ASSESSMENT REPORT
Bodangora Wind Farm
Blade Length Modification (10_0157 MOD 1)

1 BACKGROUND

Bodangora Wind Farm Pty Limited (BWF), a fully owned subsidiary of Infigen, has approval to construct and operate the Bodangora Wind Farm, located approximately 2 kilometres (km) north-east of Bodangora and 15 km north-east of Wellington in the Wellington local government area (see **Figure 1**).

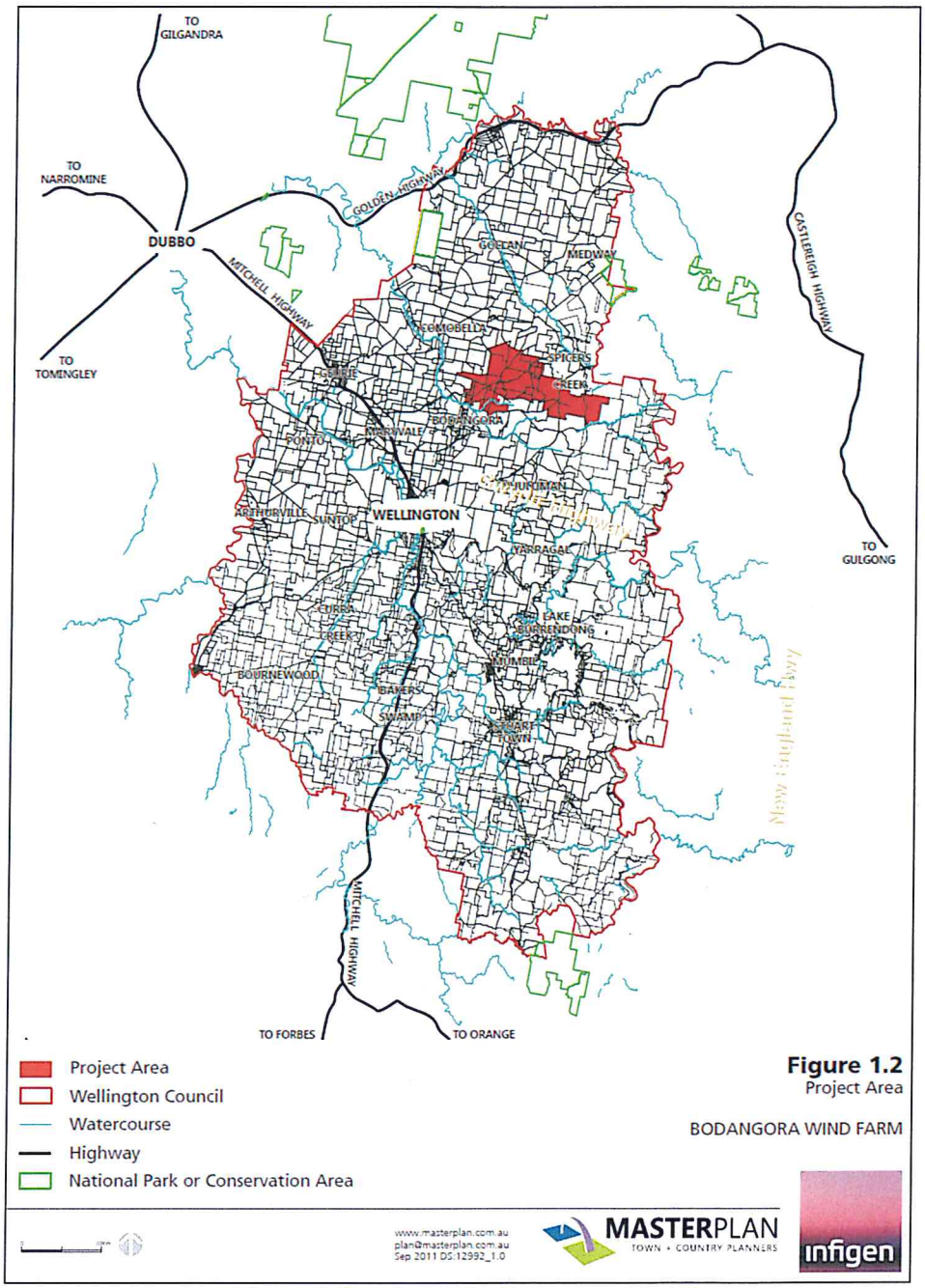

***Figure 1**: Location of the Bodangora Wind Farm*

On 30 August 2013, the then Minister for Planning granted approval for the Bodangora Wind Farm (10_0157). The approval allows for:

- construction and operation of up to a maximum of 33 wind turbines;
- a 33/132 kV substation plus switchyards, transformers and microwave towers to provide connection to the existing 132 kV Wellington – Beryl transmission line;
- 39 km of new and upgraded access tracks;
- underground and overhead cabling;
- temporary and permanent wind monitoring masts;
- a construction compound;
- gravel quarries; and
- an operation and maintenance centre.

The approved project layout is shown in **Figure 2**. The maximum approved turbine tip height is 150 metres (m), including a blade diameter of up to 114 m and a tower height of up to 100 m.

BWF has yet to commence construction of the project.

2 PROPOSED MODIFICATION

BWF has lodged an application under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act), to modify the project approval for the Bodangora Wind Farm. The proposed modification is described in the Environmental Assessment (EA) which accompanied the application (see Appendix A).

Since the project was approved, significant improvements have been made to turbine technology. In particular, the development of longer turbine blades has shown that greater efficiency of operations can be achieved, with around 10% increased generation efficiency and overall lower energy production costs.

BWF has identified a number of design refinements it can make to its turbines to realise these benefits, and is seeking a modification to allow larger, more efficient turbines to be installed.

The modification application would increase the turbine blade diameter from a maximum of up to 114 m to a maximum of up to 130 m, whilst remaining within the approved maximum turbine tip height of 150 m. This would result in each blade being up to 8 m (or 14%) longer than that currently allowed under the approval. The proposed increase would not affect the 100 m maximum turbine tower height, however the longer blades and turbine tip height would dictate the individual tower height.

3. STATUTORY CONTEXT

The Bodangora 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 to this approval must be made under the former Section 75W of the EP&A Act.

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 significantly alter the approved layout of the project;
- not alter the ancillary infrastructure; and
- not significantly increase the environmental impacts of the project.

The Minister for Planning is the approval authority for the application. However, under the Minister's delegation dated 16 February 2015, the Executive Director, Resources Assessments and Business Systems, may determine the proposed modification as Wellington Council has not made an objection, a political disclosure statement has not been made (although a disclosure was made in regard to a previous related application), and there are less than 10 public submissions in the nature of objections.

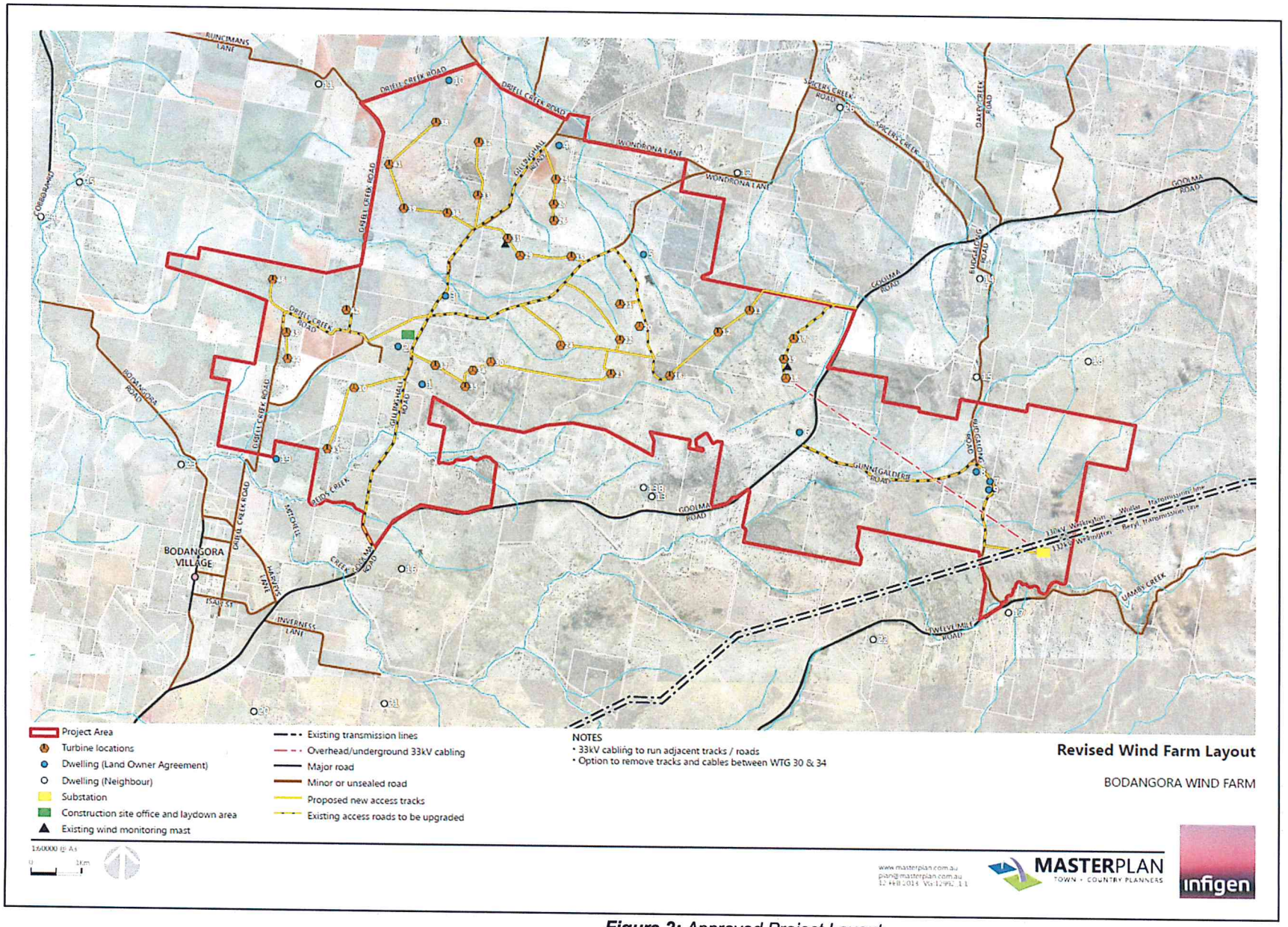

Figure 2: *Approved Project Layout*

4. CONSULTATION

The Department made the application and EA publicly available on its website on 2 September 2015. Given the minor nature of the application, the Department did not formally seek submissions on the application, but accepted comments up to 16 September 2015.

The Department also wrote to Wellington Council, Mid-Western Regional Council and the Roads and Maritime Services (RMS), inviting comment on the proposed modification.

The Department received four submissions (see Appendix B) on the modification application including one from RMS, one from Wellington Council, one from a special interest group and one from a community member. A summary of the issues raised in submissions is provided below:

RMS did not object to the proposed modification providing the existing conditions of approval related to the road dilapidation report, the construction environmental management plan and the construction traffic and access management plan remain unchanged. While the modification application proposes to change the preferred traffic access route, the conditions of approval relating to traffic and access remain unchanged.

Wellington Council did not object to the proposed modification, but raised some concerns about the fact that the application had not been formally exhibited. The application was also considered at a Council meeting in September, and the Council received 76 representations from the local community raising concerns about the application. These concerns focused on the impacts of the original wind farm rather than the current application, and included matters such as visual, noise, and property values. The Department notes that there is no obligation to formally exhibit a minor modification to an existing project approval, and that the application was made publicly available on the Department's website. The Department has also considered the key matters raised in representations to Council where they are relevant to the current application (see Section 5 below).

Bodangora Wind Turbine Awareness Group objected to the modification, raising concerns about:
- visual impacts, flora and fauna impacts, noise and transport impacts; and
- the level of community engagement by BWF in preparing the modification application.

The community member raised concerns about:
- the adequacy of visual impact assessment;
- the adequacy of the fauna assessment and the potential increased impact on avifauna from the proposed increase in rotor swept area;
- noise impacts, including compliance with existing noise conditions;
- transportation impacts;
- decommissioning impacts; and
- the level of community funding provided by the proponent.

The Department has considered the matters raised in the submissions during its assessment of the merits of the proposed modification. These matters are considered in detail in Section 5.

5. ASSESSMENT

In assessing the merits of the proposal, the Department has considered:
- the modification application;
- the Environmental Assessment (EA) and conditions of approval for the original project;
- relevant environmental planning instruments, policies and guidelines; and
- the requirements of the EP&A Act.

The Department believes that the key issues for the modification relate to visual impacts, biodiversity impacts, transportation impacts and noise impacts.

5.1 Visual Impacts

The general location and extent of the wind farm and the associated landscape features of the proposed modification remain unchanged. However, as discussed in section 1, the proposed higher efficiency turbines have different dimensions. The turbines would have an increase in blade length of 8 m (14%) from up to 57 m to up to 65 m. This would increase the maximum rotor swept area by approximately 30% over that approved for the original project. The maximum turbine tip height would remain at 150 m. To the extent that a larger blade is used, the hub height would be reduced accordingly, to ensure the tip height remains within the approved height of 150 m.

A total of 26 residences located within 6 km of the nearest proposed wind turbines were assessed as part of the visual impact assessment for the approved project. The nearest non-associated residence is located 2.09 km to the nearest wind turbine.

BWF provided a photomontage to determine the visual impact of the modification. Refer to **Figure 3.** The photomontage is indicative only, as it is not for the project itself, but for a project in an area with similar landscape characteristics. The photomontage compares wind turbines with a 57 m blade length and 100 m hub height to wind turbines with a 63 m blade length and 94 m hub height from a viewpoint located at a distance of approximately 1.6 km. The wind turbines with the 63 m blade length have a swept area approximately 22% larger than the wind turbines with the 57 m blade length. At the 1.6 km distance, there is no significant perceivable difference from the blade length increase. This perception would decrease the further the distance between the wind turbines and the observer.

The Department is satisfied that the change in visual impact is not sufficiently perceptible to result in any significant increase in impacts on landscape values or to non-associated residences. Impacts associated with the proposed modification would be adequately managed through the existing conditions of approval which require a Design and Landscaping Plan and landscaping treatments to screen any non-associated residences with views of the turbines located within 5 km of a turbine.

In regards to shadow flicker, turbine blade glint and night lighting, the Department is satisfied impacts with the proposed modification would be adequately managed through the existing conditions of approval. The existing conditions of approval require shadow flicker to not exceed 30 hours per annum at any residence not associated with the project, the turbine blades to be finished with a surface treatment that minimises any potential for glare or reflection and any aviation hazard lighting to be implemented in a manner that minimises visual intrusion to non-associated residences.

Figure 3: *Comparison of 57 m blade length wind turbines (top) with 63 m blade length wind turbines (bottom)*

5.2 Flora and Fauna Impacts

A flora and fauna assessment was undertaken to determine the potential biodiversity impacts of the proposed modification. The assessment considered a wind turbine model with an increased blade length that fit within the modification specifications of 130 m blade diameter. **Table 1** provides a comparison of the dimensions and swept areas of the wind turbines in the project approval and the wind turbines in the modification application.

Table 1: *Wind turbine specifications*

Wind Turbine	*Hub Height*	*Blade Diameter*	*Blade Above Ground*	*Swept Area*
Approved	100 m	114 m	40 m – 150 m	10,207 m^2
Proposed	85 m	130 m	20 m – 150 m	13,273 m^2

Although the rotor swept area of the wind turbines in the modification application is proposed to increase by 30%, the longer blade turbines would be unlikely to present any appreciable difference in the strike risk to birds and to bats. This is principally because 97% of all birds recorded at the site were flying below 20 m and only 8% were recorded at heights between 10 m and 20 m. Therefore around 89% of birds observed were recorded flying at heights less than 10 m, which is well below the 20 m lowest height each blade would reach. As most bird activity is at these low elevations, the higher the lowest point of the blade is above the ground, the less likely blade strike will occur.

For the remaining 3% of birds observed flying above 20 m, 2.6% were of birds flying between 20 m and 50 m and 0.4% were birds which were flying above 50 m. Of all the recorded observations, none of the birds flying above 20 m are listed species under the *Threatened Species Conservation Act 1995*. The birds that fly above 20 m can be divided into those that fly individually, such as birds of prey, and those that flock, typically the Sulphur-crested Cockatoo and the Galah.

The EA's bat surveys identified the highest level of activity was recorded along creeks and in woodland remnants, with a very small number recorded in open pasture, such as that which exists across the project site. Notwithstanding, the project layout has been designed to place turbines away from areas where the risk of bat blade strike and barotrauma may be elevated.

The Department's original assessment of the project found that the risks associated with potential bird and bat impacts would be able to be appropriately managed, subject to the preparation and implementation of a Bird and Bat Adaptive Management Program (BBAMP). The current project approval has conditions to that effect. Therefore the Department is satisfied that based on the flora and fauna assessment and survey results, that increasing the blade length would not significantly increase the current bird and bat strike risks. Further, the Department believes that the existing conditions of approval appropriately deal with any residual risks to bird and bat strike. However, the Department has taken the opportunity to refine the BBAMP condition to clarify that the plan must be prepared in consultation with the Office of Environment and Heritage (OEH).

The project approval also contains conditions that require turbines to be micro-sited at least 30 m from adjacent hollow-bearing trees where feasible and reasonable, and includes a condition requiring the development of a biodiversity offset package.

The Department is satisfied that adequate consideration of the potential risks of the modification on bird and bat species from blade strike has been undertaken. The Department accepts that a minor level of mortality to individual bird and bats is unavoidable as a result of interaction with wind turbines. Notwithstanding, the Department considers that the project has been carefully designed to minimise these risks by avoiding local habitat features including hollow-bearing trees, creeks, high quality remnant woodland and rocky outcrops, where possible. The Department is satisfied that no significant impacts would occur. Impacts on bird and bat species associated with the proposed modification would be adequately managed through the amended conditions of approval.

5.3 Transportation Impacts

As the modification seeks to use larger blades (of up to 65 m), increased turning restrictions are anticipated at certain intersections, as an overhang would be expected during the transportation of the blades. As a result, the transport route assessed for the approved project is no longer the preferred transport route, as the proposed modification would necessitate a number of major upgrades in and around Dubbo. BWF is now proposing a new transport route for the blades from the Port of Newcastle to Bodangora, which involves travelling through Gulgong via the Castlereagh Highway, Goolma Road and Gillinghall Road (as shown in **Figure 4**). This route is also shorter than the approved route.

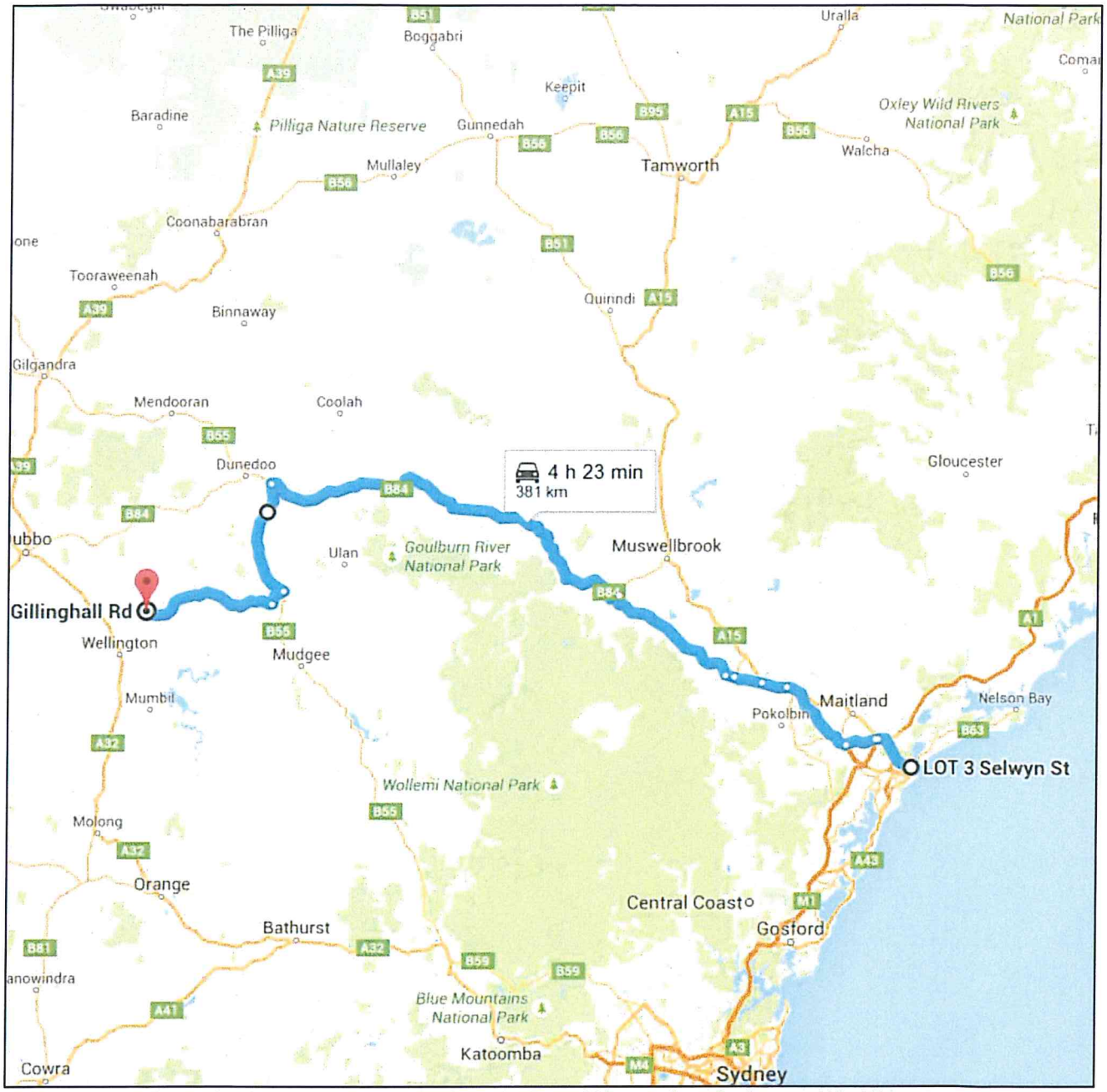

Figure 4: *Revised transport route from the Port of Newcastle to Bodangora Wind Farm*

A traffic assessment, assessed the swept path assessments of the largest vehicles, and determined the feasibility and accessibility of the vehicles along the new transport route.

The assessment concluded that there would be key locations where manoeuvring constraints for the transportation of the wind farm components would be experienced, particularly in Gulgong and on Gillinghall Road, however, these constraints would be appropriately managed and/or mitigated by implementing a number of standard traffic management measures for the use of oversize/overmass vehicles. These include appropriate markings and signs for special purpose vehicles, the use of pilot and escort vehicles and the use of warning lights and signs.

Other measures that may be required include temporary restriction of on-street parking at some intersections, avoidance or temporary removal of some road signs and light poles, trimming of trees and minor upgrades to one intersection. All these measures would be undertaken in consultation with, and to the satisfaction of, the appropriate road authority, which would either be the local Council or RMS, and in consultation with NSW Police.

The Department considers that the modified project would not result in any significant additional impacts over that already considered and approved. Any impacts resulting from the proposed modification would be adequately managed through the existing conditions of approval which require Road Dilapidation Reports to be prepared and a Construction Traffic and Access Management Plan to be prepared and implemented prior to any transportation occurring.

5.4 Noise Impacts

Operational Noise – Wind Turbines
The assessment of the noise impacts of the approved project was based on the Vestas V112 wind turbine, which has a maximum sound power level of 106.6 dB(A).

A revised noise assessment was undertaken to consider noise emissions associated with the proposed change in turbine. The assessment considered two wind turbine models, one with a rotor diameter of 130 m and hub height of 85 m and one with a rotor diameter of 120 m and hub height of 85 m. Both models have a maximum sound power level of 106.0 dB(A).

The noise assessment predicted that whichever of these models is selected, the project would still comply with the relevant noise criteria at all non-associated residences, for all measured wind speeds.

The Department is satisfied that given the predicted sound power level of the assessed models is similar to that approved, that the noise impacts of the modified project would not result in material increase in impacts to non-associated residences, and that resulting noise levels would be likely to be the same or similar to that approved for the original project.

Nonetheless, the Department has recommended some changes to the operational noise conditions of the project approval to contemporise and strengthen the noise regulation of the wind farm. These changes include requirements on BWF to:

- verify the noise predictions prior to commissioning the wind farm, through additional noise modelling;
- comply with the applicable noise criteria at all times (Nb. the changes do not alter the existing noise criteria);
- measure wind turbine noise in accordance with the Department's and EPA's current approach to wind farm noise measurement (which is based on the South Australian EPA's *Wind Farms Environmental Noise Guidelines (2009)*, with some modifications). This includes consideration of special noise characteristics such as tonality and low frequency noise, including modification factors or penalties to be applied in the unlikely event that these noise characteristics are found to be a feature of the wind farm;
- implement best practice operational noise management, including requirements to apply sector management of individual wind turbines to manage any wind directions or meteorological conditions that are found to result in exceedances of the noise criteria; and
- undertake noise monitoring to assess compliance.

Verification and Independent Review
The Department has also recommended some changes to the verification and independent review conditions of the project approval. In this regard, conditions F15 to F18 of the existing project approval require BWF to undertake verification monitoring of the wind turbines within 3 months of commissioning and provide for mitigation of any identified exceedances, and to provide for independent reviews of noise impacts.

The Department notes that the noise modelling undertaken for the project indicates that the wind farm is able to meet the applicable noise criteria at all times at all non-associated residential receiver locations. The project approval requires BWF to comply with these criteria.

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. As outlined above, the Department has also recommended a condition requiring BWF to re-confirm the noise modelling predictions prior to commissioning of the wind turbines.

However, the Department has removed the conditions relating to mitigation and independent review, as BWF's noise assessment indicates that the project would comply with the applicable criteria and the recommended conditions require BWF to comply with these criteria at all times.

As currently worded, the conditions contemplate the potential for exceedances of the criteria. This is not the case, and if BWF is found to exceed the applicable criteria then it would be in breach of its consent, and therefore subject to potential compliance action under the EP&A Act and/or its Environment Protection Licence (EPL).

Further, the Department is satisfied that the provisions for independent reviews are not warranted for contemporary wind farm projects, given that:

- 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 under a wind farm's EPL.

Consequently, the Department has recommended that the conditions contemplating non-compliance, and provisions relating to independent noise review, be deleted. As outlined above, this would not absolve BWF 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.

Other Ancillary Infrastructure

The Department has also recommended conditions simplifying the noise conditions for ancillary infrastructure (ie. the substation), and clarifying that measurement of such noise sources is to be in accordance with the provisions of the *NSW Industrial Noise Policy*. The conditions relating to construction hours and vibration criteria have also been consolidated. The Department notes that the changes do not affect the criteria or intent under the existing conditions.

5.5 Other Issues

The Department's consideration of other issues raised in submissions is provided in **Table 2**.

Table 2: *Assessment of other issues raised in submissions*

Issue	***Department's Consideration***	***Recommendation***
Decommissioning Requirements	• The Proponent provided a Decommissioning and Rehabilitation Plan as part of the approved project's EA. • The project approval contains strict conditions for decommissioning, including: - entering into agreements with landowners, with provisions to require that decommissioning occurs in accordance with the project approval; - updating the Decommissioning and Rehabilitation Plan, including funding arrangements and provision for a decommissioning bond,; - decommissioning the project within 18 months of the cessation of operation of the Project; and - preparation of a Road Dilapidation Report. • The Department considers this framework remains appropriate for the proposed modification.	No additional conditions required.
Community Funding	• The proponent is required to make contributions to the community in accordance with its Planning Agreement entered into with Wellington Council. • The Department considers this mechanism remains appropriate for the proposed modification.	No additional conditions required.

6 RECOMMENDED CONDITIONS

The Department has drafted a recommended Notice of Modification (see Appendix C), as well as a consolidated version of the project approval as modified (see Appendix D). The recommended modifications to the conditions allow:

- BBAMP monitoring and management conditions to be strengthened;
- updated operational noise management conditions;
- updated construction noise and vibration conditions; and

- administrative changes to update definitions.

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

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 assessed the key issues associated with the proposed modification, including the impact of the larger sweep area on visual amenity, the impact of the larger sweep area and lower blade height on bird and bat strike, the impact of the larger blade length on transport and the impact of the amended wind turbine model on noise. 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 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 Executive Director, Resource Assessments and Business Systems, as delegate of the Minister for Planning:

- consider the findings and recommendations of this report;
- determine that the proposed modification falls within the scope of Section 75W of the EP&A Act;
- approve the modification application, subject to conditions; and
- sign the Notice of Modification (Appendix C).

13.10.15

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13.10.15.

Mike Young
Director
Resource Assessments

APPENDIX A: ENVIRONMENTAL ASSESSMENT

See website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7250

APPENDIX B: SUBMISSIONS

See website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7250

APPENDIX C: NOTICE OF MODIFICATION

APPENDIX D: CONSOLIDATED PROJECT APPROVAL