

TURITEA WIND FARM

ASSESSMENT OF ENVIRONMENTAL EFFECTS – TURITEA WIND FARM REDESIGN



Table of Contents

1	INTRODUCTION	2
1.1	Overview	2
2	DESCRIPTION OF REVISED PROPOSAL	2
2.1	Revised Proposal.....	2
3	ASSESSMENT OF EFFECTS ON THE ENVIRONMENT	3
3.1	Positive Effects and Benefits of the Project.....	3
3.2	Effects on Landscape Values and Visual Amenity.....	4
3.3	Effects on Terrestrial Ecology.....	4
3.4	Effects on Freshwater Ecology	5
3.5	Effects on Historic and Archaeology Sites and Features	5
3.6	Cultural Values	5
3.7	Effects of Noise on Adjoining Landowners.....	5
3.8	Effects on Traffic and Transportation Networks	5
3.9	Effects on Radio and Other Communication Signals.....	6
3.10	Effects on Aviation Activities	6
3.11	Effects Arising from Electric and Magnetic Fields from External Transmission Lines	6
3.12	Effects Related to Construction Activities and Earthworks	7
3.12.1	Sedimentation.....	7
3.12.2	Geotech.....	7
3.13	Recreation and Tourism	7
4	CONCLUSIONS.....	8

1 INTRODUCTION

1.1 Overview

On 4 September 2009 Mighty River Power Limited (*Mighty River Power*) confirmed, by way of a Memorandum of Counsel presented to the Board of Inquiry (*the Board*), that it would engage landscape architect Stephen Brown to reconsider the Turitea Wind Farm layout. Acknowledging a number of comments made by the Board on landscape matters, and issues raised by submitters, Mr Brown was asked to consider how the wind farm layout could be redesigned to better conform to the surrounding landform.

This assessment of environmental effects (*AEE*):

- describes the revised layout for the Turitea Wind Farm; and
- summarises the assessments undertaken by Mighty River Power's multidisciplinary team of experts as to the benefits and environmental effects of the project in its revised form.

The changes to the layout detailed in this AEE represent amendments to the applications to construct, operate and maintain the Turitea Wind Farm as notified on 24 January 2009, and as subsequently modified to date. This AEE is intended to provide all the information necessary to consider the environmental effects of the proposal in its current form.

In undertaking their assessments of the revised layout, Mighty River Power's visual/landscape and acoustic experts were also asked to consider any potential cumulative effects that may arise in conjunction with the extension to NZ Windfarms' Te Rere Hau (*TRH*) development. It is noted that the resource consent applications for the extension to TRH were lodged some 10 months after those for Turitea, and as at the date of this AEE, are yet to be granted. Accordingly, the extension to TRH does not currently form part of the existing environment against which the effects of the Turitea project must be assessed. However, the cumulative effects of both the Turitea and the extension to TRH have been included in the assessments outlined in this AEE where relevant, for pragmatic risk reasons, and in order to be of most assistance to the Board.

Mighty River Power was, and remains confident that the wind farm layout as originally notified represents an appropriate balance of environmental effects and project benefits. However, consistent with its company values of understanding what is important to and building relationships with the communities in which it operates, and its commitment to the Board, Mighty River Power has embarked on the redesign process with the aim of further reducing the environmental effects of the wind farm.

2 DESCRIPTION OF REVISED PROPOSAL

2.1 Revised Proposal

Of the 126 turbine zones proposed at the time of the redesign announcement, this revised layout deletes 21 and relocates a further 44 to more visually recessive positions. All 21 of the deleted zones were to be located on private farmland surrounding the Turitea Reserve. The revised layout, and how this differs from the project as notified, is shown in **Appendix 1**. A revised summary table of the project's key components is provided as **Table 1**. (For

completeness, it is noted that turbine zone 55 has also been deleted from the original layout, in accordance with an agreement reached with local iwi).

The revised layout:

- (a) comprises a maximum of 105 turbine zones within which a maximum of 104 2.3MW turbines or 96 3MW turbines will be constructed; and
- (b) will have an installed capacity of up to 288MW (dependant on final turbine selection).

A plan showing the overview of the changes to the wind farm layout has been included as **Appendix 2**.

The original roading layout has largely been retained. Where necessary, the internal roading network has been adjusted to provide access to each relocated turbine zone. In areas where more substantive changes are necessary, the new alignment mirrors the original alignment as far as practicable. The revised roading layout is shown in **Appendix 3**.

The revised layout requires only one change to the spoil disposal sites as shown in Map 20 – “*Consolidated Disposal Sites*”, dated August 2009, being the removal of the proposed sites on Bryants Hill. All other disposal sites remain unchanged and have therefore not been reassessed for the purposes of this AEE. An updated spoil disposal plan is attached as **Appendix 4**.

3 ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

3.1 Positive Effects and Benefits of the Project

There are a significant number of positive benefits associated with the Turitea Wind Farm, as detailed in section 6.2 of the Turitea Wind Farm Assessment of Environmental Effects (*August 2008*). Dr Layton has assessed the impact of the amended proposal (and in particular, deletion of 21 turbine zones) on these benefits as being that the revised layout will reduce the:

- overall installed capacity from a maximum of 336MW to 288MW;
- greenhouse gas emissions avoided by between 79,000 tonnes and 334,000 tonnes depending on the type of generation displaced;
- estimated value of greenhouse gas benefits to New Zealand each year by between \$1.7 million and \$11 million; and
- direct and indirect impacts in the Manawatu on output and employment during the construction period.

However, Dr Layton has confirmed that under either the original or the amended proposal, the Turitea Wind Farm will provide an efficient source of additional electricity compared with other sources. He has further confirmed that even under the revised layout, the project's benefits still remain significant at a national, regional and local scale.

3.2 Effects on Landscape Values and Visual Amenity

As outlined in their evidence regarding the design refinements, Messrs Brown and Wyatt both consider that the removal and relocation of over half the proposed turbine zones has significantly reduced the project's landscape effects from the majority of viewpoints. This is particularly the case with respect to the closest residential properties to Bryants Hill (including views from Ngahere Park and Pacific Drive), as well as the Kahuterawa/Greens Road area.

Mr Brown has confirmed that the design refinement process has addressed the most dominant/prominent turbines, such that he considers the landscape and visual effects of the revised proposal to be acceptable. Mr Wyatt has similarly reaffirmed his original conclusion that the project's overall visual impact remains acceptable, given the capacity of the surrounding landscape to accommodate further wind turbines, and the demonstrated level of community support for such development (as detailed by Mr Kalafatelis in his evidence in chief).

For reasons already outlined, Messrs Brown and Wyatt have also considered any potential cumulative and landscape effects that may occur should both the Turitea and extension to the TRH development be consented and constructed. Both experts have confirmed that any such effects will be a subtle change, and one not requiring any specific mitigation.

Mr Wyatt has also undertaken a more detailed assessment of the potential effects from the transmission lines, and reiterated his original conclusion that any such effects will be minor.

Messrs Brown and Wyatt have also assessed the turbine tower heights proposed for the Turitea development. Mr Brown has stated that the removal or relocation of the most prominent turbine zones far outweighs any benefit in modifying or varying the height of individual turbines. He does not consider that any appreciable 'gains' would be realised by altering the turbine heights and/or additional micro-siting *per se*. Mr Wyatt similarly considers that based on his extensive experience with wind farm developments, varying the height of individual turbines generally makes no discernable difference to the visual impact of either the closest wind turbine or a group of wind turbines on the horizon.

Based on this expert advice, it is considered that the landscape and visual effects of the revised proposal within the surrounding landscape remain acceptable.

3.3 Effects on Terrestrial Ecology

Mr Willie Shaw has concluded that the design refinements have reduced the project's ecological effects when compared to the proposal as originally notified. This is primarily due to the reduction in the length of road that is to be constructed within indigenous vegetation, which has consequently reduced the area of required vegetation clearance by c.6000m². Mr Shaw also notes that the removal of 21 turbine zones in pasture habitats will reduce both the number of stream crossings and fill sites that are required (having a related reduction in effects on ephemeral watercourses).

A report detailing Mr Shaw's assessment of the revised layout is provided as **Appendix 5**.

3.4 Effects on Freshwater Ecology

Dr Coffey has confirmed that the reduction in turbine numbers and spoil disposal sites has reduced the risk and scale of sediment loading in streams from project construction. He has also advised that subject to appropriate controls being in place, the project's risk to instream communities will also not be greater than those associated with the project as notified.

Dr Coffey has accordingly re-confirmed his original conclusion that any adverse instream effects from the project will be less than minor.

3.5 Effects on Historic and Archaeology Sites and Features

Dr Clough has confirmed that:

- the revised wind farm layout will not affect the three known archaeological sites identified on figure REC1 (as attached to Dr Clough's evidence in chief);
- the effects of construction associated with the revised layout on archaeological and historic sites will remain no more than minor; and
- the inclusion of a consent condition covering accidental discovery continues to be appropriate and is recommended.

A report detailing Dr Clough's assessment of the revised layout is provided as **Appendix 6**.

3.6 Cultural Values

Mighty River Power has engaged with iwi authorities to discuss the revised layout, including meeting with representatives from Tanenuiarangi Manawatu Incorporated and Te Rangimarie Marae Trustees for this purpose. Both iwi groups have confirmed that the revised proposal does not give rise to any additional matters beyond those described previously.

3.7 Effects of Noise on Adjoining Landowners

As outlined in their reports attached as **Appendices 7** and **8** respectively, Messrs Hegley and Day have confirmed that the project's acoustic effects will be reduced under the revised proposal, even taking into account any cumulative effects from the extension to the TRH development. In particular, and based on the modelling they have undertaken, both acoustic experts have confirmed that:

- under the revised layout the predicted wind farm noise levels will be less than those originally modelled for all assessment locations; and
- their original conclusion that the wind farm will be able to comply with the requirements of *NZS6808:1998 Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators* at all times remains valid.

Revised noise contours for the wind farm are also attached to Mr Hegley's report.

3.8 Effects on Traffic and Transportation Networks

Mr Galloway has confirmed that the removal of 21 turbine zones will have an associated reduction in the amount of traffic required to build the wind farm, including:

- a decrease in the number of oversize turbine components to be delivered to the site;
- a reduction in the quantity of foundation materials (particularly concrete aggregates, cement and steel); and
- a likely reduction in the length of internal roading built with a corresponding reduction in the amount of roading aggregate to be imported.

Mr Galloway accordingly considers that the adverse traffic effects associated with the revised layout will be less than those previously assessed, while the positive effects (such as the benefits to be derived from the relocated intersection of South Range Road and Pahiatua-Aokautere Road) will remain. Mr Galloway has also advised that the resource consent conditions, as proposed, remain appropriate to address the actual and potential traffic effects of the revised layout.

3.9 Effects on Radio and Other Communication Signals

Mr Hills has confirmed that:

- the revised layout will not result in any effects on radio communication services in the area above those noted in his original assessment. Indeed, he considers that any potential effects on television reception are likely to be less than previously assessed due to the removal of the turbines at the north western flanks of the wind farm;
- any effects on radio services are accordingly still expected to be minor and for the most part very low or unlikely to be detectable; and
- analogue television is still expected to be the only radio communication service potentially affected by the project. Further, the potential for the wind farm to affect analogue television reception is expected to be reduced, affecting fewer dwellings than previously reported.

A report detailing the outcomes of Mr Hills assessment of the revised layout is provided as **Appendix 9**.

3.10 Effects on Aviation Activities

The changes to the wind farm layout will not result in effects greater in nature or scale than those already assessed by the Civil Aviation Authority (*CAA*) in November 2008, when granting a *Determination of Hazards in Navigable Airspace* in accordance with Rule Part 77 of the Civil Aviation Rules. That determination was granted subject to a number of conditions, including one requiring Mighty River Power (as proponent) to advise CAA of the final geographical co-ordinates of all turbines six months prior to construction commencing.

3.11 Effects Arising from Electric and Magnetic Fields from External Transmission Lines

Dr Black has confirmed that as the proposed 5.1km external transmission line connecting the wind farm to the Linton Substation remains unchanged by the wind farm redesign, there is no effect on his original conclusion that “*the electric and magnetic fields from the proposed transmission lines will comply with the public exposure reference levels described in the ICNIRP Guideline.*”

3.12 Effects Related to Construction Activities and Earthworks

3.12.1 Sedimentation

Following his review of the revised layout, Mr Levy has advised as follows:

"A large number of design changes have resulted in a reduction of works in the water supply catchment. This reduction in works will further reduce any risks to the Palmerston North water supply. In particular, there have been several turbines removed from the direct catchment of the lower Turitea reservoir, the sub-catchment that poses the greatest potential for sediment discharge to affect to the Palmerston North water supply. There is one case where a turbine has been moved into the upper water supply catchment, and one where there is increased roading required in this catchment, but the works removed from the catchment more than offset these effects. The works in the headwaters of the Tainui Stream have increased, but the environmental management procedures will be sufficient to address the potential effects of this. The number of spoil sites has also been reduced.

I conclude that the revised proposal will not cause any additional effects on the water supply and associated catchments, and that the environmental management and sediment and erosion techniques proposed remain more than adequate to provide a robust mitigation programme, good environmental outcomes and acceptable overall effects."

3.12.2 Geotech

As a result of his assessment of the revised proposal, Mr Alexander has concluded that:

"With the one exception noted below, the geotechnical constraints identified during the 2006 and 2009 investigations have been appropriately taken into account in the preparation of the revised proposal. The redesign has avoided, where necessary, all areas of large scale instability, and that the approach set out in my rebuttal evidence remains a suitable means of addressing any geotechnical issues that may arise during construction, including the exception described below.

The exception is the road from Browns Flat Substation up the hill to the east towards Turbine 0056. This road crosses two mapped areas of instability indicated on the Land Instability Map attached as Appendix 3 to my rebuttal evidence. The western one is crossed at its toe, and will potentially require undercutting of slip debris and construction of a structural fill to support the road and stabilise the slope above. Some counterfort drainage extending up into the area of instability may also be needed. The proposed road crosses the head of the eastern slip just below the head scarp. There is likely to be potential for ongoing creep of the slip debris, and possibly some material falling off the over steep head scarp. This area of instability would typically be dealt with using under drainage to improve the stability of the upper part of the slip (potentially counterfort type) and maintenance to clear debris that falls into the side drains. Bored drains may be used in the head scarp area if that proves to be active. Undercutting of slip debris will be required to provide a stable formation for road construction. The instability in this area is not insurmountable and with appropriate drainage and engineering solutions the instability issues can be readily overcome."

3.13 Recreation and Tourism

The changes to the wind farm layout will not result in effects on recreation and tourism greater in nature or scale than those discussed in the August AEE.

The recreational benefits associated with the development of the Turitea Wind Farm have not been affected by the changes to the wind farm layout. In particular, the proposed EcoPark will continue to represent a significant recreational and tourism opportunity for the Palmerston North community.

4 CONCLUSIONS

The Turitea Wind Farm has been redesigned as a result of the review by Stephen Brown. This redesign has resulted in material changes to the layout, with over half of the 126 turbine zones existing at the time the layout review was announced being affected by the process. Specifically, the changes to the wind farm layout include the removal of 21 turbine zones, and the relocation of a further 44 turbine zones, so that the revised proposal now comprises up to 105 turbine zones.

Overall, based on the various expert assessments outlined above, it is considered that the actual and potential effects of the revised layout are no greater, and in some instances less, than those previously assessed by Mighty River Power's experts with respect to the proposal as originally notified in January 2009. While the project's economic and energy efficiency benefits will be reduced due to the smaller scale of the wind farm under the revised layout, Dr Layton has confirmed that those benefits will remain of significance at a national, regional and local scale. In addition, both the visual/landscape and acoustic experts have advised that there will not be any unacceptable cumulative effects should both the Turitea and the extension to the TRH development be consented and constructed.

Accordingly, Mighty River Power considers that its original assessment of the project against the relevant statutory criteria in the Resource Management Act 1991 (in particular, sections 104, 105, 107 and Part 2, as outlined in Chapter 7 of the August AEE) remains valid and applicable with respect to the revised proposal. Further, it reiterates the conclusions set out in the August AEE, that "*overall the proposal clearly reflects the purpose and principles of Part II of the RMA as it enables the community to provide for its social, cultural and economic well-being by providing for sustainable power generation, displacing other non-renewable power generation sources and contributing to the operation of an efficient power network by providing generation at a strategic location.*"

Mighty River Power therefore continues to seek resource consents in this regard.

Signature:

1 Feb 2010

Stuart Lush
Generation Development Manager

For and on behalf of Mighty River Power Ltd