APPENDIX B – TECHNICAL REPORTS AND REVIEWS

DUNEDIN CITY COUNCIL
Kaunihera-a-rohe o Otepoti

Memorandum

TO:	Darryl Sycamore, Planner
FROM:	Barry Knox, Landscape Architect
DATE:	4th December 2015.
SUBJECT:	**LUC-2015-469, 147 CHURCH ROAD. PROPOSED COMMUNITY WIND TURBINES. COMMENT FROM LANDSCAPE ARCHITECT.**

This memorandum is in response to a request for comment on the establishment and operation of a cluster of three community wind turbines approximately 100 metre high, proposed for construction on Porteous Hill near Warrington. The site is around 24 ha, with a predominant pastoral land use at higher elevations, and domestic dwellings, forestry, roads and farmland at lower elevations.

The land is zoned rural, and the higher easterly part of the site is within the North Coast Coastal Landscape Preservation Area (NCCLPA), although none of the three wind turbine towers is proposed for location within the NCCLPA.

The Second Generation Plan (2GP) was recently publicly notified, and the proposed location of the three wind turbines would be within a significant natural landscape overlay in this plan. I understand that under Section 5 of the 2GP (*Network Utilities and Energy Generation*) in Objective 5.2.1, local renewable energy generation is encouraged, and the proposal is generally in line with the directions indicated by 2GP. At this stage assessment would be almost wholly considered under provisions in the operative plan, but the Second Generation plan will provide greater direction in this regard as it moves towards becoming fully operative.

My understanding is that the application is considered to be for a non-complying activity, which gives the capacity for consideration of a wide range of effects. Earthworks are proposed as part of the construction of access and tower bases. The application was notified on 4 November 2015. In terms of my comments I will limit these to landscape effects, principally those having an impact on the visual amenity values of the surrounding landscape. Although as noted none of the proposed towers would be within the NCCLPA, they are located close by and within the general context of the landscape zone. The Dunedin City District Plan provides an indication of *Features and Characteristics to be Protected* which can be used to assist with an assessment of effects on the values of surrounding landscape. These are listed below.

The Assessment of Environmental Effects provides specific assessment reports on landscape, noise, ecology and transportation. The main focus of my comments is on the visual impacts of the proposed wind turbine cluster. I have reviewed the report by Lucas Associates – *"Blueskin Energy Wind Cluster Porteous Hill Landscape Assessment".*

I undertook a site visit on 30 November 2015. Two of the photographs taken at this time are attached as Appendix 1.

General Comment

I consider that the visual effects of the wind turbine cluster are objectively and comprehensively assessed in the Landscape Assessment included in the AEE. Ms Lucas's interpretations of the visual effects are well illustrated by the inclusion of photo montages. Her assessment considered various viewpoints from outside the site, and in my opinion, this provides a valuable resource on which to base an evaluation of visual effects. Ms Lucas

interprets the effects on visual amenity and makes statements along the lines that these, rather than being adverse, in some situations would produce change, and a "*new aspect"*. These changes would not necessarily be negative, and in some cases they would be positive. She refers to the clusters as having visual effects which could be described as having *"transparency and elegance*" or which could introduce an *"elegant and meaningful addition to the landscape".*

My assessment, without the benefit of the extensive work completed by Lucas Associates, to a considerable extent would echo similar views as outlined in the AEE landscape report, but perhaps be expressed somewhat more cautiously. There is no doubt that to some people and from some views the wind turbine cluster would provide and elegant and interesting addition to the landscape. However, these are very large structures, and from some perspectives and in some climatic and time of day situations they would no doubt have effects on visual amenity which could be considered to have a more than minor adverse effect.

Overall, however, in my opinion the effects on visual amenity of the cluster of the proposed three wind turbines would be seen as providing an interesting and positive counterpoint to the surrounding landscape, without for the most part compromising basic visual amenity values in any more than a minor way.

"Features and Characteristics to be protected" for the NCCLPA

The Dunedin City District Plan lists these as:

- *The general visual dominance of the natural landscape elements, eg natural landform over human landscape elements, eg buildings or shelter plantings.*
- *The integrity, extent, coherence and natural character of the landform, streams and remaining areas of indigenous vegetation.*
- *The generally limited visual influence of any large scale structures or exotic plantings to diminish the impact of the natural landscape forms and features.*
- *The extent and quality of the dramatic coastal landforms and views. Visual interest is focused on the coastal edge.*
- *The remote wilderness character of the beach landscapes and the visual separation of these areas from adjacent developed areas by dunes or other landforms.*
- *The human-made features which are relics of the past, eg remnant shelter plantings.*
- *The highlights of transient wildlife interest, eg seals.*
- *Areas of significant habitat value, eg Aramoana Salt Marsh and Purakanui Estuary.*
- *The landscape values of the historically and culturally significant Quarantine Island/ Kamau-taurua and Goat Island/ Rakiriri, pa sites at Huriawa (Karitane) and Mopoutahi (Purakanui Bay) and site of early European settlement at Matanaka. [Amended by Variation 14: 26/8/02]*
- *The following significant landform features listed in the NZ Geological Society Geopreservation Inventory for the Otago Region:*
    - *Aramoana coastal features*
    - *Blueskin Bay coastal features*
    - *Karitane tombolo*
    - *Aramoana - Heyward Point*
    - *Harwood sea cliffs.*

Effects of the Proposal on the NCCLPA

Although as mentioned the cluster of three wind turbines is proposed for establishment outside the NCCLPA, these are close enough to the boundary that their visual dominance is within the broad context of the NCCLPA. In this respect I consider an assessment of the effects of the turbines using the features and characteristics listed above is appropriate.

Porteous Hill provides the backdrop for Blueskin Bay, particularly when viewed from Waitati township, from the hills to the south around Blueskin Road and from a number of viewpoints along the northern motorway for north moving traffic. From Warrington Porteous Hill is closer, but intervening topography, vegetation and structures at lower elevations of the hill help to screen views of the higher elevations and provide visual distractions. When the

Porteous Hill site can be seen from the east along Coast Road these views are also more intermittent and less obvious, as the visual focus of most viewers is invariably along the road itself, or at lower elevations, or towards the coast. As indicated in the landscape report, the most direct visual effect from a public access viewpoint is from Pryde Road, but this is used by very few people as it is a secondary road, mainly required for quarry access.

With regard to the *"visual dominance of the natural landscape elements"* related to installation of the turbine cluster, it is longer views from the southern sector which potentially have the widest community impact, and which would probably provide the most notable changes to the existing visual scene. There are an infinite number of lighting, weather and time of day possibilities which would introduce subtle and wide ranging variations to the visual impact of the wind turbine towers depending on the prevalence of these conditions. However, in my opinion, generally the turbines in this location, when viewed from the south, would provide a visual element which would be in scale with the extensive natural hilltop and surrounding open ground, and which would create reactions from viewers ranging from "an interesting and pleasing addition" to "a slightly annoying distraction".

Concluding Comments

It is quite difficult to be objective about effects on visual amenity and natural landscapes as far as wind turbines are concerned because of factors already alluded to. However, in my opinion the Porteous Hill turbines would introduce defined built elements into the natural landscape which would have effects on visual amenity ranging from a positive complement creating interest, to those which may have a minor adverse impact on the natural values of the surrounding landscape. This view is given weight by the existing landscape character at low to mid elevations of Porteous Hill, which as the landscape report outlines well, is a working environment. It has a variety of "*human landscape elements"* such as vegetation groupings, land use activities and smaller scale structures, which overall would allow the turbines to integrate better in this environment.

Cumulative effects would need to be carefully considered should there be any more turbines introduced in the general vicinity, but for this application, there appears to me to be an appropriate overall balance, with mostly no more than minor potential adverse effects on the visual amenity and broad natural character values of the surrounding landscape.

Barry Knox
Landscape Architect

Appendix 1. Photographs Taken 30 November 2015

Photograph 1. View to the north-east towards Porteous Hill from Highway 1. The three turbines would be visible to the left of the summit.

Photograph 2. View from Pryde Road towards the south west. Similar to "Viewpoint 2" in the AEE landscape report. The top ¾ of two of the turbines would be visible above the hilltop.

DUNEDIN CITY COUNCIL
Kaunihera-a-rohe o Otepoti

MEMORANDUM

TO: John Sule
Senior Planner

FROM: Carlo Bell
Environmental Health Officer

DATE: 13 November 2015

SUBJECT: **LUC-2015-469, 147 Church hill Road, merton**

I have reviewed the application to establish three wind turbines at this site. The site and the area around it is zoned mainly as rural and is located reasonably close to the state highway. The day-time L10 noise limit is 55 dBA (until 9pm) and night-time L10 noise limit is 40 dBA. The application includes an acoustic assessment report which is the main subject of my review.

The report appropriately refers to NZS 6808 and the Dunedin District Plan. As suggested in NZS 6808 the report identifies the predicted 35dB contour using modelling and this in turn identifies three dwellings which may be affected by noise from the wind farm when the wind farm is at maximum output. The report estimates a background daytime noise level of 36 dB L_{A90} during 'wind farm operation'. It does not discuss the nightime background. NZS 6808 suggests a limit of 40 dB L_{A90} at sensitive locations (e.g. a dwelling) or 5 dB above the background where background noise is greater.

As a starting point I have undertaken noise monitoring of existing noise levels in accordance with NZS 6801 (except for the wind conditions) and NZS 6808. This was during a range of wind conditions and at different times of the day. The results are below.

Date	***Time***	***Location***	**$L_{A90(10min)}$**	***Wind conditions***	***Comments***
28/10/15	14.56	Nr 90 Pryde	31.2	Light-mod SW wind	Some audible noise mainly stock
	15.18	Nr 22 Pryde	33.7	Light-mod SW wind	Traffic audible from SH1
	15.34	Nr 110 Porteous	30.1	Light-mod SW wind	Not much audible noise
4/11/15	21.17	Between 90 and 139 Pryde	17.6	Calm	No audible noise
	21.31	Nr 22 Pryde	26.1	Calm	Some traffic audible from SH1
	21.38	Nr 110 Porteous	23.2	Calm	No audible noise
12/11/15	06.54	Between 90 and 139 Pryde	36.1	Moderate SSW	A little traffic audible
	07.08	Nr 22 Pryde	38.7	Moderate SSW	Traffic audible from SH1

Of the locations monitored all have extremely low background noise levels except 22 Pryde Road, which is affected by noise from the state highway. Existing noise levels are very low especially at night and in low wind conditions. However, a moderate wind will significantly increase background noise levels. The wind speed at which these turbines operate is not clear from the application but is likely to be quite an important factor because if the turbines do not operate at low wind speeds the nuisance effects may be minor.

Given the technical nature of wind farm noise modelling it is suggested that this application be reviewed by an acoustic expert as discussed. From my evaluation of the application and NZS 6808 I think it would be useful to seek an opinion on the following areas;

1. Are predicted noise levels created by the wind turbines and the 35 dB L_{A90} contour likely to be a realistic estimation?

2. Is the estimated background daytime noise level of 36 dB LA90 realistic and how will this relate to the night-time background?

3. The acoustic assessment suggests there is not likely to be any effects from low frequency noise or tonality associated with these turbines. Is this likely to be the case?

4. NZS 6808 refers to a limit of 40dB LA90 for noise received at sensitive dwellings. Is this an appropriate limit in this location or could the area be considered to be high amenity as per 5.3 of NZS 6808 given low background sound levels and if so what limit would be appropriate?

5. To what degree is the effect of wind likely to 'mask' the noise of the wind turbines? Could the turbines perhaps only cause a noise nuisance at certain wind speeds meaning that wind-speed limits on the operation, at certain times of the day may be required?

6. Would the conditions suggested by the applicant to address any noise nuisance be adequate? Are any other conditions considered necessary?

Carlo Bell
ENVIRONMENTAL HEALTH OFFICER

DUNEDIN CITY COUNCIL
Kaunihera-a-rohe o Otepoti

Memorandum

TO:	Darryl Sycamore, Planner
FROM:	Grant Fisher, Transportation
DATE:	19 January 2015
SUBJECT:	**LUC-2015-469**
	147 CHURCH ROAD, MERTON

I have considered the application to establish and operate a community wind farm on the property addressed **147 Church Road, Merton**. The site is zoned **Rural**, and is accessed via Porteous Road (classified as a **Local Road**).

Application:

The proposal is to establish and operating three wind turbines on Porteous Hill, near Warrington. Construction of the wind farm will require improvement of the State Highway 1/Porteous Road intersection, and Porteous Road itself.

Road Access:

The site is accessed via State Highway 1, and Porteous Road. The NZTA have provided a written submission and are neutral toward the application, though they do recommend several conditions be imposed should consent be granted. These are summarised as:

1. The State Highway 1/Porteous Road intersection will need to be upgraded to enable swept paths for construction vehicles. Plans for the intersection upgrade, designed by a suitably qualified person, shall be submitted to the NZTA for approval.
2. An approved traffic management plan to work within the State Highway corridor is required for physical works on the State Highway 1/Porteous Road intersection.
3. An approved traffic management plan is required for the transportation of wind farm components to the site.
4. The applicant should repair any damage that has occurred to the transport network as a consequence of transportation of wind farm components to the site.

Transportation is supportive of the conditions recommended by the NZTA.

A transportation route survey, prepared by Fulton Hogan and submitted with the application, has been undertaken to assess the feasibility of using Porteous Road to transport construction materials to the site. It is based on a swept path assessment of the existing road geometry, and Fulton Hogan has identified a number of improvements that will be required to Porteous Road in order to provide for the expected heavy construction traffic. In principle Transportation have no objection to the improvements to the road, and our requirements for works being undertaken within the road are quite similar to those of the NZTA. Our requirements for these works are contained within the recommended conditions, should consent be granted, below.

The specific site access, between the Porteous Road carriageway and the property boundary, shall meet District Plan requirements (details provided within Section 3.1 (Access) of the application suggest that this will be the case). It should be advised that the vehicle access, from the carriageway to the property boundary, is over legal road and is therefore required to be constructed in accordance with the Dunedin City Council Vehicle Entrance Specification (available from Transportation).

Construction/Traffic Management:

Construction traffic associated with construction of the wind farm will impact on the functionality of the Council's transportation network, given the size of vehicles required to transport wind turbine components. A traffic management plan will therefore be required in order to ensure the transportation network can operate safely, and a consent condition relating to this is included, below.

While there will be reasonably significant traffic movements to and from the site associated with the construction period (page 29 of the application), there are expected to be minimal long-term effects on the transportation network as a consequence of wind farm operations. As such, Transportation considers traffic generated by the proposal to have no more than minor impact on the transportation network, subject the traffic management plan being in place during the construction period.

Any damage to the Council's transportation network, as a consequence of transportation of construction materials and components to and from the site, shall be repaired at the applicant's expense.

Conclusion:

Transportation considers the proposal to have no more than minor impact on the safety/functionality of the transportation network, subject to the following:

Conditions:

In addition to the recommendations of the NZTA, the following conditions are recommended.

(i) Engineering plans prepared by a suitably qualified person, showing the full details of the construction of all roading improvements (including Porteous Road), shall be submitted to and approved by the Group Manager Transportation prior to construction.
(ii) Upon completion of construction of the roading improvements, all works shall be tested to demonstrate that they meet the acceptance requirements of the DCC Code of Subdivision and Development.
(iii) Upon completion of all of the roading improvements, the works shall be certified as having been constructed in accordance with the approved plans and specifications.
(iv) A traffic management plan shall be submitted to, and approved by, Transportation, regarding the transportation of construction materials and components to and from the site. The traffic management plan shall be approved prior to these works commencing.
(v) Any damage to the Council's transportation network, as a consequence of transportation of construction materials and components to and from the site, shall be repaired at the applicant's expense.

Advice notes:

(i) The specific site access shall meet District Plan requirements. It should be advised that the vehicle access, from the carriageway to the property boundary, is over legal road and is therefore required to be constructed in

accordance with the Dunedin City Council Vehicle Entrance Specification (available from Transportation).

Grant Fisher
Planner/Engineer
Transportation

Darryl Sycamore

Subject: FW: Request for preliminary comments on a community windfarm proposal- LUC 2015-469

Attachments: Google Earth Pro 8102015 83201 a.m..bmp.jpg; Google Earth Pro 8102015 84424 a.m..bmp.jpg; Google Earth Pro 8102015 40136 p.m..bmp.jpg

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From: Z1649206 MWH Hazards Team [mailto:SM-AP-NZ-MWHHazardsTeam@mwhglobal.com]
Sent: Thursday, 8 October 2015 4:05 p.m.
To: John Sule
Subject: RE: Request for preliminary comments on a community windfarm proposal- LUC 2015-469

Hello John

We have assessed the application in relation to the hazard register, street files and available aerial photography. We have not visited the site.
We have the following comments to make regarding the application.

Proposal
The proposed activity is to construct 3 wind towers on Porteous Hill,

Hazards
The property includes a number of landslide movement features; however the actual tower locations are situated within an area not marked for landslide instability (areas mapped by GNS 2014 The hazard significance of landslides in and around Dunedin City shown pink boundary, and light-yellow infill on the attached image)

Global Setting
Underlying geology on Porteous Hill comprises Olivine Basalt and Nepheline Dolerite lithology from the second main eruptive phase.
This lithology is underlain by Burnside Mudstone, which outcrops further downslope
Whilst Porteous Hill is formed of relatively high strength lithology, the underlying burnside mudstone are extremely weak, and the entire Seacliff-Kilmog area is significantly affected by features of prior movement, as noted by M.L. Stout Aug 1971 (excerpt shows a 3d view with the local ancient features close to foundation of the northern tower)
Generally the towers are distant from any "recent" landslide features, but it is worth noting that the northern-most tower lies within 20m of an "ancient landslide boundary".

Earthworks / Excavations / Retaining Structures
Earthwork is not likely to be significant to construct the tower foundations

Discussion
There are general potential instabilities of concern associated with developments on the Kilmog, but it appears that the general area of Porteous Hill proposed for locating the towers is free from mapped instability, and is underlain by relatively strong second main phase eruptive volcanic lithology.
The proposal will not create or exacerbate instabilities on this or adjacent properties

Advice
The general Seacliff / Kilmog area is ridden with significant ancient and active landslide features. Notwithstanding this, Porteous Hill is a relatively stable area of second phase eruptive basalt and dolerite.
We recommend that the application not be declined on the basis of natural hazards

Regards
Lee Paterson

MalcolmHuntAssociates
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Date of Issue:	**30 November 2015**
Client Name:	**John Sule** Senior Planner, Dunedin City Council PO Box 5045 Dunedin
Project Reference:	130701b-MHARvw
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Document Prepared By:	Lindsay Hannah and Malcolm Hunt

Review of Acoustic Assessment

Blueskin Wind Cluster Dunedin

1.0 Introduction

Malcolm Hunt Associates [MHA] have been commissioned by Dunedin City Council [the Council] to provide a peer review of an acoustic assessment report provided by Chiles Limited regarding a proposed 3 turbine wind farm proposed for a rural site in the vicinity of Blueskin Bay, north of Dunedin.

The Chiles acoustic review has been prepared on behalf of the Applicant 'Blueskin Resilient Communities Trust' [BRCT]. In undertaking our review we have considered the following documents:

- *Chiles Limited Acoustics Assessment Report No 130701b dated 13th September 2013, prepared by Dr Stephen Chiles Principal Acoustic Engineer of Chiles Limited [herewith "the Chiles Report"].*
- *Dunedin City Council Environmental Health Officer Carlo Bell Memorandum of Noise and Health Effects prepared by dated 13th November 2015.*
- *Supporting documents including [but not limited to] information regarding the proposed Gamesa Wind Turbine Generator and WindFarmer Prediction software etc.*

Malcolm Hunt Associates two authors are qualified to undertake this review being widely experienced with wind farm noise in New Zealand. Malcolm Hunt was a member of the NZ Standards committee that developed the NZ Standard NZS6808:2010 Acoustics – *Wind Farm Noise* and has published papers on this subject. Malcolm Hunt Associates have been involved in preparing resource consent applications for wind farms and have carried out noise readings at a number of wind farms both in New Zealand and overseas.

2.0 Purpose of Review

This desktop acoustic review considers the Dunedin District Plan and related noise criteria including consistency with the procedures and criteria recommended within New Zealand Standard NZS6808:2010 Acoustics – *Wind Farm Noise*. NZS6808:2010 sets out recommended noise assessment methods that are intended to be applied nationally on a consistent basis, and represent current best practice.

3.0 Review

3.1 Receiver Locations and Surrounding Noise Sensitive Environment

As stated in the 'Introduction' section of the Chiles Report, the Applicant BRCT, plan to develop a proposed wind cluster in the vicinity of Blueskin Bay, Dunedin. The project is for three wind turbine generators to be installed on Porteous Hill.

The locations of the proposed wind turbines and the nearest residential neighbors is clearly shown in **Figure 1** of the Chiles Report, reproduced as follows as **Figure A.**

Figure A: Wind turbine generators and receiver locations as set out in Chiles Report.

The Chiles Report provides information on the local receiving environment including location of existing rural residential dwellings.

As part of our desk top review we have verified the distances provided based map co-ordinates provided and available aerial imagery. We note that without actually visiting the site and undertaking our own GPS coordinates this information appears to be accurate. We provide the following sample in **Table A** which is based on our analysis and review of the distance between Turbine 1 and No 90 Pryde Road.

	Northing Co-ordinate	Easting Co-ordinate
Turbine 1	2321570	5499259
90 Pryde Road	2321726	5499703
Chiles Acoustic Review	471m [distance between T1 And 90 Pryde Road]	
MHA Peer Review	471m [distance between T1 And 90 Pryde Road]	

Table A: Sample Analysis of distance between source [wind turbine 1] and receiver [90 Prude Road].

As indicated in **Table A** we arrive at the same distance calculation as in the Chiles Report, nothing that the distances provided in the Chiles report are worst case 'as the crow flies' from the base of the turbine to the dwellings adjacent.

3.1 Wind Turbine Generator Model

The 'Sound Level Predictions" section of the Chiles Report is based on the 'Gamesa G58 850kW' wind turbine generator although this referred to as an "indicative" type of turbine, incoating other models could be employed. We consider there are some risks of increased noise effects if the noise assessment is based on an 'indicative' model of wind turbine, when subsequently a noisier turbine is finally installed. In that case a condition of consent would be required that the consent applies to a model of wind turbine with a similar or lesser noise rating [in terms of sound power level, sound power curve and sound spectrum].

The Chiles Reports states the sound produced by a Gamesa wind turbine under normal operation does not possess special audible characteristics. Manufacturers generally ensure modern turbines are designed not to possess such characteristics; however there is always some small risk of unusual sounds arising during wind turbine generator operation. Section 5.4 of NZS6808:2010 discusses special audible characteristics of wind turbine sound and provides a method for accounting for the additional noise annoyance such turbine sounds can produce. Thus, the issue of special audible characteristics can also be dealt with via conditions of consent.

3.2 Dunedin City Plan Noise Rules

The 'Criteria' section of the Chiles Report notes that the proposed wind cluster and neighboring houses are located in the rural zone. The generally applicable rural noise performance standards are set out in Rule 25.1. There are no specific reference to wind farm noise limits in the Operative Plan. We agree with the Chiles report which states at paragraph 4: ***'The requirements of Rule 21.5.1 do not allow for the measurement and assessment of sound in the presence of significant wind, which is inherently present when a wind turbine is operating. Therefore these noise limits cannot be directly applied to the proposed wind cluster. It is considered that due to these technical constraints, it would be appropriate to apply the criteria in New Zealand Standard NZS 6808 Acoustics – Wind farm noise to this proposal'.***

We agree NZS 6808:2010 is the appropriate standard to apply. The Chiles Report correctly observes Council's Second Generation Plan [2GP] for Dunedin refers to the use of NZS 6808:2010 as a performance standard for the assessment of noise from wind turbines. Overall we support the proposition of the Chiles Report that noise associated with the proposed wind turbine development should be assessed using NZS 6808:2010 which provides methods for the prediction, measurement, and assessment of sound from wind turbines.

3.3 Noise Modelling and Inputs

The Chiles report sets out acoustic modeling of expected wind farm noise in accordance with NZS6808:2010 and Standard ISO 9613-2:1996. We agree these methods provide results for 'light downwind conditions in all directions simultaneously' as a worst case condition for noise assessment purposes.

Prediction results quoted in the Chiles Report are without terrain screening, which allows for a conservative assessment. The predicted wind farm sound emission levels are therefore worst case as they assume all wind turbine generators operating simultaneously and continuously at maximums rated sound power levels, a not unreasonable scenario.

We note that NZS 6808:2010 only requires assessment of 95% of maximum rated sound power, regardless the difference between 100% and 95% rated sound power is generally only small in terms of noise output [with 1 dB].

Figure 2 Predicted sound levels

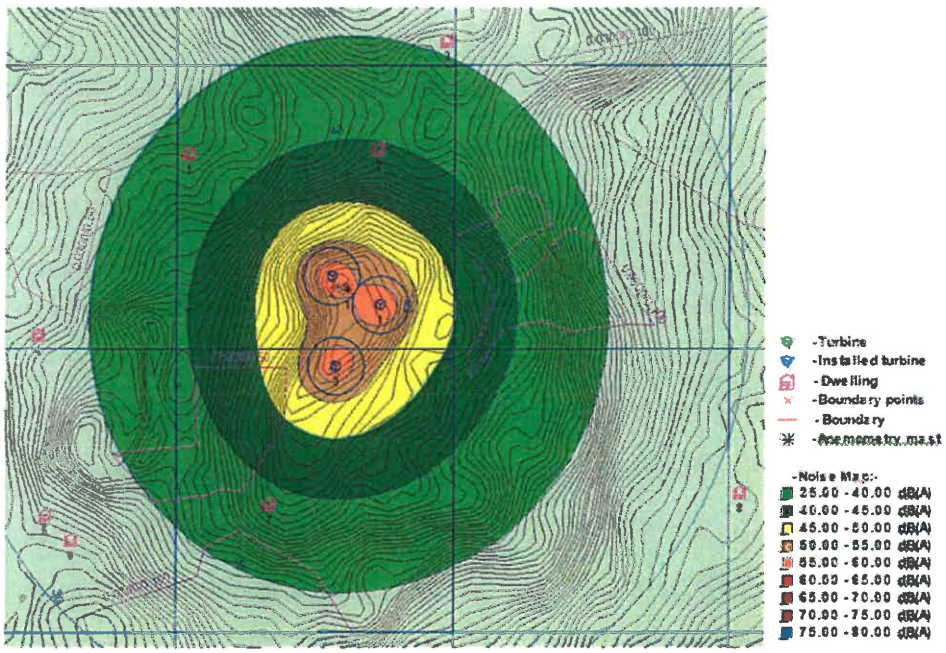

Figure 2: Predicted worst case wind turbine generators noise emission and adjacent receiver locations as set out in Chiles Report.

Overall we consider the noise modeling methods to be reasonable and the output reasonably reliable as an estimate of future cumulative noise emitted from the site.

3.3 Received Noise Levels

NZS6808:2010 Acoustics – *Wind Farm Noise* requires background noise levels to be measured at the closest relevant receiving locations, with these receive delves compared to the noise limits recommended within NZS6808:20101 as part of the noise assessment to be undertaken prior to the wind farm being developed.

NZS6808:2010 recommends the cumulative wind turbine sound should not exceed 40 dB OR the average background noise level + 5 dB, whichever is the greater of the two. Thus, the measurements to determine the "average background sound level" are an important input into the assessment of potential noise effects.

In our view the assessment of noise based on a comprehensive record of background sound levels at the most affected site[s] becomes critical consideration where the "second limb" of the NZS6808:2010 criteria applies [average background sound level plus 5 dB]. The Chiles report confirms one receiver location is expected to receive cumulative turbine sound at levels above 40 dBA at Site 2 [90 Pryde Road].

Regarding this receiver site exceeding 40 dBA the Chiles Report 'Assessment' section states: ***"From our experience at other wind farms, it is likely the daytime background sound will be at least 36 dB L_{A90} during this wind farm operation, which would result in compliance with the 'background + 5 dB' noise limit. Therefore, at all locations it is expected the wind cluster would comply with the NZS 6808 noise limit of 40 dB L_{A90} or the background sound plus 5 dB."***

We have received recently collected measurements of L_{A90} background sound pressure levels collected in the area. This data measured by Council's Environmental Health Officer Carlo Bell indicates background sound levels exceeding 36 dBA around 7.00am on 12th November when conditions were windy enough for the turbines to be operating[1]. The predicted sound level set out in the Chiles report for this location was 41 dBA. Taking the measured [single sample] of L_{A90} and allowing for wind farm sound to occur at a maximum of 5 dB over the background sound level [as per NZS6808], there exists a very real risk the wind farm sound would exceed "background plus 5 dB".

Regarding this potential non-compliance with the NZS6808:2010 criteria we have identified the Chiles report states this would not be a problem as ***"In the event there was non compliance at a location, such as at night, the wind turbines could potentially be programmed to reduce the sound levels (at the expense of power output) to maintain compliance with the noise limits."***

The assumption is that the resource consent be granted, that monitoring take place once the wind farm is installed, and if monitoring demonstrates non-compliance, then the consent holder will develop methods to reduce noise until compliance is achieved.

4.0 Findings

With respect, we reject the approach recommended in the Chiles Report where compliance with NZS6808:2010 is to be checked retrospectively with actions taken to rectify any non-compliance once the wind farm is constructed and operational. This is not acceptable as it may involve the community suffering extra [non-compliant] noise during any commissioning / monitoring phase immediately following construction of the turbines.

While we are reasonably accepting of the Chiles report and its assessment, we cannot agree that potential adverse noise effects would be suitably addressed using the post-construction compliance assessment approach recommended in that report.

[1] Wind data supplied to Council indicates wind speeds at the turbine hub height of 7m/sec to 8 m/sec at the time background sound levels were measured. This means the turbine would be operating close to maximum output at this time, yet the measured background sound level was only 36 dBA.

We consider Council needs to be informed on all aspects of potential non-compliance and be satisfied the noise criteria of NZS6808:2010 are fully complied with prior to issuing resource consent to establish and allowing the wind farm to operate.

Section 7.0 of NZS6808:2010 provides for "on/off testing" of wind farm noise once the wind farm is operational. However this option is only recommended for sites away from sensitive receivers where there is a high degree of compliance with the recommended noise limits. This is not the case with the Blueskin Wind Cluster where at least one receiver is expected to receive turbine sounds at levels above 40 dBA.

NZS6808:2010 Section 7.1.2 states "on/off testing" may be selected for post-construction compliance assessment subject to the recommendation at clause 7.1.4 where "on/off" wind farm noise testing can be justified where wind farm sound levels of 35 dB $L_{A90(10\ min)}$ or higher are predicted for noise sensitive locations. Table 4 of the Chiles report refers to THREE sites where predicted cumulative wind farm noise is likely to be received at 35 dB or more. These locations are;

1. 22 Pryde Road;
2. 90 Pryde Road; and
3. 100 Porteous Road

On this basis we do not accept an adequate assessment of noise effects has been provided within the Chiles report, provided at Appendix D to the application. Instead we recommend the Applicant conduct the necessary background sound levels monitoring and subsequent analysis at selected receiver locations and to provide this information to Council as part of a revised noise AEE. This is the recommended approach of NZS6808:2010 where wind farm sound levels are likely to exceed 35 dB $L_{A90(10\ min)}$ at any sensitive receiver site [which, as above, is the case here for three receiver sites]. It is acknowledged that this recommended approach does require extra field work [NZS6808:2010 recommends a minimum of 10 days continuous monitoring of background sounds levels which is not a trivial undertaking) across a suitable range of data wind speeds and directions, however this extra data will provide a far more robust assessment of potential wind farm noise effects prior to the wind farm being constructed, compared to the approach taken in the Chiles report.

5.0 Vibration

The Chiles Report does not provide any assessment of operational vibration in regards to the operation of the wind turbine generators. From what we have learned, potential ground borne vibration appears too unlikely to be perceptible beyond the boundary of the wind farm; however this should be confirmed by the Applicant's own investigations.

6.0 Construction Effects

The Chiles Report does not provide an assessment of construction noise or vibration effects. NZS6808:2010 references NZS6803:1999 *Acoustics - Construction Noise* for the assessment of temporary construction noise. Further, Section 1.8 of NZS6808:2010 specifically states that NZS6803:1999 shall be adopted to assess temporary construction noise. *Appendix A* Section 2.0 of NZS6808:2010 discusses possible consent conditions for construction work for wind farms.

While minimal information is available on potential construction effects, any construction noise or vibration effects are likely to be negligible from this project.

7.0 Recommended Noise Conditions

The Chiles Report under the title 'conditions' states recommended 'conditions are based on the examples included in NZS 6808'. Although we support the conditions in principal, until such time that further information on background sound levels expected at various noise levels emitted during wind farm operation, we do not support the quoted conditions and reserve comment on recommended conditions for the time being.

8.0 Conclusion and Recommendations

On behalf of Dunedin City Council, *Malcolm Hunt Associates* have undertaken a peer review of the noise assessment report by Chiles Acoustic regarding a proposed new 'wind turbine cluster' to be located in Blueskin Bay, Dunedin.

Based on our desk top review we concur with the information provided by in the application regarding the physical properties of the proposed activity, assessment criteria, wind turbine generator modelling inputs and predicted noise emission levels appear to be reasonable and fair.

However at this time we do not concur with the Applicant's assessment that compliance with NZS6808:2010 Acoustics – *Wind Farm Noise* will be achieved at all times and all noise sensitive locations will be adequately protected from the adverse effects of noise.

This is chiefly due to the fact that no comprehensive record of background sound levels matched to expected wind farm sound levels has been provided for any of the nearby receiver sites, as is typically recommended within NZS6808:2010. Instead it appears the applicant is seeking to confirm compliance post-construction using the "on/off testing" even though expected noise levels do not fall within the accepted range where compliance can be more or less guaranteed.

Malcolm Hunt Associates
30 November 2015

Document Sign off:

Lindsay Hannah MASNZ. MNZEIH Consultant	**Malcolm Hunt** MASNZ. MNZEIH Principal Acoustic Consultant.
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---DOCUMENT ENDS---

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23 December 2015 Project No. 1547458-001-L-Rev2

John Sule, Senior Planner
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ECOLOGY REVIEW: LUC-2015-469 – BLUESKIN WIND FARM

Dear John

This letter[1] outlines the findings of our review of the ecological assessment submitted with resource consent application LUC-2015-469 for a three turbine wind farm proposed to be contructed at Blueskin Bay, Otago (Lots 1 and 2 DP 473199 and OT 646829).

Background

Blueskin Energy Limited (BEL; the applicant) has submitted a resource consent application for the establishment and operation of a three turbine wind farm on a 24 hectare property at Blueskin Bay. Proposed wind farm construction activities include the extension of the access road, excavation and development of turbine foundations, erection and commissioning of turbines, installation of a grid connection and site reinstatement. The turbines will be operated to generate electricity, supported by ongoing operations and maintenance activities onsite.

Scope

An ecological assessment was submitted with the resource consent application and requires review. The scope of this review is:

1) Carry out a peer review of the ecological assessment submitted with the application.

2) Recommend appropriate condition(s) of consent.

The document reviewed in the preparation of this letter is:

- Dixon, M.; Mitchell, R. No Date. Blueskin Resilient Communities Trust – Ecological Assessment of Environmental Effects. Appendix E, AEE.

Aspects of the Assessment of Environmental Effects (AEE) were reviewed to gain an understanding of the project background and proposal details. The reference for the AEE is:

- Blueskin Energy Limited. 2015. Blueskin Wind Farm – Assessment of Environmental Effects and Resource Consent Application, October 2015.

[1] This report is provided subject to the limitations in Attachment A.

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Review

The submitted ecological assessment is a five page document that provides an ecological description of the wind farm site, a description of potential ecological effects, an analysis of potential bird strike magnitude and significance, and a conclusion. The document's structure and content do not follow any of the formats typically used for ecological assessments conducted in New Zealand. Examples of departures from standard ecological assessment reporting practice include:

- The document is undated.
- The document lacks sections covering scope, objectives and methodologies.
- Criteria for assessing ecological significance and severity of effects were not applied correctly.

Ecological assessments typically work through the various aspects of ecology (vegetation, aquatic environments, birds, herpetofauna, bats, etc.) providing details of methodology and results for each aspect. The next step is typically an assessment of the ecological significance of the species, flora/fauna communities and ecosystems present. The potential adverse effects of the project on the ecological values identified would then be assessed. Any areas of uncertainty would also be highlighted in the effects assessment. The final step is to recommend appropriate measures to avoid, mitigate, offset or compensate for any significant adverse ecological effects identified. The submitted ecological assessment does not clearly set out the assessment process applied therefore it is unclear whether the conclusions and recommendations are robust.

While there is no compulsory process for assessing ecological effects in New Zealand, widely accepted guidelines are freely available for use by ecology practitioners. For example, in March 2015 the Environment Institute of Australia and New Zealand (EIANZ) released the ecological impact assessment guidelines for New Zealand[2]. While voluntary, the guidelines have set the standard for ecological assessment in New Zealand and have been widely adopted by professional ecologists in New Zealand. The EIANZ guidelines outline the following key steps in the process for assessing ecological effects:

- Scoping
- Detailed investigations
- Assessment of effects
- Impact management and mitigation
- Monitoring

In this case the assessment excluded the key step of detailed investigations. More specific guidance was provided in June 2013 by the New Zealand Wind Energy Association who produced a framework for best practice wind farm development in New Zealand[3]. The document outlines a staged process that an ecological assessment for a wind farm development should follow. The recommended stages are:

- Level 1: Preliminary site evaluation and site sensitivity analysis
- Level 2: Site-wide investigation
- Level 3: Population-level studies
- Level 4: Post-construction monitoring

The assessment process followed in this instance does not meet the requirements for investigations for any of the four levels.

[2] Environment Institute of Australia and New Zealand. 2015. Ecological Impact Assessment (EcIA) – EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 100 p. (Downloaded from http://www.eianz.org/resources/publications/ecological-impact-assessment-guidelines-for-new-zealand)

[3] New Zealand Wind Energy Association. 2013. Wind farm development in New Zealand – a framework for best practice. 36 p. (Downloaded from http://www.windenergy.org.nz/store/doc/WindFarmDevelopmentinNZ_AFrameworkforBestPractice.pdf)

The ecological assessment was mainly focused on assessing the effects of wind farm on native bird populations. The assessment's focus on potential effects on native birds is appropriate given that the project will have relatively small construction and operational footprints (2 hectares and 0.3 hectares respectively), and the duration of construction will be relatively brief (approximately six months). However, while the focus on birds is warranted, the potential effects of the project on other fauna groups (e.g., bats and lizards) should also have been considered.

A site visit was conducted by one or both of the authors but no mention is made of any field-based methodologies applied while onsite. On that basis the assessments of ecological significance and effects are assumed to have a high level of uncertainty, and may be based entirely upon desktop investigation methods. Significant habitats for migratory native bird species are present within a few kilometres of the site (e.g., Blueskin Bay) therefore a desktop-only assessment is not considered adequate.

Where there is a risk of significant migratory bird species being adversely affected by a wind farm it is appropriate to determine whether the proposed wind farm site is on a migration route. Identifying migration routes requires intensive research that accounts for annual and climatic variation. Birds may not necessarily follow the same route every year and the height of migration flight may vary due to local climatic factors. For example, if migration occurs during a period of low cloud the birds may fly at a lower altitude potentially increasing the risk of collisions with turbines.

The assessment concludes that "the predicted adverse effect will be minor or less than minor" and recommends that baseline data on bird usage should be gathered during the pre-construction and/or construction phases. Given that no site-specific ecological investigations were carried out, and that there is uncertainty around ecological effects potentially arising from the factors mentioned, it appears that there are insufficient grounds for arriving at the conclusion reached by the authors. Further, there is a risk that there may be no means available for managing any actual or potential significant adverse ecological effects identified from baseline data gathered during the pre-construction and/or construction phases. For example, factors such as the type, size and locations of turbines are likely to be finalised during the pre-construction phase thereby precluding any possibility of making adjustments in response to findings that merge the baseline ecological data.

Despite the limitations of the assessment, post-construction monitoring at operational wind farms to date has shown that the adverse ecological effects, including effects on native bird populations, have been relatively minor. The wind farm proposed is much smaller than the wind farms where post-construction monitoring has been carried out. On that basis it is unlikely that detailed site-specific investigations would generate information that would cause sufficient concern to preclude the construction and operation of a three turbine wind farm as proposed. Therefore, rather than request that a detailed ecological investigation is completed prior to granting consent, it is considered acceptable to manage uncertainty around ecological effects through conditions of consent as recommended below.

Recommended conditions of consent

Ecology

A detailed Ecological Assessment prepared by a suitably qualified ecologist shall be submitted to the City Planning Team Leader no less than four weeks prior to the commencement of works. No works (vegetation removal, earthworks and construction) shall commence prior to the approval of the ecological assessment. The ecological assessment shall include, but not necessarily be limited to, the following:

- A detailed assessment of ecological effects on bird populations including:
  - Baseline surveys and habitat assessments of local bird populations including migratory species that occur in the wider area
  - An assessment of whether the site is on a migration route for any native bird species
- A lizard survey and habitat assessment (designed and carried out by a DOC-permitted herpetologist)
- A bat survey and habitat assessment

If the detailed ecological assessment identifies any significant potential ecological effects the an Ecological Management Plan (EMP) prepared by a suitably qualified ecologist shall be submitted to the City Planning Team Leader no less than four weeks prior to the commencement of works. No works (vegetation removal, earthworks and construction) shall commence prior to the approval of the EMP. The EMP shall include:

- Advice on turbine locations, positioning and features (e.g., ability to curtail start-up speeds) as appropriate for minimising potential bird strike at the site.
- A Lizard Management Plan (LMP) if native lizards or lizard habitat are detected during the survey.
- A Bat Management Plan if native bats or bat habitat are detected during the bat survey.
- Details of any other ecological monitoring and/or mitigation considered appropriate by the suitably qualified ecologist.

Advice note: the EMP may provide constraints on the location, type and features of the turbines that will need to be incorporated into the final design and construction of the wind farm.

Conclusion

Based on the ecological information submitted, and subject to the inclusion of the consent conditions recommended above, the overall ecological effects of the proposal can be managed appropriately.

We trust that this addresses the points raised in the scope of engagement. If you have any questions regarding the content of this letter, please do not hesitate to contact the undersigned.

Yours sincerely

GOLDER ASSOCIATES (NZ) LIMITED

Simon Chapman
Group Leader - Water Management & Ecology

SC/MN/dj

Attachment A: Report Limitations

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Attachment 1

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