

Blueskin Resilient Communities Trust – Ecological Assessment of Environmental Effects

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Description of project proposal

Refer to the general project description.

Ecological description of the wind farm site and its surrounding area

The land title within which the wind farm is located ('the site') covers 38 hectares spread over an altitude range of 380 – 401 m a.s.l. The site is situated on one of the geologically isolated peaks of volcanic origin scattered through the Waikouaiti Ecological District, part of the Otago Coast Ecological Region (Mc Ewen 1987). The landforms are hill top (Porteous Hill summit) and hill slope with variable aspect and slope.

A field visit was undertaken on the 10th July 2013. The site is subject to intensive pastoral land-use; the land cover is mostly improved pasture, with some areas of rough pasture present on the steeper ground. There is no native vegetation cover or native fauna habitat remaining at the site, with only a few isolated individuals of native ferns and shrubs persisting among the rocks directly below the summit of Porteous Hill. Therefore, using the Dunedin City District Plan Schedule 16 criteria for assessing ecological significance, the site is not ecologically significant.

LENZ Land Environment classifications summarise the environmental conditions prevailing across the land surface of New Zealand. These environmental conditions are the main drivers of the potential natural ecosystem type, and therefore the biodiversity potentially present, at any given site. The LENZ level IV environments (MfE 2002) represented at the site are Q4.1d (at the very hill top) and Q4.3d (surrounding the hill top). Generically, these two environments are characterized by a cool climate, with low solar radiation (due to the southerly latitude of the site and its close proximity to the coast), and there are moderate vapour pressure deficits and low annual water deficits operating. Relatively small scale gradients in drainage, soil type and temperatures at the site govern the two specific Level IV classifications present.

The natural vegetation cover (probably in existence until early European settlement) at the site would have been a mixture of coastal hill forest associations dominated by trees such as Hall's totara, kowhai, ngaio, lacebark, ribbonwood, and matai.

Biodiversity threat categories (Landcare Research 2007) are assigned to each Level IV Land Environment on the basis of the sum of native vegetation cover remaining among all occurrences of each Land Environment type; the Q4.1.d type is classified as 'chronically threatened' (c. 15% native vegetation remaining), and the Q4.3d type is classified as 'at risk' (c. 23% native vegetation remaining). Because there is no significant native habitat remaining at the site, these threat categories do not apply; however, if any habitat restoration were to take place, these classifications give guidance as to the relative importance of any habitat re-created.

There are several nearby areas of conservation interest to the proposed wind farm site. Approximately 500m NE of the site lies a regenerating forest fragment of c. 10 ha which does not currently feature on the Dunedin City District Plan Schedule 25.4 list of Areas of Significant Conservation Value (ASCV), but which appears from a distance to be a potential site of significance. There are three further nearby areas of significant natural habitat to the site which do feature in the ASCV list. These are: 1) Careys Creek Conservation Area, an extensive stand of regenerating inland forest dominated by broadleaf and kanuka associations situated c. 3km to the SW of the site; 2) Seacliff Scenic Reserve, a fragment of regenerating coastal bush dominated by kowhai, matai, broadleaf, kahikatea and totara and situated c. 3km to the NE of the site; 3) Blueskin Bay, an estuarine wetland classified as a 'Wetland of Regional Importance', and possessing multiple significant ecological values, is situated c. 3km to the south. Blueskin Bay is a mosaic of mudflat, salt marsh, reed swamp and succulent herb swamp habitats which provides regionally significant habitat for a variety of resident and visiting coastal bird populations, some of which are threatened species. Other potential and unconfirmed proximal sites of possible conservation significance would be any breeding sites of coastal or oceanic bird species on the cliffs of the coast north of Warrington Beach, and there are potential plans to reintroduce cliff nesting sea-birds such as the titi (sooty shearwater) along this stretch of coast.

Description of potential ecological effects

There are three potential pathways for direct ecological effects to result from the development; ground vegetation disturbance, sediment transport as a result of ground disturbance, and mortality of birds as a result of either electrocution or being struck by rotating turbines. These potential effects are dealt with in turn.

The part of the site affected by the wind farm development is approximately 2ha in size with a ground infrastructure footprint within this area of 0.3ha. This footprint comprises ground disturbance associated with roading and turbine platforms. After pasture-cover restoration the ground footprint would cover only 28 square metres. The replacement of pasture with wind-farm infrastructure will have no direct ecological effects because the lack of natural habitat currently present at the site means none will be cleared.

There is a possibility of sediment transport into the local streams, however, given the relatively small scale of total surface disturbance (c. 0.3 ha), the proposed construction and mitigation methods detailed in Section 3, as well as the distance of the disturbance zones from streams, this potential effect is judged to be less than minor with a low likelihood of occurrence.

The most important potential adverse effect is that upon local birds, and especially those of conservation importance. Since the site itself does not contain significant habitat for either feeding or breeding of native birds, there will be no bird habitat loss associated with the development. Therefore, the potential adverse effects upon birds would be limited to impacts on local native bird population viability due to mortalities of any birds that may fly through or visit the site. Potential mortality causes due to the operation of the wind-farm infrastructure are: electrocution from either the three transformers or the c. 100 m of high voltage overhead cabling making the connection into the existing 33kV OtagoNet distribution line (most high voltage cabling will be underground); and, collisions with the three rotating turbines.

If the mitigation measures of flagging the overhead lines and positioning them perpendicular to the prevailing wind is undertaken then the likelihood of adverse impacts from electrocution will be much reduced (Erickson et al 2005), and considering the lack of adjacent habitat for significant

populations of native birds to the site as well as the limited extent of live infrastructure, this potential effect is judged to be negligible.

It is not possible to fully assess the potential adverse effects of turbine bird strike at this time, owing to the lack of data on the species, numbers, and use frequency of birds flying through the site. However, as a result of the analysis of available information, as detailed below, this effect is judged to be minor, at most.

Analysis of potential bird strike magnitude and significance

Bird strike monitoring data from other wind-farms in NZ and internationally are available to provide guidance on the likely magnitude of bird strike at the site.

The closest data to the site on bird strike risks are from Trustpower's Mahinerangi wind-farm beneath the Lammermoor Range in South Otago (Golder 2013), where bird strike monitoring was undertaken at twelve turbines over two years of their operation. Mahinerangi monitoring showed an average per annum bird strike rate of 1.1 birds per turbine, including adjustments for possible sources of underestimation (Strickland et al. 2011) as a result of either observer imperfection or scavenger activity. Whilst Mahinerangi is situated in a different environment from the Porteous Hill site, it does share the climatic phenomenon of being commonly in mist (a factor assumed to increase the risk of passing birds striking the turbine blades). Since the wind farm is situated within the normal adult home range of habitats suitable for eastern falcons (e.g. Careys Creek) potential does exist for falcons to use or pass through the site. Therefore it is of interest that at Mahinerangi several individuals of the local population of eastern falcon are known to regularly use the wind farm itself yet no incidences of falcon bird strike have been recorded there (despite there also being a programme of radio-telemetry monitoring of the falcons in addition to the general bird strike monitoring); indeed, falcons have been observed on several occasions to avoid the blades when flying through the wind farm turbine zone.

Other wind farms in New Zealand have reported higher estimates of bird strike, including a rate of 6 birds per turbine per year estimated by Boffa Miskell for the coastally situated West Wind wind farm in 2011. The difference in strike rates among wind farms is likely to be a function of the difference between the environments in which the wind farms are constructed, and thus differences in bird communities and relative abundances using the wind farm air-space.

A comparative study of bird strike at nine wind farms in the USA also helps put these two contrasting New Zealand statistics into context. In the USA study, the estimated strike rates per turbine per year ranged from 0.63 to 7.7 (Erickson et al. 2005), with five of the nine having estimates of < 2 birds per turbine per year.

On the basis of the experience at other wind farms cited, a reasonably conservative estimate of potential bird strike at the Porteous Hill site would be 3 birds per turbine per year. Whether or not this would be considered a significant adverse effect depends upon the species affected, and whether these numbers could pose a threat to population viability considering any other threats acting on the bird species in question.

Because the bird communities resident in a modified production landscape such as that surrounding Porteous Hill are likely to be dominated by introduced species, most of the

mortalities are likely to occur upon introduced species. Nonetheless, on the basis of local habitat availability, population records, and typical movement patterns, some species of conservation interest have a reasonable likelihood of occasionally using or passing through the site; these species include: the eastern falcon (*Falco novaeseelandiae*), the pied and variable oystercatchers (*Haematopus finschi* and *H. unicolour*), and, the black billed gull (*Larus bulleri*). The falcon and black billed gull are threatened species (Miskelly et al. 2008), with statuses of vulnerable and endangered respectively. Movement patterns for the black billed gull are unknown but its seasonal movements from the main breeding sites in Southland rivers to coastal feeding sites such as Blueskin Bay are very unlikely to involve Porteous Hill. Variable oystercatchers are not usually seen far from the coast, but will forage in paddocks, and occasionally nest a short distance inland, usually on mown or grazed grassy areas or bare ground. The pied oystercatcher is known to sometimes use coastal farmland areas adjacent to estuaries and lagoons to breed. As noted above, the wind farm is within the home range of known sites of falcon breeding and it is possible that falcons would use the site from time to time to feed. In addition, it is also conceivable that very occasional visits would be made to the site by other bird species of conservation from the Orokonui Eco sanctuary. Based on this general knowledge of movement patterns and the predicted magnitude of effect, a significant adverse effect on native or conservation concern species is unlikely to result from wind farm mortalities at the site.

Even though a significant adverse effect is thought to be unlikely, because bird usage of the site by native species and species of conservation concern is unknown, the precautionary approach would be to monitor bird usage of the site during the construction phase. The most time-efficient monitoring method would be to use the point-centred-count method for four five minute periods at a frequency of twice per month across one whole year, and alternating survey times of successive visits between the hour after dawn and the hour before dusk.

If significant numbers of native species of conservation interest are shown to be present at, or to be passing through the site, then in order to confirm bird strike rates and struck species identity, monitoring of the incidence of bird strike should be considered for a period of one year post-construction, and at a bi-weekly frequency. Such monitoring should be conducted by walking parallel transects 5-10 m apart (depending on ground visibility owing to vegetation cover and slope etc.) in order to search for carcasses in an area around the turbine bases that equals 1.5 times the diameter of the rotor blade sweep. International studies have shown this area to be inclusive of most fallen birds struck by a turbine blade, regardless of the turbine orientation (Orloff & Flannery 1982, Smallwood 2007).

If results of bird strike monitoring prove there to be an adverse effect, then strategies to offset the adverse effects should be considered. An effective strategy to offset any loss of individuals due to turbine strike would be predator control to improve the breeding success of local populations of the possibly affected species.

Conclusion

In conclusion, the only potential adverse ecological effect of the wind farm development of note is thought to be bird mortalities from turbine strike events. Based on previous studies of bird strike at wind farms in New Zealand and overseas, a conservative estimate of bird mortality rates at the Porteous Hill site will be an average of three per annum per turbine. Given this relatively modest predicted rate of total bird mortality and the likelihood that native species will be in the minority of those struck, the predicted adverse effect will be minor or less than minor. However, because populations of native birds of conservation interest do exist within a few kilometers of the site, and because the identity and frequency of bird species flying through the site are

unknown, it is recommended that the precautionary approach is taken of gathering baseline data on bird usage during the pre-construction and/or construction phases. Bird usage baseline data could then be used to make a decision on whether any bird strike monitoring, or extra mitigation/compensation measures are required.

References

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