ENVIRONMENTAL ASSESSMENT REPORT

Section 75W of the *Environmental Planning & Assessment Act 1979*

Collector Wind Farm (10_0156 MOD 1)
Modifications to infrastructure and blade diameter

1 BACKGROUND

Ratch-Australia Developments Pty Limited (Ratch) has approval to develop the Collector Wind Farm, located northwest of the village of Collector in the Upper Lachlan local government area (see **Figure 1**).

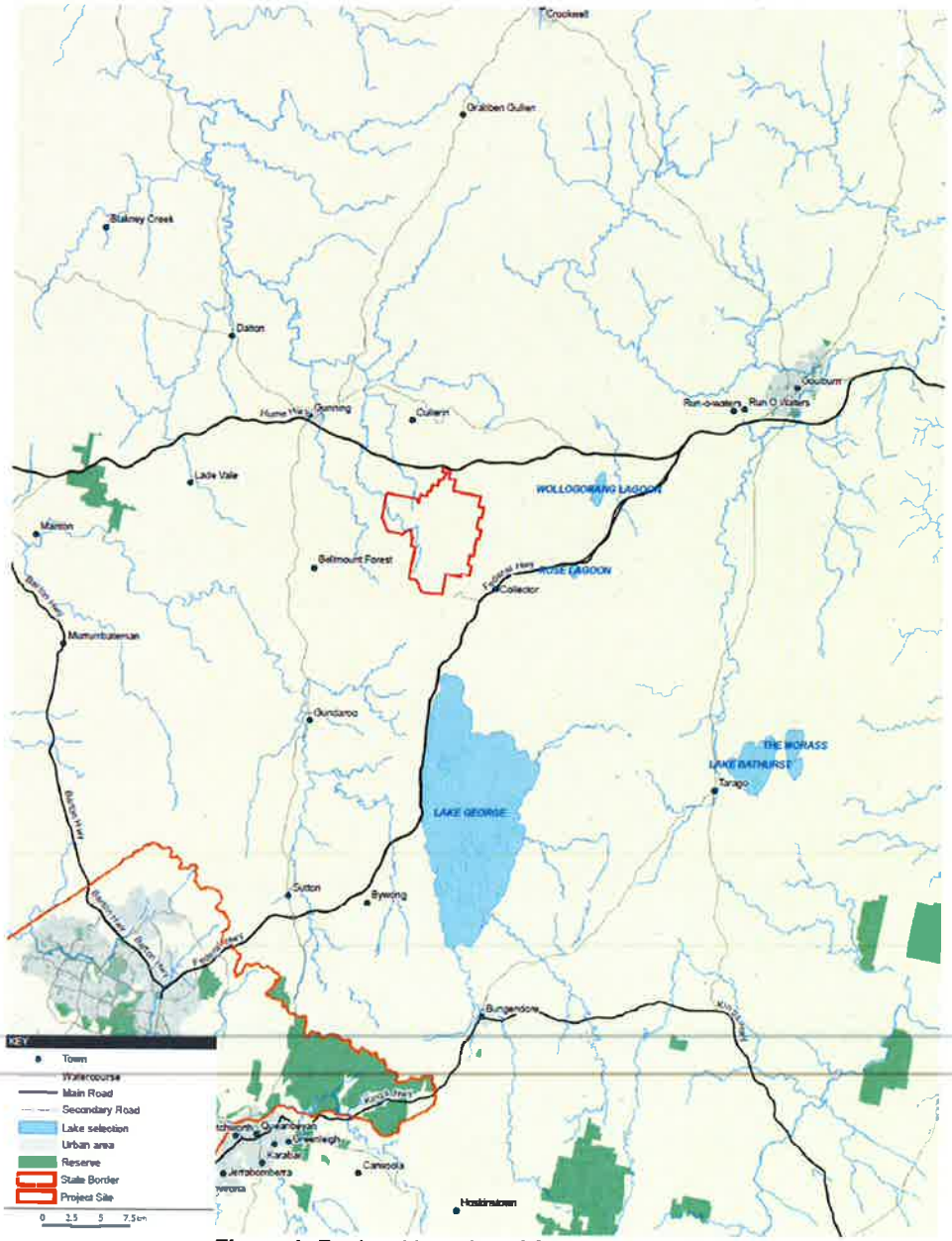

Figure 1: *Regional Location of Collector Wind Farm*

The project was approved by the Planning Assessment Commission (the Commission) on 2 December 2013 under Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act).

The approved project comprises:

- up to 55 wind turbines with a maximum tip height of 150 m, a tower height of up to 100 m and a blade diameter of up to 112 m;
- connection to the electricity grid via an existing TransGrid 330kV transmission line; and
- associated surface infrastructure including 7 site access points along Lerida Road South, construction compounds and an operation/maintenance facility.

The project has a capital investment value (CIV) of $350 million and would create around 100 construction jobs and 10 operational jobs, and generate enough electricity to power around 65,000 homes.

The approved project layout is shown in **Figure 2**.

Ratch has yet to commence construction of the project.

1.1 Site Context

The site is located on several undulating ridgelines and hills trending north-south along the Cullerin Range, and toward the northern point of the Lake George escarpment. Land use in the area is characterised by agriculture (grazing).

There are no non-associated receivers within 2 km of the wind farm, but there are 7 residences between 2 km and 3 km (see **Figure 2**).

The wind farm would connect to an existing Transgrid 330 kV transmission line to the north of the site via a substation located in the northern portion of the site.

Lerida Road South is a local road that forms the primary access for the approved project.

The Cullerin Range Wind Farm is located immediately to the north of the site on the other side of the Hume Highway. There are also a number of other operating wind farms in the region, including Gunning to the north, and the Capital and Woodlawn Wind Farms to the south near Lake George.

2 PROPOSED MODIFICATION

Ratch is proposing to make a number of relatively minor changes to the approved project in response to detailed design of the wind farm and ongoing consultation with stakeholders (including Upper Lachlan Shire Council and associated landowners).

The proposed modifications include:

- changes to the layout of ancillary infrastructure, including the:
  - internal road layout and site access;
  - cabling layout and substation cabling; and
  - construction compound and operation/maintenance facility;
- changes to blade diameter of the wind turbines;
- changes to biodiversity offsetting and clearing limits in the approval to reflect current NSW Government policy; and
- revision to the noise limits in the approval to reflect current NSW Government policy.

Importantly, the proposed modification does not involve any changes to the number, layout or height of the wind turbines themselves. All changes to layout of infrastructure are located within properties associated with the wind farm.

The proposed modifications are outlined in the following sub-sections, and are described in detail in the Environmental Assessment (EA) which accompanied the application (see **Appendix A**).

The proposed modified layout is shown in **Figure 3**.

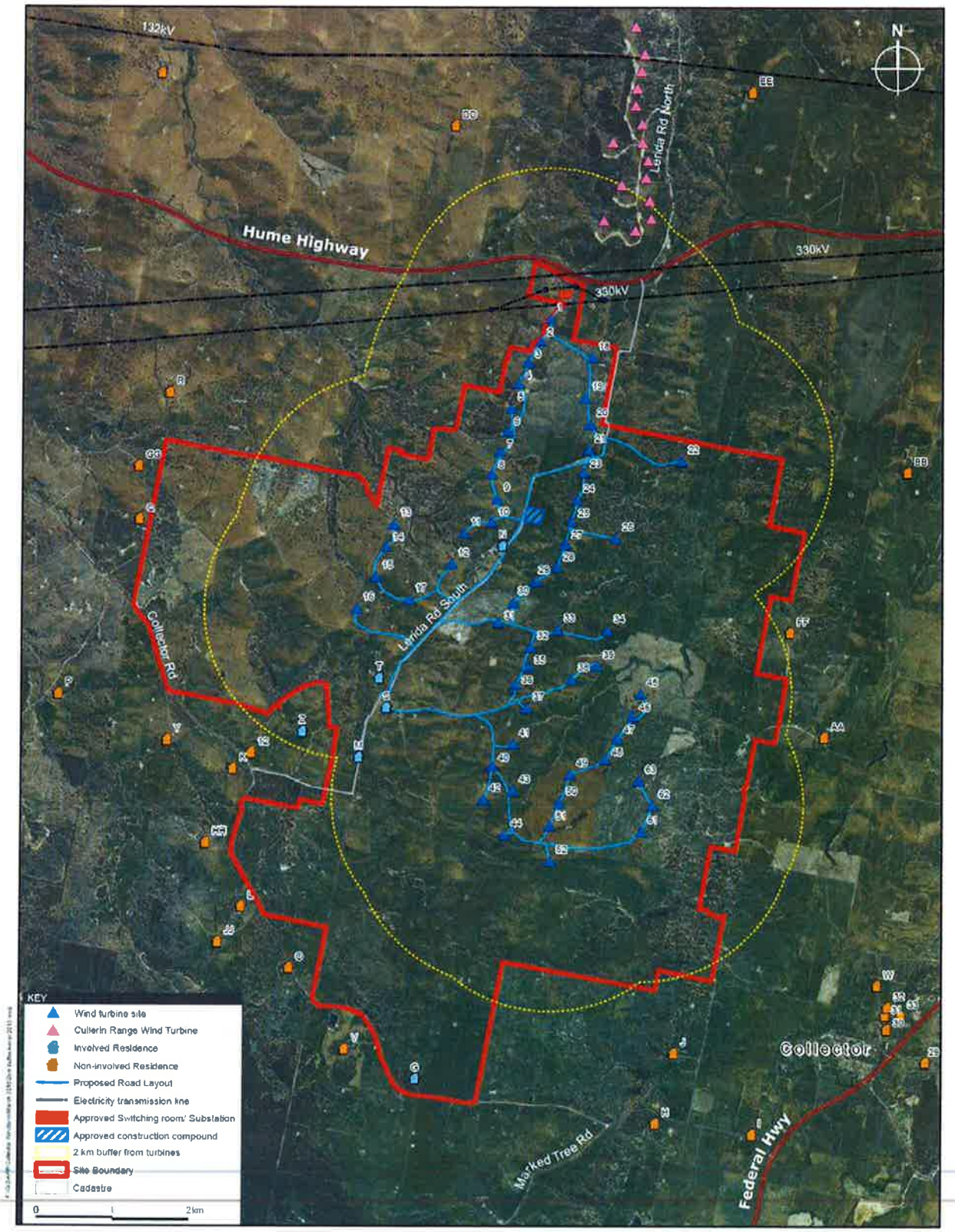

Figure 2: *Approved Project*

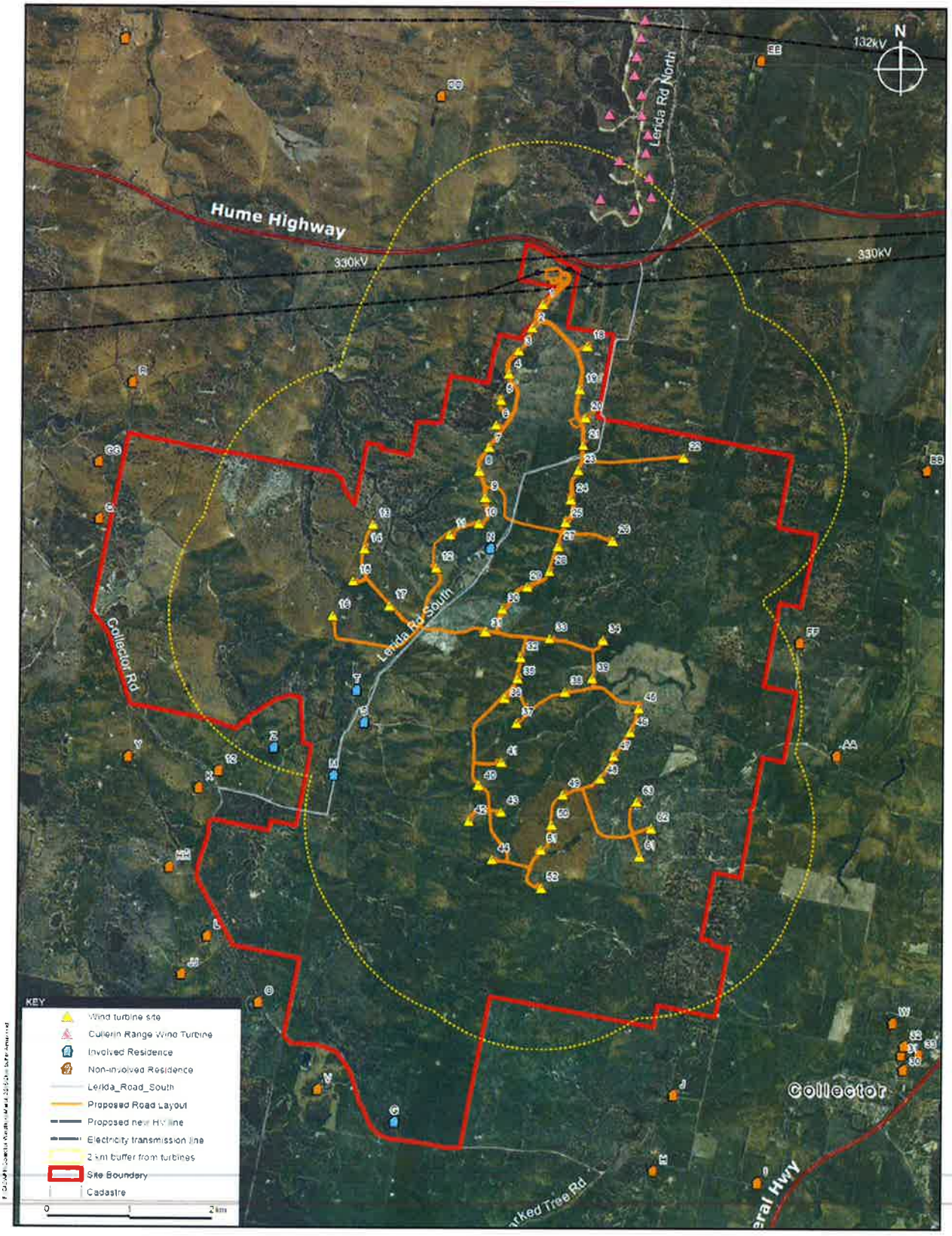

Figure 3: *Proposed Modified Layout*

2.1 *Road Layout and Site Access*

The approved project involved a number of internal access tracks, access points and use of Lerida Road South to access components of the wind farm (see **Figure 2**).

Ratch is proposing to make some changes to the internal road layout and site access in response to Council requests that the use of Lerida Road South be minimised. The changes also follow feedback from associated landholders and detailed design considerations that identified constraints with approved alignments of internal access tracks.

The modification proposes to rationalise the internal access tracks and consolidate the use of Lerida Road South by providing:

- 1 key site access point from Lerida Road South; and
- 3 crossing points over Lerida Road South.

The key access point from Lerida Road South for vehicles to enter and leave the project site would be located approximately 2 km south of the Hume Highway (instead of 7 km south of the Hume Highway under the approved project).

The modification would also reduce the number of intersections with Lerida Road South from 7 to 4.

The existing approval allows micro-siting of project components within a 100 m radius, as long as impacts remain consistent with those assessed. As part of the road layout changes, Ratch is also seeking to increase the micro-siting allowance from 100 to 300 m, but only for the internal access tracks between Turbines 61 and 63, and between Turbines 2 and 18, to cater for topographical constraints in these areas.

2.2 *Cabling Layout*

Cabling between the wind turbines for the approved project is generally underground. The proposed modification seeks to:

- allow overhead 33 kV cabling in 2 areas, namely between:
  - Turbines 11 and 12 (500 m section); and
  - Turbines 34 and 39 (550 m section); and
- install a new underground communications cable (300 m length) connecting the substation to Transgrid's existing statewide communications system (established on its 330kV transmission lines to the north of the site).

The overhead cabling between the nominated turbines is required to avoid steep gullies and reduce the overall length of the cabling between these turbines. The underground communications cabling at the substation is necessary to meet the telecommunications requirements for the project.

2.3 *Construction Compound and Operation/Maintenance Facility*

The proposed modification involves relocating the construction compound and operation/maintenance facility to a site adjacent to the new site access point. The proposed relocation reflects the modified internal road layout and would improve the efficiency of vehicle movements on the site during both construction and operations (see **Figure 4**).

2.4 *Blade Diameter*

The original EA assessed the impacts of turbines with a maximum blade diameter of 112 m and a maximum tip height of 150 m.

The modification proposes to increase the blade diameter from 112 m to 117 m. However, the existing maximum tip height of 150 m would not change, as the hub height would be reduced accordingly.

Ratch estimates that the larger blade diameter would increase the electricity generation from the wind farm by approximately 1.5% to 2%, which is equivalent to the energy supply requirements for 1,200 households.

Figure 4: *Construction Compounds and Operational Buildings*

2.5 *Biodiversity Offsetting and Clearing Limits*

The existing approval contains:

- specific limits on the clearing of all native vegetation and endangered ecological communities; and
- a requirement for a biodiversity offset package through the use of a "suitable metric method (such as the BioBanking Assessment Methodology)".

At the time of the original approval, the NSW BioBanking Assessment Methodology had not been formally adopted by the NSW Government.

The modification seeks to remove specific clearing limits and to address vegetation clearance by relying on biodiversity offsets, calculated through the BioBanking Assessment Methodology which was formally adopted by the NSW Government in October 2014.

2.6 *Revision of Noise Limits*

The existing approval contains a noise limit of $L_{Aeq(10minute)}$ 35 dB(A).

The South Australian EPA's *Environmental Noise Guidelines: Wind Farms* (2009) have been adopted by the NSW Government to assess and regulate noise from wind farms. These guidelines provide noise criteria in rural zones of:

- $L_{Aeq(10minute)}$ 35 dBA; or
- background noise plus 5dBA.

The original EA was based on noise surveys and data from 2010 which contained some anomalies. As a consequence, a noise limit based on background noise was not included in the approval.

The modification seeks to incorporate the 'background plus 5 dBA' limit, in addition to the 35dBA limit, in accordance with current NSW Government policy.

3. STATUTORY CONTEXT

3.1 *Section 75W*

The Collector Wind Farm was originally approved under Part 3A of the EP&A Act. Although Part 3A was repealed on 1 October 2011, the project remains a 'transitional Part 3A project' under Schedule 6A of the EP&A Act, and hence any modification is to be made under the former Section 75W of the EP&A Act.

3.2 *Approval Authority*

The Minister for Planning is the approval authority for the application. However, under the Minister's delegation dated 14 September, 2011 the Planning Assessment Commission (the Commission) will determine the proposed modification application as:

- Upper Lachlan Shire Council objected to the application during the public exhibition period; and
- there were more than 25 objections from the public.

3.3 *Modification*

Based on its assessment, the Department is satisfied that the application can be characterised as a modification to the existing approval (rather than a new project in its own right) as the proposal would:

- not change the physical extent of the project, and the changes are contained within associated properties; and
- not significantly increase the environmental impacts of the project (see **Section 5**).

4. CONSULTATION

The Department consulted with key agencies and publicly exhibited the application and accompanying EA from 29 October to 13 November 2015, and accepted submissions until 20 November 2015 (in response to requests from the community).

Departmental representatives also visited the site and attended a meeting of the Community Consultative Committee (CCC) for the project.

In addition, Ratch undertook the following consultation on the modification:

- advised the community within 5 km of the modification through a newsletter;
- advertised in the Gunning Lions Newsletter;
- held one-on-one meetings with residents within Collector village and properties closer to the site; and
- advised the CCC of the modification.

In response to the exhibition period the Department received a total of 55 submissions, including 5 from government agencies, 4 from special interest groups and 46 from members of the general public (see summary in **Table 1**).

The majority of public submissions were from people living within 5 km of the wind farm.

Table 1: *Summary of submissions*

Submitters	***Number***	***Objection / Support***
Agency:	***5***	
• Upper Lachlan Shire Council	1	Objected
• Department of Primary Industries - Lands • Environment Protection Authority • Office of Environment and Heritage • Roads and Maritime Services	4	No objections
Special Interest groups:	***4***	All object
• Parksbourne Mummel Landscape Guardians • Friends of Collector • Australian Industrial Wind Turbine Awareness Network • Collector and Districts Historical Association	4	
Community	***46***	All object
Approx. distance from Collector Wind Farm:		
< 5 km	29	
5 - 50 km	4	
> 50 km	7	
unknown	6	
TOTAL	***55***	

Full copies of all submissions are included in **Appendix B**. Further consultation received from agencies during the assessment process is provided in **Appendix D**.

4.1 Agency Submissions

The key matters raised in agency submissions are summarised below, and considered in more detail in **Section 5** of the report.

Upper Lachlan Shire Council (Council) objected on the basis that the project does not comply with Council's Development Control Plan (DCP). However, the submission from Council does not identify how the project (or the proposed modification) is inconsistent with the DCP.

Council's submission also made specific recommendations with regard to Lerida Road South (a Council road), namely that use of the road should be minimised and that it should be sealed and widened to address traffic safety issues.

Ratch subsequently committed to upgrading Lerida Road South and to making a range of other traffic safety improvements (see **Section 5.2**). Based on these upgrades, Council subsequently supported the traffic safety improvements and the use of Lerida Road South for project-related traffic (see **Appendix D**).

Council (and some community submissions) also raised issues about the management of the Community Enhancement Fund. However, the Department notes that this issue is associated with the existing approval and is not directly relevant to the proposed modification. The Department has been consulting with Council, Ratch and the CCC in regard to this matter, and is satisfied that the management of this fund can be addressed separately in accordance with the existing approval.

Environment Protection Authority (EPA) advised that the proposed setting of noise limits based on 35 dB(A) or background plus 5 dB(A), whichever is the greater, is consistent with current government policy. The EPA supported the operational noise limits as proposed in the modification application.

Office of Environment and Heritage (OEH) confirmed that it supported the proposed mitigation measures for management of Aboriginal cultural heritage items, provided no views to the contrary are received from Registered Aboriginal Parties. OEH is satisfied with the proposed biodiversity assessment and offsetting arrangements, but recommended that any tree hollows be salvaged during construction and placed at least 100 metres from the proposed wind turbine locations (see **Section 5.5**). OEH has also advised the Department that it is satisfied with the recommended amendments to the project approval (see **Appendix D**).

Roads and Maritime Services (RMS) did not object to the modifications but requested the conditions require special permits for oversized/over mass loads, that Ratch be required to develop a Traffic Management Plan, and that heavy vehicle right hand turns onto the Hume Highway from Lerida Road South are avoided. Ratch has agreed to all these recommendation, as discussed further in **Section 5.2**.

Department of Primary Industries – Lands (DPI) made comment about the need for authorisation for the use of any Crown Land.

4.2 Special Interest Groups and Community Submissions

As outlined above, all 50 submissions from special interest groups and the general public objected to the proposed modification.

The submissions focused on concerns about the changes to the turbine blades and associated amendments leading to increased impacts associated with noise, shadow flicker, visual, health, erosion and biodiversity.

Many community submissions also raised concerns about:
- the noise impact assessment;
- the revised noise criteria; and
- the community consultation process.

The Department has summarised the issues raised in these submissions in **Table 2**, and has considered these issues further in **Section 5**.

It is noted that many of the submissions objected to and raised concerns about the approved project, rather than specific issues associated with the proposed modification.

Table 2: *Summary of community submissions*

Issue
• **Noise** *Assessment* o Concerns about the noise consultants used to assess the modification *Criteria* o Differences in noise levels between day, evening and night-time measures not accounted for o Background noise + 5dB(A) does not accurately characterise rural background noise o The proposed new noise limit of 35 dB(A), or background noise + 5 dB(A), whichever is greater will not protect residents from adverse impacts o Questions about the lawfulness of the proposed adjustment to background noise o The Department's wind farm noise guidelines should be updated *Impact* o Larger turbine blades and associated increase in the swept area will increase sound energy o Concerns that infrasound will increase due to the increased blade size, and that infrasound impacts are still unknown o Concerns regarding the Department's competency to assess inaudible noise and infrasound
• **Community engagement** o Inadequate community consultation by Ratch and the Department o Insufficient time for Collector community to review the modification EA o The CCC is not representative of the community o Lack of availability of hard copy of the EA until the end of the exhibition period

Issue
• **Opposition to the project as approved** ○ Management of the Community Enhancement Fund by Council is not supported by Collector community ○ The project offers no real benefit to Collector community ○ The energy efficiency and viability of wind farms is questionable ○ Lack of permission from all Aboriginal land title holders for the wind farm to use the land ○ Collector community opposes the wind farm and the community is leaving Collector in order to escape impacts of wind farm ○ Lack of economic benefit provided by the project ○ The wind farm will decrease surrounding land and property value
• **General Concerns** ○ Changes are too significant to be classified as a modification to the original approval ○ The modified wind turbine layout and increased blade length will increase impacts, including noise, shadow flicker, visual, health, erosion, bird deaths and loss of habitat ○ Wind farm technology is still experimental and impacts are not fully understood ○ The NSW Government planning process is biased towards wind farm developers
• **Transport** ○ Risk that Lerida Road will be used by Ratch despite the proposed modifications
• **Visual** ○ Increased blade size will increase visual impacts ○ Photomontages presented in the EA are inaccurate in the presentation of wind turbines ○ A photomontage depicting the additional overhead cable has not been provided
• **Biodiversity** ○ Concerns about vegetation clearance associated with modified internal road network and the use of the Biobanking Assessment methodology ○ The vegetation clearance required for the modifications ○ Additional area of above ground electrical cabling will have increased impacts on flora and fauna

4.3 Response to Submissions

Ratch has provided a detailed response to the issues raised in submissions (see **Appendix C**), which was made publically available on the Department's website.

5. ASSESSMENT

In assessing the merits of the proposal, the Department has considered the:

- EA for the original project and current conditions of approval;
- EA and supporting assessment for the modification;
- submissions and the response to submissions;
- relevant environmental planning instruments, policies and guidelines; and
- requirements of the EP&A Act.

5.1 Approved Project and Modification

Several public submissions were critical of the approved project and the modification application process, with many considering that the changes were too large to be considered as a modification. Submitters stated the community opposes the wind farm, and questioned the economic benefit of the project and its benefit to the Collector community.

The merits of the project as a whole were considered in detail during the assessment of the original project application and determined by the Commission. The Commission concluded that the project could be undertaken in an environmentally acceptable manner and is in the public interest, and therefore approved the project subject to strict conditions.

Whilst the Department acknowledges the concerns raised by the community in relation to the wider project, it notes that these issues are not directly relevant to the current modification application.

There are two points to make in response to the criticisms of the application being characterised as a modification: one in relation to the planning system framework and the other in relation to the nature of the application.

Firstly, the EP&A Act allows approvals to be modified. As long as each proposal can be characterised as a genuine modification, consent authorities are required to follow due process and assess the application on its merits.

Secondly, the Department must be satisfied that the nature of the application can be characterised as a modification to the original project. The Department has considered the changes and is satisfied that they are relatively minor in relation to the currently approved project.

In this regard, the modification does not change the layout of the wind turbines or significantly alter the layout of the wider wind farm including its ancillary infrastructure. Although the modification proposes minor changes to the blade diameter (an increase of 5 m); the overall maximum tip height (150 m) would not change.

The proposed changes are also located within associated properties and do not extend the physical boundary of the approved project, and the proposed amendments to noise and biodiversity conditions are consistent with current NSW Government policy.

Accordingly, the Department is satisfied that the proposed changes are minor and can be characterised as a modification to the approved project (rather than a new project in its own right), and that it is appropriate to consider this application under Section 75W of the EP&A Act rather than requiring a new development application.

5.2 Traffic

Traffic Safety

The existing approval does not restrict the use of Lerida Road South, but Ratch has proposed a range of changes to improve traffic safety associated with the wind farm by reducing the use of Lerida Road South, and the number of intersections between Lerida Road South and the wind farm's internal access tracks.

In particular, the proposed modification would reduce the use of Lerida Road South by locating the main site access point at the earliest opportunity (2 km) south along Lerida Road South from its intersection with the Hume Highway, rather than 7 km for the approved project. It would also reduce the number of intersections with Lerida Road South from 7 to 4 (see **Figures 3** and **4**).

The Department consulted with Ratch about further reducing the number of intersections with Lerida Road South, including whether a single entrance/exit point could be used to access the entire site. However, there are a number of steep gullies across the site which would prevent access from the main entrance/exist point (e.g. between turbines 11 and 12), and site vehicles would have to travel large distances along internal access roads to navigate from one part of the site to the other side (e.g. from turbine 16 to turbine 52 would be around 15 km).

Consequently, the Department accepts that the proposed access arrangements strike an appropriate balance between minimising the use of Lerida Road South and facilitating reasonable access to the site.

As mentioned above, Ratch has also committed to addressing all of Council's concerns about road safety, including:

- sealing and widening Lerida Road South from the Hume Highway to a point 250 m south of the southern-most site crossing point;
- designing the intersections with Lerida Road South as staggered intersections (i.e. requiring vehicles to turn on/off Lerida Road South) rather than allowing vehicles to go straight across the road to further improve safety;
- installing new fencing (or maintaining the existing fencing) along both sides of Lerida Road South from the Hume Highway to a point approximately 250 m south of the southern-most crossing point; and
- relocating the intersection of the access road between turbines 12 and 16, and between turbines 17 and 31, at least 125 m (and up to 250 m if practicable) away from Lerida Road South.

Subject to the implementation of these upgrades, Council has confirmed that the proposed modification would meet its requirements in relation to traffic safety, and that it accepts the continued use of Lerida Road South for project-related traffic to the southern-most crossing point/intersection (see **Appendix D**).

The Department has recommended conditions requiring Ratch to implement the agreed road upgrades to the satisfaction of Council, and on balance considers that the proposed consolidation of the number of approved site intersections is a considerable improvement on the site access arrangements originally approved.

Some public submissions expressed concern that despite these modifications, project traffic would still use Lerida Road South, with resultant traffic safety impacts. However, the Department notes there are no restrictions on the use of Lerida Road South under the existing approval, and given the proposed changes, and the relatively low traffic volumes associated with the project (see below), there is no justification to restrict the use of this road.

RMS requested that heavy vehicle right hand turns onto the Hume Highway from Lerida Road South be avoided, to reduce potential safety concerns associated with construction trucks making right hand turns across the highway. In its Response to Submissions, Ratch stated that the Construction Traffic and Access Management Plan would include protocols for drivers to ensure this would not occur. The Department has strengthened this commitment by recommending a new condition prohibiting trucks from turning right onto the Hume Highway from Lerida Road South during construction.

The Department acknowledges that this restriction would require trucks (returning east) to travel an additional 11 km west to Gunning before turning around at the next available interchange. However, it accepts that this additional travel distance is warranted to reduce safety risks on the highway.

Some public submissions requested that this right hand turn restriction be extended to all construction vehicles and not just heavy vehicles. The Department notes that the recommended condition relating only to heavy vehicles is consistent with the advice from RMS, and that the proposed modification would not result in any significant increase in construction traffic (see below). Therefore, the Department considers that extending the right hand turn restriction to all construction vehicles is not warranted.

Changes to Construction Traffic

The changes to infrastructure layout would require additional construction materials. This would result in a minor (ie. some 3%) increase in the overall construction traffic, albeit that most of this increase is related to revised assumptions in the traffic assessment, rather than increases associated with the modification itself. The assessment indicates that this minor increase can be safely accommodated by the road network.

Importantly, the maximum daily traffic during construction would not change (i.e. up to 170 vehicles per day during concrete pouring), and the operational traffic impacts would also remain unchanged.

The Department and Council are satisfied that the traffic generation resulting from the modification is generally consistent with the approved project, and would be appropriately managed under the existing conditions of approval, subject to the recommended road upgrades outlined above.

Transporting Turbine Components

The EA for the modification states that the increase in blade length is unlikely to have any impact on road transport or route selection.

The Department is satisfied that the modification would not impact road transport or route selection and can be managed in accordance with the existing conditions, which include a requirement on Ratch to prepare and implement a detailed Construction Traffic and Access Management Plan, in consultation with Council and the RMS.

Conclusion

The Department has recommended conditions requiring Ratch to undertake the road upgrades and to avoid trucks making right hand turns from Lerida Road South to the Hume Highway. With the implementation of these conditions, the Department, Council and RMS are satisfied that the proposed modification would reduce the traffic impacts associated with the project by addressing safety concerns, particularly around upgrading and rationalising the use of Lerida Road South.

5.3 Noise

Wind Turbine Noise Criteria and Assessment

The NSW Government has adopted the South Australian EPA's *Environmental Noise Guidelines: Wind Farms* (2009) (the SA Guidelines) for the establishment of noise criteria for wind farm developments. The SA Guidelines establish noise criteria at sensitive receivers for wind farms as being the higher of:

- 35 dB(A) $L_{Aeq(10minute)}$; or
- background noise plus 5 dB(A) correlated to the integer wind speed at hub height.

These criteria have been established in recognition of the relationship between wind speed and background noise associated with noise impacts from wind farms. That is, although noise generated by wind turbines increases as wind speeds increase, background noise levels are also affected by increased wind speed. This means that the noise generated by wind turbines at higher wind speeds may be fully or partially masked by a corresponding increase to background noise levels at the receiver from windy conditions.

Ratch's noise assessment for the original project conservatively adopted the minimum 35 dBA criterion for all non-associated residences, irrespective of the wind speed and background noise. This was because of concerns about the quality of the background noise data that was collected for the original assessment, and because Ratch's modelling indicated that the wind farm would meet the minimum 35 dBA criteria at all non-associated receivers.

Consequently, the project approval currently requires Ratch to meet the minimum 35 dBA criterion at all non-associated residences, with no allowance for background noise-based criteria.

Ratch has now undertaken additional detailed background noise monitoring and modelling of the noise impacts of the revised wind turbines, and is proposing to amend the criteria in the project approval so as to be consistent with the SA Guidelines and NSW Government policy (that is, the higher of 35 dBA or background plus 5 dBA).

The Department and EPA have reviewed the revised noise assessment and both authorities are satisfied that the background noise data provided is now of a quality and quantity that allows the establishment of criteria in accordance with the SA Guideline and NSW Government policy.

The revised noise assessment included consideration of noise impacts at 35 receiver locations surrounding the wind farm[1], for the modified turbines with 117 m diameter blades (see **Figure 3**).

The modelling predicts that the noise levels for the project would be below 35 dBA at all non-associated receivers at all wind speeds, with the exception of one receiver (Receiver FF) located to the east of the wind farm and around 2.1 km from the nearest turbine[2].

The highest predicted noise level from the wind turbines at Receiver FF would be 37 dBA, which would occur at wind speeds of 12 metres per second, and is based on the conservative scenario where the receiver is assumed to be downwind from all the turbines. The background noise level at wind speed of 12 metres per second would be 42 dBA, which means the applicable criteria is 47 dBA (i.e. background of 42 dBA plus 5 dBA).

Consequently, at 37 dBA, the noise from the wind turbines would not only remain well below the applicable criteria at this residence, but would also remain well below the background noise level at the applicable wind speed.

Overall, the Department and EPA are satisfied that the wind farm would comply with the applicable noise criteria at all times, and that the project is unlikely to result in any significant noise impacts to surrounding receivers. The Department has recommended conditions requiring Ratch to comply with the applicable criteria (i.e. the higher of 35 dBA or background plus 5 dBA) at all times, in accordance with current NSW Government policy.

Infrasound and Other Noise Issues

A number of community submissions expressed concern about potential health impacts associated with, and the Department's ability to assess the impact of, infrasound.

The National Health and Medical Research Council (NHMRC) has released a statement on wind farms and human health confirming that '*there is currently no consistent evidence that wind farms cause adverse health outcomes in humans*', and that any further health based studies should be limited to consideration of residences in close proximity to wind farms (ie. less than 1.5 km).

Further, the SA Guidelines do not include any specific modification factors or penalties for low frequency noise (which includes infrasound as a subcategory). This is because the South Australian EPA is satisfied that infrasound is not a feature of modern wind turbine designs.

[1] Including one residence proposed but not yet constructed to the south west of the wind farm.
[2] The assessment also indicated an additional residence (Residence Z) would marginally exceed the criteria (by up to 2 dBA), however this is now an associated residence.

The Department notes that there are no non-associated residences within 2 km from any of the approved wind turbines. Consequently, the Department considers that the risk of any residual health effects on surrounding residents would be negligible.

Submissions also raised issues about wake effects, wind shear, inversions and the van den Berg effect.

In response to these concerns, the Department notes that:

- turbine wake was considered in the noise modelling at residential receivers including the combined influence of all the turbines;
- wind shear was considered in the assessment by the background monitoring being referenced to the hub heights of the turbines;
- inversions are not a significant factor for wind turbine noise assessments, as inversions are characterised by low wind speeds when the turbines rotate slowly (i.e. during calm conditions) and maximum noise impacts from wind farms occur at higher wind speeds; and
- van den Berg effects (or excessive amplitude modulation) are associated with aerodynamic noise from a wind turbine's blades, and is sometimes referred to as "swish" or "thump". Amplitude modulation is already factored into the assessment of noise under the current SA Guidelines, and the conservative criteria that have been set by the NSW EPA.

The Department and the EPA accept that these issues have been appropriately addressed in accordance with the SA Guidelines, and are satisfied that the noise generated by the project would comfortably comply with the applicable criteria.

Verification and Independent Review

The project approval[3] currently requires Ratch to undertake verification monitoring of the wind turbines upon commissioning and provide for mitigation of any identified exceedances, as well as provisions for independent reviews of noise impacts.

The Department has retained the verification requirements in the project approval, given that actual monitoring of the working wind farm turbines would be important for establishing noise levels and verifying the modelling results.

However, the Department has removed the conditions relating to mitigation and independent review, given that:

- the noise assessment indicates that the project would comfortably comply with the applicable criteria and the recommended conditions require Ratch to comply with these criteria at all times;
- once operational, wind farm noise sources are generally static – that is, they produce the same noise from the same turbines under the same meteorological conditions. The independent review provisions in the project approval originated from mining-related development consents, where the noise sources change in location and nature over time as mining progresses; and
- following changes to the *Protection of the Environment Operations Amendment (Scheduled Activities) Regulation 2013*, the EPA became the appropriate regulatory authority for wind farms, with wind farms now requiring an EPL. If there are any valid concerns that the noise from a wind farm has changed over time, then the EPA is best placed to conduct an investigation using its powers under the *Protection of the Environment Operations Act 1997*.

Importantly, removing these conditions would not absolve Ratch from its responsibilities under the project approval to comply with the applicable noise criteria at all times, or to comply with conditions in relation to community consultation, complaints management, compliance monitoring, incident reporting, independent auditing, dispute resolution and environmental management.

Conclusion

The Department is satisfied that the proposed modification has been assessed in accordance with contemporary noise policy for wind farms, and would not result in any significant noise impacts. The Department has recommended conditions which would require Ratch to:

- comply with contemporary noise criteria at all non-associated receivers (including Receiver FF);
- measure noise generated by the wind farm generally in accordance with the requirements of the 2009 SA Guidelines;

[3] Conditions E14 to E18.

- undertake noise monitoring following commencement of operation of the wind turbines to determine compliance with the noise limits; and
- undertake further monitoring, if required by the Secretary.

The Department has also revised the operational noise criteria for the substation to broaden its application to all ancillary infrastructure.

The requirements relating to low frequency noise and tonality are unchanged in the recommended approval (although it is noted that for clarity they are located in a new attachment to the approval).

5.4 Visual

The visual assessment for the modification expanded on the assessment provided for the original EA.

Community submissions expressed concern that:
- the increased blade size would increase the visual impacts;
- the photomontages were inaccurate; and
- proposed sections of overhead electricity cable were not assessed with the photomontages.

The Department has considered the visual assessment and is satisfied that it is adequate and that the photomontages are appropriate for the purposes of the modification. The Department considers that the concerns regarding the difficulty in perceiving the change of the modification on the photomontages is largely related to the difficulty in discerning a minor change in turbine blade diameter of 5 m at distance, and not to the quality of the photomontage.

It is important to note that although there are minor increases to the blade diameter (5 m), the maximum tip height (150 m) of each wind turbine would not change as the hub height would be reduced to maintain the overall tip height.

The visual assessment concluded that there would be no change to the zone of visual influence or extent of visibility as a result of the modifications. The assessment concluded that visual impact of the modified blade length would be indistinguishable from the approved project. The Department accepts these conclusions.

In relation to concerns about the overhead transmission line, the Department notes that this relates to two sections (500 m and 550 m respectively) of 33 kV transmission line. The transmission lines would be similar to existing electricity cabling along Lerida Road South. These sections of cabling are located more than 1.5 km from the nearest non-associated residence and would not be visible from these residences.

Accordingly, the Department considers that the visual impact of the cabling is minor in nature, and would not result in any significant impacts on local residents or the landscape as a whole.

Some community submissions expressed concern about the impacts on shadow flicker from the changes to the turbine blades. Shadow flicker for the modified project was assessed and it was concluded that no shadow flicker was anticipated at any non-associated residence. Two associated residences (Residences N and S) are anticipated to experience shadow flicker, however these were also assessed as being affected by the approved project, and the proposed modification would not significantly increase this impact (the impact would actually decrease at Residence S).

Overall, the Department considers that the visual impacts associated with the proposed modification would be largely indistinguishable from the approved project. The Department is satisfied that the existing conditions of approval would appropriately address any residual visual amenity impacts associated with the modified project, which include requirements on Ratch to:
- provide landscaping treatments to residences within 5 km with views to the turbines, at the landowners request;
- ensure wind turbines and associated infrastructure is painted/finished to minimise visual obtrusiveness and glare;
- minimise lighting obtrusiveness; and
- prepare and implement a detailed Design and Landscaping Plan.

The Department has recommended an additional condition specifically stating that the wind turbines are limited to a maximum tip height of 150 metres.

5.5 *Biodiversity*

Vegetation Clearing and Biodiversity Offsetting

The project approval contains limits on clearing of native vegetation (see **Table 3**).

Table 3: *Impacts to native vegetation (existing approval)*

	Total Native Vegetation Impacts (including EEC)	Box Gum Woodland and Derived Grassland EEC	Tablelands Snow Gum Woodland EEC
Amount impacted (ha)	34.81 ha	31.79 ha	1.83 ha

The biodiversity assessment for the modification application provides an update of the impacts based on the modified project layout areas, including additional surveys[4] to inform the assessment and calculation of offset requirements.

The key changes to vegetation clearing identified in the modification biodiversity assessment include:

- avoiding all impact to Tablelands Snow Gum Grassy Woodland EEC[5];
- a 5.1 hectare increase in clearing of Box Gum Woodland and Derived Native Grassland EEC; and
- changes to the assumptions for clearing to include the more conservative scenario that all clearing is permanent (including construction impacts that will be rehabilitated), consistent with OEH's contemporary approach.

The revised impacts to native vegetation from the modifications are shown in **Table 4**.

Table 4: *Impacts to native vegetation (modified project)*

	Total Native Vegetation Impacts (including EEC)	Box Gum Woodland and Derived Grassland EEC	Tablelands Snow Gum Woodland EEC
Amount impacted (ha)	38.3 ha	36.9 ha	0

The Department understands that the 5.1 hectare increase in clearing of the Box Gum EEC is predominantly due to a refinement of the areas to be cleared following detailed design and the recent surveys, and a small increase resulting from the physical changes proposed as part of the modification. The Department also notes that 26.7 hectares of the identified EEC to be cleared comprises predominantly low quality derived grassland, with only 10.2 hectares comprising woodland EEC.

The biodiversity assessment for the proposed modification also included consideration of the modified layout on threatened flora and fauna species, and on hollow bearing trees. The assessment indicates that the modified project would not result in a significant impact on any threatened flora and fauna species, although it would marginally increase the number of hollow bearing trees that would be affected (i.e. 38 hollow bearing trees, which is 1 more than predicted for the approved project).

The existing approval contains requirements to minimise the impact on hollow-bearing trees. In addition, Ratch has committed to salvaging and re-using cleared tree hollows in retained areas of vegetation on site (which would be placed not less than 100 m from turbines).

The Department and OEH are satisfied that although there is a small increase in the net area of EEC to be cleared, and the number of hollow bearing trees that would be affected, this is acceptable and is unlikely to result in any significant impacts on the biodiversity values of the locality, particularly as these impacts will need to be offset.

The Department has recommended conditions requiring Ratch to:

- restrict clearing of the Box Gum Woodland and Derived Grassland EEC to the revised estimate; and
- offset the clearing by retiring ecosystem credits for the project within 2 years of commencing construction, in accordance with the BioBanking Assessment Methodology.

The Department notes that Ratch is seeking to remove the specific clearing limits, and instead seeks to address vegetation clearance by relying solely on biodiversity offsets calculated through the BioBanking Assessment Methodology.

[4] Ratch undertook an additional survey for threatened flora as part of its Response to Submissions due to seasonality issues associated with the initial surveys (which prevented the identification of some potentially-occurring species).

[5] This reduction is due to the condition in the project approval deleting Turbines 53-60 from the wind farm (ie. Condition A6).

The Department and OEH accept Ratch's approach to biodiversity offsetting through the BioBanking Assessment Methodology, as it is consistent with the current policy for biodiversity offsetting associated with major projects.

However, the Department does not accept Ratch's request to remove the limits for clearing vegetation and has recommended the limits remain, but has amended the conditions to clarify these limits apply to the clearing of EEC (as opposed to native vegetation in general).

Community submissions expressed concern that the change to the assessment methodology would damage the Cullerin escarpment and allow Ratch flexibility to clear vegetation unrestrained. The Department notes that clearing cannot occur unrestrained as the project approval contains a limit for clearing Box Gum Woodland and Derived Grassland EEC, and requirements to minimise clearing of native vegetation. There is also a general requirement to develop the project in a manner that is generally consistent with the EA.

Bird and Bat Strike

The changes to the blade length would increase the rotor swept area from 9,850 m^2 to 10,751 m^2 (i.e. an increase of approximately 9%), and the rotor swept height would decrease from 38 m to 33 m (to maintain the same overall tip height of 150 m).

The biodiversity assessment concluded that the lower rotor swept height may increase the potential risk for birds flying at 33 m and above colliding with rotating turbines. However, the bird utilisation surveys found that only 2.3% of birds were recorded at heights between 33 and 39 m and that the majority of these birds were common and widespread species (rather than threatened species).

The Department accepts that this is a minor change to the risk of bird/bat strike, but notes that the existing approval requires Ratch to prepare and implement a Bird and Bat Adaptive Management Plan (BBAMP), which includes requirements for adaptive management of turbines to reduce mortality.

The Department accepts that any additional risk would be appropriately managed through adaptive management. In this regard, the Department notes that Ratch has already prepared a draft BBAMP (see Appendix D of the EA for the modification) which will need to be finalised in consultation with OEH in accordance with the approval.

Micro-siting

The modification seeks to amend the definition of micro-siting to increase the existing 100 m allowance to 300 m in localised areas, namely the internal access track between turbines 61 and 63, and between turbines 2 and 18. Ratch seeks this change to address topographical constraints in these areas.

The Department considers that the EA does not contain sufficient justification or assessment for this micro-siting change, and consequently recommends that the allowance is not approved.

However, the Department has taken the opportunity to update the micro-siting conditions to reflect contemporary drafting. These recommended changes would not change the intent of the existing micro-siting conditions, and would include requirements on Ratch to:

- restrict micro-siting to a maximum of 100 m from the proposed locations (as is in the existing approval) provided it would not result in any non-compliance with the approval;
- locate turbines at least 60 m from hollow bearing trees (as is in the existing approval); and
- submit final layout plans of the development documenting any micro-siting.

5.6 Other Issues

The Department's consideration of other issues raised in submissions or identified in the Department's assessment is provided in **Table 5**.

Table 5: *Assessment of other issues*

Issue	*Department's Consideration*	*Recommendation*
Heritage	• Additional survey and assessment was undertaken for the modification in consultation with the Pejar Local Aboriginal Land Council. • 3 stone artefacts were identified to be potentially impacted by the modification. All were assessed to be of low significance. • Although the artefacts are of low significance, Ratch stated it would avoid impact where possible. • OEH supported the overall approach of avoidance but recommended that 2 of the 3 sites be avoided. • The Department is satisfied that the impact of the modification is not significant, and would be appropriately managed through the Cultural Heritage Management Plan (to be updated for the modification) and has recommended the avoidance of two artefacts as requested by OEH. • Some submissions raised concerns that Aboriginal native title claimants/holders had not provided permission for the wind farm. The Department notes that this issue is not directly relevant to the proposed modification, and that it is a separate matter for Ratch to ensure that it has legal access to the land consistent with NSW and Australian laws.	Amend heritage condition to include requirement to avoid artefacts SU1/L1 and SU54/ L1
Aviation	• As the wind turbine tip height would not change, the conclusions of the aeronautical assessment in the original EA remain valid. • The existing approval contains requirements for further consultation regarding aviation with relevant authorities.	No change to conditions.
Bushfire risks, erosion, property values, economic viability	• The Department is satisfied that the proposed modification would not materially change any of these impacts, and where appropriate, these matters have already been addressed in the existing approval through specific conditions (eg. requirement for a Bushfire Risk Management Plan).	No change to conditions.

6 RECOMMENDED CONDITIONS

The Department has drafted a recommended Notice of Modification (see **Appendix F**), as well as a consolidated version of the project approval as modified (see **Appendix E**).

The recommended modifications to the conditions include:

- administrative changes:
  - updating references;
  - updating the list of Aboriginal heritage items;
  - incorporating an updated Statement of Commitments;
- limits to the approval:
  - adding limits for the wind turbine height (i.e. 150 m);
  - updating the conditions for micro-siting (but maintaining existing restrictions);
  - requiring notification of the Department prior to commencing each stage of the project;
  - adding requirements for structural adequacy, demolition and operation of plant and equipment;
- biodiversity:
  - amending the vegetation clearing limits for EECs;
  - amending the offset strategy requirements, so that offsets are based on identified ecosystem credits, consistent with current NSW Government policy;
- road and transport:
  - amending road upgrade requirements to reflect Council's requirements and Ratch's commitments;
- noise:
  - updating the noise criteria in accordance with current NSW Government policy; and
  - removing noise conditions that contemplate non-compliance with the noise criteria.

Ratch has reviewed the proposed conditions and does not object to them.

Council has also advised that it is satisfied with the recommended conditions.

7 CONCLUSION

The Department has assessed the modification application in accordance with the relevant statutory requirements, having regard to the EA, submissions, as well as documentation relating to the original project.

The Department has considered the key issues associated with the proposed modification, including the relocation of infrastructure, implications of greater clearing, implications of longer blades including visual impact, and the implications of changing noise limits. The Department's assessment has found that the proposed modification would not materially increase the impacts of the original project.

Importantly, the proposed modification would reduce local road impacts and also increase the efficiency of electricity generation of the wind farm and assist the NSW Government in meeting its renewable energy targets.

Consequently, the Department is satisfied that the proposed modification is in the public interest and should be approved. The Department considers that the amended conditions of approval would effectively manage and minimise any residual impacts associated with the proposed modification.

8 RECOMMENDATION

It is recommended that the Planning Assessment Commission, as delegate of the Minister for Planning:

- considers the findings and recommendations of this report;
- determines that the proposed modification falls within the scope of Section 75W of the EP&A Act;
- approves the modification application, subject to conditions; and
- signs the Notice of Modification (**Appendix F**).

25/5/16

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25.5.16.

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