BEFORE THE WAITOMO DISTRICT COUNCIL

IN THE MATTER	of the Resource Management Act 1991 ("Act")
AND	
IN THE MATTER	of an application to vary resource consent RM050019 by Taumatatotara Windfarm Limited under s127 of the Act

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EVIDENCE OF MICHAEL MOORE
ON BEHALF OF TAUMATATOTARA WINDFARM LIMITED
[LANDSCAPE]
20 OCTOBER 2023

Counsel: G K Chappell

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1. INTRODUCTION

1.1 My full name is Michael William Moore.

1.2 I have a Bachelor of Science degree (BSc) in Geography from University of Canterbury (1983), a Post Graduate Diploma in Landscape Architecture (DipLA) from Lincoln University (1985), and a Master of Regional Resource Planning (MRRP) from University of Otago. I am a registered member of the New Zealand Institute of Landscape Architects (NZILA).

1.3 I am Principal of Mike Moore Landscape Architects, a Dunedin based consultancy. Much of my work involves landscape and / or natural character assessment, including assessments to inform regional or district planning documents, or in relation to project resource consents. I have been involved with numerous wind farm projects throughout New Zealand, and list projects I consider relevant to this project in **Appendix A.**

1.4 In May this year I was commissioned by Taumatatotara Wind Farm Ltd to provide evidence in respect of effects on landscape values and visual amenity associated with the proposed variation. I have not been involved with the project prior to this. I have reviewed the landscape and visual assessments prepared by WSP Ltd on the proposed variation to the consent[1], and have visited the site and surrounding viewpoints on 15 August 2023.

Code of conduct

1.5 I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and will continue to comply with it while giving oral evidence. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

[1] Reports by WSP dated 25 June 2020 and 22 March 2021, and Memorandum from Jeremy Head dated 24 August 2021

Scope of evidence

1.6 In my evidence, I

(a) Provide an executive summary of my key conclusions.

(b) Outline the method adopted to assess the landscape and visual amenity effects.

(c) Briefly outline the key aspects of the proposed variation.

(d) Discuss the landscape character and values.

(e) Assess the effects of the proposed variation on the landscape values.

(f) Assess the visual effects of the proposed variation from specific viewpoints where concerns have been raised in consultation to date.

(g) Assess the proposed variation against those statutory provisions relevant to landscape and visual amenity effects.

(h) Address relevant submissions; and

(i) Address the section 42A Report.

2. EXECUTIVE SUMMARY

2.1 My evidence addresses the landscape (including visual) effects of the proposed variation application and the updated variation application. An A3 graphic supplement containing supporting diagrams, maps and images forms part of my evidence. This is **Attachment One**.

2.2 A 22-turbine wind farm with 110m and 121.5m high turbines is already part of the consented baseline. The variation application proposes surrender of turbines 12 – 22 whilst increasing the height of the remaining turbines to 172.5m, whilst the updated variation application proposed surrender of turbines 12 – 22 as well as turbines 2, 4 and 9, and increasing the remaining turbine height to 180.5m. My assessment relates to the effects of the

difference between what is consented and now proposed, on the landscape values.

2.3 The site and relevant surrounding landscape context has no District Plan overlays recognising any significant landscape values. The key landscape values relate to rural character, including openness, legible natural landform, the presence of indigenous vegetation in places, and rural land uses. Considering the fact that the consented wind farm is already part of the 'existing environment' I assess the sensitivity of the landscape to the proposed variation as low.

2.4 The variation will result in a substantially reduced wind farm footprint overall with a smaller area impacted by earthworks. Whilst the variation application and updated variation application involve fewer turbines, these are larger in scale, resulting in an increase in height over those consent of 42% and 48% respectively.

2.5 The nature and degree of visual effects will vary with viewpoint, in general, being positive in relation to the consented wind farm from viewpoints to the south. From viewpoints to the north / north-east near the proposed larger turbines, there will be some adverse effects. Given that the primary effect is the presence of the wind farm at all, the effects of greater visual dominance associated with the larger turbines on the rural character amenity values of openness and naturalness is less significant.

2.6 Overall, in relation to the consented environment, physical landscape effects will be positive. Whilst the nature of visual effects will vary with specific viewing location, my assessment is that these will be positive overall. The main reason for this is that reduction in the number of turbines and the reduced spread of the windfarm will be more visually significant than an increase in turbine scale. Of the specific viewpoints assessed, I consider that adverse effects associated with both the variation application and the updated variation application will be no more than low-moderate (minor).

2.7 I have assessed the variation consent and the updated variation consent against the statutory provisions relevant to landscape matters and conclude that these variations will be generally consistent with those provisions.

3. METHODOLOGY

3.1 My assessment follows the concepts and principles outlined in the New Zealand Institute of Landscape Architects (NZILA) Landscape Assessment Guidelines[2]. Some key definitions and understandings from this document are highlighted throughout my evidence.

3.2 My assessment is based on a site visit undertaken in mainly clear conditions on 15 August 2023, review of the previous landscape assessments by WSP, the ZTV maps and simulations prepared by Energy3 Ltd, and a review of the relevant statutory documents.

3.3 I do not rely on the previous assessments but have undertaken my own, based on an assessment of the landscape character and values and the current wind farm iteration now proposed. The previously prepared ZTV maps and simulations have been helpful aids in this. Where further graphic representation to illustrate effects has been considered necessary, I have requested this, and it has been provided by Energy3 Ltd on behalf of the applicant. In this regard, both full photo-simulations and wire-frame diagrams to illustrate the degree of comparative turbine visibility from various viewpoints have been useful.

3.4 **Appendix B** is a statement by Energy3 Ltd describing the method adopted in producing the photo-simulations and wireframe diagrams.

[2] Te Tangi a te Manu, Aotearoa New Zealand Landscape Assessment Guidelines. Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022.

4. THE PROPOSED VARIATION

Variation Application

4.1 The consented wind farm consists of 22 turbines in lineal formation along an approximately 6.2km length of ridgeline. The southern 11 turbines are 110m high, whilst the northern 11 are 121.5m (to blade tip). The variation application proposes surrender of the 11 turbines at the southern end and an increase in height of the remaining 11 turbines at the northern end to 172.5m (to blade tip). This reduces the ridgeline length covered, to approximately 3.5km.

4.2 For the turbines remaining, locations are effectively unchanged, and apart from being larger in scale, the turbines will have similar proportions and appearance to those consented. The rotation however, will be reduced from 18 rpm to 11.1 rpm.

Updated Variation Application

4.3 Taumatatotara Wind Farm Ltd are now proposing a further iteration of the proposed development. This entails reducing the number of turbines to eight and increasing their height (to rotor blade tip) to 180.5m – an increase of 8m. Table 1 below outlines the comparisons with the variation application, and **Figure 1** illustrates key differences in the proposed turbines.

	Variation application	*Updated variation application*
Number of turbines	*11*	*8*
Rotor tip height	*172.5m*	*180.5m*
Rotor diameter	*155m*	*163m*
Hub height	*95m*	*99m*
Blade chord (widest)	*4m*	*4.4m*
Rotation	*11.1 rpm*	*10.0 rpm*

5. LANDSCAPE CHARACTER AND VALUES

5.1 Having reviewed the WSP landscape assessment reports and undertaken my own assessment, I agree with the description of the relevant landscape surrounding the wind farm site in those documents. I will not repeat a description here but highlight some key points arising from my assessment about the landscape values as follows. **Appendix C** provides an outline of my assessment of the landscape character and values of the site and its landscape context.

5.2 Across the site and relevant surrounding area, there are no overlays in either the Operative Waitomo District Plan (OWDP) or the Proposed Waitomo District Plan (PWDP) recognizing significant landscape values. The key landscape values expressed in these documents relate to rural character and the presence of indigenous vegetation[3].

5.3 In my assessment, the amenity values related to rural character are primarily based on:

a. Low built density / high level of openness

b. Qualities of naturalness associated with legible natural landform under grassland cover and highlighted in places by indigenous forest cover. Legibility is reduced in places by patterns of land use at odds with the underlying landform (often associated with exotic forestry).

c. Rural land uses.

5.4 The existing environment includes the consented but presently unbuilt, wind farm. Whilst its effects are not yet evident, the 22 121.5m and 110m high turbines located over a distance of approximately 6.2km, will modify the currently experienced landscape character to an extent that has been deemed acceptable by the previous consent decision.

[3] OWDP Objectives 11.3.4, 11.3.8 and 11.3.9

6. LANDSCAPE EFFECTS OF THE PROPOSED VARIATION

Definitions / Method

6.1 As expressed in the NZILA Landscape Assessment Guidelines[4] '*Landscape embodies the relationship between people and place. It is the character of an area, how the area is experienced and perceived, and the meanings associated with it.'*

6.2 Landscape effects are defined as '*an adverse or positive outcome for a landscape value as a consequence of changes to a landscape's physical attributes'.*

6.3 Landscape effects are assessed against the landscape values. They may be positive or adverse in nature and I rate the degree of effect in terms of the 7-point rating scale recommended in the Landscape Assessment Guidelines and shown in Table 1 below. The table also illustrates the relationship of this scale to RMA terminology.

Table 1: Degree of effect assessment scale

Very low	*Low*	*Low-mod*	*Moderate*	*Mod-high*	*High*	*Very high*
Less than minor	*Minor*		*More than minor*		*Significant*	

6.4 A 22-turbine wind farm with 110m and 121.5m high turbines is already part of the consented baseline. The relevant effects to be assessed now, relate to the difference between what is consented and now proposed.

Physical Effects

6.5 In terms of physical landscape effects, the variation will result in a substantially reduced wind farm footprint overall, impacting approximately 3.5km of ridgeline as opposed to approximately 6.2km. Rather than there being 22 turbines at 121.5m and 110m height, the variation application will limit the number to 11 172.5m high turbines and the updated variation application will result in 8

[4] Te Tangi a te Manu, Aotearoa New Zealand Landscape Assessment Guidelines. Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022.

180.5m turbines at the northern end. For the 172.5m turbines, the scale increase proposed is 42%, and for the 180.5m turbines the scale increase is 48.6%.

6.6 Due to the deletion of the 11 southern turbines, the length of access roading required will be substantially reduced. As noted in the AEE, due to technological advances in fabrication and transportation, no extra road widening over that already approved will be required. Whilst the larger turbines will require larger footings, in terms of area impacted, excavation requirements overall will be reduced from 4312m^2 to 3564m^2. As per the consented wind farm, the earthworks disturbance will mainly be on hilltop areas with low visibility from lower elevation viewpoints and will be remedied by revegetation of affected areas.

Visual Effects

Introductory comments

6.7 The theoretical visibility analysis carried out by Energy3 Ltd (see **Figures 2 (a) – (c)**) indicate that the larger 11 and 8 turbine variations will result in greater visibility of the wind farm generally, than the 22 smaller turbines consented, but that in some areas to the south, visibility is reduced. In my assessment, the ZTV maps for the variation consent and updated variation consent indicate that the areas of increased visibility are largely unoccupied farm and forest land and that the variation application and updated variation application will not result in significant impacts of greater visibility affecting sensitive viewpoints.

6.8 **Appendix D** contains my visual effects assessment from key viewpoints in the area and **Figures 3 – 11** provide supporting graphic illustration. The viewpoints addressed have been selected on the basis that they are significant public viewpoints and places from which photo-simulations have already been prepared (Figures 3 and 4), or that they are places about which issues have been raised in consultation (Figures 5 – 11). Other than for viewpoints from which photo-simulations had already

been prepared, my assessments are informed by wireframe diagrams.

6.9 The proposed variation will not result in any significant changes to required earthworks and will not have effects related to the legibility and coherence of the natural landforms. Likewise, there will be no change to the pastoral land use character. The proposed turbines retain the same overall character and appearance as those consented, and the key impacts associated with the variation will arise due to changes to the number and scale of the turbines and the effect of this on rural character landscape values of openness / spaciousness and naturalness.

6.10 Whilst personal responses to wind farms vary, as large built elements with a utilitarian character I assess the consented (but currently unrealised) effect of turbines visible in the rural landscape as adverse. Greater or lesser impact of these elements arising from the variation will have adverse or positive effects accordingly. The magnitude of the wind farm effects will vary from viewpoint to viewpoint depending on the number of turbines visible, their spread in the landscape, and their scale. It will also vary with viewing distance and degree of screening.

6.11 Wind turbines, with their turning rotors are dynamic, and this is a factor which contributes to their visual impact. The larger turbines proposed in the variation application and updated variation application will have slower rotation than the consented turbines. It is generally accepted[5], and also my observation, that slower speeds appear more graceful. I consider that the difference between 18 rpm (consented turbines) and 11.1rpm / 10rpm (variation application and updated variation application turbines) will result in a character difference that will be noticeable and which will have some modest aesthetic benefits.

Viewpoints to the south

6.12 Viewed from the south (e.g. Figures 4, 6 and 7), the variation application will generally result in positive effects in relation to

[5] Based on my experience having reviewed various wind farm landscape / visual effects assessments

what is currently consented due to the significantly reduced length of ridgeline impacted and the greater distance to turbines, which helps to mitigate the apparent scale of the larger turbines. It will result in fewer turbines and whilst these will be larger, their scale will not be overly dominant in relation to the scale of the host landforms. As discussed, the slower turbine rotation will also have a modest positive aesthetic effect. These factors will all assist to reduce the adverse effects of structures on the rural character landscape values.

6.13 In my assessment, the updated variation application, will further reduce adverse effects. The slight increase in the turbine scale relative to the variation application will be barely discernible and will be significantly outweighed by the reduction in the number of turbines. In relation to the consented wind farm this too will have positive visual effects.

6.14 The degree of these positive effects will vary with specific viewpoint. From those places assessed I have rated the visual effects of both the variation application and the updated variation application as ranging from positive / moderate – positive / moderate-high.

Viewpoints to the north / north-east

6.15 Taharoa Village is a rural settlement to the north of the site. This is 7km distant, located largely on slopes orientating away (northward) from the wind farm site, and generally screened by intervening hill forms. Figure 5(a) indicates that from some places there will be some minor visibility of the consented wind farm beyond the tops of the hills, restricted to the moving tips of up to 6 but more probably 3 rotors (factoring in additional vegetation screening).

6.16 The larger turbines associated with the variation application and the updated variation application will result in the turbines being more noticeable. The turbines will be seen as a tight cluster of 6 (variation application) and 3 (updated variation application). Given the viewing distance, visual impact will still be low. I rate

the comparative effects of both variation scenarios against the consented baseline as adverse / low.

6.17 Taharoa Road is a public road to the north-east of the site and Figures 3(a) – (c) illustrate the effects of the wind farm from a point on this road with clear views toward the site. From this area only some of the northern turbines will be visible and the benefits of surrendering the southern 11 turbines of the consented wind farm will not be apparent. From the Figure 3 viewpoint the variation application will result in the same number of turbines being visible as the consented scheme (6) but these will be greater in scale and more dominant. I consider that the impact of the scale increase is modest in comparison with the impact of turbines on the ridgeline at all and that the proposed turbine scale is not inappropriately large relative to the scale of the host landform. Overall, I assess the variation application effects as adverse / low.

6.18 The updated variation application will result in 4 rather than 6 turbines being visible, and the scale increase relative to the variation application will be minimal. Compared with the consented wind farm, the positive effect of the reduction in the number of turbines will outweigh the adverse effect of increased scale and dominance on the rural character landscape values in my assessment. There will be less ‘clutter’ and overall, I rate the comparative effects as positive / low.

6.19 The wind farm will be visible from parts of Te Waitere Road as well as some adjacent dwellings, approximately 3 – 4km to the north-east of the site. Figures 10 and 11 illustrate views and visibility from two residential viewpoints in this area.

6.20 The northern turbines will have the most impact from this area due to their proximity. From the two viewpoints assessed, the variation application will have adverse effects when assessed against the consented wind farm, associated with greater dominance of turbines seen over the top of intervening landform. This is both in terms of number of closer turbines visible and their greater scale. I consider that the degree of this effect is mitigated to an extent in that the primary adverse effect is the presence

and visibility of turbines at all. I also consider that some mitigation is provided by the surrender of the more distant southern turbines which have some potential visibility, and the effect of this in reducing the overall spread of the wind farm in the landscape. Overall, I rate adverse effects of the variation application as up to low-moderate.

6.21 The updated variation application will result in fewer turbines visible than for the variation application, but still more, and larger closer proximity turbines than for the consented wind farm. Overall, I consider that the effects on rural character landscape values are also up to adverse / low-moderate in relation to the consented wind farm.

Landscape Effects Conclusion

6.22 The sensitivity of this landscape to the effects of the proposed variation is low, primarily because a wind farm is already part of the consented environment.

6.23 Overall, in relation to this consented environment, physical landscape effects will be positive. Whilst the nature of visual effects will vary with specific viewing location, my assessment is that these will be positive overall. The main reason for this is that reduction in the number of turbines and the spread of the windfarm will be more visually significant in terms of effects on rural character landscape values than an increase in turbine scale.

7. SPECIFIC VIEWPOINTS ASSESSMENT

7.1 Consultation has revealed that there are concerns about the effects of the proposed variation from specific places, in particular Taharoa Village, 158 and 227 Coutts Road, 11 Taumatatotara Road West, and 83, 84 and 176 Te Waitere Road.

7.2 I have carried out assessments from at or near these places, to the extent that access has been possible, and my assessments are outlined in **Appendix D.** These assessments have been made, largely based on viewing the site from the properties or

public roads adjacent, and wire-frame diagrams comparing the consented and proposed development.

7.3 The following table summarises my findings:

Locality	***Effects on landscape values of the variation application (baseline – consented wind farm)***	***Effects on landscape values of the updated variation application (baseline – consented wind farm)***
Taharoa Village	*Adverse / low*	*Adverse / low*
158 Coutts Road	*Positive / moderate*	*Positive / moderate*
223 Coutts Road	*Positive / moderate-high*	*Positive / moderate-high*
11 Taumatatotara West Road	*Neutral*	*Neutral*
83 Te Waitere Road	*Neutral*	*Neutral*
84 Te Waitere Road	*Adverse / low-moderate*	*Adverse / low*
176 Te Waitere Road	*Adverse / low-moderate*	*Adverse / low-moderate*

8. SHADOW FLICKER

8.1 Shadow flicker is an annoyance effect associated with shadows of rotating blades that appear to flicker at any one location. The zone of likely effect is discussed in the Australian National Wind Farm Development Guidelines Draft dated July 2010, and Table E-2 in that document uses modelling parameters for the zone of influence of shadows as the maximum blade chord (widest part of the blade) multiplied by a factor of 265.

8.2 The proposed turbines have maximum blade chords of 4.0m (155m diameter rotor – variation application) and 4.4m (163m diameter rotor – updated variation application) respectively - less

than or similar to the consented turbines. This will result in a zone of influence that is no greater than that of the consented wind farm (1166m). This zone is shown in **Figure 12**. Any potential shadow flicker effects will be less with the proposed variation however, because there are fewer turbines and none within 1060m of third-party dwellings.

9. ASSESSMENT AGAINST THE RELEVANT STATUTORY PROVISIONS

9.1 I have assessed the proposed variation against those provisions of the Operative and Proposed Waitomo District Plan, and the Waikato Regional Policy Statement that are relevant to landscape effects and this assessment is outlined in **Appendix E.** Overall, it is my assessment that the landscape effects of the proposed variation will be positive. Where there are adverse effects, these are no greater than low-moderate (minor) in those places assessed.

10. RESPONSE TO RELEVANT SUBMISSIONS

10.1 J M and B J Knight raise concern about night-time lighting of the turbines, in particular Turbine 11, and consider that this will be 'visual pollution' and a 'major effect'.

10.2 It is my understanding that there is no determination yet as to how many or which turbines, are to have aviation lighting. This aside, Civil Aviation Authority (CAA) regulations[6] include minimum conditions that will require lighting of at least the turbines at either end of the windfarm, the highest turbine, and to ensure that spacing between lit turbines does not exceed 900m. Turbines over 150m height will also be required to have secondary back-up lighting at half the nacelle height.

10.3 As per Condition 34 of the existing consent, the consented wind farm would require lighting on five turbines, and this would extend along a greater length of ridgeline than is now proposed. Under the consented scheme however, there would be no need for secondary lighting at half the nacelle height. On the basis of the

[6] https://www.aviation.govt.nz/assets/airspace-and-aerodromes/airspace/wind-farm-turbines.pdf

CAA regulations, I consider that compared with the consented wind farm, lighting associated with the variation application and updated variation application will be higher and more concentrated in a smaller area, and that there is likely to be a slight increase in the number of lights overall.

10.4 Given this situation it is my assessment that adverse night-lighting effects on rural amenity values will vary with specific viewpoint, but overall, are unlikely to be more than low (minor). It is my observation that from the Knight property (158 Coutts Road) the surrender of the 11 southern turbines in the consented scheme will result in lower lighting effects at night due to their greater proximity and the visibility of these turbines from this viewpoint.

11. RESPONSE TO SECTION 42A REPORT

11.1 The key landscape and visual effects issue arising from the Section 42A Report is that further information is requested to clarify:

- *'The way in which the landscape architect has reached the effects conclusions and assessment ratings through his report.*
- *The extent to which Mr Moore has relied on the original WSP LVA and the extent to which he has undertaken his own independent assessment in sufficient detail to be verified and reviewed by Council'.*

11.2 I have reviewed the WSP reports, and the photo-simulations and visibility mapping associated with these. My evidence however, is firmly based on my own assessment, which has been informed by a site visit and additional requested graphic illustration material.

11.3 The 'report' referred to above is the WSP report which was prepared by others. I trust that there is sufficient information and detail in this evidence (and appendices) to back up my conclusions to the satisfaction of Council's landscape architect.

Mike Moore

APPENDIX A: LIST OF RELEVANT PROJECTS

Proposed Jericho Wind Farm, Blackmount, Southland, Landscape Assessment, Southern Generation Partnership, 2023.

Proposed Variation, Kaiwera Downs Wind Farm, Mataura, Southland, Landscape Assessment Peer Review for Gore District Council, 2023.

Proposed Chatham Islands Wind Farm, Waitangi, Landscape Assessment, Chatham Islands Renewable Energy, 2021.

Proposed Kaimai Wind Farm, Paeroa, Landscape Assessment, Kaimai Wind Farm Ltd, 2018.

Dunedin City District Plan Review, Advice to Dunedin City Council regarding appropriate Plan provisions and development standards for network utilities (including wind turbines), 2017.

Proposed Blueskin Wind Farm, Warrington, Otago, Landscape Assessment, Blueskin Energy Ltd, 2017.

Flat Hill Wind Farm, Bluff, Southland, Landscape Assessment, Flat Hill Wind Farm Ltd, 2011.

Proposed Doctors Hill Wind Farm, Waikari, Canterbury, Landscape Assessment, Energy3 Ltd, 2011.

Dominion Salt Wind Farm, Marlborough, Landscape Assessment, Dominion Salt Ltd, 2010.

Lulworth Wind Farm, Marlborough, Landscape Assessment, Energy3 Ltd, 2009.

Proposed Longspur Wind Farm, Rakaia Gorge, Canterbury, Landscape Assessment, Longspur Wind Farm Ltd, 2009.

Mt Stuart Wind Farm, Waitahuna, Otago, Landscape Assessment Peer Review for Clutha District Council, 2009.

Weld Cone Wind Farm, Ward, Marlborough, Landscape Assessment, Energy3 Ltd, 2008.

Horseshoe Bend Wind Farm, Otago, Landscape Assessment Report, Pioneer Generation Ltd, 2007.

Mahinerangi Wind Farm, Otago, Landscape Assessment Peer Review for Clutha District Council, 2007.

APPENDIX B: PHOTOMONTAGE AND WIRE FRAME DIAGRAM METHOD (ENERGY3 LTD)

Taumatatotara Wind Farm

Photomontage and ZVI Methodology

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4						
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Approval			
Author Signature		***Approver Signature***	
Name		***Name***	
Title		***Title***	

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1. Photo-simulation Overview

Photomontages of the proposed T4 Wind Farm were formulated using "WindFarm", development software (Release 4.2.2.1) written by ReSoft, a specialist wind farm software development company (http://www.resoft.co.uk/English/).

WindFarm is an integrated software package which combines the ability to formulate turbine site layouts and assess potential turbine energy yields. It has the ability to analyse various turbine layouts for both noise emissions and visual impacts.

Topographical data has been obtained through a variety of sources. The LINZ Data Service has been accessed to provide background raster maps and surrounding 20m vector contours. Ventus Energy has provided contour data of the site and immediate surrounding area, which New Zealand Aerial Mapping initially prepared. Contour resolution is 5m for an area of 5km X 7km centered on the proposed wind farm; contour resolution reduces to 20m outside of this area when relying on LINZ data. The data is provided as a WAsP vector "map" file containing the 5m and 20m contours relevant to the analysis in a single vector file.

The provided broader area data has a resolution of 20m, and the data provided for the general site of the proposed wind farm has a sampled resolution of 5m.

An 8m digital elevation model is available, which in theory provides better height resolution; however, LINZ states regarding this dataset, "Suitable for cartographic visualisation only. It was created by the interpolation of 20m contours with post-processing and filtering; it is not suitable for terrain analysis."

The GIS software package QGIS was used to read the respective files for manipulation.

The resultant shape files were imported and loaded into the T4 project file in WindFarm; the input files are ordered so that the high-resolution data takes precedence over the lower-resolution underlying data. The data files are effectively merged, and the contour attributes coalesced to form one continuous terrain file. Prospective turbine sites are also input into the model, the existing wind mast sites, photographic viewpoints, and terrain location markers. As a check, the original DEM data

is sampled and compared with the turbine heights calculated by WindFarm to ensure accuracy is preserved.

WindFarm uses the compiled terrain height data and layout information for turbine energy yield calculations, and of particular importance, to create the wireframe terrain mesh for Photomontage formation.

2. Photomontage Creation

Photomontages of the proposed wind farm were created using the WindFarm software package. Minor image refinements were carried out using the graphical design software Photoshop. Multiple photographs are stitched together where necessary to gain a wider field of view as desired.

The basis of the photomontage creation is the loaded topographical data. This data is used to create a three-dimensional wireframe model, on which its accuracy and resolution are based on that of the loaded topographical data. This is a combination of both 5m resolution data centered around the wind farm site and 20m contours in the case of the data set used for the wider area. When the vector contour files are loaded into WindFarm, the data is converted into a specific grid file format to enable the wireframe rendering.

Turbine dimensions and attributes are entered into the WindFarm turbine studio module. The dimensions are based on the proposed generic turbine to ensure that the rendered turbines provide a realistic representation. Critical dimensions and attributes include:

- Tower height, diameter, and taper
- Blade length, chord, taper, radius, pitch axis, and width
- Hub size and shape
- Nacelle size and shape
- Colour

The following screenshot provides an example of the parameters required to define a generic blade size to represent the proposed turbine accurately. Similar configuration screens define the tower, hub, and nacelle dimensions.

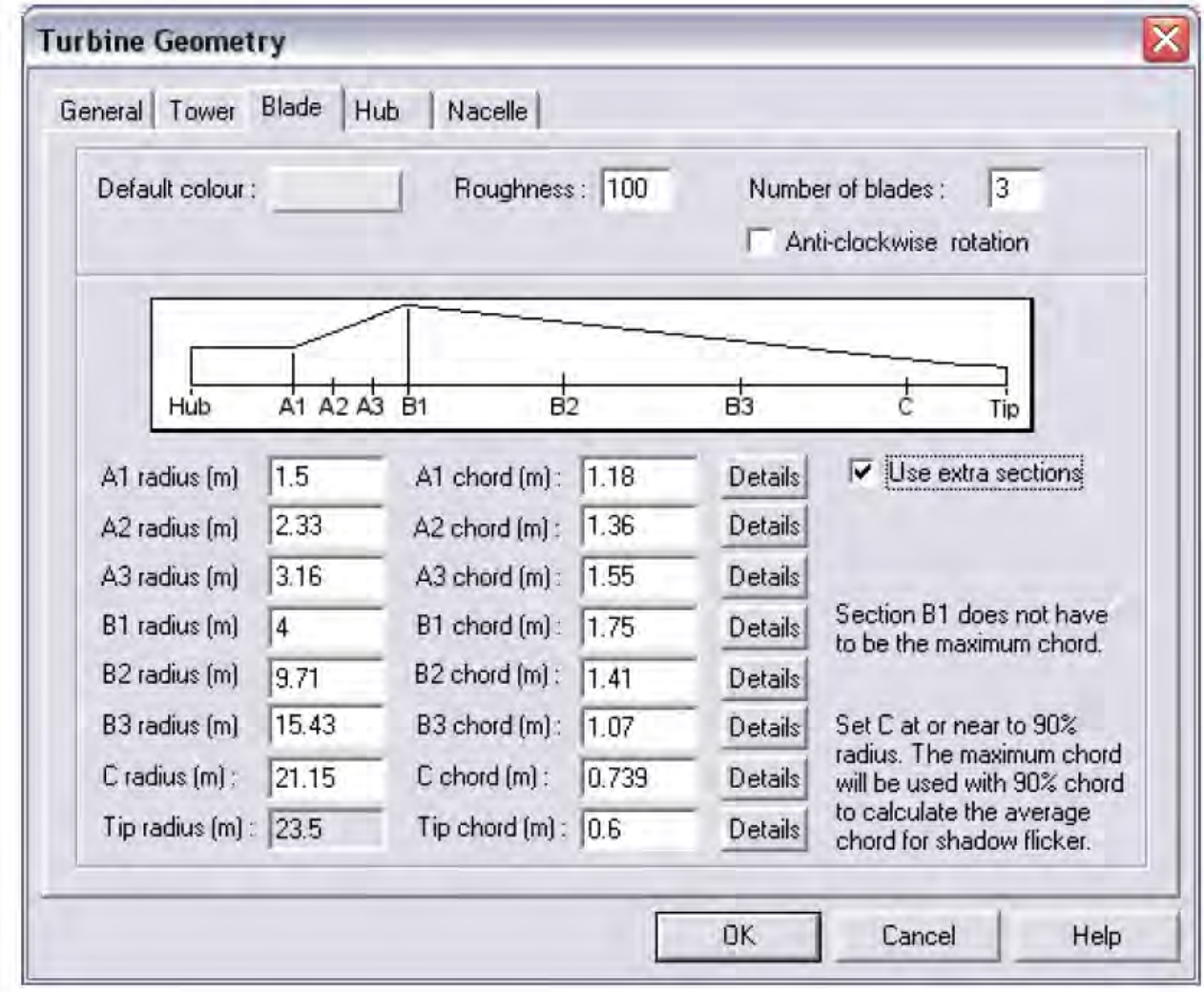

Figure 1 - Blade size definition screenshot

Once the proposed wind farm layout has been entered via entry of the surveyed turbine locations, WindFarm then renderers an outline of the turbines using the input physical dimensions and the three-dimensional wireframe as the ground plane reference.

The following screenshot shows an example of a generated wireframe and rendered turbine representations based on the desired turbine specifications.

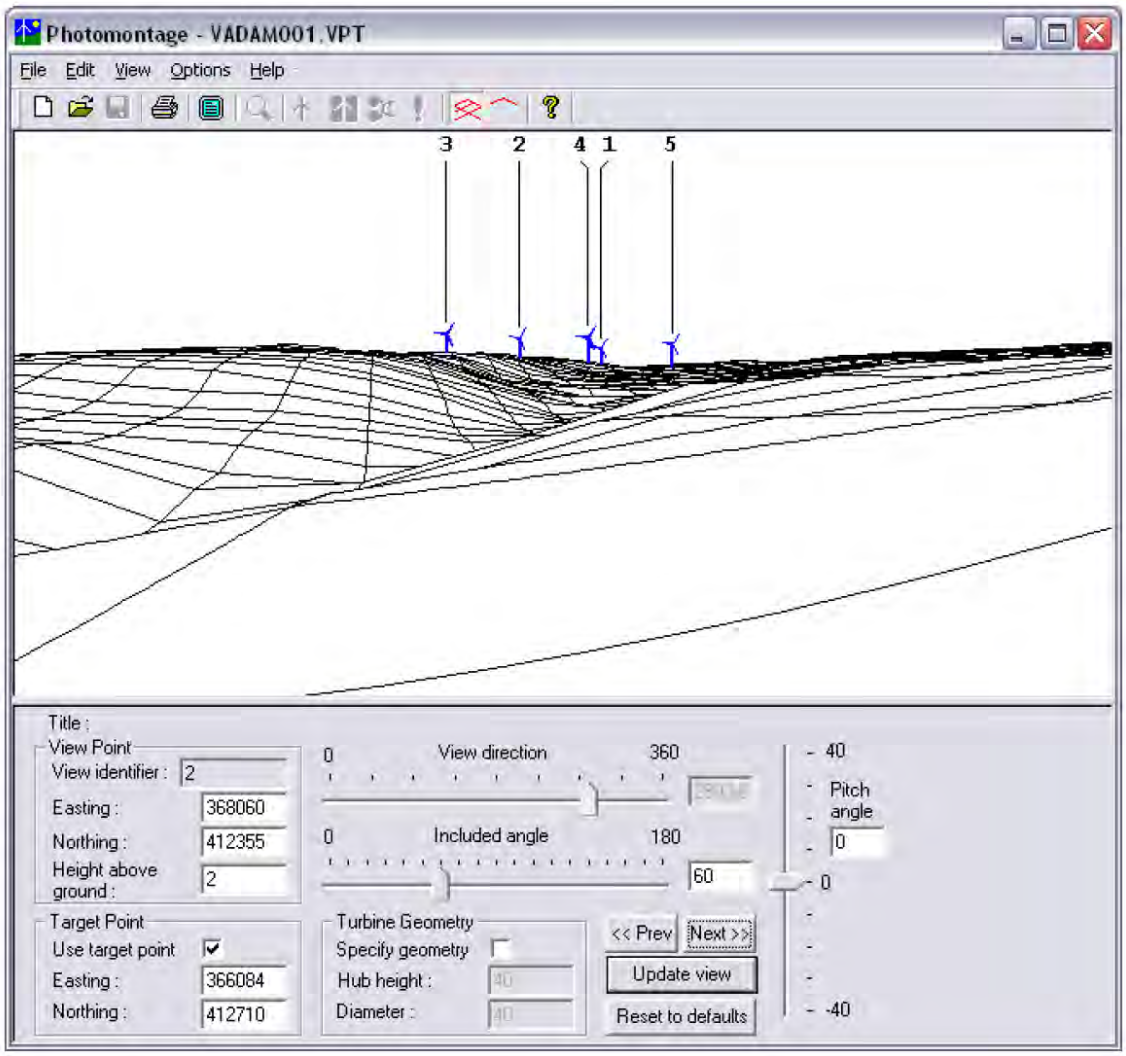

Figure 2 - Wireframe created from contour data

After the turbine rendering process has been completed, viewpoint coordinates must be specified for the photos to be used as the montage background. Once the viewpoints are specified, the WindFarm program can project a wireframe with scaled turbines as if viewed from each defined viewpoint.

If a wider field of view is required than from a single photograph, several photos may be stitched together and then loaded into the photomontage module. Photoshop is used for the stitching procedure. It is essential to ensure that the horizontal field of view from multiple stitched photographs does not exceed 124° as this is greater than the primary human field of view. Likewise, the vertical field of view should not exceed 55°.

The next step of the photomontage formation is to overlay the individual or stitched photographic image from a particular viewpoint with its corresponding wireframe view. During this process, the software operator must manipulate certain variables to ensure the photo closely aligns with the wireframe with a specific reference to the horizon.

Variables associated with the manipulation include:

- Height above ground from which the photo was taken
- View direction
- Included viewing angle
- View target coordinates (optional)
- Pitch angle
- Photographic rotation
- Projection

In addition, geographic locators can be specified to align the photographs with the three-dimensional wireframe accurately. These are visually and physically identified on the actual wind farm site and then referenced via a GPS coordinate in the wind farm layout. The markers are subsequently displayed in the wireframe model as visible reference markers. When the relevant photograph is loaded into the WindFarm software module, input parameters can be manipulated so that the wireframe markers align with their respective referenced object on the photograph.

Examples of locators used on the T4 Wind Farm site include specific marker flags installed at known locations for the process, monitoring towers, water tanks, power pylons, cell towers, and radio transmission towers.

The following screenshot shows the process of using markers to align and position the photograph correctly; note that in this case, an existing wind monitoring mast was utilised as a visual marker on the left side of the shot:

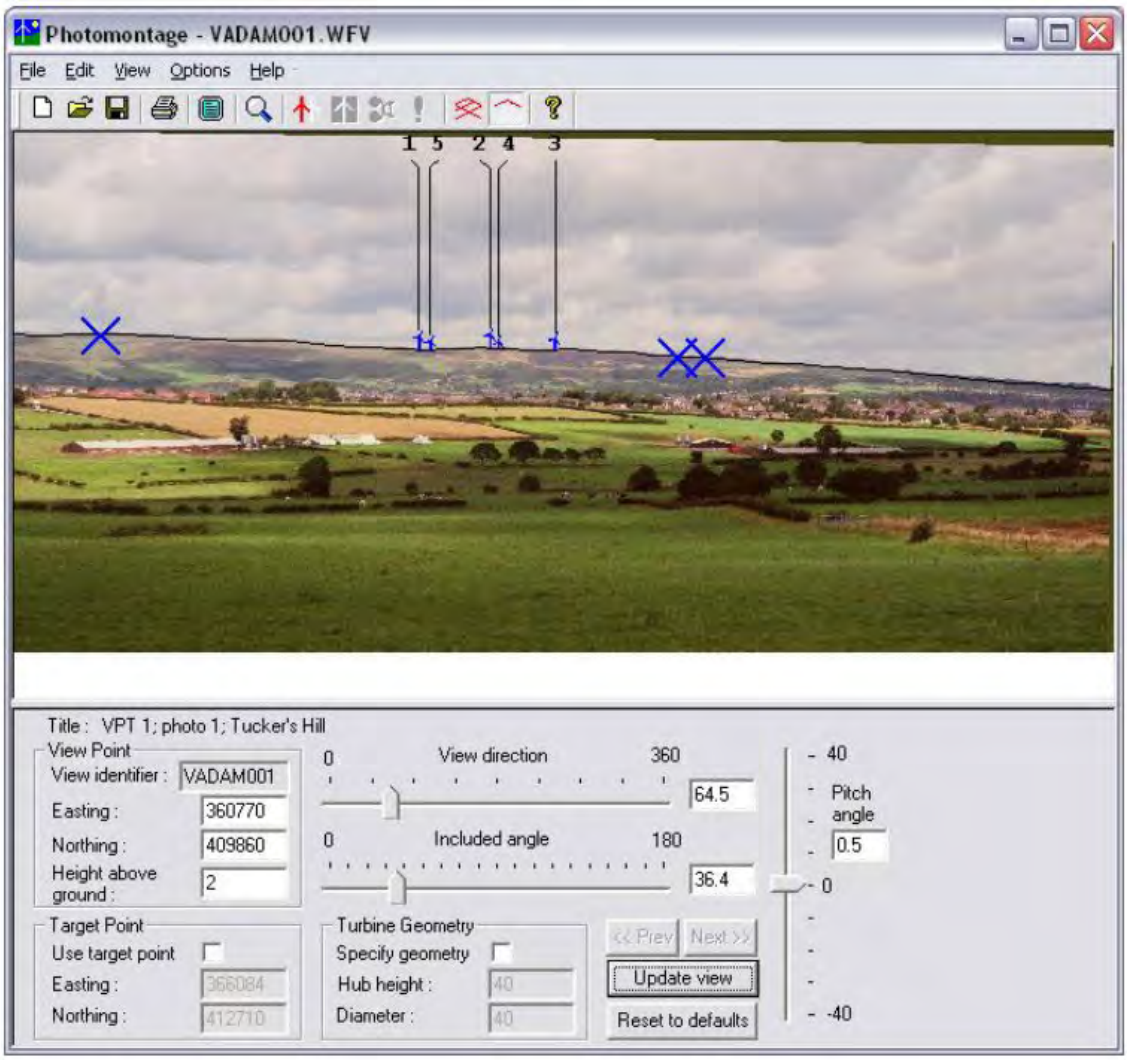

Figure 3 - Photograph alignment with geographical markers

Following the correct photograph placement relative to the wireframe model, the turbines can be fully rendered to see how they fit in relation to the background photograph.

At this point, the individual turbine positions relative to the photographs foreground are considered. For example, there may be trees in the foreground that should obscure some of the individual turbine structures. If this is the case, exclusion zones are digitised around foreground objects so that the rendered turbines will appear behind these objects as opposed to the appearance of being in front of them.

The following screenshot shows the exclusion zone process:

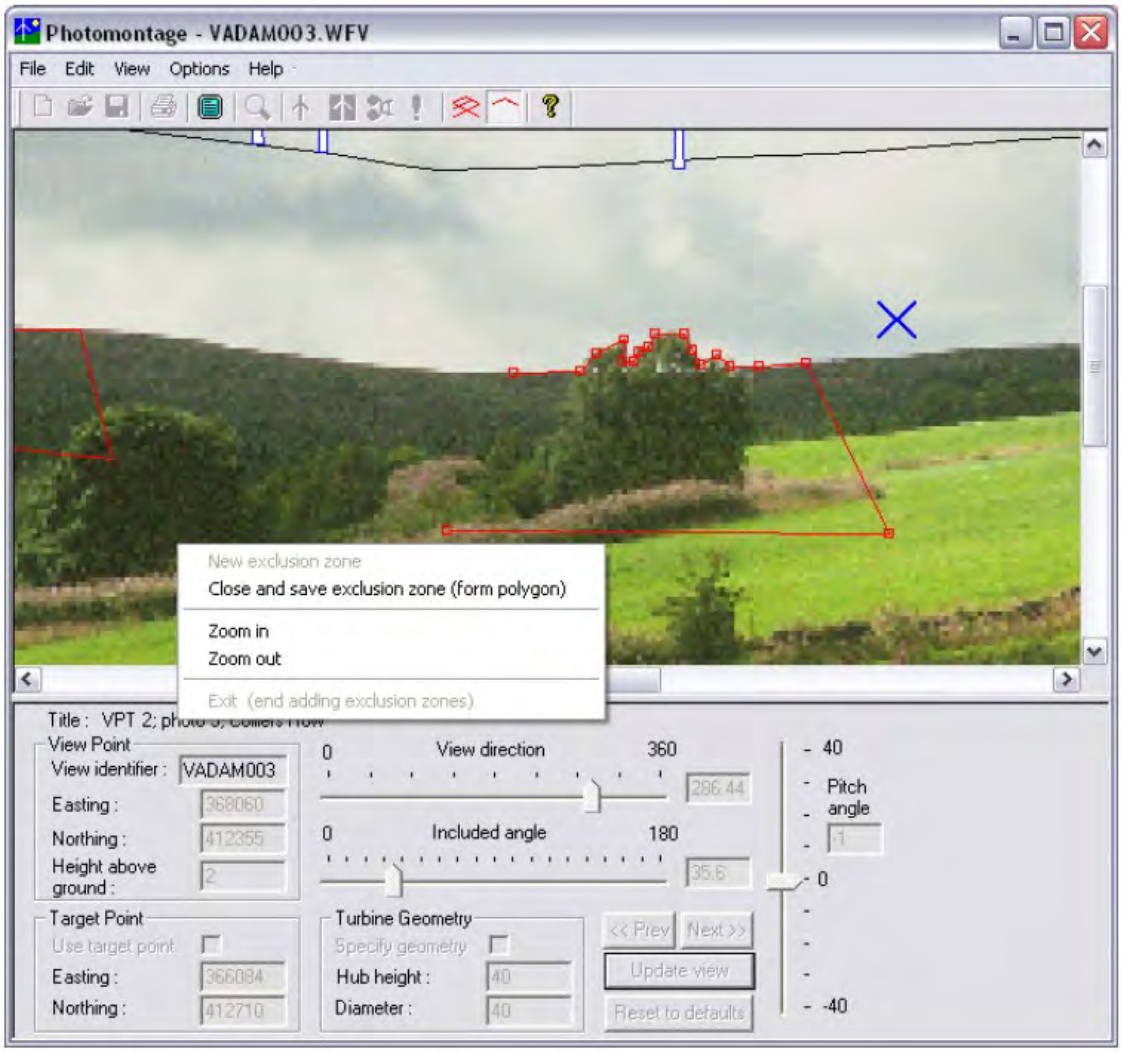

Figure 4 - Digitising exclusion zones

Several other settings for the display of the turbines are also required to produce realistic simulations. These settings include:

- Lighting model
    - In this module, the Sun's position is specified relative to the wind farm so that realistic shading is factored into the rendered turbines. The position of the turbine nacelles and blades relative to the viewer can also be manipulated depending on requirements.
    - Light intensity can be adjusted for the following scenarios:
        - Bright sunlight
        - Weak sunlight
        - Cloudy conditions with no sun

- Custom control of conditions is also possible

- Colour Shift and Blur
  - The turbine colour is initially set via turbine specifications in the turbine studio module. However, colours may be manually adjusted to allow for a sunrise or sunset reddening effect.
  - Blur may be used when the distant horizon on a photograph appears slightly blurred. In this situation, the rendered turbine will appear too sharp in relation to the photograph and, therefore, may give a false appearance. Blur reduces the resolution of the rendered turbine, giving a more realistic look in these situations.
- Earth's Radius
  - The Earth's radius is a preset value but can be overridden if necessary.
  - Atmospheric refraction can also be included if necessary or desired.

The following screenshot shows a completed photomontage before export:

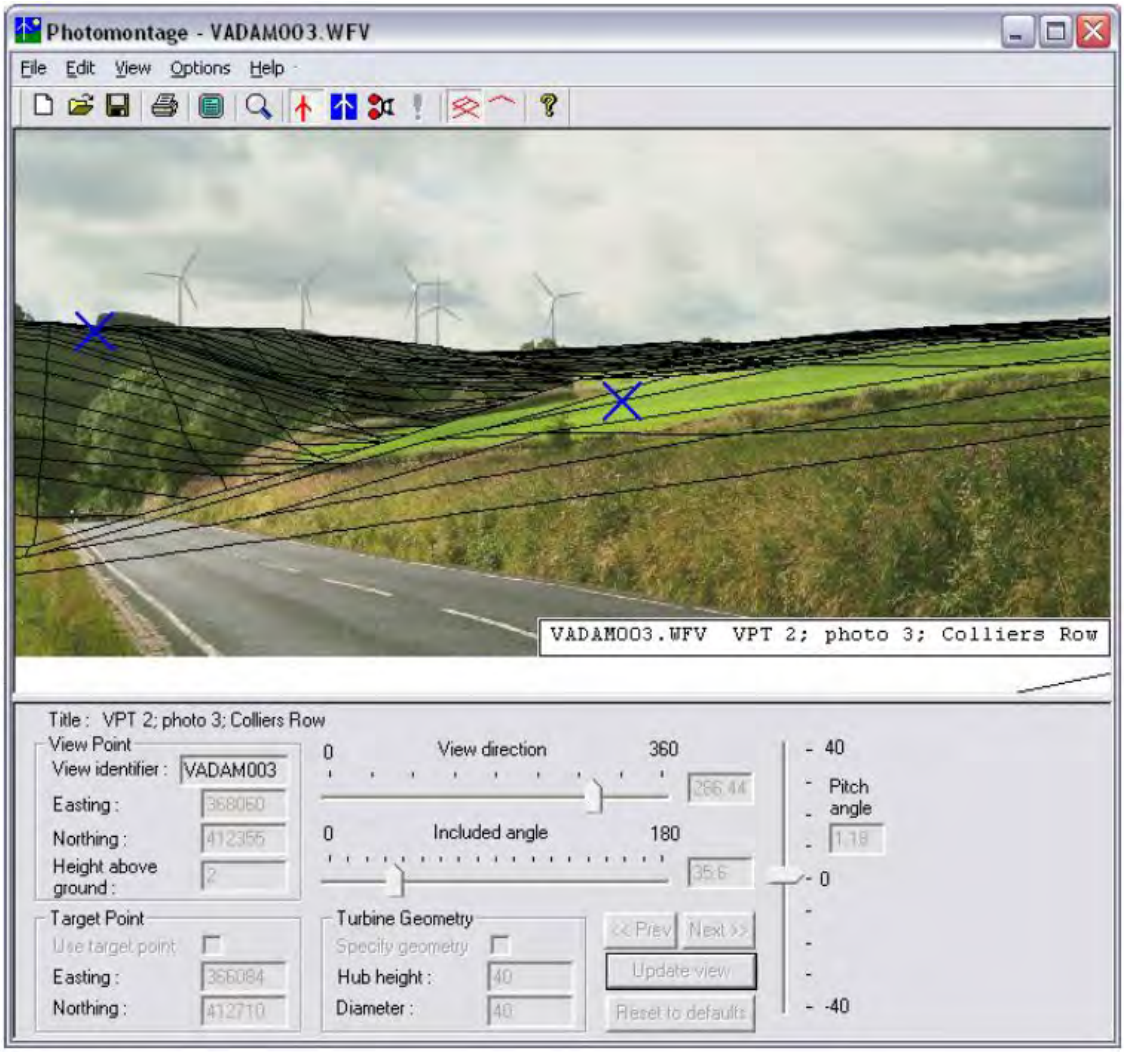

Figure 5 - Completed photomontage before export

On completion of the photomontage, the image is exported using the same resolution as the original photograph. WindFarm calculates the correct viewing distance for an accurate representation when the image is exported.

Adjustments are often required to be made to the exported photomontages to reflect reality better; for example, the turbine may be slightly above ground level due to topographical inaccuracies brought about by the resolution of topographical data or when trees are in the foreground of turbines. There may also sometimes be an unnatural transition from the ground or vegetation to the turbine tower, which requires some finessing to look realistic. These adjustments are performed with the Photoshop software package and may include refining the transition from ground/vegetation to the tower structure. It may also be used to “reorder” more complex vegetation or structures in the

foreground so that turbines appear accurately behind semi-porous objects in the foreground, such as deciduous trees, power lines, or lattice structures.

Photoshop may also be used to adjust the background light levels so that the turbines can be seen more clearly to illustrate their positions on the landscape. In this case, a dual set of images is created so that a viewer may see the unadjusted background image as a comparison.

The following screenshot shows the situation where the leftmost turbines tower section intersects with trees. To be realistic, the tower margins should be blended with the trees to some extent instead of a virtual truncation.

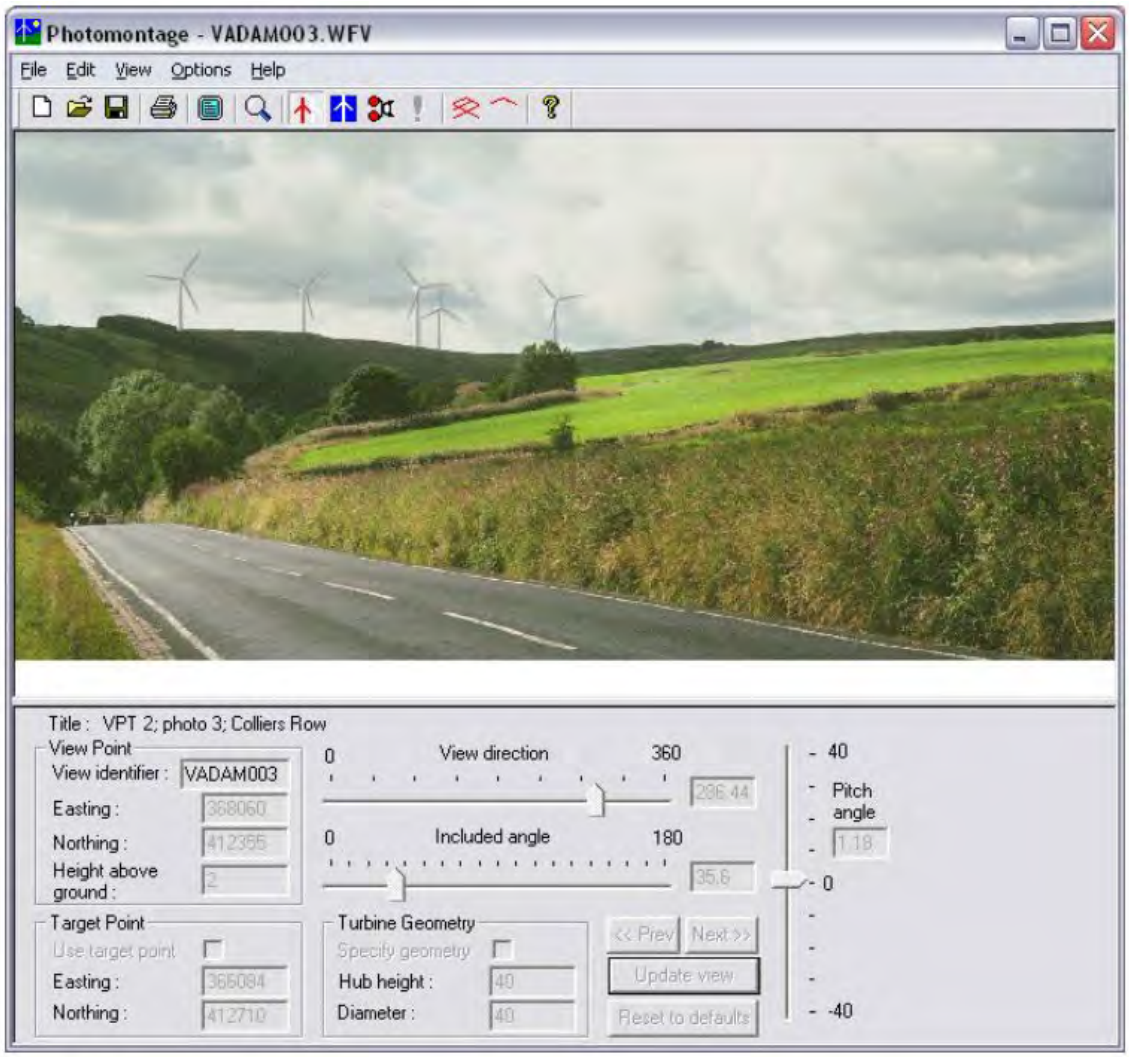

Figure 6 - Photoshop editing required on left most turbines' intersection with surrounding trees

Run Data is available from each photomontage file and describes critical parameters of the photomontage process to enable auditing and verification.

3. Variances in Methodology to NZILA BPG 10.2

In August 2008, the New Zealand Institute of Landscape Architects hosted a Landscape Planning Initiative; a directive arose to prepare a series of Best Practice Guide (BPG) documents. The Technical Guide for Photomontage Simulations was the first of such papers to be published. As such, it has relevance to the formation of the ZVI analysis and the photomontages for the proposed T4 Wind Farm.

The analysis does accurately follow the general principles set out in the NZILA BPG, namely:

- The analysis is as accurate as possible with the provided data to assist in making well-informed judgments.
- The analysis by WindFarm is based on a structured and replicable procedure so that others may test and confirm the simulations' accuracy and credibility.
- The analysis is carried out by specialist wind farm software and, therefore, uses techniques that represent the project in its true environmental context and in a fair and reasonable manner.
- The presentation clearly represents and conveys important information regarding the analysis of each photomontage.

As part of the presentation process, it is essential to ensure that large-format printing is carefully managed to maintain the relationship between picture size and viewing distance. The prepared images are configured to be printed in the A3 format so that the printed image is 40cm wide. Each photomontage has the appropriate viewing distance noted to attain the correct perspective. Often, when displayed on a computer monitor, users will zoom in on the image; this distorts the viewed image resolution and no longer accurately represents the potential wind farm.

4. Zone of Visual Influence Software and Major Inputs

The Zone of Visual Influence (ZVI) for the proposed Jericho Wind Farm was formulated using the software package “WindFarm” as per the photomontage creation.

To accurately position turbine layouts and locations in order to create the ZVI images and analysis, topographical contour information is required.

The topographical data file used in the photomontage creation is also used for the ZVI process. The LINZ Data Service has been accessed to provide background raster maps and surrounding 20m vector contours. Ventus Energy has provided contour data of the site and immediate surrounding area, which New Zealand Aerial Mapping initially prepared. Contour resolution is 5m for an area of 5km X 7km centered on the proposed wind farm; contour resolution reduces to 20m outside of this area when relying on LINZ data. The data is provided as a WAsP vector “map” file containing the 5m and 20m contours relevant to the analysis in a single vector file.

The provided broader area data has a resolution of 20m, and the data provided for the general site of the proposed wind farm has a sampled resolution of 5m.

WindFarm uses the contour and layout information for a number of turbine energy yield calculations, and of particular importance, to perform the ZVI calculations and create the wireframe image for Photomontage formation if required.

5. ZVI Calculation

The ZVI module of WindFarm creates maps of the zone of visual influence of a wind farm and the cumulative visual impacts of several wind farms should there be more than one wind farm in the immediate area under study.

There are several different ways of counting visibility. The most common way is to count the number of turbines visible from specific points within a specified radius of the wind farm, with the point of visibility being the blade tip, nacelle, or a point on the tower.

In addition, a visibility count can be made, which sums each blade tip, nacelle, and a point on the tower that can be seen. Therefore, if a whole turbine can be seen, the count for that turbine would

be three. The maximum count for a wind farm using this method is three times the number of turbines if no weighting is used for any particular component. However, this method has the disadvantage that a count of 6 could be either six blade tips or two whole turbines, which are visually very different.

The ZVI calculations use the input contour files and the selected turbine dimensions to calculate where and how many turbines can be seen from any vantage point. The accuracy of the ZVI calculation is dependent on the resolution of the contour data. With only 20m contour data available for the wider area, the results will not be as accurate as using 2m contour data for the entire ZVI calculation area, for example.

Various options are available to the software operator when conducting the ZVI analysis. Important operator variables are:

- Topographical data
- Centre point of calculation area (usually notional wind farm centre)
- Calculation area
- Calculation shape (circular or square)
- Counting methodology (nacelle, blade, tower, or all components)
- Observer height relative to ground level
- Resolution of each visibility point
- Atmospheric refraction
- The Earth's curvature
- Inclusion of features which obscure visibility

It should be recognised that only the topography is normally used in a ZVI calculation (sometimes called a "bald earth" ZVI), ignoring the effects of trees, buildings or other structures, and therefore representing the theoretical maximum visibility of turbines that may be seen from a given point. However, WindFarm permits the specification of exclusion zones where features other than the landscape obscure the wind farm. For example, a forest area may be defined and given a nominal height of 20m. The turbines' visibility is automatically set to zero inside the exclusion zone. In addition, the wind farm visibility will be modified at the edges of the forest because of its height. No exclusion zones have currently been entered into the ZVI analysis. However, shelter belts, exotic forests, bush, and other structures in the immediate vicinity of the proposed wind farm could be defined as exclusion zones, thus reducing overall visibility.

The graphical output of the ZVI analysis is a shaded circular or square region (depending on the calculation shape selection), with various colours identifying the number of visible turbine points from a particular vantage point. The output then has a topographical map of the area overlaid to give spatial context to the viewer.

The following screenshots illustrate the graphical ZVI output:

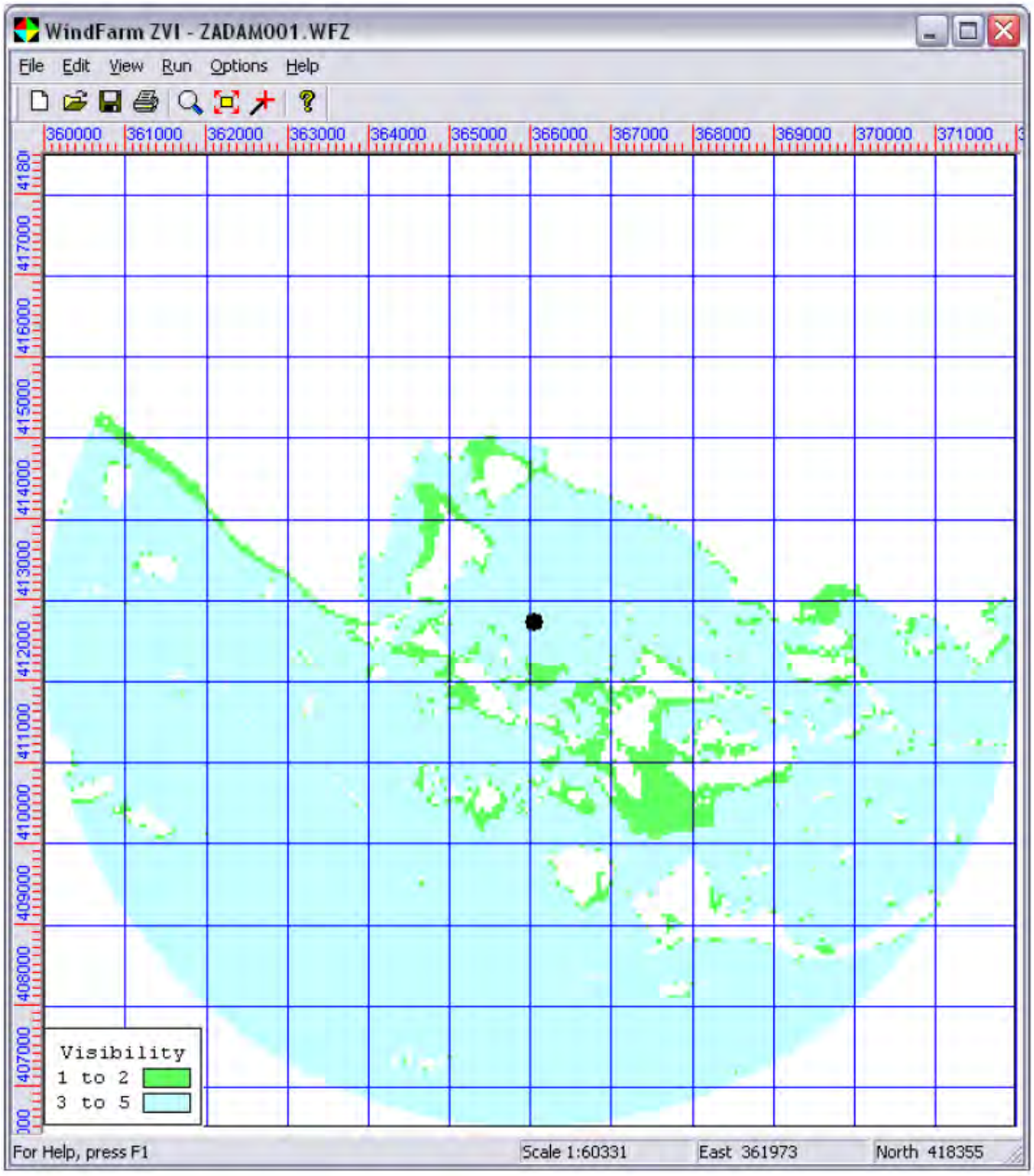

Figure 7 - ZVI Output

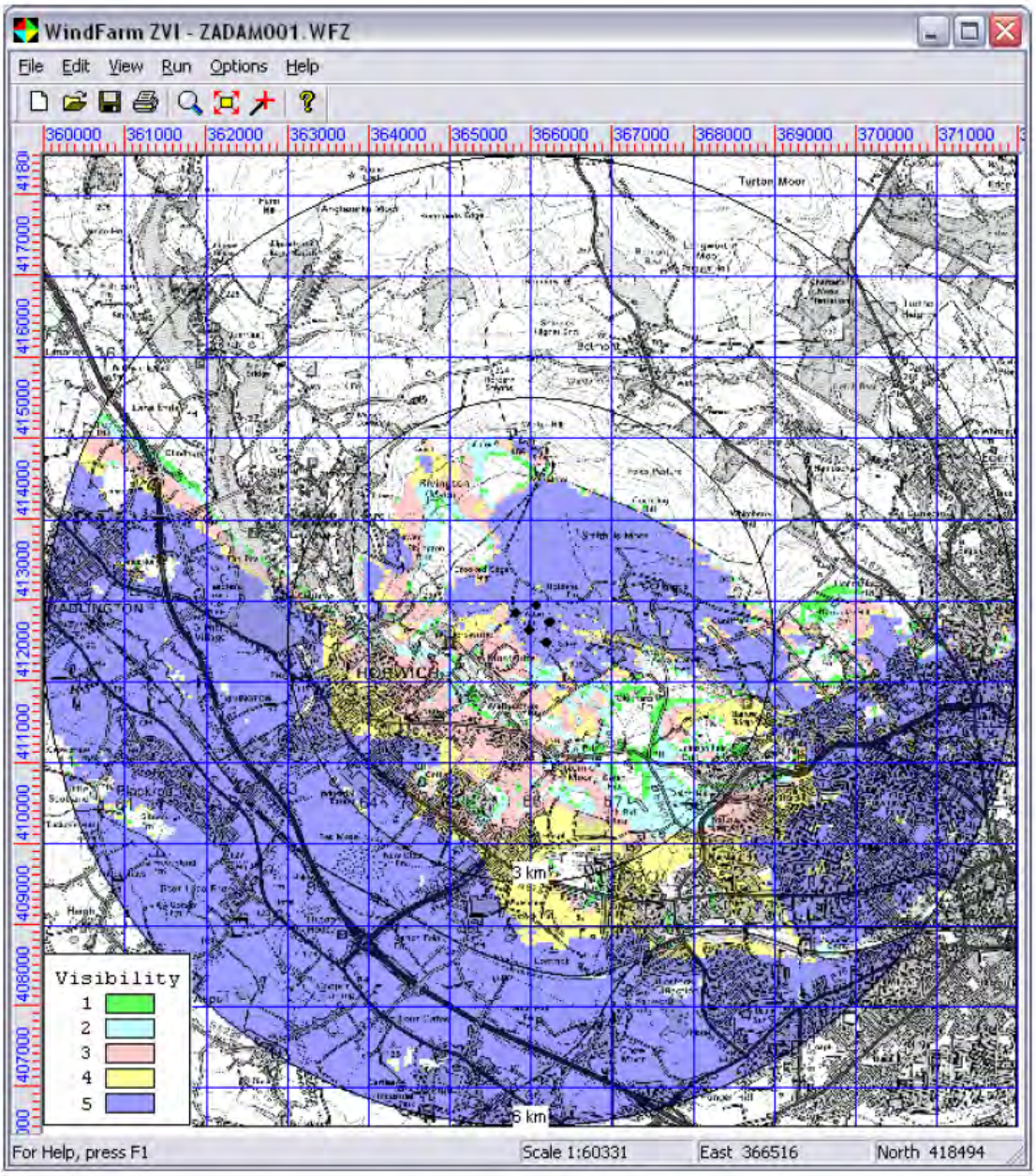

Figure 8 - ZVI output overlaying a topographical map

Run Data and Statistics are available from each calculation run, and describe critical parameters of the run data, and also a list of visibility statistics. The number of visibility points, percentage of total points, and area are given for each group. The information can be printed or exported as required.

6. ZVI Variances in Methodology to NZILA BPG 10.2

In August 2008, the New Zealand Institute of Landscape Architects hosted a Landscape Planning Initiative; a directive arose to prepare a series of Best Practice Guide (BPG) documents. The Technical Guide for Photomontage Simulations was the first of such documents to be published, and as such, has relevance to the formation of the ZVI analysis and the photomontages for the proposed Jericho Wind Farm.

The ZVI analysis does accurately follow the general principles set out in the NZILA BPG, namely:

- The analysis is as accurate as possible with the provided data to assist in making well-informed judgments.
- The analysis by WindFarm is based on a structured and replicable procedure so that others may test and confirm the accuracy and credibility of the simulations.
- The analysis is carried out by specialist wind farm software and, therefore, uses techniques that represent the project in its true environmental context and in a fair and reasonable manner.
- The presentation provides a clear representation and conveys important information regarding the analysis for each ZVI analysis.

APPENDIX C: TAUMATATOTARA WIND FARM PROPOSED VARIATION -LANDSCAPE CHARACTER DESCRIPTION AND LANDSCAPE VALUES ASSESSMENT

Site / Landscape description

The site is located on ridgelines forming the catchment boundary of the Marakopa River (to the south / south-east), the Waihipa Stream (to the west) and the Mangatangi Stream (to the northeast). It is within the wider context of the West Waikato hills and ranges and the geology is siltstone and sandstone of the Te Kuiti Group[7]. The topography is dissected, steep sided hills, generally 250 – 350m high of relatively uniform height, and the land is largely under pasture and managed for stock grazing. There are areas of indigenous forest as well as exotic forestry and there are scattered rural dwellings at low density. The permitted baseline includes consent for 22 turbines – the northern 11 to 121.5m blade tip height and the southern, to 110m blade tip height.

Recognised landscape values

Landscape values in the wider area, referenced in the Operative and Proposed Waitomo District Plans, and in the Waikato Regional Landscape Study[8] include:

- Karst features (OWDP Obj 11.3.2)
- Rural character including low built density / rural land uses (OWDP Obj 11.3.8 & 11.3.9).
- Areas of indigenous vegetation (OWDP Obj 11.3.4)

There are no landscape overlays in the OWDP or PWDP that impact the site or its landscape setting, but the site is adjacent to Significant Natural Areas of regional and local significance as shown in the PWDP maps. The site does not coincide with any geo-heritage significance as identified in the New Zealand Geopreservation Inventory[9]. There are no historical & Cultural Values overlays of relevance in the PWDP. The site is not within the coastal environment as identified in the Natural Character Study of the Waikato Coastal Environment[10].

[7] Edbrooke S, 2005, Geology of the Waikato Area, Institute of Geological & Nuclear Sciences Ltd

[8] Environment Waikato, 2010, Waikato Regional Landscape Study, Environment Waikato Technical Report 2010/12

[9] www.geomarine.org.nz/NZGI/

[10] Boffa Miskell, 2016, Natural Character Study of the Waikato Coastal Environment, Waikato Regional Council.

Landscape values assessment

The wind farm site does not coincide with any notable karst features and is located on pastoral farmland. In my assessment, its key landscape values relate to its rural character, which I assess as having a moderate-high level of amenity based on the following:

- A high level of openness / low built density
- Moderate-high naturalness based on landform legibility under predominantly grassland cover and with areas of indigenous forest highlighting steeper / damper areas. This is reduced in places by patterns of land use at odds with the underlying landform (typically associated with exotic forestry).
- Rural land use.

APPENDIX D: TAUMATATOTARA WIND FARM PROPOSED VARIATION - VISUAL EFFECTS ASSESSMENT

Method

As noted in the NZILA Landscape Assessment Guidelines[11] visual effects are consequences for landscape values as experienced in views.

The following is my assessment of the visual effects of the variation from selected viewpoints in the area surrounding. These viewpoints have been selected on the basis that that they are representative public viewpoints from which photo-simulations have already been prepared, or that they are places about which issues have been raised in consultation.

Assessments are informed by the following:

- Site Visit

  My visit to the project site and surrounding areas has provided experience of the landscape generally, providing for better understanding of the likely visual effects as illustrated in the photo-simulations and wireframe diagrams. All viewpoints assessed have been visited except for 84 and 176 Te Waitere Road. In these cases, I have relied to some extent on photographs previously taken by others.

- Photo-simulations and wireframe diagrams prepared by Energy3 Ltd.

  These are based on computer generated vector models of the proposed infrastructure on a digital contour base. It is acknowledged that their accuracy is limited by the 20m contour data used for the wider area, however, the images have been refined with reference to the relevant photographs. It is also acknowledged that the wireframe diagrams do not account for vegetative screening. Nevertheless, I consider that these diagrams provide a reasonably accurate and useful basis on which to make comparisons of the relative visibility of the various windfarm iterations.

Assessments consider the differences in the visual effects of the proposed in relation to the consented wind farm and the consequences of these on the landscape values expressed in the views. The effects may be positive or adverse in nature and I rate the degree of effect in terms of the 7-point rating scale recommended in the Landscape Assessment Guidelines and shown in Table 1 below. The table also illustrates the relationship of this scale to RMA terminology.

[11] Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines, Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022.

Table 1: Degree of effect assessment scale

Very low	*Low*	*Low-mod*	*Moderate*	*Mod-high*	*High*	*Very high*
Less than minor	*Minor*		*More than minor*		*Significant*	

Viewpoints assessment

Taharoa Road, approximately 1.35km north of its intersection with Te Waitere Road

- *See Figures 3 (a) – (c).*

Relevance of viewpoint	A public road view with good visibility toward the site
Basis of assessment	Site visit and photographs / Review of Photo-simulations previously and recently prepared by Energy3.
Distance to closest turbine	Proposed: 2006m Consented: 2006m
Existing views description	This is a view south-westward from Taharoa Road across the valley associated with Mangatangi Stream to the site ridgeline. As shown in Figure 3(a) 6 of the 22 consented turbines would be visible from this viewpoint if built, and these are part of the consented environment. The landscape character is open, pastoral farmland and the turbines on the higher ridge opposite some 2km distant, will be a significant and dominant focal point. As large built elements with a utilitarian character they will adversely affect naturalness values and associated rural amenity values. They do not however affect landform legibility.
Description of visual effects	As shown in Figure 3(b) the variation application introduces no more turbines into this view (other than the tip of turbine 7). The larger scale turbines will appear more visually dominant but more aesthetically pleasing (to a small extent) with their slower turbine rotation. The effect of scale difference is modest compared with the effect of turbine presence at all. Considering the scale of the turbines relative to that of the host landform, the turbines will remain the subservient element. As regards the updated variation application (see Figure 3(c)), the number of turbines visible from this viewpoint will reduce to four, and the small increase in scale compared with the application variation will not be particularly noticeable. In relation to the consented wind farm I

	consider that the positive effect of fewer turbines (less clutter / greater spaciousness) will outweigh the negative effects of increased scale and associated visual dominance and that the overall effect will be positive.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application - Adverse / low Updated variation application – Positive / low

Marakopa Road, at its intersection with Coutts Road

- *See Figures 4(a) – (c)*

Relevance of viewpoint	A public road view with good visibility toward the site. Generally representative of visual effects from the wider area surrounding including along Marakopa and Coutts Roads.
Basis of assessment	Site visit and photographs / Review of Photo-simulations previously and recently prepared by Energy3.
Distance to closest turbine	Proposed: 4.96km Consented: 3.28km
Existing views description	This is a view northward from the Marakopa Valley toward the site ridgeline. The hill country is largely covered in a mix of pasture and indigenous forest. As shown in Figure 4(a) 19 of 22 turbines of the consented wind farm would be visible if built (with 2 screened by vegetation from this particular viewpoint), and these form part of the consented environment. These would line out across a long length of the skyline from this viewpoint and as large built elements with a utilitarian character, adversely affect naturalness values and associated rural amenity values. They do not however affect landform legibility.
Description of visual effects	As illustrated in Figure 4(b) 9 of the larger turbines proposed by the variation application will be visible, with 2 screened by vegetation from this particular viewpoint. The 11 turbines proposed are at the more distant end of the site from this area and their increase in scale is more than compensated for by the deletion of the 11 closer proximity turbines.

	Their slower rotation will also assist to minimise adverse visual effects compared with the consented turbines. Whilst large, and seen as focal points, the turbine scale is not so great as to dominate the host landforms. The updated variation application will reduce the number of turbines visible from 9 to 7 from this viewpoint. and the small increase in scale compared with the application variation will not be particularly noticeable. In relation to the consented wind farm I consider that the positive effect of fewer turbines will outweigh the negative effects of increased scale and associated visual dominance.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application - Positive / moderate Updated variation application – Positive / moderate

Taharoa Village (corner of Taharoa Road and Rotopohue Road)

- *See Figures 5(a) – (c)*

Relevance of viewpoint	A public road view, generally representative of views toward the site, where possible in the Taharoa Village area.
Basis of assessment	Site visit and photographs / Preparation of wire frame diagrams
Distance to closest turbine	Proposed: Approx 7.05km Consented: Approx 7.05km
Existing views description	Tahora Village is approximately 6.5km distant from the site and located on gentle slopes with a northward aspect orientating away from the site. The wind farm is located on more distant hills to the south and although not currently present, 121,5m high turbines are part of the consented existing environment. In general and as shown in Figure 5(a), there is landform screening between the village and the site, but there will be some visibility of the tips of rotors 1 – 6. Considering additional vegetation screening I estimate that probably only 3 will be visible, tips only, seen in a tight

	group and moving above the intervening hill. This will have a low visual impact considering the distance.
Description of visual effects	Figure 5(b) illustrates the visibility of the variation application. 6 turbines will be visible, tightly grouped. These will be higher above the hill screening than the consented turbines and will be more noticeable. Considering the distance and the screening however, visual impact will still be low, albeit augmented by the movement of the rotors. Figure 5(c) illustrates the visibility of the updated variation application. This will result in 3 turbines visible above the intervening landform. Being higher, these will be more noticeable than the consented wind farm. In relation to the variation application the effect will be less cluttered and better aesthetically. Considering the distance and the screening, visual impact will be low, albeit augmented by the movement of the rotors.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application – Adverse / low Updated variation application – Adverse / low

Coutts Road, adjacent to 158 Coutts Road

- *See Figures 6(a) – (c)*

Relevance of viewpoint	A public road. Adjacent to the property of a submitter The photo and wire-frame diagram viewpoint is at a slightly higher elevation than the dwelling but are generally indicative of the view / visibility from this property.
Basis of assessment	Site visit and photographs (from road) / Preparation of wire frame diagrams.
Distance to closest turbine	Proposed: Approx 3.75km Consented: Approx 2.86km
Existing views description	This is a view north-east across river valley flats toward the site ridge. The hill country is largely covered in a mix of pasture and indigenous forest and there is exotic forestry on some of the closer hills.

	As shown in Figure 6(a) 21 turbines of the consented wind farm would be visible if built, and these form part of the consented environment. These would line out across a long length of the skyline from this viewpoint and as large built elements with a utilitarian character, adversely affect naturalness values and associated visual amenity values of the rural landscape. They do not however affect landform legibility. Whilst mitigated to varying degrees by landform screening, in general the closer (southern) turbines will have the greatest visual impact.
Description of visual effects	Figure 6(b) indicates that all 11 larger turbines proposed by the variation application will be visible from this viewpoint. Whilst larger than the turbines consented, these extend across a considerably shorter length of the skyline ridge to the north. The turbine's scale is not so large as to dominate the landform and their slower rotation will also assist to minimise adverse visual effects as compared with the consented turbines. Overall, the much-reduced extent of the wind farm more than compensates for the increase in the scale of the 11 remaining turbines. Figure 6(c) illustrates the effects of the proposed updated variation application and indicates that all 8 turbines will be visible, although 1 will be partially screened. The small increase in scale compared with the application variation will not be particularly noticeable. In relation to the consented wind farm I consider that the positive effect of fewer turbines (less clutter / greater spaciousness) will outweigh the negative effects of increased scale and associated visual dominance and that the overall effect will be positive.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application - Positive / moderate Updated variation application – Positive / moderate

Coutts Road, adjacent to 223 Coutts Road

- *See Figures 7(a) – (c)*

Relevance of viewpoint	A public road. Adjacent to the property of a submitter. The photograph and wireframe diagram are from the road, at a lower elevation than the dwelling. These are generally indicative of the view / visibility from this property but due to the lower viewpoint will understate potential visibility from the dwelling.
Basis of assessment	Site visit and photographs (from road) / Preparation of wire frame diagrams.
Distance to closest turbine	Proposed: Approx 3.54km Consented: Approx 3.0km
Existing views description	This is a view north-east across river valley flats. The valley is relatively enclosed northward but opens out more eastward from this viewpoint, The site ridge is largely screened by intervening landform, except at its southern end, where it has a cover of indigenous forest. As shown in Figure 7(a) 8 turbines (one of these mainly screened) of the consented wind farm would be visible if built, and these form part of the consented environment. These would be seen on the skyline ridge to the east from this viewpoint. As large built elements with a utilitarian character, adversely affect naturalness values of the rural landscape. They do not however affect landform legibility and are somewhat peripheral to the main northern outlook.
Description of visual effects	Figures 7(b) and 7(c) indicate that none of the proposed larger turbines associated with the variation application and updated variation application will be visible from this viewpoint as they will be screened by intervening landform. The proposed wind farm will have much reduced visual effects from this viewpoint.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application - Positive / moderate-high Updated variation application – Positive / moderate-high

Taumatatotara West Road, adjacent to 11 Taumatatotara West Road

- *See Figures 8(a) – (c)*

Relevance of viewpoint	A public road. Adjacent to a property mentioned in the submission of Y Armstrong. The photo and wire-frame diagram are generally indicative of the view / visibility from this property.
Basis of assessment	Site visit and photographs (from road) / Preparation of wire frame diagrams.
Distance to closest turbine	Proposed: 2.24km Consented: 2.24km
Existing views description	This is a relatively high elevation viewpoint to the north-east of the wind farm. The view direction is south-westward but more open southward than westward given immediate landform screening. The landscape is pastoral and enhanced by the presence of a large area of indigenous forest nearby. As illustrated in Figure 8(a), if built, the consented wind farm would have no visibility from this viewpoint
Description of visual effects	Figures 8(a) and 8(b) indicate that neither the variation application nor the updated variation application will result in any visibility from this viewpoint.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application – Neutral Updated variation application - Neutral

Vicinity of dwelling, 83 Te Waitere Road

- *See Figures 9(a) – (c)*

Relevance of viewpoint	This is s residential location and the property of a submitter.
Basis of assessment	Site visit and photographs / Preparation of wire frame diagrams.

Distance to closest turbine	Proposed: Approx 2.76km Consented: Approx 2.76km
Existing views description	This is a relatively high elevation viewpoint to the north-east of the site. The view direction is south-westward and relatively screened by landform close-by to the west and amenity vegetation and an accessory building to the south. As illustrated in Figure 9(a) if built, the consented wind farm would not have any visibility from this location.
Description of visual effects	Figures 9(b) and 9(c) indicate that the proposed wind farm changes will not result in any visibility from this viewpoint.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application – Neutral Updated variation application - Neutral

Vicinity of dwelling, 84 Te Waitere Road

- *See Figures 10(a) – (c)*

Relevance of viewpoint	This is s residential location and the property of a submitter. A simulation has been prepared but this did not include an appropriately wide view angle. The wire-frame diagram has been prepared to assist a fuller understanding of the visual effects. The viewpoint assessed is above the dwelling. Visibility is likely to be slightly less from the dwelling level.
Basis of assessment	Review of photographs taken by others, photo-simulations previously prepared by Energy3, and Preparation of wire frame diagrams.
Distance to closest turbine	Proposed: Approx 2.96km Consented: Approx 2.96km
Existing views description	This is a relatively high elevation viewpoint to the north-east of the site. The view direction is south-westward, across the shallow valley form associated with the headwaters of Oteke Stream. The landscape has an

	open, pastoral, rural character and patches of indigenous forest enhance naturalness values. Figure 10(a) indicates that of the closer, northern turbines, 7 are mainly visible, 3 have rotor tip visibility only, and 1 is completely screened. The southern turbines are more peripheral but subject to vegetation screening, all are visible, albeit 2 have only rotor tip visibility. These form part of the consented environment. The turbines would be seen beyond the intervening ridge on the skyline to the south-west from this viewpoint. As large built elements with a utilitarian character, the turbines will adversely affect naturalness / openness values of the rural landscape. They do not however affect landform legibility, and the intervening ridge form provides a degree of buffer.
Description of visual effects	Figure 10(b) indicates that 10 of the proposed variation application turbines will be mainly visible, with 1 having rotors largely screened. Whilst the removal of the southern turbines reduces the total potential spread of the windfarm in the views, these are more distant and of less significance than the closer northern turbines. The effect of the variation application will be adverse because more of the closer turbines will be visible, and these will be of greater scale and more visually dominant. The primary adverse effect is the visibility of any turbines however, and the increased number and / or scale of turbines is of lesser significance. Nonetheless, it is my assessment that the effects of the variation application will be adverse / low-moderate. As shown in Figure 10(c) the updated variation application will result in all 8 turbines being visible, 7 having rotors mainly visible and 1 being mainly screened. In relation to the variation consent, the small scale increase is more than outweighed by the reduced number of turbines visible. In relation to the consented wind farm, there will be fewer of the closer turbines visible, but their scale will be larger. I assess comparative effects as adverse / low.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application – Adverse / low-moderate Updated variation application – Adverse / low

Vicinity of dwelling, 176 Te Waitere Road

- *See Figures 11(a) – (c)*

Relevance of viewpoint	This is a residential location and the property of a submitter.
Basis of assessment	Review of photographs previously taken by others / Preparation of wire frame diagrams.
Distance to closest turbine	Proposed: Approx 3.32km Consented: Approx 3.31km
Existing views description	This is a relatively high elevation viewpoint to the north-east of the site. The view direction is south-westward, across the shallow valley form associated with the headwaters of Oteke Stream. The landscape has an open, pastoral, rural character and patches of indigenous forest enhance naturalness values. Figure 11(a) indicates that of the closer, northern turbines, only 1 has visibility to nacelle level, 4 have rotor tip visibility only, and 6 are completely screened. The southern turbines are more peripheral but subject to vegetation screening, 7 are visible, albeit 3 of these have only rotor tip visibility. These form part of the consented environment and would be seen on the skyline to the south-west from this viewpoint.
Description of visual effects	Figure 11(b) illustrates the visibility of the variation application turbines and indicates that all 11 proposed turbines will be visible, with 6 of these being mainly screened by landform. In terms of both the numbers and scale of the closer turbines, the comparative effects of the variation application with the consented wind farm will be adverse, and I rate the effects as adverse / low-moderate. A higher rating is precluded because the consented wind farm will still have some effect and this lowers the sensitivity of the assessment baseline. I consider too, that the surrender of the southern turbines will have some positive effect in reducing the overall spread of the wind farm potentially visible. Figure 11(c) illustrates the visibility of the updated variation application turbines and indicates that all 8 proposed turbines will be visible, with 1 of these being mainly screened by landform. In terms of both the numbers and scale of the closer turbines, the comparative effects of the variation application with the consented wind farm will be adverse, and

	I rate the effects as adverse / low-moderate. I consider that relative to the variation application, the reduced number of turbines is positive, but not enough to reduce the rating relative to the consented wind farm.
Nature / degree of effect on values (baseline – consented wind farm)	Variation application – Adverse / low-moderate Updated variation application – Adverse / low-moderate

APPENDIX E: ASSESSMENT AGAINST RELEVANT STATUTORY PROVISIONS

Operative Waitomo District Plan

Objective / Policy	***Comment***
Objective 11.3.8 *To promote use of rural land in a manner which encourages maintenance and enhancement of amenity values of the rural environment, protects outstanding natural features and landscapes from inappropriate use and development, and preserves the natural character of the coastal environment, wetlands, lakes and rivers, and their margins.*	A 22-turbine windfarm is already part of the consented environment. The proposed variation application and updated variation application, reduce the number of turbines to 11 and 8, but increase turbine height to 172.5m and 180.5m respectively. The effects of this on rural amenity values will vary with viewpoint. From places surrounding the northern part of the site (where the higher turbines are proposed) there will be some adverse rural character amenity effects associated with greater visual dominance of the turbines. From areas to the south of the site however, the effects will be generally positive. Overall, I consider that the more restricted footprint of the windfarm and lesser number of turbines proposed, overrides adverse effects associated with increased turbine size and visual dominance. I consider that the variation application and the updated variation application are consistent with this objective.
Objective 11.3.9 *To encourage maintenance and enhancement of rural visual character.*	Overall, it is my assessment that the proposed variation application and the updated variation application will maintain rural character with less significant adverse visual effects than the consented wind farm.
Policy 11.4.12 *To ensure that all rural activities, including extractive industries, are established and operated so as to avoid, remedy or mitigate adverse effects on amenity or on neighbours, or on significant karst features.*	Compared to the consented wind farm, the proposed variation will result in visual amenity effects of lower magnitude for many residents in the surrounding area. There will be some increase in the magnitude of these effects from others, but in relation to the viewpoints assessed, these adverse effects will be no more than minor in my assessment.

Policy 11.4.17 *To avoid, remedy or mitigate the adverse effects of rural buildings situated close to boundaries, and large non-farm buildings, on sunlighting, privacy, landscaping and amenity.*	The turbines associated with the variation application and the updated variation application will be larger than those already consented, but there will be fewer of them and a reduced wind farm footprint. Whilst acknowledging that there will be some places from which the effects of the proposed variation will be adverse, it is my assessment that overall, effects on rural character amenity values will be positive.
Objective 15.3.2 *To ensure that the development of network utilities is carried out in a manner that is sensitive to the amenities and heritage values of the District and avoids, remedies or mitigates adverse effects on the environment.*	In the context of the consented wind farm, it is my assessment that both the variation application and the updated variation application will have positive landscape effects overall.
Policy 15.4.2 *To ensure that the development of network utilities does not give rise to significant adverse environmental effects, including but not limited to increased noise emissions, effects on the visual amenity and/or heritage resources of an area or significant impacts on important habitats and ecosystems.*	In the context of the consented wind farm, visual effects of the variation application and the updated variation application on rural character and amenity are assessed as being positive overall. In those places assessed, where the variation will result in adverse effects, the degree of these adverse effects has been assessed as no more than minor.

Proposed Waitomo District Plan

Objective / Policy	***Comment***
Objective NU-O2. *The adverse effects of network utilities on the environment are avoided, remedied or mitigated whilst recognising the positive effects and functional and operational needs of network utilities.*	As discussed above, the landscape effects of the variation application and the updated variation application will be positive overall, when compared with the consented wind farm.
Policy NU-P9.	The key landscape values in this area are associated with rural character. In comparison

For roads in all locations and all land located outside of overlays, scheduled sites and features, manage the adverse effects of network utilities whilst taking into account their functional and operational needs, by: *1. Controlling the height, bulk and location of network utilities in a manner that minimises any adverse effects on the anticipated outcomes for the receiving environment including the role, function, character and identified qualities of the zone or precinct; …..*	with the consented wind farm, the variation application and the updated variation application will have positive effects on this overall, through reducing the footprint / spatial extent of the wind farm with the attendant benefits of less clutter / more spaciousness. The remaining turbines will be larger than those consented, but effects associated with increased visual dominance from viewpoints assessed near the northern end of the site, will be no greater than minor from those places assessed.
Policy NU-P10. *Ensure the location, scale and operation of network utilities and their ancillary activities avoid, remedy or mitigate adverse effects on nearby sensitive activities as far as practicable by:* *1. Maintaining required separation distances to ensure reverse sensitivity effects are minimised; and* *2. Ensuring sites are sufficiently landscaped and screened; and* *3. Ensuring that industrial buildings are designed as far as practicable to not overshadow or overly dominate the wider surrounding area.*	Neither the variation application nor the updated variation application will result in turbines being any closer to dwellings than those already consented. They do, however, result in taller turbines and a greater degree of visual dominance in some cases. From the viewpoints assessed, the adverse effects on landscape / visual amenity values resulting from this will be no more than minor.
Objective GRUZ-O5. *Ensure rural character and amenity is maintained and where possible, enhanced.*	It is my assessment that the proposed variation application and updated variation application better maintains rural character and amenity than the consented wind farm overall.
Policy GRUZ-P1. *Land use activities and development must be restricted to a density, scale and intensity and be located appropriately, in order to maintain rural character and amenity by:* *1. Ensuring agricultural, pastoral and horticultural activities predominate in the zone; and*	The wind farm will co-exist with farming land use. Both the variation application and the updated variation application will result in the spatial extent of the wind farm being reduced. The larger turbines will have adverse effects from some viewpoints surrounding however. In terms of those viewpoints assessed, these effects will be no greater than minor in degree.

2. Ensuring structures are an appropriate scale and appropriately located; and …	
Policy GRUZ-P3. *Ensure that rural character, amenity and safety is maintained and that reverse sensitivity effects are minimised by:* *1. Ensuring that activities and structures are set back from road and internal boundaries; and ….* *6. Managing the scale, intensity, timing and duration of activities to ensure compatibility with the amenity and character of the rural environment; ….*	See comments above

Waikato Regional Policy Statement

Objective ***/ Policy***	***Comment***
Objectives EIT-01 – Energy *Energy use is managed, and electricity generation is operated, maintained, developed and upgraded, in a way that: …* *7. addresses adverse effects on natural and physical resources*	In the context of the consented wind farm, the proposed variation application and updated variation application will have positive effects on the landscape values overall.