study area or within the site perimeter. The nearest know roosts for Bent-wing Bats are located 30km from the site.</p> <p>The last paragraph in section 3.2.1 (page 29) of the Ecology Assessment currently reads “Some caves that may be utilised by cave-roosting microchiropteran bat species occur within the southern parts of the site perimeter but will not be affected by the project.”</p> <p>This statement was based on personal communication between a landowner and a member of the ecology survey team at the time of the field study</p>

	<p>(September/October 2010). Epuron has clarified this with the RPS ecologist and the landowner who have advised that they are not aware of the existence of any caves in the steep gorge to the south of the wind farm site.</p> <p>The last paragraph in section 3.2.1 (page 29) of the Ecology Assessment should be deleted.</p>
Apparent lack of understanding of the ecology and behaviour of many species (specifically birds) and potential under estimation of the impact on these species	<p>It is difficult to respond to such a generic comment. The specific details of the species that are most likely to be impacted by the proposed wind farm have been addressed in section 4.2 of the ecology assessment (page 45 – 52 of Appendix 3).</p> <p>The assessment included consideration of the cumulative impacts of the proposed White Rock wind farm together with the other known wind farm proposals: Glen Innes, Sapphire and Ben Lomond wind farms (page 51 of Appendix 3).</p>
Inadequate details of proposed offset plan	<p>An offset proposal to mitigate or compensate for impacts on fauna and flora was considered for the project (page 127 of the EA and page 83 – 85 of the Ecology Assessment). The intent of identifying potential offset areas (map on page 128 of the EA) was to demonstrate the availability of a number of options for offset areas within the wind farm site.</p> <p>Epuron engaged ecologist Kevin Mills to carry out a field survey to verify that the proposed offset areas do in fact contain the Ribbon Gum – Mountain Gum Woodland EEC that is planned to be offset. Please refer to Attachment 2 for a copy of this assessment, including details of the current land use and confirmation of the conservation value of these areas and hence their suitability as an offset for the vegetation to be removed.</p> <p>Epuron has committed to developing an appropriate Offset Plan in consultation with OEH prior to the commencement of construction (Refer to SoC 21 on page 191 of the EA).</p>

4.7 Inverell Shire Council

Issue	Response
Proposed mobile phone tower near White Rock Mountain	Section 5.2 of the Telecommunications Impact Assessment (Appendix 6 of the EA) details the correspondence to and any responses received from the three mobile phone companies. Despite no response from Telstra or any other indication of a planned tower, Epuron has no objection to the installation of a mobile phone tower in the vicinity of White Rock Mountain and are willing to discuss the details with the Council and Telstra. The proposed location may need to be modified to ensure that the mobile network antenna has the appropriate separation distance from the wind farm infrastructure to minimise any disruption to the planned coverage.
Community Enhancement Program	The proponent acknowledges the Council's interest in a community enhancement program and welcomes suggestions on the details and format to be included in such a program.
Temporary construction facilities	Prior to commencement of the works the proponent will consult with Council to ensure that the temporary facilities, including effluent and waste disposal, are appropriately designed and comply with the relevant legislation.
Setback from non-	Detailed consideration of the Council's DCP was addressed in section 6.3.2 of the

Issue	Response
associated dwellings	<p>Environmental Assessment. There are 12 non-associated dwellings within 2km of a turbine location, which is considered a very small number for a large (96.6 km²) wind farm site. Of these 12 non-associate dwellings, 3 owners have made submissions. Epuron believes that there is no technical reason to consider a 2km setback as all of the potential impacts that relate to distance from a turbine such as operational noise, shadow flicker and safety have been adequately addressed in the Environmental Assessment.</p>
Setback from non-associated property boundaries	<p>Detailed consideration of the Council’s DCP was addressed in section 6.3.2 of the Environmental Assessment. We note the Council’s request for a 260 – 300m setback from non-associated property boundaries. All of the proposed turbines have been located so that the foundations, towers and turbine blades are wholly within the associated property. Epuron believes that there is no technical reason to consider a setback from non-associated property boundaries as all of the potential impacts that relate to distance from a turbine to a property boundary such as fire hazards and safety have been adequately addressed in the Environmental Assessment. The proposed substation locations will allow the associated asset protection zones to be wholly within the project boundary.</p>
Accuracy of Figure 34 (Photomontage W41)	<p>The photomontage locations used in the Landscape and Visual Impact Assessment (LVIA) were carefully selected by a Registered Landscape Architect experienced in the preparation of LVIA for wind farm projects. The “Tryagain” residence is surrounded by scattered tree cover, including trees to the north and east of the residence which partially screen the views towards the wind turbines within the wind farm – refer photograph below.</p>  <p>“Tryagain” residence (left) and W41 camera location to the east (right)</p> <p>The selected location for photomontage W41 is on the wind farm side of a line of trees around 55m south east of the residential dwelling and was chosen to represent a typical view toward the greater number of wind turbines within the proximity of the residential dwelling. Epuron believes that the W41 photomontage (illustrated in Figure 34 of the LVIA included in the EA) provides an accurate representation of the view towards the wind farm from the residential curtilage.</p> <p>Council’s assessment and determination that turbine numbers 32 and 33 would be completely visible from the “Tryagain” residence, including blades, hub and entire tower is <u>not</u> correct. Cross sections (Attachment 4 of this report) from the “Tryagain” residence to turbine numbers 32 and 33 have been prepared in order to illustrate the likely extent of visibility. The cross sections demonstrate that the lower portions of the towers and blades will be screened by tree cover on land rising to the north east above the “Tryagain” residence toward the wind farm. Whilst the hubs and portions of the blades will be visible, turbines 32 and 33 are not considered to have an over bearing visual dominance on the residence’s views.</p>

4.8 Glen Innes Severn Council

Issue	Response
Incorporation of Chapter D1 Wind Power Generation Glen Innes Severn DCP 2008	Detailed consideration of the Council's DCP was addressed in section 6.3.2 of the Environmental Assessment.
Wind turbines which do not comply with the South Australian Environment Protection Authority's Wind Farms – Environmental Noise Guidelines	All wind turbine locations comply with the relevant criteria in the South Australian Environment Protection Authority's Wind Farms – Environmental Noise Guidelines (2003). Refer to section 9.2 and Appendix 2 of the Environmental Assessment for more details.

4.9 Department of Trade and Investment – Division of Resources and Energy

Issue	Response
Provision of final turbine and infrastructure locations to DTIRIS and mineral title holders prior to construction	Epuron has committed (Statement of Commitment 50) to providing this information prior to the commencement of construction. The wind turbine and infrastructure locations are only finalised following selection of the turbine make/model and further detailed design.

4.10 NBN Television

Issue	Response
Potential impact on television input signal from Mt Dowe to repeater station at Carpenters Hill	<p>An updated assessment of the impact of the wind farm on the input signal from Mt Dowe to Carpenters Hill has been carried out. Please refer to Attachment 2 for more details. Two turbine locations (No. 2 and 3) were found to intrude into the 2nd fresnel zone of the signal path and hence have the potential to impact on the signal.</p> <p>Epuron has consulted with and committed to work with NBN Television to identify the best solution to allow the two turbines to be built and to avoid any interference with the signal, including relocating the link if necessary.</p> <p>We note that the current approved turbine locations for the adjacent Glen Innes wind farm also have the potential to interfere with the same signal path and Epuron have contacted the project developers, NP Power, to discuss a common solution to the potential impact.</p>

4.11 NSW Rural Fire Service

Issue	Response
Separate structures from bush fire hazards	The design of wind farm infrastructure, such as substations, will incorporate appropriate asset protection zones in accordance with RFS guidelines.
Adequate egress/access to the wind farm	The proposed wind farm access tracks, main access point and alternate access points will greatly improve the current egress and access to the site.
Ability to provide for adequate water supplies for bush fire suppression operations	A Bushfire Management Plan will be developed in consultation with the RFS and NSW Fire Brigade as part of the Construction Environment Management Plan and will include holding appropriate fire fighting equipment on site for the suppression of bush fires.
Emergency evacuation procedures	Emergency evacuation procedures will be developed prior to construction as part of the project Occupational Health and Safety Plan and familiarisation with the procedures would form part of the induction for all workers and visitors to the site.
Operational procedures for the mitigation and suppression of bush fires	A Bushfire Management Plan will be developed in consultation with the RFS and NSW Fire Brigade as part of the Construction Environment Management Plan

5 Conclusion

Epuron believes that this Submissions Report has adequately addressed all of the issues raised in the fifteen submissions received to enable the Department of Planning to complete its assessment and determination of the Proposal.

The Statement of Commitments in section 12 of the Environmental Assessment, together with the commitments contained in the responses in this Submissions Report will ensure that the proposed White Rock Wind Farm can be constructed with minimal impact to the existing environment.

Attachment 1 – Vegetation Type Details and Flora Quadrant Plot Data





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Our Ref: PR104226: PH

9th August 2011

Epuron

Level 11, 75 Miller Street
North Sydney NSW 2060

ATTENTION: Michael Kurnik

Dear Sir

RE: Condition of the White Box Yellow Box Blakely's Red Gum Woodland, White Rock Wind Farm.

RPS has been requested by Epuron to provide additional details of the mapped vegetation type "Cleared Pasture with Scattered Trees" detailed within the Ecological Assessment for a proposed wind farm development at White Rock, near Glen Innes, on the New England Tablelands of New South Wales (NSW). This additional information is in response to a request by the Office of Environment and Heritage (OEH) to receive further details of the floristics of the areas delineated as "Cleared Pasture with Scattered Trees" to ascertain whether this community may constitute 'derived grassland', which is a component of the White Box Yellow Box Blakely's Red Gum Woodland (Box Woodland), which is listed as Endangered under the NSW Threatened Species Conservation Act 1995 (TSC Act 1995).

Ecological investigations included the recording of flora quadrats within various locations throughout the site, particularly within areas proposed to be impacted by the wind turbine footprints. Due to changes in the design following field investigations, vegetation mapping has relied so some extent on aerial photograph interpretation utilising ground truthing. Unfortunately, no quadrat data was collected within areas containing Yellow Box or Blakely's Red Gum. Those areas noted as containing Yellow Box and Blakely's Red Gum were however opportunistically ground-truthed and photographed during the site visit. Quadrat 4 is the nearest quadrat to the areas mapped (Figure 1), however this is within areas where surrounding canopy species are commensurate with Ribbon Gum – Mountain Gum Woodland. As these areas would not have once been dominated by those tree species that are indicative of the Box Woodland community, the understorey could also not be considered derived grasslands within this area.

Under the TSC Act, Box Woodland can exist in a number of states. Intact stands that contain diverse upper and mid-storeys and ground layers are rare. Modified sites include the following:

- *Areas where the main tree species are present ranging from an open woodland formation to a forest structure, and the ground layer is predominantly composed of exotic species; and*
- *Sites where the trees have been removed and only the grassy ground layer and some herbs remain.*

Within those areas where Yellow Box and Blakely's Red Gum does or would have once occurred, the understorey was noted as being heavily improved and dominated by non-native pasture species. No native tussock grass understorey was noted within this area. As those areas that are without trees do not have a remaining native understorey, only those areas containing trees have been mapped as Box Woodland, as per the above definitions of modified sites. A summary of these conclusions is provided in Attachment 1.

If you have any further enquiries regarding the above please do not hesitate to contact the writer.

Yours faithfully
RPS



Paul Hillier
Senior Ecologist

Encl:

Attachment 1 - White Box, Yellow Box, Blakely's Red Gum and Derived Grasslands EEC considerations.

Attachment 2 – Vegetation Map

Attachment 3 – Box Woodland Photos



Attachment 1

White Box Yellow Box Blakely's Red Gum Woodland EEC considerations.

TSC Act 1995 Considerations

Under the TSC Act, White Box Yellow Box Blakely's Red Gum Woodland EEC can exist in a number of states. Intact stands that contain diverse upper and mid-storeys and ground layers are rare. Modified sites include the following:

- Areas where the main tree species are present ranging from an open woodland formation to a forest structure, and the ground layer is predominantly composed of exotic species; and
- Sites where the trees have been removed and only the grassy ground layer and some herbs remain.

Identification guidelines have been provided for this community (NPWS 2002).

Table 1.1: TSC Act Box Gum Woodland Listing Criteria

Box Gum Woodland	NPWS Comment	Answer
1. The study area is in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands or NSW South Western Slopes Bioregions – proceed to 2.		1. The study area is located on the New England Tableland.
1* The study area is outside the above bioregions	Not Box Gum Woodland	
2. There are no native species in the understorey, and the study area is unlikely to respond to assisted natural regeneration	Not Box Gum Woodland	
2* The study area is otherwise – proceed to 3		There is the possibility of native species being present in the understorey.
3. The study area has trees – proceed to 4.		Patches of Yellow Box and Blakely's Red Gum occur.
3* The study area is treeless, but is likely to have supported White Box, Yellow Box or Blakely's Red Gum prior to clearing – proceed to 5		Treeless areas are present, however is likely to have supported Yellow Box and Blakely's Red Gum prior to clearing.
4. White Box, Yellow Box or Blakely's Red Gum, or a combination of these species, are or were present – proceed to 5		Yellow Box and Blakely's Red Gum are present in a woodland form (this can constitute the EEC as per the definitions provide in the community profile).
4* White Box, Yellow Box or Blakely's Red Gum have never been present	Not Box Gum Woodland	
5. The study area is predominantly grassy**	Is Box Gum Woodland	The understorey is predominately grassy, however is not native and therefore not considered to be Box Gum Woodland.
5* The understorey of the study area is dominated by shrubs excluding pioneer species	Not Box Gum Woodland	

**predominately grassy is considered to mean predominately native grasses, in line with the definitions provided in the community profile.

In reference to the NSW NPWS Identification Guidelines for White Box Yellow Box Blakely's Red Gum Woodland EEC (NPWS 2002) and White Box Yellow Box Blakely's Red Gum Woodland – profile (DEC 2005), it is determined that only those areas still containing a woodland structure constitutes the Box Gum Woodland EEC.



Attachment 2

Vegetation Map




WARNING
No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from RPS Newcastle

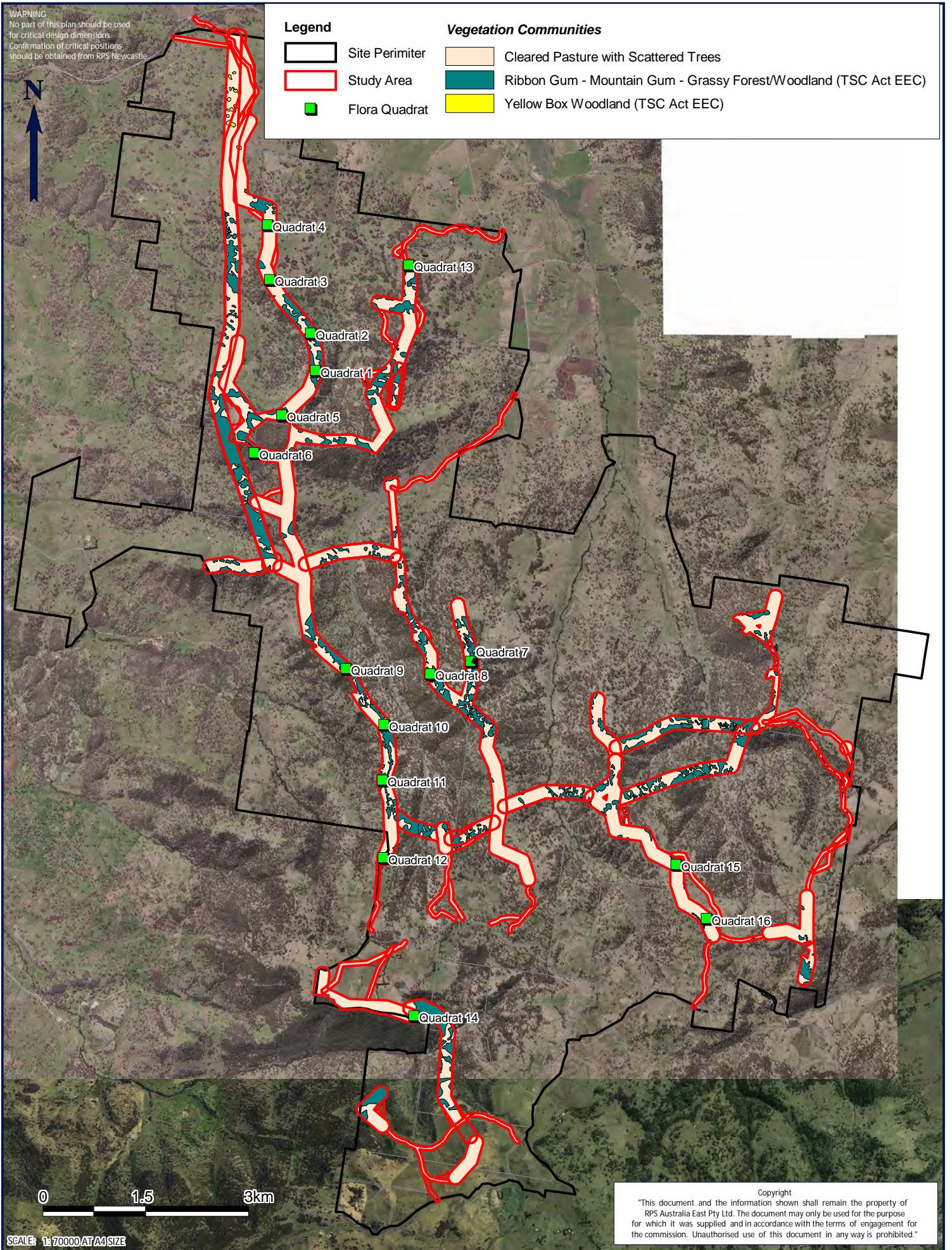


Legend

-  Site Perimeter
-  Study Area
-  Flora Quadrat

Vegetation Communities

-  Cleared Pasture with Scattered Trees
-  Ribbon Gum - Mountain Gum - Grassy Forest/Woodland (TSC Act EEC)
-  Yellow Box Woodland (TSC Act EEC)



SCALE: 1:70000 AT A4 SIZE

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TITLE: ATTACHMENT 1:
VEGETATION COMMUNITIES

LOCATION: WHITE ROCK

DATUM: N/A
PROJECTION: MGA ZONE 56 (GDA 94)

DATE: 23/08/2011
PURPOSE: REPORT FIGURE

LAYOUT REF: J:\JOBS\104k\104226 Glen
Innes\10- Drafting\White Rock\Ecology\
Report Figures
VERSION (PLAN BY): B A4 (PH)

CLIENT: EPURON
JOB REF: 104226

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Attachment 3

Box Woodland Photos



Plate 1: Box Woodland Area 1



Plate 2: Box Woodland Area 2



Plate 3: Box Woodland Area 3 (within drainage line)



Plate 4: Box Woodland Area 4

104226: White Rock Wind Farm Project - Flora Quadrat Data (2010)

Family	Scientific Name	Common Name	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Apiaceae	<i>Cyclosporum leptophyllum*</i>	Slender Celery				2									1			
Apiaceae	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort							2						2			
Asteraceae	<i>Bidens pilosa*</i>	Cobbler's Pegs		2														
Asteraceae	<i>Carduus nutans subsp. nutans</i>	Nodding Thistle	1	1					1	1		1			1			1
Asteraceae	<i>Centaurea solstitialis*</i>	St Barnaby's thistle			1													
Asteraceae	<i>Cymbonotus lawsonianus</i>	Bears-ear	1					1				2			1			
Asteraceae	<i>Euchiton gymnocephalus</i>	Cudweed						1							1			
Asteraceae	<i>Hypochaeris radicata*</i>	Flatweed								1								1
Asteraceae	<i>Taraxacum officinale*</i>	Dandelion	2	1	2	1	1	2	1		1	1	1		2		1	
Brassicaceae	<i>Capsella bursa-pastoris*</i>	Shepherds purse			1	1									1			
Carophyllaceae	<i>Cerastium glomeratum*</i>	Mouse-ear Chickweed				3												
Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush			4													
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed		1				2	2	1			2			3		2
Davalliaceae	<i>Nephrolepis cordifolia*</i>	Fish-bone Fern											1					
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken						2								2		
Fabaceae/ faboideae	<i>Trifolium pratense*</i>	Red Clover				4	2				3				2		2	
Fabaceae/ faboideae	<i>Dillwynia sericea</i>	Showy Parrot Pea												1				
Fabaceae/ faboideae	<i>Hardenbergia violacea</i>	False Sarsparilla										1						
Fabaceae/ faboideae	<i>Trifolium dubium*</i>	Yellow Suckling Clover						3		2					2			
Fabaceae/ faboideae	<i>Trifolium repens*</i>	White Clover	5	3	3	4	4	4			1	1	3	1	4	2	3	
Fabaceae/ faboideae	<i>Vicia sativa subsp. sativa*</i>	Common Vetch		2	3			2			2	1	2					2
Fabaceae/ faboideae/ Mimosoideae	<i>Acacia dealbata</i>	Silver Wattle																1
Geraniaceae	<i>Geranium solanderi</i>	Cutleaf Cranesbill						2		1	2	2	2	1			1	1
Lamiaceae	<i>Lamium amplexicaule*</i>	Dead Nettle			2						1							
Lamiaceae	<i>Marrubium vulgare*</i>	White Horehound				2	2				1			1				

Family	Scientific Name	Common Name	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Lomandraceae	<i>Lomandra longifolia</i>	Spiky-headed Mat-rush										1	2			2	1	
Myrtaceae	<i>Eucalyptus dalrympleana</i>	Mountain Gum		4			3	4		3						3		
Myrtaceae	<i>Eucalyptus laevopinea</i>	Silvertop Stringybark														3		
Myrtaceae	<i>Eucalyptus melliodora</i>	Yellow Box	1	2							3							3
Myrtaceae	<i>Eucalyptus viminalis</i>	Ribbon Gum							4			3	4	5				
Oxalidaceae	<i>Oxalis perrenans</i>	Yellow-flowered Wood Sorrel		3	3	4	1	2	1		3		2		3			1
Pittosporaceae	<i>Bursaria spinosa var. spinosa</i>	Blackthorn		3			1	2		2			1	4				1
Plantaginaceae	<i>Plantago lanceolata*</i>	Ribwort								1				1				
Plantaginaceae	<i>Plantago minor*</i>	-											1		1			
Poaceae	<i>Avena sativa*</i>	Oats	3												3			3
Poaceae	<i>Cynosurus echinatus*</i>	Rough Dog's Grass									3	3						
Poaceae	<i>Elymus scaber</i>	Wheat Grass					1											
Poaceae	<i>Imperata cylindrica</i>	Blady Grass							5				3	2		3		3
Poaceae	<i>Pennisetum clandestinum*</i>	Kikuyu	3	1														
Poaceae	<i>Phalaris sp.*</i>	Phalaris	4		4	3	3				4	5	2	4	3	3	4	4
Poaceae	<i>Poa seiberiana</i>	Tussock Grass	3	3		3	2	4	4	6	3	3	6	3	3	5		3
Poaceae	<i>Themeda australis</i>	Kangaroo Grass								3			3	3	2	2		2
Poaceae	<i>Vulpia Sp.*</i>	Fescue	4				3								3	2	4	4
Polygonaceae	<i>Rumex brownii</i>	Swamp Dock													1			
Polygonaceae	<i>Rumex crispus*</i>	Curled Dock			3	1					1							1
Ranunculaceae	<i>Ranunculus lappaceus</i>	Glossy Buttercup							1			1	2					
Rosaceae	<i>Acaena novae-zelandiae</i>	Biddy Biddy							3	2	1		1		1			
Rosaceae	<i>Rubus anglocandicans*</i>	Blackberry						1							1	1	2	3
Rubiaceae	<i>Asperula conferta</i>	Common Woodruff					3	2	3	2	2	2		3	3	3		2
Santalaceae	<i>Exocarpos cupressiformis</i>	Native Cherry						1										
Solanaceae	<i>Lycium ferocissimum*</i>	African Boxthorn		1														
Urticaceae	<i>Urtica incisa</i>	Stinging Nettle		2		1	2		1		2			2				1
Urticaceae	<i>Urtica urens*</i>	Small Nettle		2					1			3	1			1	1	2
Verbenaceae	<i>Verbena bonariensis*</i>	Purpletop			1		1				2			2				

Family	Scientific Name	Common Name	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10	Q11	Q12	Q13	Q14	Q15	Q16	
Violaceae	<i>Melicytus dentatus</i>	Tree Violet										2							3
Violaceae	<i>Viola betonicifolia</i>	Native Violet														1	1		1

Cover Abundance

1 = <5% few individuals

4 = 25-50% cover

2 = <5% many individuals

5 = 50-75% cover

3 = 5-25% cover

6 = 75-100% cover

Paul Hillier
Senior Ecologist

RPS Australia East
(02) 49404200



Attachment 2 – Proposed Biodiversity Offset



ASSESSMENT OF PROPOSED OFFSET AREAS

WHITE ROCK WIND FARM PROJECT GLEN INNES



prepared by

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November 2011

11/36

Document Reference

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Cover Photograph: View of the eastern part of the forest within the Northern Offset Area (Area 1).

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This report was prepared for Epuron Pty Limited in accordance with their instructions. The report must only be used by the previously named and only for the stated purpose and not for any other purpose.

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1.0 Introduction

This Assessment was commissioned by Epuron Pty Limited who are seeking approval for the White Rock Wind Farm project to the west of Glen Innes on the northern tablelands of New South Wales.

The Ecological Assessment Report, prepared by RPS Group (2011), contained plans for setting aside offset areas within the wind farm properties. Three potential areas were delineated but no field surveys were undertaken to identify the type, condition or significance of the forests and woodlands contained within these offset areas.

Kevin Mills & Associates were engaged to undertake a preliminary field survey of the identified offset areas and to verify whether they contained the Ribbon Gum – Mountain Gum Woodland EEC similar to the native vegetation that would need to be cleared for the development of the wind farm. The survey would confirm the current land use and assess the conservation value of the proposed offset areas. Dr Kevin Mills visited the three areas on the 16 and 17 November 2011 prior to the preparation of this report.

2.0 The Study Areas

The three study areas are located within the White Rock Wind Farm properties; see **Figure 1**. The areas are summarised below, in **Table 1**.

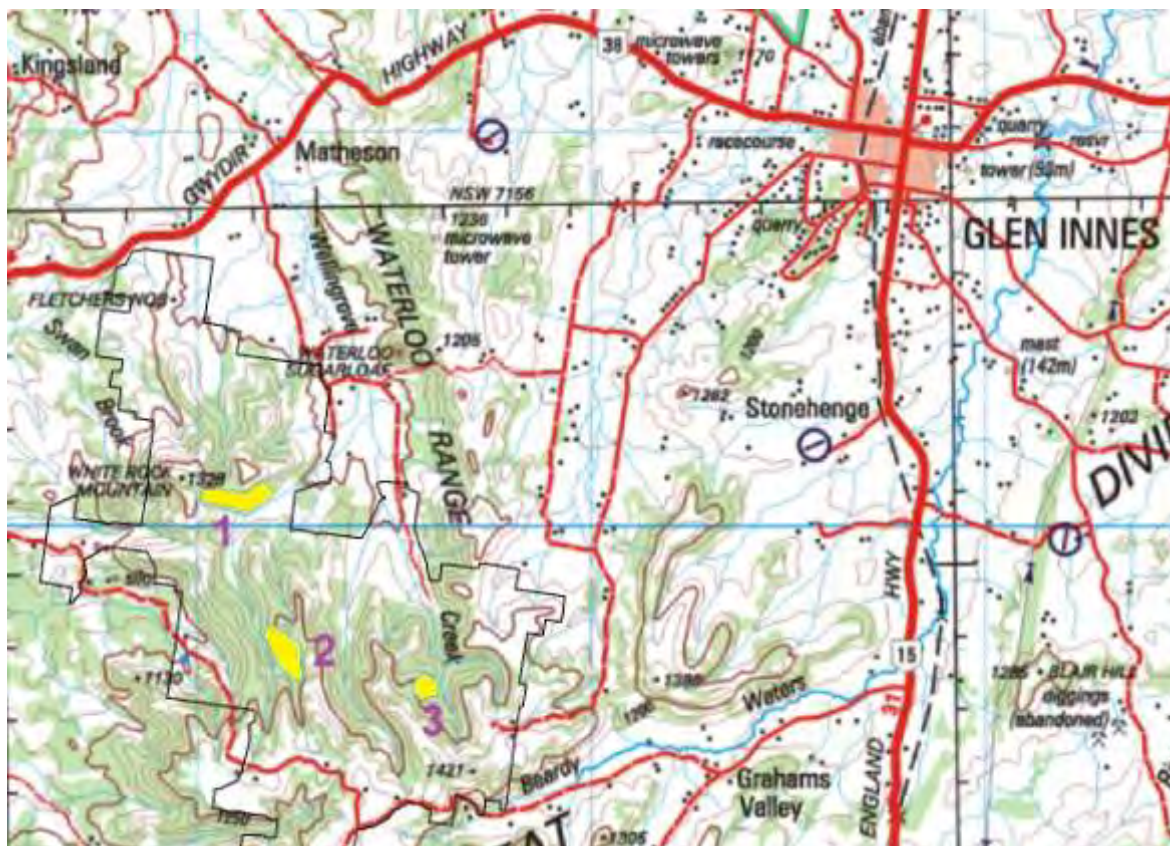


Figure 1. The Study Areas.

Table 1
Location and Characteristics of the Offset Areas

No.	Property	Size	Location (grid reference)	Altitude	Geology	Aspect	Topography
1	Taylor	75 ha	South of Gwydir Highway, about 1.5 km of the end off Ilparran (Jenkins) Road; south side of Talarook Ridge. 0360500 6700500	1,100m-1240m	Basalt	South	Moderately steep to steep valley-side slopes, creek at base of slope.
2	Ward	70 ha	North of Kellys Road, off Graham Valley Road. East of Falls creek. 0362000 6696500	1,160m-1,270m	Basalt	southwest	Moderately steep to steep valley-side slopes, creek at base of slope.
3	McCosker	23 ha	North of Maybole Road, off Graham Valley Road. West of Wellingrove Creek. 0365800 6695800	1,140m-1,240m	Basalt	east	Gentle to moderately steep slope.

3.0 Survey Methods

A vegetation/habitat survey of each offset area was undertaken in the field on 16 and 17 November 2011. The sites were surveyed on foot and most of each area was viewed. A vegetation description was prepared for each site based on the field investigations. The vegetation communities occurring in the study area were classified on the basis of their structure and the name(s) of the dominant species in the tallest stratum. The various vegetation classes within the system include closed forest (rainforest), open forest, woodland, open woodland, isolated trees, shrubland, heathland, grassland, sedgeland and fernland. Where relevant, the communities identified in this study are cross-referenced with established nomenclature, such as listed endangered ecological communities.

The plant species names in this report are the current names published by the National Herbarium of New South Wales in the *Flora of New South Wales* (Harden 1992-2002). Most of the common names are from the *Flora of New South Wales* (op. cit.), *Australian Plant Genera* by Baines (1981) and *Weeds of the South-east* by Richardson, Richardson and Shepherd (2006).

Most of the fauna species' names in this report are from the Australian Museum's *The Mammals of Australia* (Strahan 1995), *Australian Bats* (Churchill 1998), *Systematics and Taxonomy of Australian Birds* (Christidis & Boles 2008) and *Reptiles and Amphibians of Australia* (Cogger 1992).

The habitats present within each area were identified and described; important features for threatened animals were also noted.

4.0 Descriptions of Offset Areas

4.1 Area 1 - Northern Area

Vegetation

The vegetation is tall forest to woodland, dominated by Ribbon Gum *Eucalyptus viminalis*, with scattered Rough-barked Apple *Angophora floribunda* mainly on the lower slopes in the south. Blakelys Red Gum *Eucalyptus blakelyi* occurs on some parts of the upper slope. Yellow Box *Eucalyptus melliodora* occurs on the valley floor nearby but apparently not within the designated area.

Smaller trees are scattered through the forest; these species are Native Cherry *Exocarpos cupressiformis*, Blackwood *Acacia melanoxylon*, and much less commonly, Black She-oak *Allocasuarina littoralis*. The shrub Blackthorn *Bursaria spinosa* is very common, growing up to four or more metres tall; this shrub is dense in some places. The shrub Tree Violet *Hymenanthera dentata* occurs here and there.

In most places the ground cover is a mixture of native forbs and grasses and exotic herbaceous plants, with natives dominating in many places. The common native species include Tall Tussock *Poa labillardieri*, Stinking Pennywort *Hydrocotyle laxiflora*, Bidgee Widgee *Acaena novae-zelandiae*, Spiny-headed Mat-rush *Lomandra longifolia*, Slender Tick-trefoil *Desmodium varians*, Native Geranium *Geranium solanderi*, Forest Hedgehog Grass *Echinopogon ovatus*, Common Bracken *Pteridium esculentum*, Traveller's Joy *Clematis aristata* and Blady Grass *Imperata cylindrica*.

Invasive weeds are not common; Blackberry *Rubus* sp. occurs here and there, particularly on the edge of the forests and in the east. Two other serious woody weeds were observed, but these are rare; the species are Briar Rose *Rosa rubiginosa* and Hawthorn *Crataegus monogyna*.

A plant list was prepared for each area and those species found in this area are indicated in the complete list at **Appendix 1**.

Habitats

The forest is composed of medium to large sized trees; tree hollows occur in the larger trees and in some dead trees. The area contains scattered rocky areas, scree slopes, a few quite large areas of bedrock and some small cliffs. The understorey is as described above, namely primarily native grassland with moderately dense to dense shrubs (Blackthorn) growing to over four metres tall.

Significant Features

The forest is a part of the listed community Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion. The stand is in a reasonably good condition given the highly modified character of most of the stands in the region. A Wedge-tailed Eagle's nest, which was in use, occurs in one location; this is apparently a traditional site as an old nest was in an adjacent tree.

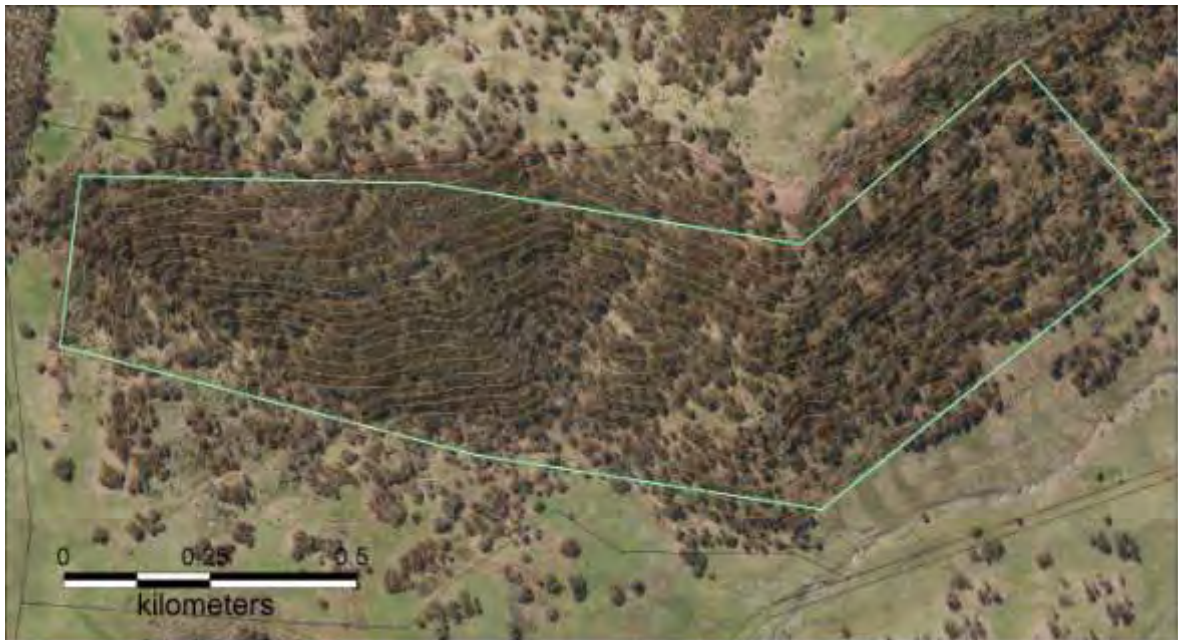


Figure 2. Northern Offset Area

4.2 Area 2 - Central Area

Vegetation

The vegetation is tall forest to woodland, dominated by Ribbon Gum *Eucalyptus viminalis*, with scattered Rough-barked Apple *Angophora floribunda* on the lower slopes in the west. The other eucalypts present are rare, namely a few specimens of Snow Gum *Eucalyptus pauciflora* and New England Peppermint *Eucalyptus nova-anglica* near the creek. Smaller trees are scattered in the forest; these species are Native Cherry *Exocarpos cupressiformis*, Blackwood *Acacia melanoxylon* and a few Black She-oak *Allocasuarina littoralis*. The shrub Blackthorn *Bursaria spinosa* is common, growing up to four metres tall; other shrubs are rare. The ground cover is mainly native forbs and grasses; the dominant species is Tall Tussock *Poa labillardieri*. Other common species are Stinking Pennywort *Hydrocotyle laxiflora*, Bidgee Widgee *Acaena novae-zelandiae*, Native Geranium *Geranium solanderi*, Forest Hedgehog Grass *Echinopogon ovatus*, Common Bracken *Pteridium esculentum*, Traveller's Joy *Clematis aristata* and Blady Grass *Imperata cylindrica*.

Serious invasive weeds are rare, only a few Blackberry *Rubus* sp. bushes were seen. Common exotic species include White Clover *Trifolium repens*, Medic *Medicago* sp., Spear-thistle *Cirsium vulgare* and Soft Brome *Bromus hordaceus*.

A plant list was prepared for each area and those species found in this area are indicated in the complete list at **Appendix 1**.

Habitats

The forest is composed of medium to large sized trees; tree hollows occur in the larger trees and in some dead trees. The area contains scattered small rocky areas and a few large areas of bedrock and large boulders. The understorey is as described above, namely primarily native grassland with moderately dense shrubs (Blackthorn) growing to about four metres tall.

Significant Features

The forest is a part of the listed community Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion. The stand is in a reasonably good condition given the highly modified character of most of the stands in the region.



Figure 3. Central Offset Area

4.3 Area 3 - Southern Area

Vegetation

The vegetation is a forest to woodland dominated by three tree species, namely Ribbon Gum *Eucalyptus viminalis*, Yellow Box *Eucalyptus melliodora* and Blakelys Red Gum *Eucalyptus blakelyi*. In many places a moderately dense thicket of Blackthorn *Bursaria spinosa* is present. The ground cover is mostly dominated by exotics, as listed below. The natives tend to be scattered amongst the exotics rather than forming a native grassland cover.

Common exotic species include Cocksfoot *Dactylis glomerata*, Phalaris *Phalaris* sp., Soft Brome *Bromus hordaceus*, Tall Fescue *Festuca arundinacea*, White Clover *Trifolium repens* and Spear-thistle *Cirsium vulgare*.

A plant list was prepared for each area and those species found in this area are indicated in the complete list at **Appendix 1**.

Habitats

The forest is composed of medium to large sized trees; tree hollows occur in the larger trees and in some dead trees. The area contains a few small rocky areas. The understorey is as described above, namely primarily exotic grassland (pasture) with moderately dense native shrubs (Blackthorn) growing to about four metres tall.

Significant Features

The forest is a part of the listed community Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion; in this case with Yellow Box *Eucalyptus melliodora* as a significant component. The stand is not in as good a condition as the above areas, but it does have a shrub understorey and the presence of Yellow Box, absent from the above sites, complements those sites.



Figure 4. Southern Offset Area

5.0 Overview of Significant Features

5.1 Threatened Flora

Threatened plant species are listed on schedules under the New South Wales *Threatened Species Conservation Act, 1995* (TSC Act). Information on the occurrence of threatened plant species in New South Wales can be obtained from the NSW Wildlife Atlas (DECC). A search of the Wildlife Atlas has revealed that 23 threatened plant species have been recorded in the Glen Innes Severn local government area (LGA). Of these 23 threatened species, only three have been recorded in proximity to the project area; Warra Broad-leaved Sally *Eucalyptus camphora* subspecies *relicta*, Bluegrass *Dichanthium setosum* and Austral Toadflax *Thesium australe*. A brief search for these species was undertaken in areas of suitable habitat. The probability of these species occurring in the offset areas is assessed in **Table 2**.

5.2 Threatened Fauna

Threatened fauna species are listed on schedules under the New South Wales *Threatened Species Conservation Act, 1995* (TSC Act). The NSW Wildlife Atlas indicates that 46 threatened fauna species have been recorded in the Glen Innes Severn LGA. Those species possibly occurring in proximity to the project area are listed in **Table 3**. The probability of these species occurring in the offset areas is assessed in **Table 3**.

Table 2
List of Threatened Plant Species for the Glenn Innes Area

Species	Probability of Occurrence		
	Area 1	Area 2	Area 3
<i>Dichanthium setosum</i> Bluegrass	possible	possible	possible
<i>Eucalyptus camphora</i> subspecies <i>relicta</i> Warra Broad-leaved Sally	unlikely	unlikely	unlikely
<i>Thesium australe</i> Austral Toadflax	unlikely	unlikely	unlikely

Table 3
List of Threatened Fauna Species for the Glen Innes Area

Species	Probability of Occurrence		
	Area 1	Area 2	Area 3
Mammals			
Spotted-tailed Quoll	unlikely	unlikely	unlikely
Squirrel Glider	unlikely	unlikely	unlikely
Eastern Bentwing-bat	foraging only	foraging only	foraging only
Eastern Falsistrelle	possible	possible	possible
Greater Broadnosed Bat	unlikely	unlikely	unlikely
Little Pied Bat	unlikely	unlikely	unlikely
Yellow-bellied Sheathtail Bat	possible	possible	possible
Grey-headed Flying-fox	possible	possible	possible
Birds			
Australasian Bittern	no	no	no
Black-necked Stork	no	no	no
Blue-billed Duck	no	no	no
Barking Owl	possible	possible	possible
Masked Owl	possible	possible	possible
Powerful Owl	unlikely	unlikely	unlikely
Brown Treecreeper	possible	possible	unlikely
Diamond Firetail	possible	possible	possible
Speckled Warbler	possible	recorded	possible
Regent Honeyeater	unlikely	unlikely	unlikely
Turquoise Parrot	unlikely	unlikely	unlikely
Olive Whistler	possible	possible	possible
Square-tailed Kite	possible	possible	possible
Glossy Black-Cockatoo	unlikely	unlikely	unlikely

5.3 Threatened Communities

As noted above, all three areas contain examples of the listed endangered ecological community known as Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion listed community; see **Appendix 3**. The northern and central areas (areas 1 and 2) are similar in terms of extent, diversity in native biota and overall quality of natural values. The southern area (area 3) is not of such a high conservation value because the area is smaller and generally does not support an understorey that is native dominant.

6.0 Conclusion

With very few conservation reserves located on the basalt country of the Glen Innes Region, the three proposed offset areas could contribute significantly to conserving plant and animal species and communities on the basalt landscape in the locality. While much of the basalt country is still well treed, most of this does not have a native understorey. Native understorey, particularly a shrub layer, is important for many native animals that could not otherwise survive in an area. The key features of the three areas is illustrated by the set of photographs at **Appendix 4**.

The areas chosen are important because they sample reasonably good examples of the Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion listed community; see **Appendix 3**. This community, characteristic of the basalt soils in this district, is over-cleared across most of its range. The community has been listed as endangered in New South Wales because its area has been drastically reduced in area and what remains is mostly highly modified.

The survey undertaken here found that the areas are quite diverse in terms of native plants and animals present, particularly areas 1 and 2; see **Appendices 1 and 2**. The forests have the potential to contain threatened species, although only one species was recorded in this survey. Conservation values can be significantly enhanced through improved management. The negative impacts on natural values caused by the current land use through weeds, feral animals and stock grazing would require management to improve the situation in each of the designated areas. The initial requirement is for fencing of each area to exclude grazing stock. The proposed offset areas would provide suitable options to offset the quantum and condition of native vegetation to be removed during the construction of the proposed wind farm.

It is **recommended** that the final boundaries of each area be determined in the field by an ecologist with conservation reserve management experience. The boundaries shown for areas 1 and 2 are not appropriate in some places because of recent clearing; these boundaries require 'fine tuning', based on current field conditions.

It is further **recommended** that a Conservation Management Plan be prepared for the final offset areas. This should be prepared by a person with experience in conservation reserve management.

7.0 References

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Appendix 1
Preliminary Plant Species Lists for the Offset Areas

Species	Common Name	1.North	2.Central	3.South
Note that only indigenous plants have been recorded.				
<i>Acacia melanoxylon</i>	Blackwood	n	c	s
<i>Acaena novae-zelandiae</i>	Bidgee-widgee	n	c	s
<i>Adiantum aethiopicum</i>	Common Maidenhair	n	c	
<i>Ajuga australis</i>	Austral Bugle	n	c	
<i>Allocasuarina littoralis</i>	Black She-oak	n	c	
<i>Amyema pendulum</i>	Drooping Mistletoe	n	c	s
<i>Angophora floribunda</i>	Rough-barked Apple	n	c	
<i>Asperula conferta</i>	Common Woodruff	n	c	
<i>Asplenium flabellifolium</i>	Necklace Fern	n	c	
<i>Austrodanthonia sp.</i>	Wallaby Grass	n		
<i>Austrostipa sp.</i> (large tussock)	Three-awned Speargrass	n	c	
<i>Austrostipa sp.</i> (small tussock)	Three-awned Speargrass		c	
<i>Bothriochloa macra</i>	Red-leg Grass	n	c	
<i>Brachycome sp.</i> (large flower)	Daisy	n	c	s
<i>Brachycome sp.</i> (small flower)	Daisy		c	
<i>Bulbine bulbosa</i>	Bulbine Lily	n	c	
<i>Bursaria spinosa</i>	Blackthorn	n	c	s
<i>Carex ? inversa</i>	Common Sedge	n	c	
<i>Carex appressa</i>	Tall Sedge	n	c	
<i>Cassinia quinquefaria</i>	Cough Bush	n		
<i>Centipeda sp.</i>	Sneezeweed		c	
<i>Chamaesyce drummondii</i>	Caustic Creeper	n		
<i>Cheilanthes distans</i>	Bristly Cloak Fern	n		
<i>Cheilanthes sieberi</i>	Mulga Fern	n	c	
<i>Clematis aristata</i>	Traveller's Joy	n	c	s
<i>Clematis microphylla</i>	Small-leaved Clematis	n	c	
<i>Coprosma quadrifida</i>	Prickly Currant-bush		c	
<i>Crassula sieberiana</i>	Australian Stonecrop	n	c	
<i>Cymbonotus lawsonianus</i>	Bear's Ear	n	c	
<i>Cymbopogon refractus</i>	Barbed-wire Grass	n	c	
<i>Cynoglossum australe</i>	Australian Hound's-tongue	n	c	
<i>Daucus glochidiatus</i>	Native Carrot		c	s
<i>Desmodium rhytidophyllum</i>	Tick-trefoil			s
<i>Desmodium varians</i>	Slender Tick-trefoil	n	c	s
<i>Dichelachne micrantha</i>	Shorthair Plumegrass	n		
<i>Dichondra repens</i>	Kidney-weed	n	c	s
<i>Doodia australis</i>	Common Rasp Fern	n	c	
<i>Echinopogon ovatus</i>	Forest Hedgehog Grass	n	c	
<i>Einadia nutans</i>	Climbing Saltbush			s
<i>Einadia trigonos</i>	Fishweed			s
<i>Epilobium billardierianum</i>	Willowherb	n	c	
<i>Eucalyptus blakleyi</i>	Blakelys Red Gum	n		s
<i>Eucalyptus melliodora</i>	Yellow Box			s
<i>Eucalyptus nova-anglica</i>	New England Peppermint		c	
<i>Eucalyptus pauciflora</i>	Snow Gum		c	
<i>Eucalyptus viminalis</i>	Ribbon Gum	n	c	s
<i>Exocarpos cupressiformis</i>	Native Cherry	n	c	
<i>Galium sp.</i>	Bedstraw	n	c	
<i>Geitonoplesium cymosum</i>	Scambling Lily	n	c	s
<i>Geranium solanderi</i>	Austral Crane's-bill	n	c	
<i>Glycine clandestina</i>	Twining Glycine	n	c	s

Species	Common Name	1.North	2.Central	3.South
<i>Haloragus heterophylla</i>	Swamp Raspwort	n		
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	n	c	s
<i>Hymenanchera dentata</i>	Tree Violet	n	c	s
<i>Hypericum gramineum</i>	Small St John's Wort	n		
<i>Imperata cylindrica</i>	Blady Grass	n	c	s
<i>Indigofera australis</i>	Austral Indigo		c	
<i>Juncus</i> sp.	Rush	n	c	
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	n	c	
<i>Lomandra multiflora</i>	Many-flowered Mat-rush	n		
<i>Microlaena stipoides</i>	Weeping Grass	n	c	
<i>Olearia argophylla</i>	Musk Daisy Bush		c	
<i>Olearia rosmarinifolia</i>	Daisy	n		
<i>Oxalis</i> sp.	Oxalis	n		
<i>Pandorea pandorana</i>	Wonga Vine	n	c	
<i>Panicum effusum</i>	Hairy Panic			
<i>Pellaea falcata</i>	Sickle Fern	n	c	
<i>Phragmites australis</i>	Common Reed			
<i>Pimelea curviflora</i>	Curved Rice-flower	n	c	
<i>Plantago debilis</i>	Slender Plantain	n	c	
<i>Poa labillardieri</i>	Tussock Grass		n	c
<i>Polystichum fallax</i>	Shield fern	n	c	
<i>Poranthera microphylla</i>	Small Poranthera	n		
<i>Pteridium esculentum</i>	Bracken	n	c	s
<i>Pyrrosia rupestris</i>	Rock Felt Fern	n		
<i>Ranunculus lappaceus</i>	Common Buttercup	n	c	
<i>Rubus parvifolius</i>	Native Raspberry	n	c	s
<i>Rumex brownii</i>	Swamp Dock	n	c	s
<i>Schoenus apogon</i>	Common Bogrush	n	c	
<i>Scutellaria humilis</i>	Dwarf Skullcap	n	c	
<i>Senecio diaschides</i>	Fireweed	n		
<i>Senecio hispidulus</i>	Hill Fireweed	n	c	s
<i>Senecio prenanthoides</i>	Fireweed	n	c	
<i>Senecio quadridentatus</i>	Cotton Fireweed	n	c	s
<i>Sigesbeckia orientalis</i>	Indian Weed	n		s
<i>Stellaria pungens</i>	Prickly Starwort	n	c	s
<i>Urtica incisa</i>	Stinging Nettle	n	c	s
<i>Viola betonicifolia</i>	Purple Violet		c	
<i>Viola hederacea</i>	Native Violet	n		
<i>Vittadinia cuneata</i>	Fuzzweed	n		
<i>Vittadinia gracilis</i>	Fuzzweed			s
<i>Wahlenbergia communis</i>	Tufted Bluebell	n	c	s

Appendix 2
Fauna Species List for the Offset Areas

Species		Offset Areas	District
Birds			
Australian Magpie	<i>Gymnorhina tibicen</i>	0	
Australian Raven	<i>Corvus coronoides</i>	0	
Australian White Ibis	<i>Threskiornis molucca</i>		d
Australian Wood Duck	<i>Chenonetta jubata</i>		d
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	0	
Black-shouldered Kite	<i>Elanus axillaris</i>	0	
Brown Goshawk	<i>Accipiter fasciatus</i>	0	
Brown Songlark	<i>Cincloramphus cruralis</i>		d
Brown Thornbill	<i>Acanthiza pusilla</i>	0	
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>	0	
Common Starling*	<i>Sturnus vulgaris</i>		d
Crested Pigeon	<i>Ocyphaps lophotes</i>		d
Crimson Rosella	<i>Platycercus elegans</i>	0	
Eastern Rosella	<i>Platycercus eximius</i>	0	
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	0	
Eastern Yellow Robin	<i>Eopsaltria australis</i>	0	
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	0	
Galah	<i>Cacatua roseicapilla</i>	0	
Grey Butcherbird	<i>Cracticus torquatus</i>	0	
Grey Fantail	<i>Rhipidura fuliginosa</i>	0	
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	0	
House Sparrow*	<i>Passer domesticus</i>		d
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	0	
Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>		d
Magpie-lark	<i>Grallina cyanoleuca</i>		d
Masked Lapwing	<i>Vanellus miles</i>		d
Nankeen Kestrel	<i>Falco cenchroides</i>		d
Noisy Friarbird	<i>Philemon corniculatus</i>	0	
Noisy Miner	<i>Manorina melanocephala</i>		d
Olive-backed Oriole	<i>Oriolus sagittatus</i>	0	
Pacific Black Duck	<i>Anas superciliosa</i>	0	
Painted Button-quail	<i>Turnix varia</i>		d
Pied Butcherbird	<i>Cracticus nigrogularis</i>		d
Pied Currawong	<i>Strepera graculina</i>	0	
Red Wattlebird	<i>Anthochaera carunculata</i>	0	
Red-browed Finch	<i>Neochmia temporalis</i>	0	
Richard's Pipit	<i>Anthus novaeseelandiae</i>		d
Rufous Whistler	<i>Pachycephala rufiventris</i>	0	
Sacred Kingfisher	<i>Todiramphus sanctus</i>	0	
Southern Boobook	<i>Ninox novaeseelandiae</i>	0	
Speckled Warbler	<i>Chthonicola sagittata</i>	0	
Spotted Pardalote	<i>Pardalotus punctatus</i>	0	
Straw-necked Ibis	<i>Threskiornis spinicollis</i>		d
Striated Pardalote	<i>Pardalotus striatus</i>	0	
Stubble Quail	<i>Coturnix pectoralis</i>		d
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	0	
Superb Fairy-wren	<i>Malurus cyaneus</i>	0	
White-browed Scrubwren	<i>Sericornis frontalis</i>	0	
White-naped Honeyeater	<i>Melithreptus lunatus</i>	0	
White-throated Treecreeper	<i>Cormobates leucophaeus</i>	0	
Willie Wagtail	<i>Rhipidura leucophrys</i>		d
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>	0	

Species		Offset Areas	District
Birds			
Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>	0	
Mammals			
Eastern Grey Kangaroo	<i>Macropus giganteus</i>	0	
Swamp Wallaby	<i>Wallabia bicolor</i>	0	
Brown Hare*	<i>Lepus capensis</i>		d
Fallow Deer*	<i>Dama dama</i>	0	
Feral Goat*	<i>Capra hircus</i>	0	
Feral Pig*	<i>Sus scrofa</i>	0	
Fox*	<i>Vulpes vulpes</i>	0	
Rusa Deer*	<i>Cervus timorensis</i>	0	
Reptiles			
Delicate Skink	<i>Lampropholis delicata</i>	0	
Copper-tailed Skink	<i>Ctenotus taeniolatus</i>	0	
Frogs			
Common Eastern Froglet	<i>Crinia signifera</i>	0	
Spotted Grass Frog	<i>Limnodynastes tasmaniensis</i>	0	

Appendix 3

Final Determination: Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/ Woodland of the New England Tableland BioRegion

NSW Scientific Committee Final Determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion as an ENDANGERED ECOLOGICAL COMMUNITY in Part 3 of Schedule 1 of the Act. Listing of endangered ecological communities is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion is the name given to the ecological community characterised by the assemblage of species listed in paragraph 2 that typically occurs at elevations of 700 - 1500 m, and is mainly confined to the high undulating basalt plateau with deep, chocolate or krasnozem loam soils (Benson and Ashby 2000). The structure of the community is typically open forest 20 - 30 m tall, although it may assume the structure of woodland, sometimes less than 12 m tall, in exposed sites or where subject to past clearing or thinning. The understorey contains a sparse stratum of shrubs and a continuous groundcover composed mostly of grasses and herbs.

2. Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion is characterised by the following assemblage of species:

<i>Acacia dealbata</i>	<i>Acaena agnipila</i>
<i>Acaena novae-zelandiae</i>	<i>Ajuga australis</i>
<i>Ammobium alatum</i>	<i>Asperula conferta</i>
<i>Brachyscome nova-anglica</i>	<i>Bracteantha bracteata</i>
<i>Bulbine bulbosa</i>	<i>Craspedia variabilis</i>
<i>Cullen tenax</i>	<i>Cynoglossum australe</i>
<i>Desmodium varians</i>	<i>Dichelachne micrantha</i>
<i>Dichondra repens</i>	<i>Dichopogon fimbriatus</i>
<i>Diuris abbreviate</i>	<i>Elymus scaber</i>
<i>Epilobium billardierianum</i>	<i>Eucalyptus dalrympleana</i> subsp. <i>heptantha</i>
<i>Eucalyptus pauciflora</i>	<i>Eucalyptus stellulata</i>
<i>Eucalyptus viminalis</i>	<i>Euchiton gymnocephalus</i>
<i>Exocarpos cupressiformis</i>	<i>Galium ciliare</i>
<i>Geranium solanderi</i>	<i>Glycine clandestina</i>
<i>Hybanthus monopetalus</i>	<i>Hydrocotyle laxiflora</i>
<i>Hypericum gramineum</i>	<i>Lachnagrostis filiformis</i>
<i>Lomandra longifolia</i>	<i>Luzula densiflora</i>
<i>Pimelea linifolia</i>	<i>Poa labillardierei</i> var. <i>labillardierei</i>
<i>Poa sieberiana</i> var. <i>sieberiana</i>	<i>Poranthera microphylla</i>
<i>Pteridium esculentum</i>	<i>Pultenaea microphylla</i>
<i>Ranunculus lappaceus</i>	<i>Rubus parvifolius</i>
<i>Rumex brownii</i>	<i>Scleranthus biflorus</i>
<i>Senecio bipinnatisectus</i>	<i>Senecio diaschides</i>
<i>Senecio</i> sp. E	<i>Stellaria pungens</i>
<i>Themeda australis</i>	<i>Thesium australe</i>
<i>Veronica calycina</i>	<i>Viola betonicifolia</i>
<i>Wahlenbergia stricta</i> subsp. <i>stricta</i>	

3. The total species list of the community is larger than that given above, with many species present only in one or two sites, or in low abundance. The species composition of a site will be influenced by the size of the site, recent rainfall or drought conditions and by its disturbance (including grazing, land clearing and fire) history. The number and relative abundance of species will change with time since fire, and may also change in response to changes in fire regimes. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given above is mainly of vascular plant species, however the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. These components of the community are poorly documented.

4. Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion is characterised by a tree layer usually c. 20 m tall, reaching up to 30 m in resource-rich sites, but considerably shorter than 20m on exposed or damp sites or where past clearing has removed mature trees. Common overstorey species include *Eucalyptus viminalis* (Ribbon Gum), *E. dalrympleana* subsp. *heptantha* (Mountain Gum), *E. pauciflora* (Snow Gum or White Sallee) and occasionally *E. stellulata* (Black Sallee). The understorey comprises a sparse layer of shrubs including *Acacia dealbata*, *Pultenaea microphylla* and *Pimelea linifolia* and a dense to very dense grassy ground cover dominated by *Poa sieberiana* var. *sieberiana*, *P. labillardieri* var. *labillardieri*, *Themeda australis* and *Elymus scaber* with herbs such as *Acaena* spp. *Ammobium alatum*, *Asperula conferta*, *Geranium solanderi*, *Ranunculus lappaceus* and numerous other species (Benson and Ashby 2000).

5. Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion provides important habitat for the nationally vulnerable plant species *Thesium australe*, commonly known as 'Austral Toadflax' (Benson and Ashby 2000).

6. Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion is currently known from parts of the Local Government Areas of Armidale Dumaresq, Bellingen, Clarence Valley, Glen Innes Severn, Guyra, Inverell, Tenterfield, Uralla and Walcha but may occur elsewhere in this bioregion. Bioregions are defined in Thackway and Creswell (1995).

7. Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion includes Communities 6 and 7 of Benson and Ashby (2000) and Tableland Grasslands and Woodlands on Basaltic Soils (Vegetation Type 1b, *Eucalyptus viminalis*) of Clarke *et al.* (1995). There may be additional occurrences of the community within and beyond these surveyed areas. Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland belongs to the Tableland Clay Grassy Woodlands vegetation class (Keith 2004).

8. Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion may co-occur with White Box Yellow Box Blakely's Red Gum Woodland, also listed under the *Threatened Species Conservation Act (1995)*. The two Endangered Ecological Communities may intergrade where they adjoin and in intermediate habitats such as occur in the vicinity of Armidale. All intermediate assemblages are collectively included within the two communities.

9. The extent of Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion prior to European settlement has not been mapped across its entire range. However, in the Guyra District, Benson and Ashby (2000) estimate that 85 per cent of their Map Units 6 and 7 have been cleared, leaving less than 8500 hectares, of which less than half still retains a largely native understorey. This indicates a large reduction in geographic distribution of the community. Throughout the range of this community most of the understorey is highly modified, with many weeds present and a reduced native species richness (J. T. Hunter pers. comm.). An unknown area persists as native grassland where the woody component of the

community has been eliminated by clearing. Of the area still wooded, much is regrowth after clearing or has had its understorey adversely affected by grazing or weed invasion.

10. The remaining stands are severely fragmented by past clearing and further threatened by continuing fragmentation and degradation, high grazing pressure, inappropriate fire regimes and invasion by introduced taxa (Benson and Ashby 2000, Keith 2004). Common introduced taxa include *Hypochaeris radicata*, *Trifolium repens*, *Cirsium vulgare*, *Taraxacum officinale*, *Arenaria leptoclados* and *Petrorhagia nanteullii* (Benson and Ashby 2000). Exotic perennial grasses such as *Eragrostis curvula* and *Andropogon virginicus* also threaten the community at higher altitudes (J. T. Hunter pers. comm.). Grazing pressure within remnant stands may be intense at certain times and high frequency (in some cases, annual) fires are a common management practice, leading to reduced understorey diversity. Most remnants are in poor condition, with some of the best examples now found along roadsides where they are often susceptible to gradual attrition due to road maintenance activities (J. T. Hunter pers. comm.). Collectively these processes represent a large reduction in the ecological function of the community. Clearing of native vegetation, High frequency fire resulting in disruption of life cycle processes in plants and animals and loss of vegetation structure and composition and Invasion of native plant communities by exotic perennial grasses are listed as Key Threatening Processes under the NSW *Threatened Species Conservation Act 1995*.

11. The community is poorly represented in conservation reserves with only 17 hectares represented in Little Llangothlin Nature Reserve (Benson and Ashby 2000).

12. In view of the above, the Scientific Committee is of the opinion that Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival cease to operate.

Dr Lesley Hughes
Chairperson
Scientific Committee
Proposed Gazettal date: 21/10/05
Exhibition period 21/10/05 – 16/12/05

References

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Keith, D.A. (2004). 'Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT'. Department of Environment and Conservation, Hurstville, New South Wales.

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Appendix 4
Photographs



Photograph 1. Area 1 (northern), showing the dense Blackthorn understorey below Ribbon Gums.



Photograph 2. Area 1 (northern), showing scree slope of basalt blocks, such areas provide important habitat for reptiles.



Photograph 3. Area 2 (central), Ribbon Gum is dominant over a native understorey of Blackthorn shrubs and tussock ground cover.



Photograph 4. Area 2 (central), large rocky outcrops occur here and there, providing shelter for native animals, including reptiles.



Photograph 5. Area 3 (southern), the trees are mainly Ribbon Gum and Yellow Box, with a largely exotic ground cover.



Photograph 6. Area 3 (southern), much of the area has a reasonably dense cover of Blackthorn shrubs.



Attachment 3 – NBN Television Signal Analysis



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

A television repeater station is located on Carpenters Hill near Glen Innes that re-broadcasts the TV communication signals from Mt Dowe, 160km to the south west. This station provides the analogue and digital TV signal to the town of Glen Innes. Two proposed turbine locations (No. 2 & 3) have the potential to impact on the signal to the Carpenters Hill repeater station as shown in Figure 1 below.

Epuron has consulted with NBN Television and has committed to ensuring that the proposed White Rock Wind Farm has no detrimental impact on the TV signal. The proposed actions are:

1. Installing new communications link infrastructure to reroute the communications signal around the White Rock Wind Farm; or
2. Relocating the two turbines so that they are outside the 2nd Order Fresnel zone of the signal path.

The Glen Innes Wind Farm is located to the north east of White Rock Wind Farm and is also likely to impact on the NBN communications link. Epuron has consulted with NPPower, the proponents of the Glen Innes Wind Farm with a view to working together to identify a common solution to any rerouting of the signal.

The wind turbine generators at the White Rock and Glen Innes Wind Farms are not in close proximity to the broadcast site or the receiver site. However, the communication link between Mt Dowe and Carpenters Hill is extremely long, at a distance of 160km, and is also extremely important, as it provides TV reception for the whole town of Glenn Innes. For these reasons, testing TV reception post-construction would not be suitable, and mitigation measures must be taken prior to construction of the White Rock Wind Farm.

Table 1 – Technical Information of Communication Links

	Channel	Licence #	Frequency (Mhz)	Band
Analogue TV	NBN	1384281	548.198	UHF
	Prime	1384349	196.24	VHF
	SCB	1384355	569.198	UHF
Digital TV	NBN	1908984	592.5	UHF
	Prime	1192229	205.625	VHF
	SCB	1191509	613.5	UHF

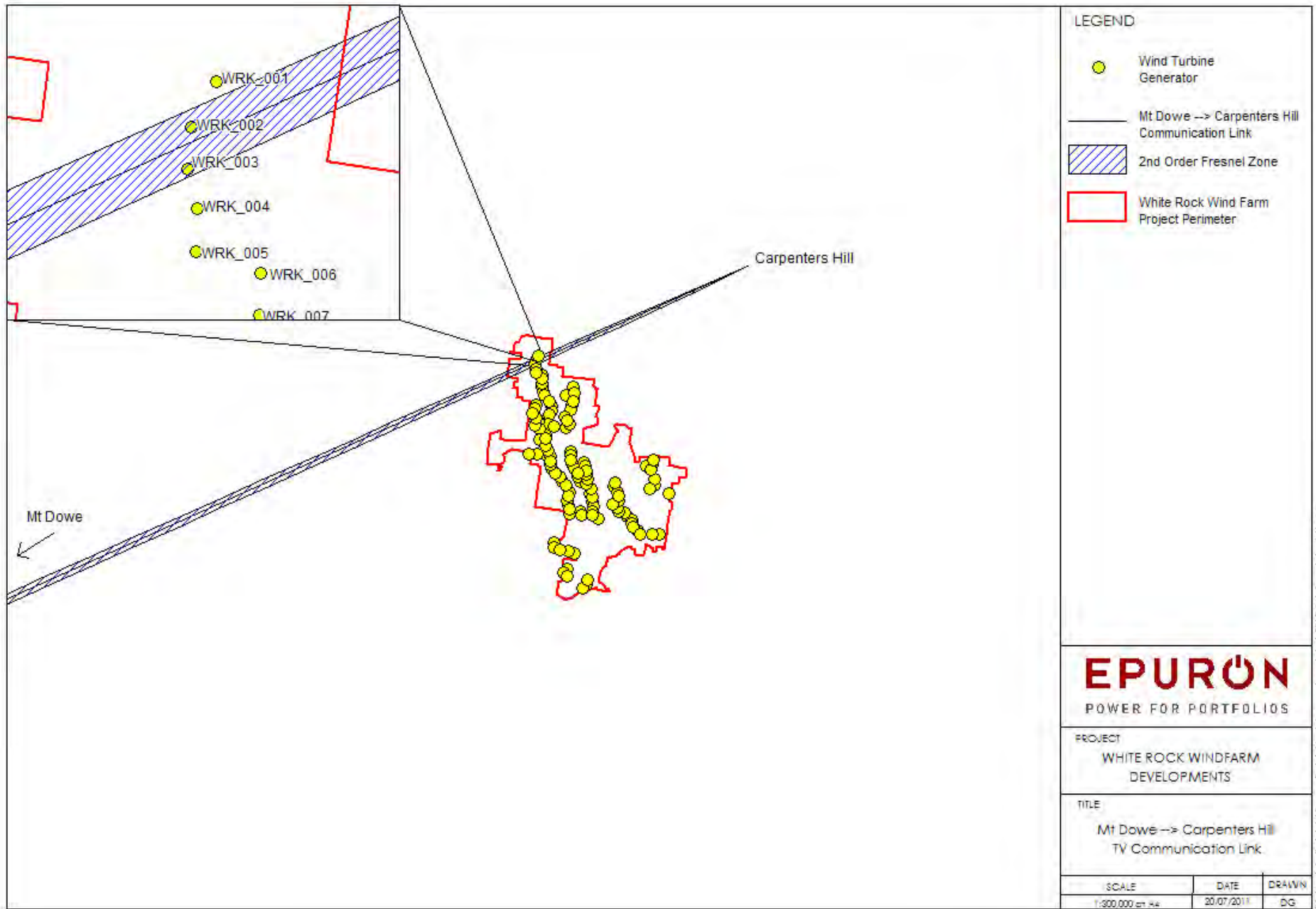


Figure 1 – Map of Communications Link and White Rock Wind Farm

Fresnel Calculations

2nd order Fresnel calculations have been used to conservatively estimate the radius of the circular area around the communications link which should not be obstructed to ensure the best possible reception and lowest interference of objects between the broadcast site and receiver site. The equation is shown below:

$$2^{\text{nd}} \text{ Order Fresnel Zone} = \text{SQRT}(600 * (d1 * d2) / (\text{Frequency} * (d1 + d2)))$$

The analysis was performed with the lowest frequency TV communication, as this gives the largest, most conservative Fresnel zone. Analogue TV signals were not included in the analysis because analogue TV signals are likely to be phased out of use by the time of the construction of the White Rock Wind Farm.

The analysis shows a maximum 2nd order Fresnel zone at the centre of the communications link, with a radius of 341m. The radius of the Fresnel zone at the White Rock Wind Farm is closer to 200m. The Fresnel zone is in three dimensions and for this reason, the communications link would not be able to pass over the White Rock Wind Farm wind turbines unobstructed.

The communications link travels from 1635m above sea level to 1210m above sea level, approximately 1252m above sea level at the White Rock Wind Farm. The ground level at the White Rock Wind Farm is approximately 1030m above sea level. The top of a wind turbine at this location would be approximately 1170m above sea level, which leaves approximately 80m between the wind turbine and the communications link. A 200m 2nd Fresnel zone buffer would not fit in-between the wind turbine and the communications link.

Table 2 – Fresnel Calculations for Mt Dowe → Carpenters Hill Communications Link

d1 (m)	d2 (m)	Frequency (MHz)	Fresnel Zone (2nd) metres
0	160000	205.625	0
5000	155000	205.625	118.8854
10000	150000	205.625	165.3954
15000	145000	205.625	199.1624
20000	140000	205.625	225.9731
25000	135000	205.625	248.093
30000	130000	205.625	266.692
35000	125000	205.625	282.4663
40000	120000	205.625	295.8682
45000	115000	205.625	307.2082
50000	110000	205.625	316.708
55000	105000	205.625	324.5291
60000	100000	205.625	330.7907
65000	95000	205.625	335.5801
70000	90000	205.625	338.9596
75000	85000	205.625	340.9713
80000	80000	205.625	341.6392

85000	75000	205.625	340.9713
90000	70000	205.625	338.9596
95000	65000	205.625	335.5801
100000	60000	205.625	330.7907
105000	55000	205.625	324.5291
110000	50000	205.625	316.708
115000	45000	205.625	307.2082
120000	40000	205.625	295.8682
125000	35000	205.625	282.4663
130000	30000	205.625	266.692
135000	25000	205.625	248.093
140000	20000	205.625	225.9731
145000	15000	205.625	199.1624
150000	10000	205.625	165.3954
155000	5000	205.625	118.8854
160000	0	205.625	0



Attachment 4 – Updated sections of Environmental Noise Assessment





Appendix F: Predicted Wind Farm Noise and Relevant Criteria

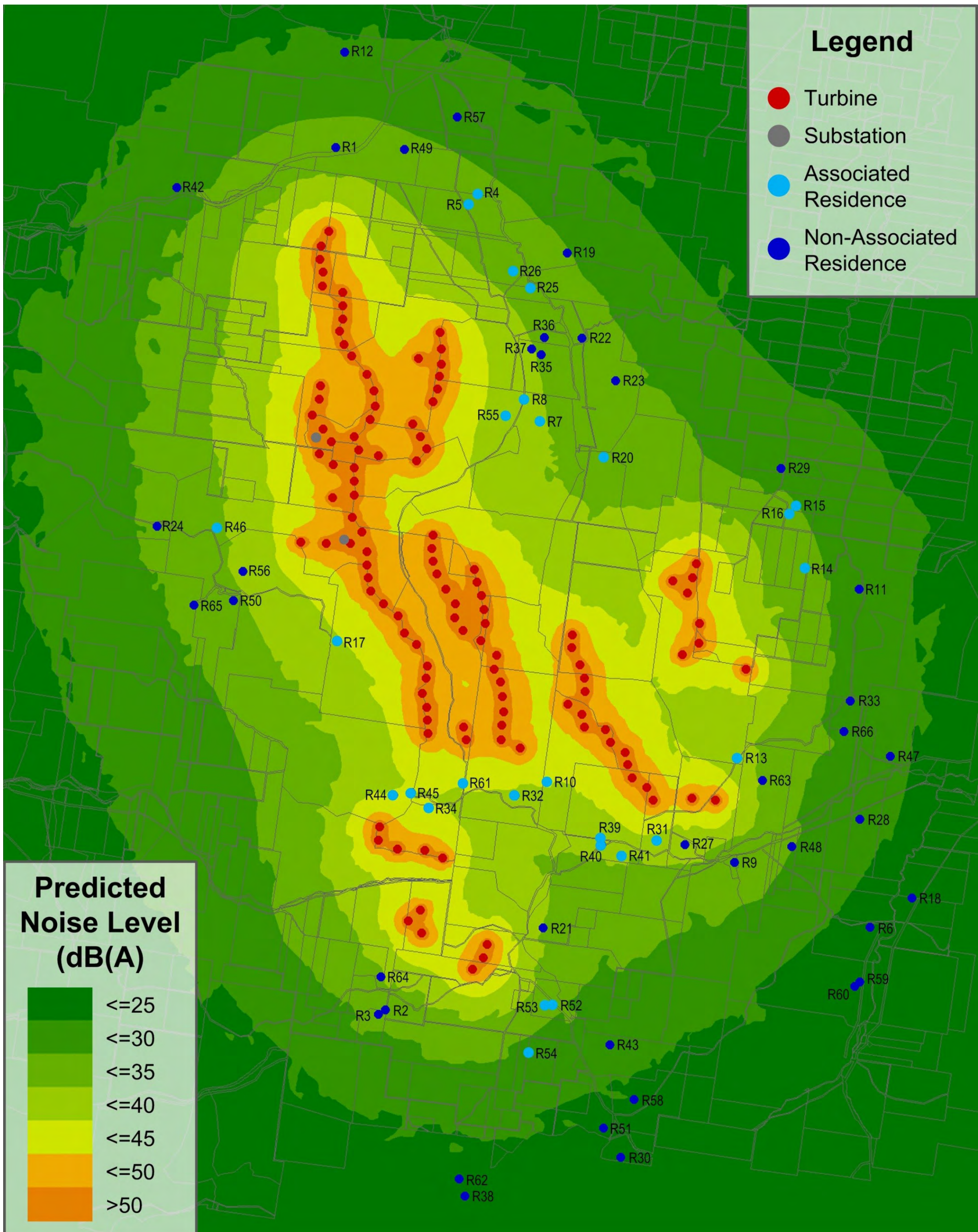
Wind Speed (m/s)	Criteria (dB(A))						Predicted Noise Level V90 (dB(A))						Predicted Noise Level MM92 (dB(A))					
	5	6	7	8	9	10	5	6	7	8	9	10	5	6	7	8	9	10
R1	38	38	39	39	40	41	27	31	32	33	33	32	29	31	32	32	32	32
R2	35	35	36	38	39	40	28	31	33	34	34	33	30	32	33	33	33	33
R3	35	35	36	38	39	40	27	31	33	34	33	32	29	31	32	32	32	32
R4	45	45	45	45	45	45	27	30	32	33	33	32	29	30	31	31	31	31
R5	45	45	45	45	45	45	28	31	33	34	34	32	29	31	32	32	32	32
R6	35	35	36	38	39	40	20	24	25	26	26	25	21	23	23	23	23	23
R7	45	45	45	45	45	45	31	34	36	37	37	35	33	35	35	35	35	35
R8	45	45	45	45	45	45	32	35	37	38	38	36	34	35	36	36	36	36
R9	35	35	36	38	39	40	29	32	34	34	35	34	31	33	33	33	33	33
R10	45	45	45	45	45	45	36	39	41	42	42	41	38	40	41	41	41	41
R11	35	35	36	38	39	40	24	27	29	30	30	28	25	27	28	28	28	28
R12	35	35	36	38	39	40	22	25	27	28	28	27	23	25	26	26	26	26
R13	45	45	45	45	45	45	32	35	37	37	38	37	34	36	37	37	37	37
R14	45	45	45	45	45	45	27	30	32	33	33	31	28	30	31	31	31	31
R15	45	45	45	45	45	45	26	29	31	32	32	31	27	29	30	30	30	30
R16	45	45	45	45	45	45	26	30	32	33	32	31	28	30	31	31	31	31
R17	45	45	45	45	45	45	35	38	40	41	41	40	37	39	40	40	40	40
R18	35	35	36	38	39	40	20	23	25	26	26	24	20	22	23	23	23	23
R19	35	35	36	38	39	40	26	29	31	32	32	31	27	29	30	30	30	30
R20	45	45	45	45	45	45	29	32	34	35	35	34	31	33	34	34	34	34
R21	36	38	39	41	43	45	31	34	36	37	37	35	32	34	35	35	35	35
R22	35	35	36	38	39	40	28	31	33	34	34	32	29	31	32	32	32	32
R23	35	35	36	38	39	40	27	31	32	33	33	32	29	31	31	31	31	31
R24	35	35	36	38	39	40	27	30	32	33	33	32	29	30	31	31	31	31
R25	45	45	45	45	45	45	29	32	34	35	35	33	30	32	33	33	33	33
R26	45	45	45	45	45	45	29	32	34	35	35	34	31	32	33	33	33	33
R27	38	38	38	38	39	40	33	36	38	38	39	38	35	37	38	38	38	38
R28	35	35	36	38	39	40	23	26	28	29	29	28	24	26	27	27	27	27
R29	35	35	36	38	39	40	24	27	29	30	30	29	25	27	28	28	28	28
R30	35	35	36	38	39	40	19	22	24	25	25	24	19	21	22	22	22	22
R31	45	45	45	45	45	45	34	38	39	40	40	39	36	38	39	39	39	39
R32	45	45	45	45	45	45	35	38	40	41	41	40	37	39	40	40	40	40
R33	35	35	36	38	39	40	24	28	29	30	30	29	26	27	28	28	28	28
R34	45	45	45	45	45	45	36	39	41	42	42	41	38	40	41	41	41	41



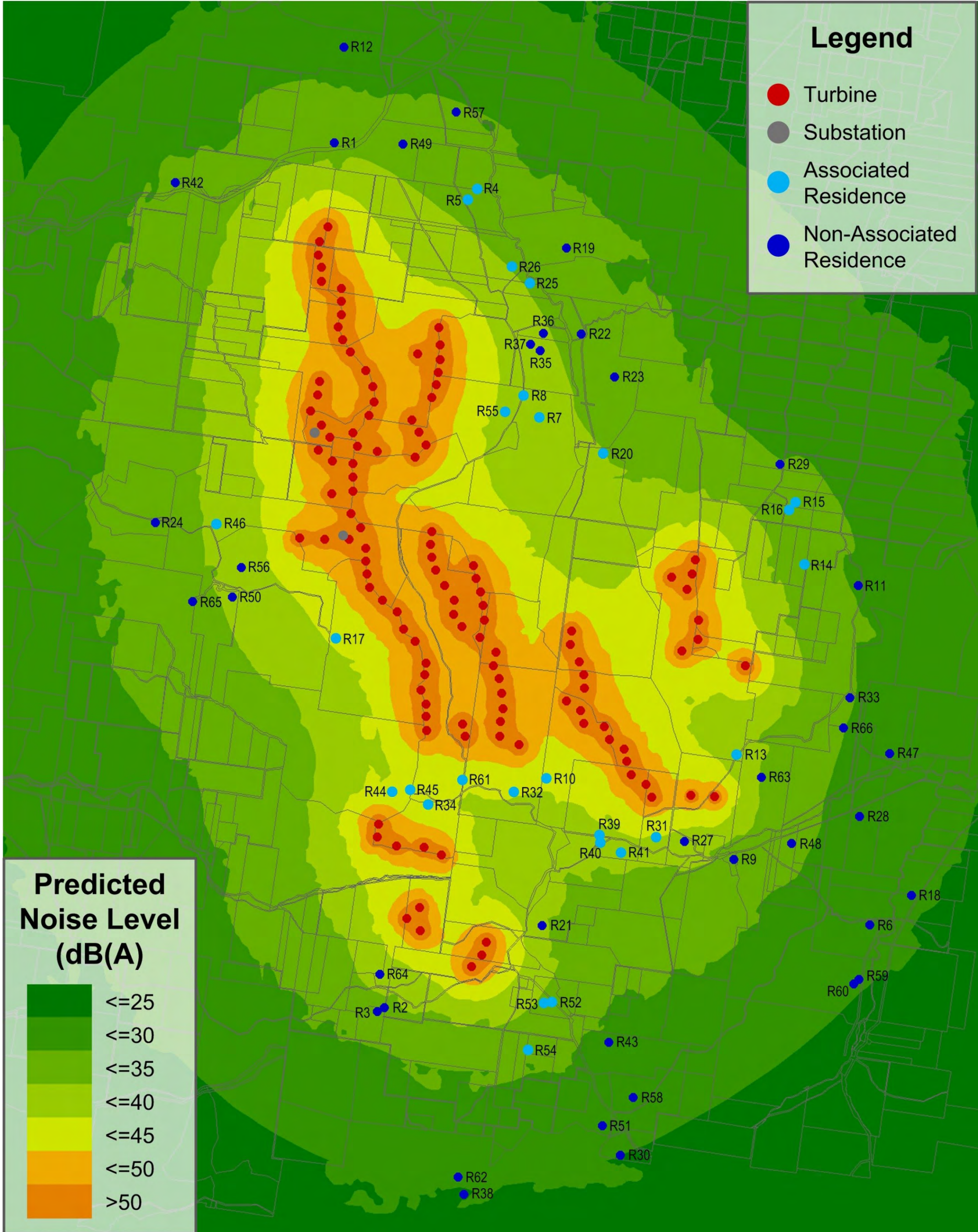
Wind Speed (m/s)	Criteria (dB(A))						Predicted Noise Level V90 (dB(A))						Predicted Noise Level MM92 (dB(A))					
	5	6	7	8	9	10	5	6	7	8	9	10	5	6	7	8	9	10
R35	37	37	38	39	40	42	30	33	35	36	36	35	32	34	35	35	35	35
R36	35	35	36	38	39	40	30	33	35	36	35	34	31	33	34	34	34	34
R37	35	35	36	38	39	40	31	34	36	37	37	35	32	34	35	35	35	35
R38	35	35	36	38	39	40	19	22	24	25	25	23	19	21	22	22	22	22
R39	45	45	45	45	45	45	33	36	38	39	39	37	35	37	38	38	38	38
R40	45	45	45	45	45	45	32	35	37	38	38	37	34	36	37	37	37	37
R41	45	45	45	45	45	45	31	35	37	37	37	36	33	35	36	36	36	36
R42	35	35	36	38	39	40	25	28	30	31	31	30	26	28	29	29	29	29
R43	35	35	36	38	39	40	23	26	28	29	29	28	24	26	27	27	27	27
R44	45	45	45	45	45	45	36	39	41	42	42	41	38	40	41	41	41	41
R45	45	45	45	45	45	45	36	39	41	42	42	40	38	39	40	40	40	40
R46	45	45	45	45	45	45	31	33	35	36	36	35	32	34	35	35	35	35
R47	35	35	36	38	39	40	22	25	27	28	28	27	23	25	26	26	26	26
R48	35	35	36	38	39	40	26	29	31	31	32	31	27	29	30	30	30	30
R49	35	35	36	38	39	40	27	30	32	33	33	31	28	30	31	31	31	31
R50	35	35	36	38	39	40	30	33	35	36	36	35	32	34	34	34	34	34
R51	35	35	36	38	39	40	20	23	25	26	26	25	21	22	23	23	23	23
R52	45	45	45	45	45	45	27	30	32	33	33	32	29	31	32	32	32	32
R53	45	45	45	45	45	45	28	32	33	34	34	33	30	32	33	33	33	33
R54	45	45	45	45	45	45	25	29	31	31	31	30	27	29	30	30	30	30
R55	45	45	45	45	45	45	33	36	38	39	39	38	35	37	38	38	38	38
R56	35	36	38	40	43	45	32	35	37	37	37	36	33	35	36	36	36	36
R57	35	35	36	38	39	40	24	28	30	30	30	29	26	27	28	28	28	28
R58	35	35	36	38	39	40	21	24	26	27	27	26	22	23	24	24	24	24
R59	35	35	36	38	39	40	19	23	25	25	25	24	20	21	22	22	22	22
R60	35	35	36	38	39	40	20	23	25	25	25	24	20	22	23	23	23	23
R61	45	45	45	45	45	45	36	40	41	42	42	41	38	40	41	41	41	41
R62	35	35	36	38	39	40	19	23	25	25	25	24	20	22	22	22	22	22
R63	35	35	36	38	39	40	30	33	35	35	36	34	31	33	34	34	34	34
R64	39	40	42	44	46	49	30	33	35	36	36	35	32	34	35	35	35	35
R65	35	35	36	38	39	40	28	31	33	34	33	32	29	31	32	32	32	32
R66	35	35	36	38	39	40	24	28	29	30	30	29	26	27	28	28	28	28

Appendix G: Noise Contours

REpower MM92 2050KW turbines (7m/s)



Vestas V90 3MW turbines (8m/s) (T2 and T112 operating in low noise mode)





Attachment 5 – Cross Sections from “Tryagain” to Turbine No. 32 & 33



1,830m

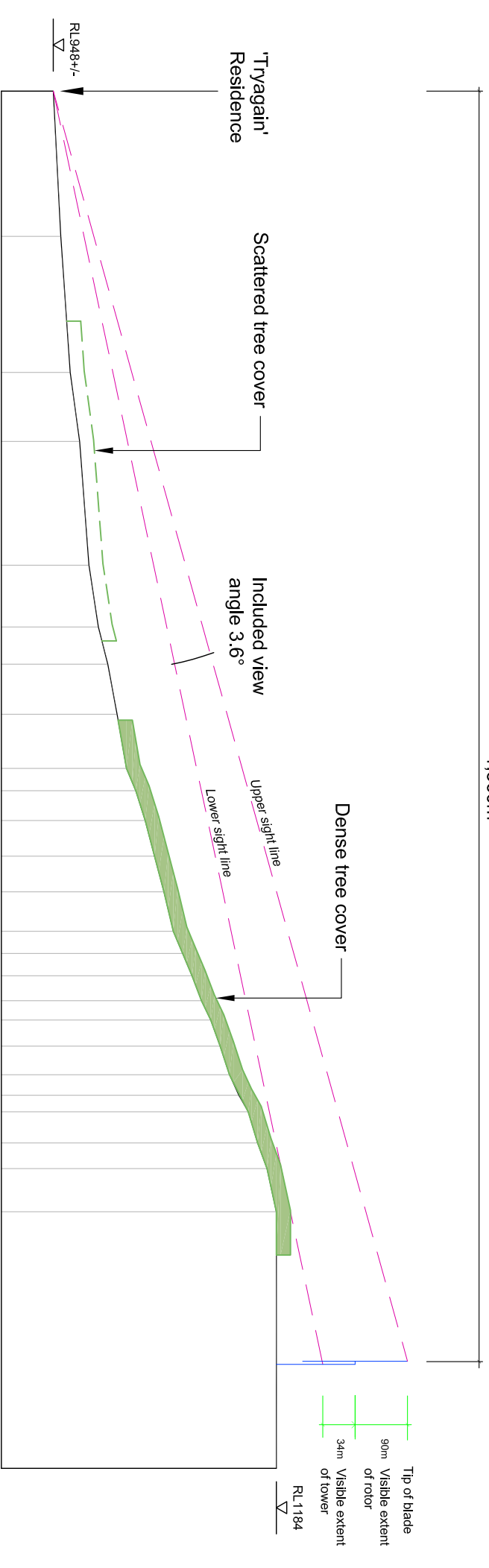
Turbine #33 (140m tip of blade)



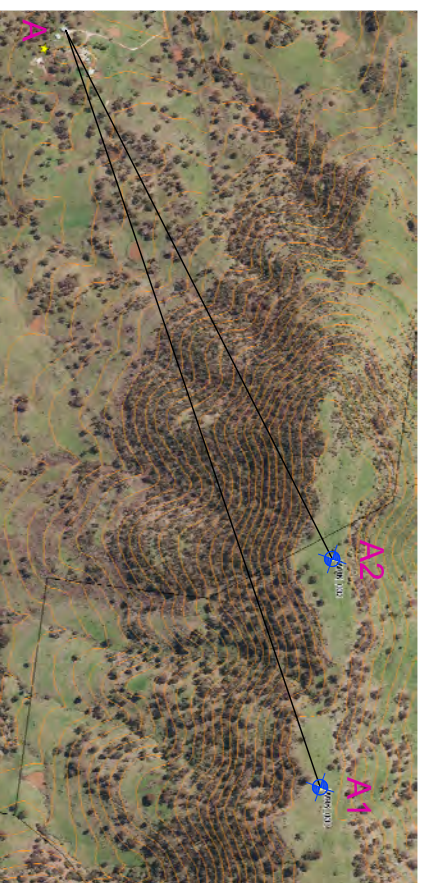
'Tryagain' Residence Cross Section A - A1 (Residence to turbine #33)

1,360m

Turbine #32 (140m tip of blade)



'Tryagain' Residence Cross Section A - A2 (Residence to turbine #32)



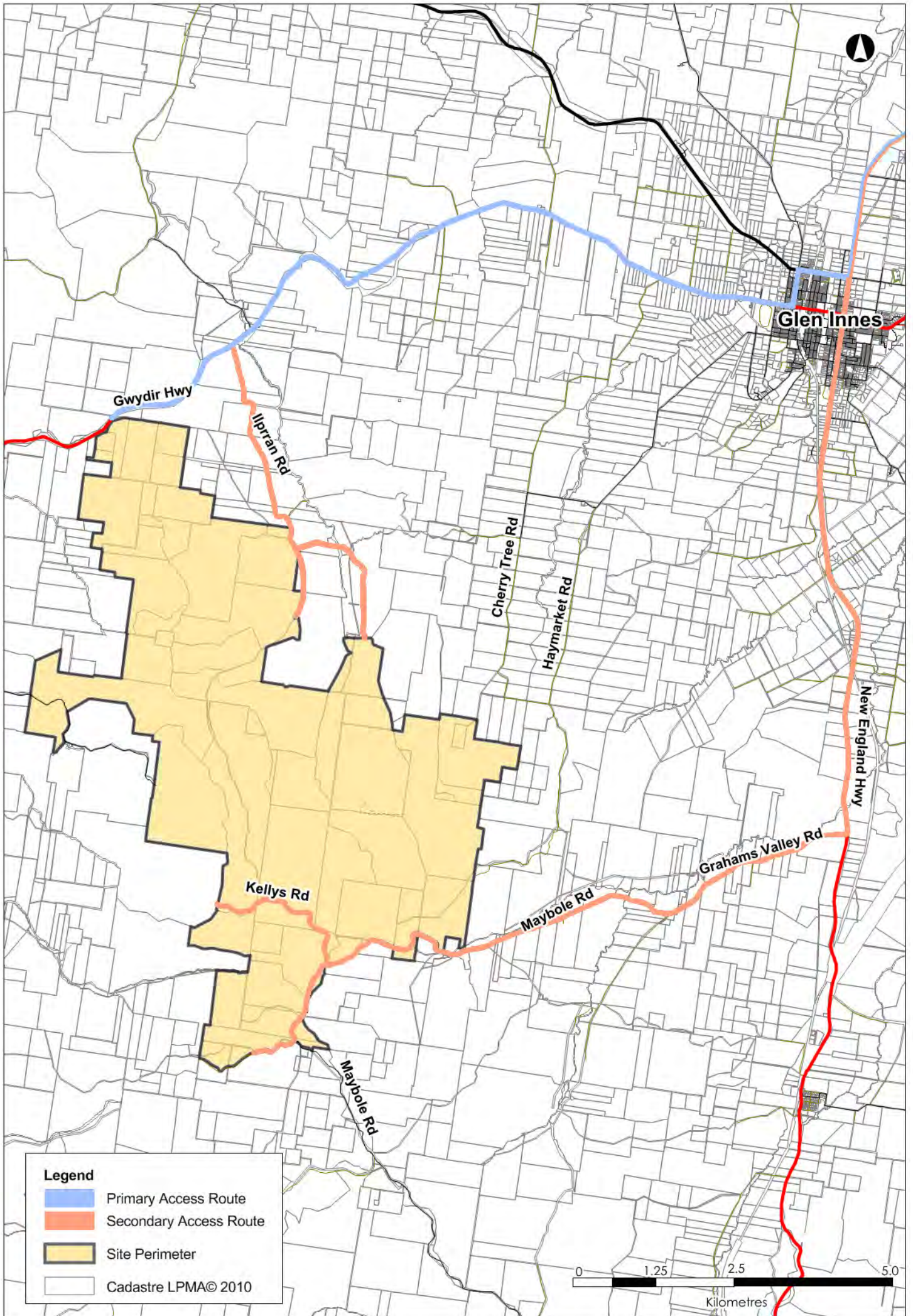
Section Locations

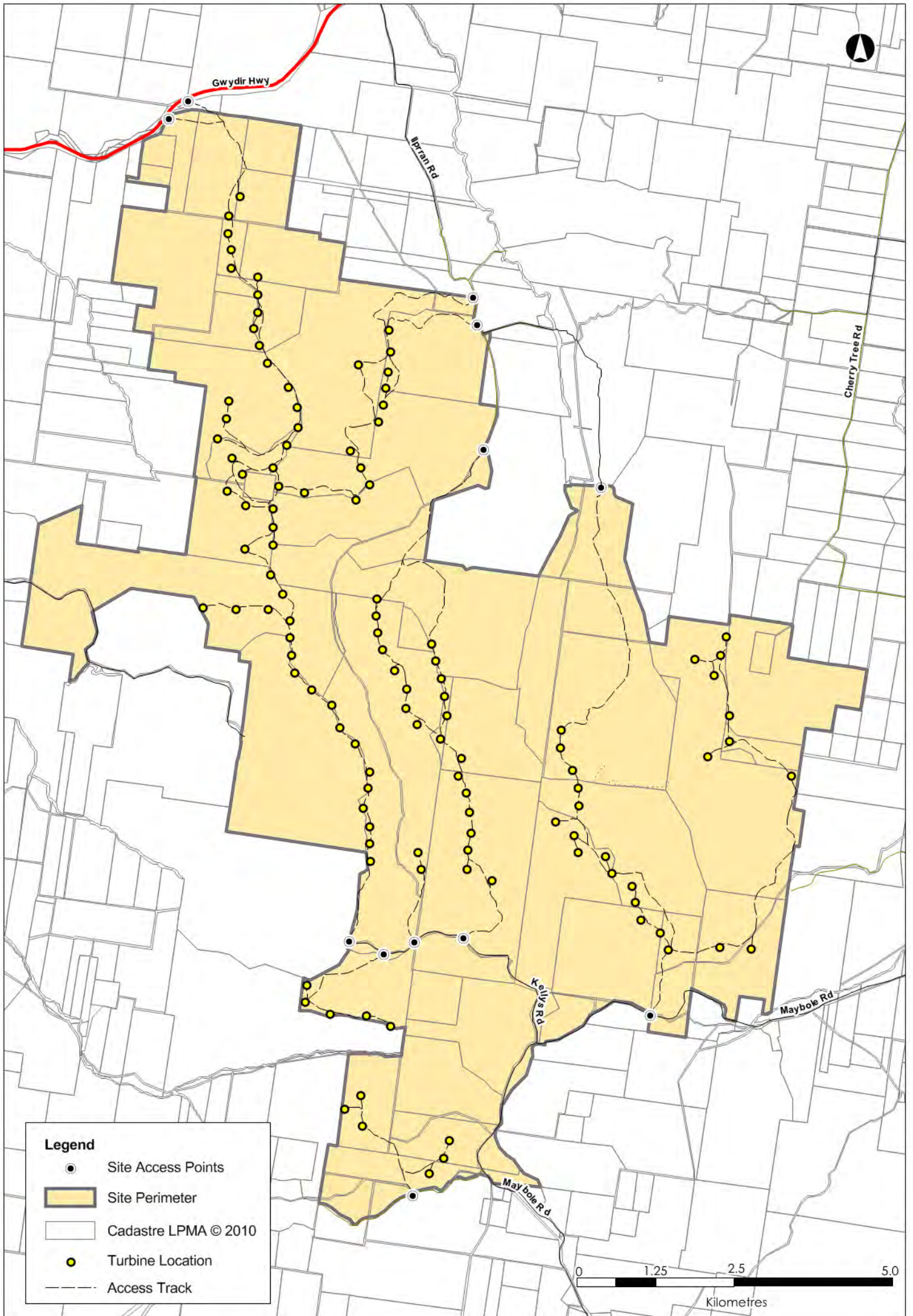




Attachment 6 – Additional Alternate Site Access



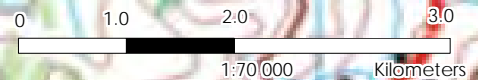
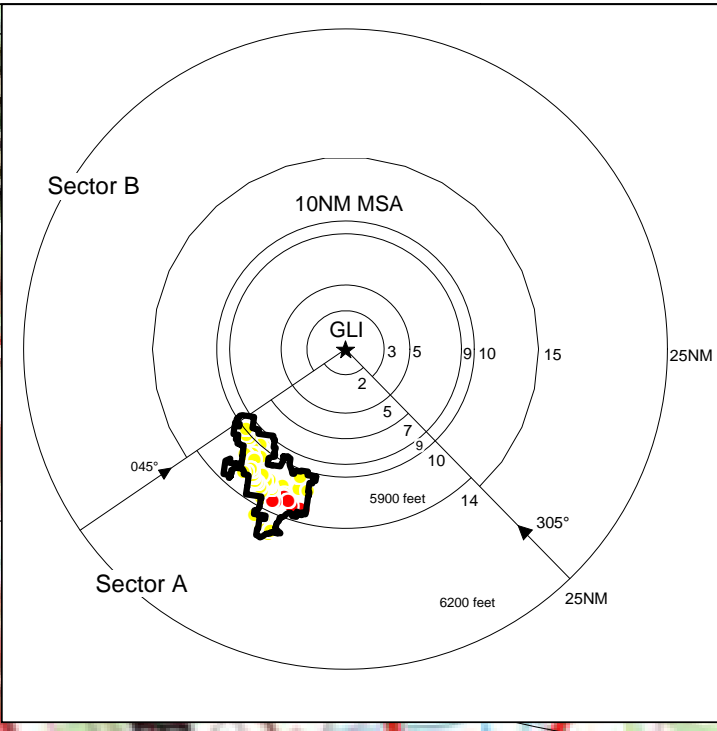
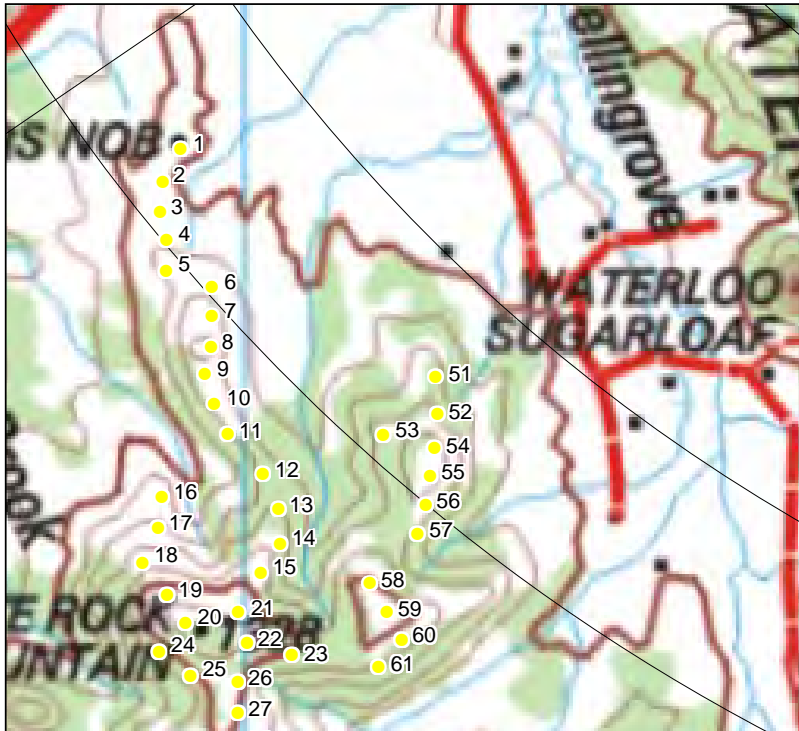






Attachment 7 – Preliminary Aviation Impact Assessment





LEGEND

- Turbine Location
- Turbine Location Penetrating Obstacle Identification Surface
- ★ Glen Innes Airport
- Approach Procedure Distance

EPURON
POWER FOR PORTFOLIOS

PROJECT
White Rock Wind Farm

TITLE
Turbines that Impact Approach Procedures

SCALE	DATE	DRAWN
1:70,000 at A4	02/09/11	DG

1m =	3.28084	ft											
<i>Procedure</i>						<i>Limit (ft)</i>	<i>MOC (ft)</i>	<i>OIS (ft)</i>					
10 MSA						5900	984	4916					
Sector A DME/GPS Arrival						5900	1000	4900					
Sector A DME/GPS Outer						6200	1000	5200					
Sector B DME/GPS Arrival Initial						5600	877	4723					
Sector B DME/GPS Arrival Intermediate						4900	410	4490					
<i>Turbine ID</i>	<i>Eastings</i>	<i>Northing</i>	<i>Base Elevation (m)</i>	<i>Base Elevation (m)</i>	<i>Turbine Tip Height</i>	<i>Tip Elevation (m)</i>	<i>Tip Elevation (ft)</i>	<i>Penetration of 10MSA OIS (ft)</i>	<i>Penetration of Sector A DME/GPS Arrival OIS (ft)</i>	<i>Penetration of Sector A DME/GPS Arrival Outer OIS (ft)</i>	<i>Penetration of Sector B DME/GPS Arrival Initial OIS (ft)</i>	<i>Penetration of Sector B DME/GPS Arrival Intermediate OIS</i>	
97	366016.9	6694076	1411	1418	150	1568	5144	Not within 10MSA	244	Not within sector A Outer		Not within sector B	
99	366959.2	6693853	1410	1422	150	1572	5157	Not within 10MSA	257	Not within sector A Outer		Not within sector B	
100	367453.7	6693821	1400	1404	150	1554	5098	Not within 10MSA	198	Not within sector A Outer		Not within sector B	
96	365710	6694283	1395	1400	150	1550	5085	Not within 10MSA	185	Not within sector A Outer		Not within sector B	
91	364716.4	6695348	1395	1398	150	1548	5079	Not within 10MSA	179	Not within sector A Outer		Not within sector B	
98	366143.7	6693813	1393	1398	150	1548	5079	Not within 10MSA	179	Not within sector A Outer		Not within sector B	
95	365617.8	6694558	1390	1392	150	1542	5059	Not within 10MSA	159	Not within sector A Outer		Not within sector B	
118	362597.4	6690521	1390	1395	150	1545	5069	Not within 10MSA	Not within sector A Arrival	-131		Not within sector B	
117	362683.3	6690796	1383	1390	150	1540	5052	Not within 10MSA	Not within sector A Arrival	-148		Not within sector B	
119	362373	6690279	1382	1385	150	1535	5036	Not within 10MSA	Not within sector A Arrival	-164		Not within sector B	
94	365568.2	6694819	1380	1386	150	1536	5039	Not within 10MSA	139	Not within sector A Outer		Not within sector B	
90	364654.6	6695616	1371	1377	150	1527	5010	Not within 10MSA	110	Not within sector A Outer		Not within sector B	
92	365149.5	6695285	1370	1374	150	1524	5000	Not within 10MSA	100	Not within sector A Outer		Not within sector B	
82	362968.9	6695085	1370	1370	150	1520	4987	Not within 10MSA	87	Not within sector A Outer		Not within sector B	
83	363365.5	6694909	1360	1369	150	1519	4984	Not within 10MSA	84	Not within sector A Outer		Not within sector B	
109	360436.6	6693254	1350	1354	150	1504	4934	Not within 10MSA	Not within sector A Arrival	-266		Not within sector B	
93	365255.7	6695022	1344	1348	150	1498	4915	Not within 10MSA	15	Not within sector A Outer		Not within sector B	
110	360405.3	6692984	1341	1344	150	1494	4902	Not within 10MSA	Not within sector A Arrival	-298		Not within sector B	
111	360809.6	6692794	1341		150	1491	4892	Not within 10MSA	-8	Not within sector A Outer		Not within sector B	
112	361382.3	6692765	1340		150	1490	4888	Not within 10MSA	-12	Not within sector A Outer		Not within sector B	
115	361030.9	6691291	1340		150	1490	4888	Not within 10MSA	-12	Not within sector A Outer		Not within sector B	
89	364364.6	6695828	1340		150	1490	4888	Not within 10MSA	-12	Not within sector A Outer		Not within sector B	
78	362954.2	6696287	1339		150	1489	4885	Not within 10MSA	-15	Not within sector A Outer		Not within sector B	
77	362828.5	6696560	1335		150	1485	4872	Not within 10MSA	-28	Not within sector A Outer		Not within sector B	
113	361753.6	6692603	1330		150	1480	4856	Not within 10MSA	-44	Not within sector A Outer		Not within sector B	
116	361311.3	6691035	1330		150	1480	4856	Not within 10MSA	-44	Not within sector A Outer		Not within sector B	
86	364626.5	6696645	1330		150	1480	4856	Not within 10MSA	-44	Not within sector A Outer		Not within sector B	
80	363030.1	6695661	1325		150	1475	4839	Not within 10MSA	-61	Not within sector A Outer		Not within sector B	
81	362981.9	6695387	1325		150	1475	4839	Not within 10MSA	-61	Not within sector A Outer		Not within sector B	
76	362879.6	6696841	1321		150	1471	4826	Not within 10MSA	-74	Not within sector A Outer		Not within sector B	
20	359422.4	6701317	1320	1324	150	1474	4836	Not within 10MSA	-64	Not within sector A Outer		Not within sector B	

50	362238	6695085	1317		150	1467	4813	Not within 10MSA	-87	Not within sector A Outer	Not within sector B
49	362184.9	6695344	1311		150	1461	4793	Not within 10MSA	-107	Not within sector A Outer	Not within sector B
22	359992.8	6701137	1310		150	1460	4790	Not within 10MSA	-110	Not within sector A Outer	Not within sector B
114	361291.1	6691510	1307		150	1457	4780	Not within 10MSA	-120	Not within sector A Outer	Not within sector B
87	364715	6696372	1301		150	1451	4760	Not within 10MSA	-140	Not within sector A Outer	Not within sector B
88	364727.1	6696088	1300		150	1450	4757	Not within 10MSA	-143	Not within sector A Outer	Not within sector B
69	362176.4	6697369	1296		150	1446	4744	Not within 10MSA	-156	Not within sector A Outer	Not within sector B
60	361423.4	6701163	1290		150	1440	4724	Not within 10MSA	-176	Not within sector A Outer	Not within sector B
108	368091.1	6696553	1290		150	1440	4724	Not within 10MSA	-176	Not within sector A Outer	Not within sector B
21	359908.5	6701419	1284		150	1434	4705	Not within 10MSA	-195	Not within sector A Outer	Not within sector B
79	363005.3	6695984	1283		150	1433	4701	Not within 10MSA	-199	Not within sector A Outer	Not within sector B
106	367103.7	6697104	1280		150	1430	4692	Not within 10MSA	-208	Not within sector A Outer	Not within sector B
73	362612.4	6697810	1280		150	1430	4692	Not within 10MSA	-208	Not within sector A Outer	Not within sector B
75	362545.6	6697147	1276		150	1426	4678	Not within 10MSA	-222	Not within sector A Outer	Not within sector B
26	359905.8	6700772	1274		150	1424	4672	Not within 10MSA	-228	Not within sector A Outer	Not within sector B
59	361286.8	6701426	1273		150	1423	4669	Not within 10MSA	-231	Not within sector A Outer	Not within sector B
48	361440.1	6695213	1272		150	1422	4665	Not within 10MSA	-235	Not within sector A Outer	Not within sector B
105	367115.4	6697506	1270		150	1420	4659	Not within 10MSA	-241	Not within sector A Outer	Not within sector B
61	361205.9	6700913	1270		150	1420	4659	Not within 10MSA	-241	Not within sector A Outer	Not within sector B
19	359252.7	6701580	1270		150	1420	4659	Not within 10MSA	-241	Not within sector A Outer	Not within sector B
107	366767.4	6696860	1270		150	1420	4659	Not within 10MSA	-241	Not within sector A Outer	Not within sector B
25	359468.8	6700831	1267		150	1417	4649	Not within 10MSA	-251	Not within sector A Outer	Not within sector B
103	366558.3	6698405	1266		150	1416	4646	Not within 10MSA	-254	Not within sector A Outer	Not within sector B
27	359907.6	6700489	1265		150	1415	4642	Not within 10MSA	-258	Not within sector A Outer	Not within sector B
24	359176.4	6701055	1264		150	1414	4639	Not within 10MSA	-261	Not within sector A Outer	Not within sector B
23	360404.6	6701025	1263		150	1413	4636	Not within 10MSA	-264	Not within sector A Outer	Not within sector B
68	362002.8	6697628	1262		150	1412	4633	Not within 10MSA	-267	Not within sector A Outer	Not within sector B
74	362644.8	6697511	1261		150	1411	4629	Not within 10MSA	-271	Not within sector A Outer	Not within sector B
65	361627.8	6698554	1260		150	1410	4626	Not within 10MSA	-274	Not within sector A Outer	Not within sector B
104	366869.1	6698144	1260		150	1410	4626	Not within 10MSA	-274	Not within sector A Outer	Not within sector B
72	362560.7	6698100	1260		150	1410	4626	Not within 10MSA	-274	Not within sector A Outer	Not within sector B
28	359898.7	6700199	1260		150	1410	4626	Not within 10MSA	-274	Not within sector A Outer	Not within sector B
58	361127	6701687	1253		150	1403	4603	Not within 10MSA	-297	Not within sector A Outer	Not within sector B
47	361431.3	6695495	1253		150	1403	4603	Not within 10MSA	-297	Not within sector A Outer	Not within sector B
85	364441.9	6697003	1251		150	1401	4596	Not within 10MSA	-304	Not within sector A Outer	Not within sector B
71	362470	6698378	1241		150	1391	4564	Not within 10MSA	-336	Not within sector A Outer	Not within sector B
40	360825.4	6697677	1241		150	1391	4564	Not within 10MSA	-336	Not within sector A Outer	Not within sector B
66	361818.4	6698225	1240		150	1390	4560	Not within 10MSA	-340	Not within sector A Outer	Not within sector B
39	360512.9	6697920	1240		150	1390	4560	Not within 10MSA	-340	Not within sector A Outer	Not within sector B
36	360165.8	6698737	1240		150	1390	4560	Not within 10MSA	-340	Not within sector A Outer	Not within sector B
55	361686.4	6702678	1240		150	1390	4560	-356	-340	Not within sector A Outer	Not within sector B
102	366975.6	6698466	1240		150	1390	4560	Not within 10MSA	-340	Not within sector A Outer	Not within sector B
64	361551.9	6698814	1232		150	1382	4534	Not within 10MSA	-366	Not within sector A Outer	Not within sector B
46	361422.5	6695759	1232		150	1382	4534	Not within 10MSA	-366	Not within sector A Outer	Not within sector B
44	361404.7	6696366	1230		150	1380	4528	Not within 10MSA	-372	Not within sector A Outer	Not within sector B
37	360200.5	6698468	1230		150	1380	4528	Not within 10MSA	-372	Not within sector A Outer	Not within sector B

29	359455.5	6700147	1230		150	1380	4528	Not within 10MSA	-372	Not within sector A Outer	Not within sector B
101	367053.1	6698762	1228		150	1378	4521	Not within 10MSA	-379	Not within sector A Outer	Not within sector B
67	362014.9	6697924	1227		150	1377	4518	Not within 10MSA	-382	Not within sector A Outer	Not within sector B
35	360174.8	6699010	1222		150	1372	4501	Not within 10MSA	-399	Not within sector A Outer	Not within sector B
15	360117.9	6701785	1222		150	1372	4501	Not within 10MSA	-399	Not within sector A Outer	Not within sector B
45	361320	6696046	1221		150	1371	4498	Not within 10MSA	-402	Not within sector A Outer	Not within sector B
63	361525.1	6699085	1220		150	1370	4495	Not within 10MSA	-405	Not within sector A Outer	Not within sector B
41	360956.1	6697318	1220		150	1370	4495	Not within 10MSA	-405	Not within sector A Outer	Not within sector B
43	361427.8	6696617	1216		150	1366	4482	Not within 10MSA	-418	Not within sector A Outer	Not within sector B
62	361547.9	6699357	1214		150	1364	4475	Not within 10MSA	-425	Not within sector A Outer	Not within sector B
84	364458.6	6697276	1214		150	1364	4475	Not within 10MSA	-425	Not within sector A Outer	Not within sector B
38	360248.1	6698187	1212		150	1362	4469	Not within 10MSA	-431	Not within sector A Outer	Not within sector B
56	361645.2	6702414	1212		150	1362	4469	Not within 10MSA	-431	Not within sector A Outer	Not within sector B
42	361201.8	6697069	1210		150	1360	4462	Not within 10MSA	-438	Not within sector A Outer	Not within sector B
54	361725.1	6702938	1210		150	1360	4462	-454	-438	Not within sector A Outer	Not within sector B
70	362412.8	6698645	1201		150	1351	4432	Not within 10MSA	-468	Not within sector A Outer	Not within sector B
34	359822.2	6699193	1191		150	1341	4400	Not within 10MSA	-500	Not within sector A Outer	Not within sector B
30	359863.1	6699736	1190		150	1340	4396	Not within 10MSA	-504	Not within sector A Outer	Not within sector B
18	359023.6	6701878	1183		150	1333	4373	Not within 10MSA	-527	Not within sector A Outer	Not within sector B
31	360061.4	6699431	1180		150	1330	4364	Not within 10MSA	-536	Not within sector A Outer	Not within sector B
33	359318.8	6699188	1180		150	1330	4364	Not within 10MSA	-536	Not within sector A Outer	Not within sector B
32	358792.3	6699215	1180		150	1330	4364	Not within 10MSA	-536	Not within sector A Outer	Not within sector B
14	360298.3	6702056	1177		150	1327	4354	Not within 10MSA	-546	Not within sector A Outer	Not within sector B
57	361569.6	6702146	1167		150	1317	4321	Not within 10MSA	-579	Not within sector A Outer	Not within sector B
53	361250.5	6703057	1165		150	1315	4314	-602	-586	Not within sector A Outer	Not within sector B
52	361753.2	6703254	1151		150	1301	4268	-648	-632	Not within sector A Outer	Not within sector B
9	359600.1	6703621	1151		150	1301	4268	Not within 10MSA	-632	Not within sector A Outer	Not within sector B
8	359658	6703876	1150		150	1300	4265	Not within 10MSA	-635	Not within sector A Outer	Not within sector B
13	360283.6	6702372	1148		150	1298	4259	Not within 10MSA	-641	Not within sector A Outer	Not within sector B
51	361736.9	6703602	1121		150	1271	4170	-746	-730	Not within sector A Outer	Not within sector B
10	359685.8	6703353	1120		150	1270	4167	Not within 10MSA	-733	Not within sector A Outer	Not within sector B
17	359169.5	6702205	1111		150	1261	4137	Not within 10MSA	-763	Not within sector A Outer	Not within sector B
12	360138.1	6702698	1111		150	1261	4137	Not within 10MSA	-763	Not within sector A Outer	Not within sector B
7	359663.8	6704162	1104		150	1254	4114	Not within 10MSA	-786	Not within sector A Outer	Not within sector B
11	359812.1	6703071	1100		150	1250	4101	Not within 10MSA	-799	Not within sector A Outer	Not within sector B
16	359202.9	6702484	1081		150	1231	4039	Not within 10MSA	-861	Not within sector A Outer	Not within sector B
6	359665.2	6704433	1080		150	1230	4035	-881	-865	Not within sector A Outer	Not within sector B
5	359242.5	6704577	1070		150	1220	4003	Not within 10MSA	-897	Not within sector A Outer	Not within sector B
4	359246.8	6704867	1041		150	1191	3907	-1009	-993	Not within sector A Outer	Not within sector B
1	359376.9	6705707	1030		150	1180	3871	-1045	-1029	Not within sector A Outer	Not within sector B
3	359186.2	6705126	1030		150	1180	3871	-1045	-1029	Not within sector A Outer	Not within sector B
2	359210.1	6705405	1011		150	1161	3809	-1107	-1091	Not within sector A Outer	Not within sector B

**GPS ARRIVAL PROCEDURES
GLEN INNES, NSW (YGLI)**

4 JUN 2009

FIA BN CEN 134.2	CTAF 126.7	PAL 125.3			Bearings are Magnetic Elevations in FEET AMSL
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25 NM MSA
5300
B-065
GLI NDB
6200
B-185
10 NM MSA 5900

GPS REFERENCE WAYPOINT GLI NDB
AWIS (PHONE) 02 6732 5748

GLI NDB 212
* NO CIRCLING
* NO CIRCLING SOUTH-WEST OF RWY 10 & RWY 32.

AD ELEV 3433

SECTOR A

GLI NDB
045° 305°

NDB
6200 5900 5100 4900 5360 4400 4380 6200
3°
MDA MAPI
NM FM NDB 25 15 14 9 7 5 2 0

MISSED APPROACH:
CLIMB ON TRACK TO 6200FT.

CIRCLING MINIMA		A,B: 4380-2.4		C: 4380-4.0		D: N/A		
NM FM NDB	7.7	7	6	5	4	3	2	1.9
ALT (3° APCH PATH)	6200	5990	5670	5360	5040	4720	4400	4380

SECTOR B

GLI NDB
046° 304°

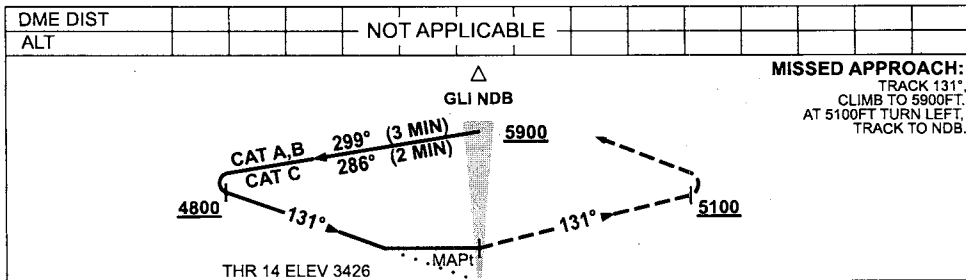
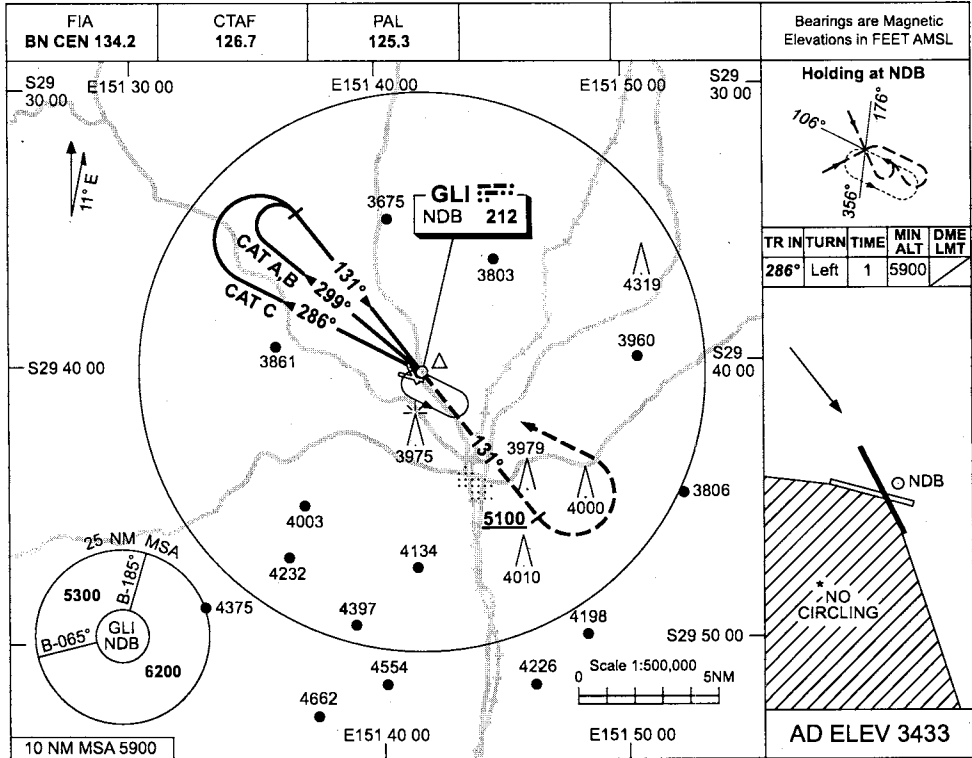
NDB
6200 5600 4900 5140 4500 4360 6200
3°
MDA MAPI
NM FM NDB 25 15 9 5 3 0

MISSED APPROACH:
CLIMB ON TRACK TO 6200FT.

CIRCLING MINIMA		A,B: 4260-2.4		C: 4360-4.0		D: N/A			
NM FM NDB	8.3	8	7	6	5	4	3	2.6	2.2
ALT (3° APCH PATH)	6200	6090	5770	5460	5140	4820	4500	4360	4260

GLIDG01-119

10 MAR 2011 USE QNH NDB RWY 14
GLEN INNES, NSW (YGLI)



NOTES

1. MAX IAS:
HOLDING: 210KT.
INITIAL:
CAT A&B 140KT.
CAT C 210KT.
- *2. NO CIRCLING SOUTH-
WEST OF RWY 10 &
RWY 32.
3. AWIS (PHONE)
02 6732 5748

CATEGORY	A	B	C	D
S-I NDB	4160 (727-4.0)			NOT APPLICABLE
CIRCLING*	4260 (827-2.4)		4360 (927-4.0)	
ALTERNATE	(1327-4.4)		(1427-6.0)	

Changes: TOPO, CO-ORD FORMAT, Editorial.

GLINB01-126

