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RMA considerations

1. TAG and FOTR submit that the Turitea wind farm application fails to comply with requirements of Section 6(c) of the RMA as it fails to protect areas of significant indigenous vegetation and significant habitats of indigenous fauna, including and not limited to *Brachyglottis kirkii* var. *kirkii*¹ and the New Zealand Falcon (karearea, *Falco novaeseelandiae*)². Furthermore this application also fails to comply with Sections 7(d) and 7(f) of the RMA as it fails to protect the intrinsic values of ecosystems and maintenance and enhancement of the quality of the environment, respectively.
2. As the Board of Enquiry members will be aware, Part 1, Section 2(1) of the RMA defines 'Intrinsic Values, in relation to ecosystems' as [emphasis added]:

'those aspects of ecosystems and their constituent parts which have value in their own right, including -

- (a) Their **biological and genetic diversity**; and*
- (b) The essential characteristics that determine an **ecosystem's integrity, form, functioning, and resilience**'*

and defines 'Environment' as [emphasis added]:

*'(a) **Ecosystems** and their constituent parts, including people and communities;'*

and defines 'Biological Diversity' as [emphasis added]:

*'means the variability among living organisms, and the **ecological complexes of which they are a part**, including diversity within species, between species, **and of ecosystems.**'*

3. We submit that the Turitea wind farm application also fails to comply with the Health (Drinking Water) Amendment Act 2007. In particular Section 69U [emphasis added]:

'69U Duty to take reasonable steps to contribute to protection of source of drinkingwater

'(1) Every drinkingwater supplier must take reasonable steps to—

¹ de Lange, P.J., Norton, D.A., Courtney, S.P., Heenan, P.B., Barkla, J.W., Cameron, E.K., Hitchmough, R., and Townsend, A.J. 2009. Threatened and uncommon plants of New Zealand (2008 revision). *New Zealand Journal of Botany* **47**. 61-96.

² Hitchmough, R., Bull, R., and Cromarty, P. 2007. New Zealand threat classification system lists: 2005. Science & Technical Publishing. Wellington, Department of Conservation

‘(a) contribute to the protection from contamination of each source of raw water from which that drinkingwater supplier takes raw water:

‘(b) protect from contamination all raw water used by that drinkingwater supplier.

‘(4) Examples of things that may, depending on the circumstances, constitute, or contribute towards, the taking of reasonable steps under subsection (1) include—

‘(c) contributing, directly or indirectly, to improved catchment management whether by planting of trees, promoting and assisting the use of integrated water resources management, or through other means.

4. It is our assertion that this application fails to protect specific aspects of the ecosystems associated with the Turitea Reserve (“the reserve”) and will impact negatively on the drinkingwater derived from the Turitea Catchment.
5. The applicant has applied for several resource consents from the local regional and territorial authorities. However, it is of note that from the summary of submissions document³ supplied to all submitters, the particular land use consent that generated the most opposition (74.8%) from submitters (page 46) was the:

Manawatu-Wanganui (Horizons) Regional Council land use consent number 104553: for vegetation clearance and land disturbance in rare or threatened habitats, near streams and on highly erodible land throughout the general wind farm site

Only 21% of submissions received were supportive of this land use consent.

Rare fauna and flora associated with the reserve

6. For example, *Brachyglottis kirkii* var. *kirkii* is described⁴ as being present at proposed turbine sites 0015 and 0019.
7. *B. kirkii* var. *kirkii* is described as ‘declining – data poor’ in de Lange *et al.*⁵
8. In the evidence of Mr Shaw⁶ he states that:

³ ‘Mighty River Power – Turitea wind farm project. Summary of Submissions, Ministry for the Environment, April 2009’

⁴ Evidence of Mr Shaw, Attachment WBS8 (page 101).

⁵ de Lange, P.J., Norton, D.A., Courtney, S.P., Heenan, P.B., Barkla, J.W., Cameron, E.K., Hitchmough, R., and Townsend, A.J. 2009. Threatened and uncommon plants of New Zealand (2008 revision). *New Zealand Journal of Botany* **47**. 61-96.

⁶ Mr Shaw evidence, para 56

*‘An ecologist should be present during the initial construction phase for all new roads and turbines in indigenous forest and scrub habitats to assess alignments, minimize vegetation impacts where possible, and to check sites for threatened plants (it may be feasible to move some plants or collect material for cultivation, e.g. *Brachyglottis kirkii*).’*

9. The moving or collection of plant material recognized as ‘declining’ is an inappropriate mitigation method for plant species that are rare both nationally and within the reserve.
10. Mr Shaw describes that up to 25ha ‘horopito forest and scrub’ may be cleared⁷ is currently present. Some attempt is made to describe the plant species associated with ‘horopito forest and scrub’⁸. However, several locally rare plant species associated with this vegetation type, such as mountain cabbage tree (*Cordyline indivisa*), *Gaultheria antipodaldepressa* and *Dracophyllum filifolium*, have been omitted.
11. Based on visits undertaken by our ecology expert Isobel Gabites, mountain cabbage tree (*Cordyline indivisa*) and *Dracophyllum filifolium* were uncommon along the Turitea Catchment Access Road and may be threatened by the proposal. It is unknown whether any of the *D. filifolium* were sexually mature⁹, but our observations and that from Mr Shaw¹⁰ (Plate 20) indicate that no flowering of the *C. indivisa* associated with proposed turbines site 039 was occurring. It is therefore conceivable that the removal of these plants may result in the local extinction of these species. Studies by Alan Esler¹¹ made on the Turitea Reserve and surrounding environs describe the distribution of *D. filifolium* and *C. indivisa* as such:

‘D. filifolium: Not more than a dozen plants seen. These were about Arawaru and on a ridge separating the Tiritea [sic] and Otangaue [sic] catchments.’

‘C. indivisa: A few can still be found in the higher, wetter parts of the Tiritea [sic] and Kahuterawa catchments but there appears to be no reproduction’.

12. These Esler descriptions of the distribution of *D. filifolium* and *C. indivisa* are from 40 years ago and amazingly the distribution has not changed significantly since then. *D. filifolium* and *C. indivisa* still remain uncommon and generally associated with the road edges

The maintenance and enhancement of reserve ecosystems

⁷ Mr Shaw evidence, para 54

⁸ Descriptions of vegetation types, Section 2.3, Attachment WBS6

⁹ Proposed turbine site 033, Plate 13, evidence of Mr Shaw

¹⁰ Proposed turbine site 039, Plate 20, evidence of Mr Shaw

¹¹ Esler, A.E. Botany of the Manawatu District New Zealand. 1978. Botany Division DSIR, Auckland, p120 and p156

13. The evidence of Mr Shaw clearly underestimates the plant diversity along the Turitea Catchment Access Road, where based on preliminary botanical surveys, over 120 plant species were identified within 5m of the access road¹². Our surveys of the Turitea Catchment did not indicate any further populations of mountain cabbage tree (*Cordyline indivisa*), *Gaultheria antipoda/depressa* and *Dracophyllum filifolium* away from access road.
14. The Wildlands report downplays the ecological values associated with the access road and underestimates the botanical diversity present. Indeed, the local botanical diversity of these 'depressed shrubland at these specific altitudes is likely to be unique nationally.
15. 'Horopito forest and scrub' is described in the evidence of Mr Shaw¹³ as:

'Horopito dominates this vegetation type'
16. Furthermore Mr Shaw describes¹⁴:

'horopito-dominant vegetation is slow-growing'
17. Indeed, horopito (*Pseudowintera colorata*) is described as slow-growing in several books describing the growth characteristics and requirements for New Zealand native plants^{15, 16 17}. In such harsh climatic conditions, growth of horopito is likely to be extremely slow and recovery and revegetation extremely slow.

Duty to avoid, remedy or mitigate

18. As the Board of Enquiry members will be well aware, when describing 'Adverse Effects' Part 3, Section 17(1) of the RMA states:

'Every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment'
19. Mr Shaw describes¹⁸:

'A substantial package of mitigation works is proposed to mitigate those ecological effects arising from the construction and operation of the Turitea wind farm.'
20. Three specific mitigation strategies have been described Mr Shaw in is evidence on behalf of the applicant¹⁹:

¹² Seminar by Dr Jill Rapson, Massey University, 22nd April 2009 (Appendix A).

¹³ Descriptions of vegetation types, Section 2.3, Attachment WBS6

¹⁴ Mr Shaw evidence, para 80

¹⁵ Cave & Paddison's 'The Gardeners Encyclopaedia of New Zealand Native Plants', p.274

¹⁶ Eadie's '100 Best New Zealand Native Plants for Gardens', p.113

¹⁷ Crowe's 'Which Native Plant Can I Grow Here?', p.34

¹⁸ Mr Shaw evidence, para 112

the rehabilitation and revegetation of about one third (c.8 ha) of the up to 25 ha of indigenous vegetation that has been proposed to be cleared during construction;

pest control within and adjacent to revegetated areas; and

ongoing weed monitoring and control within the footprint of the Wind Farm.

21. Our visits to the reserve (November 2008, February 2009 and May 2009) have resulted in considerable concerns regarding the robustness and adequacy of the mitigation methods, as proposed by the applicant.
22. We also question the robustness of the 25ha of indigenous area for clearance; how will this be monitored and what steps will be taken if 25ha is cleared before the completion of the project?.

Direct vegetation transfer

23. Direct vegetation transfer is described²⁰ as having:

'been used successfully at other sites and a successful one-year trial has been undertaken at Turitea'.

24. Two separate vegetation transfers were undertaken^{21 22}. Unfortunately there was no inclusion of the appearance of the vegetation prior to its removal, only post-transferral. Our own assessments of the trial (from November 2008 to May 2009) have indicated that much of the larger (>1 meter high) vegetation has not been successfully transferred, has died and that where transfer has occurred, exotic weed infestation of the transferred vegetation has resulted (Figure 1).
25. It is surprising that a comprehensive mitigation strategy can be deemed successful based on only two separate transfer events. Any statistical significance of successful transfer would be difficult to obtain with only two replicates. The aspect for both of the transfer sites was different (SW to NE and NW to SE) with the SW to NE transfer being exposed to the prevailing gusty Westerly winds.

Vegetation rehabilitation

¹⁹ Mr Shaw evidence, para 16

²⁰ Evidence of Mr Shaw, para 125

²¹ Ross C. and Berban P: 2007a: Turitea revegetation direct transfer of native Vegetation trial, Tararua Range, Manawatu: Landcare Research Contract Report: LC0607/079. Report prepared for Mighty River Power and RST Environmental Solutions. 16 pp.

²² Ross C. and Berban P. 2007b: Turitea revegetation: direct transfer of native vegetation trial, Tararua Range, Manawatu - vegetation after one year. Landcare Research New Zealand Contract Report: LC0708/072. Report prepared for Mighty River Power and RST Environmental Solutions. 16pp.

26. Furthermore, Mr Shaw states²³:

'The exotic grass browntop is already common at the site and may be the most practicable option for initial vegetation'

27. It should be noted that browntop (*Agrostis capillaris*) is a globally invasive species²⁴, and despite it already being present within the reserve, its capacity to harbour predators and thus compete with native vegetation²⁵, should be highlighted as further evidence of potential erosion of the intrinsic ecological values of the reserve if this proposal was consented.

28. Furthermore, the invasive growth of browntop along roadsides is already plainly evident (Figure 2) and its more rapid growth, relative to other vegetation will preclude the establishment of native plant species.

29. The value of browntop as a suitable option for initial vegetation is uncertain; one submitter that lives locally to the planned proposal states in their submission²⁶:

'Grass growth is also slow on west facing exposed faces.'

30. If indeed grass growth is slow, it is likely that native regeneration will be even slower. Furthermore, this submitter indicates that weather conditions often preclude outside activities.

'On numerous occasions the wind has prevented us from undertaking farming or other planned activities.'

This observation may impact the implementation of any proposed mitigation strategies.

31. Surveys undertaken along the Turitea Catchment Access Road between November 2008 and May 2009, indicated the presence of minimal loess (wind-blown silt deposits) on a greywacke bed. Vegetative growth is tenuous at best, on near vertical rock faces along the road where the topsoil/loess is of minimal thickness and readily wind eroded/carried (Figure 3 and 4). Several areas of bare greywacke were observed.

32. The evidence of Mr Shaw describes²⁷

'Retention of topsoil for use in vegetation rehabilitation is of fundamental importance. Excavation of topsoil should be minimised because of this. Any excavated topsoil must be stored, either in situ or

²³ Evidence of Mr Shaw, para 121

²⁴ <http://www.issg.org/database/species/search.asp?st=sss&sn=&rn=Greenland&ri=18596&hci=-1&ei=-1&fr=1&sts=&lang=EN>

²⁵ Sessions, L., and Kelly, D. 2002. Predator-mediated apparent competition between an introduced grass, *Agrostis capillaris*, and a native fern, *Botrychium australe* (Ophioglossaceae), in New Zealand. *Oikos* **96**. 102-109.

²⁶ Joseph Poff, submission number 449, <http://www.mfe.govt.nz/rma/call-in-turitea/submissions/449poffjoseph.pdf>

²⁷ Evidence of Mr Shaw, para 118

off-site, so that it can be spread on the surface of rehabilitation landforms.'

33. The scarcity of available topsoil along the Turitea Catchment Access Road is a real concern for successful vegetation rehabilitation. The use of²⁸

'seed of native grasses such as bush rice grass (Microlaena avenacea), toetoe (Cortaderia fulvida), and Chionochloa conspicua subsp. conspicua'

does not adequately mitigate the loss of horopito or any of the many other plant species associated with the 'Horopito forest and scrub' growing directly adjacent to the Turitea Catchment Access Road, or on proposed new access roads to turbine sites.

34. Furthermore, trial plantings undertaken on the reserve adjacent to the catchment access road appear to have been unsuccessful (evidence of Ms Gabites). Mr Shaw describes²⁹ Mr Shaw describes:

'Very large numbers of plants will be needed to cover the total area from which vegetation will be cleared.'

35. Despite 'very large numbers' being an unhelpful indication of specific quantities of plants required, initial trials do not give confidence of this strategy as being an effective mitigation method for the areas cleared of vegetation.

Revegetation of pine forest.

36. Visits to the reserve have included botanical surveys in the remaining pine forest. Based on these data, the pine forest on the reserve represents an important habitat for certain plant species. For example, there are few tawa (*Beilschmeidia tawa*) and rewarewa (*Knightsia excelsa*) found along the Turitea Catchment Access Road and those that are present are small and stunted. However the pine forest has afforded protection for both species from the harsh climatic conditions associated with the higher elevations. Where rewarewa previously grew within the confines of the now harvested pine forest, only exposed dying skeletons are left (Figure 5a). However, rewarewa and tawa specimens within the sheltered pine forest are healthy and viable (Figure 5b and 6). Financial decisions based on wood export prices may determine whether the remaining pine forest is harvested. However, further harvesting by way of mitigation for the removal of 25ha of indigenous vegetations removal along the Turitea Catchment Access Road is inadequate and will actually lead to further clearance of native bush. The intrinsic ecological values of pine forests for providing a wide range of habitats for indigenous fauna and flora are well noted³⁰. Older pine forests,

²⁸ Evidence of Mr Shaw, para 121

²⁹ Evidence of Mr Shaw, para 123

³⁰ Pawson, S. and Brockerhoff, E. 2005. Natives in a pine forest. New Zealand Geographic 72. March-April 78-93.

in particular, often support a wide range of native plants and animals, and in some cases even provide valuable habitat for rare and endangered species (Figure 7).

37. For example, the study of Bleakley et al.³¹ included two areas of Turitea pine forest as sites to evaluate the use of artificial refuges to monitor adult Wellington tree weta (*Hemideina crassidens*). Three specimens from the order Orthoptera were identified, from surveys outlined³², but no indication was given of whether they were weta (*Anostostomatidae*).
38. Bird surveys undertaken from November 2008 to May 2009 identified kereru utilising the remaining pine forest adjacent to South Range Road and the Turitea Catchment Access Road as roost sites. Mr Shaw describes³³:

'Kereru are present in low numbers but mainly utilise tawa-dominant forest in the lower valley'

39. Native insectivorous birds such as fantail (*Rhipidura fuliginosa*), tomtit (*Petroica macrocephala*), whitehead (*Mohoua albicilla*), rifleman (*Acanthisitta chloris*), silvereye (*Zosterops lateralis*), grey warbler (*Gerygone igata*), shining cuckoo (*Chrysococcyx lucidus*) and also morepork (*Ninox novaeseelandiae*) are all other bird species that are known to inhabit exotic pine plantations³⁴. Surprisingly kakakpo, kiwi and kokako may also use pine forests as a food source and habitat³⁵. The destruction of the remaining pine forest would eliminate a valid habitat already utilized by indigenous fauna and flora.
40. The pine forests within the reserve possesses intrinsic ecological values and are difficult to harvest economically, hence previous harvesting was not completed. Mr Shaw describes³⁶ the harvesting of the remaining pine plantation and the

're-establishment of indigenous vegetation on the areas of what is currently pine forest'

as an effective mitigation strategy for the removal of horopito forest and scrub is inaccurate when there is already a dense understorey of indigenous plants within the remaining pine forest. Without the protection of the remaining pine forest, the regeneration of indigenous plant species in clear-felled forest to their current status would likely take decades. A strategy to let the pines fall naturally, slowly opening up the canopy is a

³¹ Bleakley, C., Stringer, I., Robertson, A., and Hedderley, D. 2006. Design and use of artificial refuges for monitoring adult tree weta, *Hemideina crassidens* and *H. thoracica* DOC Research & Development Series 233.

³² Evidence of Mr Shaw, Table 4, para 45

³³ Evidence of Mr Shaw, para 97

³⁴ Heather, B.D., and Robertson, H.A. 2000. The Field Guide to Birds of New Zealand. Viking, Penguin Books.

³⁵ Pawson, S. and Brockerhoff, E. 2005. Natives in a pine forest. New Zealand Geographic 72. March-April 78-93.

³⁶ Evidence of Mr Shaw, para 112

more suitable strategy for the long-term revegetation and regeneration of the area back to predominantly indigenous vegetation.

41. The Turitea Reserve Management Plan, Part 2: Planning and Resource Consent³⁷ states with regard to pine harvesting:

'The poor growth on the South Range Road site means that this site may not be replanted following harvest. If this occurs the site would be returned to native vegetation'.

42. The validity of the applicant using a clear management strategy likely to be undertaken in due course, whether this proposal receives consent or not, questions its legitimacy in this application.

Growth characteristics of vegetation on the Turitea Reserve

43. Esler³⁸ describes the state of vegetation growth 40 years ago as being a function of the strong prevailing westerly winds as such:

'A very conspicuous influence of wind is the formation of a wind roof on the vegetation in higher parts of the reserve. Few plants protrude above this level. The outstanding example is the pure Pseudopanax anomalus on E Trig. Each bush conforms to the height of the canopy and lateral chafing if one bush against another has produced a blocky canopy like a magnified Merino fleece. Pepper tree in the same environment becomes grossly distorted. The leading shoots develop on the lee side of each bush and main stems lie nearly parallel to the ground

The development of a wind roof creates a structure which intercepts most of the incident light at or near the surface allowing little to penetrate the ground This is one reason for the paucity of species beneath these shrubs.'

44. Little has changed in the following 40 years with Esler's eloquent description of the wind roof still present (Figure 8) at higher elevations adjacent to the Turitea Catchment Access Road and the associated with proposed turbine sites.
45. However, when vegetation associated with this contiguous wind roof is opened up and exposed to the prevailing wind (Figure 9), the 'edge effect' is obvious with extensive die-back of the exposed foliage and in some cases death of the whole plant occurs. There is already indications of further die-back of exposed vegetation
46. Prior to canopy collapse brought about by understorey clearance (deer and pigs) and canopy degradation (possums and 1936 storm), the characteristic

³⁷ <http://www.pncc.govt.nz/content/6895/Turitea%20Reserve%20Management%20Plan%20part%202.pdf>, section 2.3.3.1, p38

³⁸ Esler, A.E. 1969. The changing plant cover of the Palmerston North water reserve, Tiritea Valley. Botany Division, DSIR.

canopy species within the Turitea catchment, were northern rata (*Metrosideros robusta*) and kamahi (*Weinmannia racemosa*)³⁹ (Esler, 1978). It is disappointing to note that there is no mention in the Wildlands assessment of revegetation/re-introduction of locally eco-sourced rata or kamahi as part of the mitigation strategies for the areas of cleared vegetation. The re-introduction of rata and kamahi along the Turitea catchment would signify a tangible attempt to re-create the native bush that was evident at the site a century ago.

Bird collisions with turbines

47. The overall proposed turbine layout raises serious concerns for the safe passage of birds from areas further South West of the Turitea Catchment, including the Kahuterawa Valley/Sledge Track/Hardings Park area and further parts of the Tararua State Forest Park. The proposed turbine layout indicates that the only possible turbine-free access for birds to the Turitea Catchment will be a 2km section from the Turitea Valley, over the Lower and Upper Reservoirs. The remaining 22km (approximately) of the upland area surrounding the Turitea Catchment currently is given over to turbines associated with the proposal.

48. Mr Shaw states⁴⁰:

'Local residents and migrants (i.e. species that migrate within large territories or seasonally to local feed sources) present at Turitea include tui, bellbird, kereru, kākā, and NZ falcon.'

49. Bird surveys taken from Red Rock Knob (altitude 556m) on Hardings Park between Jan 2008 and March 2009 have shown the passage of kereru (*Hemiphaga novaeseelandiae*) and tui (*Prothemadera novaeseelandiae*) over the Turitea Catchment Access Road from the Kahuterawa catchment to the Turitea catchment. Kereru and tui were observed during March 2009 feeding on horopito fruit in Hardings Park at an elevation of approximately 500m. These observations highlight that native bird species do utilise food-sources at higher altitudes around the Hardings Park/Otangane catchment and thus, it is likely that passage between these areas and the Turitea catchment occurs to take advantage of seasonal food sources. A recent survey along the Turitea Catchment Access Road highlighted the fruiting of native plants such as *Coprosma robusta* (Figure 10). Furthermore, the evidence of Mr Shaw states that NZ falcon (*F. novaeseelandiae*) (acutely threatened, nationally vulnerable)⁴¹ and kaka (*Nestor meridionalis*)⁴² are also present in the Turitea and surrounding area. It is likely that the NZ Falcon (*F. novaeseelandiae*) may also utilise both intact and cleared pine forest as hunting and nesting habitats⁴³. The kaka

³⁹ Esler, A.E. Botany of the Manawatu District New Zealand. 1978. Botany Division DSIR, Auckland.

⁴⁰ Evidence of Mr Shaw, para 97

⁴¹ Evidence of Mr Shaw, paras 100-105

⁴² Evidence of Mr Shaw, para 107

⁴³ Pawson, S. and Brockerhoff, E. 2005. Natives in a pine forest. New Zealand Geographic 72. March-April 78-93.

(acutely threatened, nationally vulnerable) is known to be dispersive⁴⁴) and hence could be at risk when entering or leaving the Turitea catchment area. It is these bird species that may fly at approximate turbine blade height (50-125m) and are at risk from collision.

50. Mr Shaw outlines⁴⁵:

'A number of generic 'best practice', measures to reduce the impacts of Wind Farms on birds have been identified, including:

- *Avoid siting Wind Farms on key migration routes and bird habitat that is of conservation importance.*
- *Use ecologically sensitive construction and operation practices.*
- *Implement a bird monitoring programme to improve understanding of risk of impacts on birds and potential mitigation measures.*
- *Avoid alignment turbines perpendicular to main flight paths and provide corridors between turbine groups that are aligned with existing flight paths;*
- *Improve habitat for bird species that do use the site.*

(Drewitt & Langston 2006)'

51. The proposed turbine layout does little to address the likely risk of bird collision with turbines, contrary to the 'best practice' recommendations highlighted above.

52. Furthermore, Mr Shaw's describes⁴⁶:

'A number of studies have estimated mortality of birds at Wind Farms, commonly expressed as collisions/per turbine/per year, based on ground searches of turbine sites for bird carcasses, with data corrected for detection probabilities and scavenger removal. Searcher efficiency rates are influenced by the ability and motivation of the searcher, size of bird, and vegetation type, while scavenger removal is influenced by bird size and seasonal effects (Morrison 2002)'

53. Unlike other New Zealand wind farms where turbines are often constructed on farm land, surrounded by short grass, the proposed site terrain and extensive vegetation associated with this application does not lend itself to the easy location of birds killed or injured due to turbine collision. It is likely

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http://www.wellington.govt.nz/haveyoursay/meetings/subcom/Council_Controlled_Organisation_Performance/2009/02Mar0915/pdf/8_Karori_Wildlife_Sanctuary_Trust_2008_09_Q2_Report.pdf

⁴⁵ Evidence of Mr Shaw, para 93

⁴⁶ Evidence of Mr Shaw, para 92

that bird collisions will therefore be significantly underestimated. A similar conclusion was made by Powlesland⁴⁷.

'In many instances, the numbers of carcasses reported are likely to be underestimates, as they are often based only on found carcasses, without accounting for scavenging and searcher efficiency.'

54. Several studies referenced in the Powlesland review indicated rapid removal of carcasses by scavengers where for example, most passerine (small perching birds) carcasses disappeared within 3 days, but that large carcasses remained for 3 months.

55. The evidence of Professor Craig clearly describes⁴⁸ that raptors (falcons, harriers, hawks, eagles, owls etc.)

'appear to be especially at risk (from turbine collisions). As some raptors tend to be naturally found in low numbers, where even a small mortality risk can adversely influence population viability'

56. There is no indication of the number of pairs of New Zealand Falcon found in the Turitea area or surrounding environs. However, the New Zealand Falcon did receive significant attention during the proposed Motorimu Wind Farm Resource Consent application and Environment Court Hearing⁴⁹ which is within 4km of this site

57. Mr Craig describes that tui are currently present in low densities at Turitea, quoting an unknown section of the Wildlands Report.

58. However, tui have been seen or heard around the proposed wind farm site on all occasions that the site was visited between November 2008 and May 2009. Furthermore tui have been observed on many occasions feeding on Hardings Park adjacent to the Turitea Catchment. It seems that tui may indeed utilise food sources at higher elevations around the Turitea Catchment/Hardings Park area. Similarly, kereru have been observed feeding and roosting at higher elevations in both Hardings Park and the proposed Turitea site.

59. Bird collisions are already occurring at the Manawatu wind farms⁵⁰. Mr Shaw indicates that:

'The Te Apiti wind farm has reported the death 11 magpies (Gymnorhina tibicen), two Australasian Harriers (Circus aproximans) and one kingfisher (Todiramphus sanctus) since opening in 2005.'

⁴⁷ Powlesland R. 2009. Impacts of wind farms on birds: a review. Department of Conservation, Wellington. *Science for Conservation* 289: 53 pp.

⁴⁸ Evidence of Professor Craig, para 25

⁴⁹ Motorimu Wind Farm Ltd appeal Environment Court hearing ENV-2007-WLG-000098.

⁵⁰ Evidence of Mr Shaw, para 87

60. Mr Craig indicates that after consultation with Meridian Energy, there had been⁵¹:

14 bird deaths (being 13 magpies and one kingfisher) associated with the Te Apiti wind farm between July 2004 and June 2006.'

61. The later evidence clearly omits the two Australasian Harriers, with a concomitant increase of apparent magpie deaths. Further on in his evidence⁵², Mr Craig states that

'only one Australasian Harrier has been reported killed'

after collision with wind turbines, clearly contradicting the evidence of Mr Shaw. Whether the methods employed by the developers for the detection of bird carcasses lack the same robustness as their data recording of bird deaths is unknown.

62. Powlesland⁵³ states that:

'the cumulative loss of sensitive or rare habitats may be significant, especially if multiple large developments are sited at locations of high bird use.'

The proliferation of wind farms could be considered an example of the aforementioned statement, where increased areas of elevated ridgeline are being given over to wind farm developments. Many of these areas are habitats frequented by New Zealand Falcon and thus the cumulative likelihood of turbine collision is likely to occur.

63. Mr Craig indicates⁵⁴ that the benefit of

'pest control undertaken within the proposed (site) envelope will markedly reduce'

the

'loss of eggs, young and adult birds from within the wind farm envelope and adjacent areas'

and

'will greatly exceed any small losses from turbine strike'

However Mr Craig indicates that⁵⁵

'densities of falcon appear very low'

⁵¹ Evidence of Professor Craig, para 33

⁵² Evidence of Professor Craig, para 35

⁵³ Powlesland R. 2009. Impacts of wind farms on birds: a review. Department of Conservation, Wellington. *Science for Conservation* 289: 53 pp.

⁵⁴ Evidence of Professor Craig, paras 43-47

⁵⁵ Evidence of Professor Craig, para 42

64. Therefore any New Zealand Falcon deaths due to turbines collision will have a disproportionate effect on overall viability of the population. For two breeding pairs; one turbines collision death reduces the breeding population by 50%. This together with the evidence of Mr Shaw⁵⁶ that

'Falcon are resident on the ridge but utilise vast territories'

offers no guarantees that the Falcon will take advantage of future areas of pest-management proposed by the applicant. Birds will nest where they will. It is a double-edged sword that the Falcon population may be more adversely impacted by bird strike than other common indigenous bird species AND less likely to utilise this area under pest management, for breeding.

65. Like the New Zealand Falcon, Powlesland⁵⁷ highlights concerns regarding impact of bird collisions on other bird species, including kaka, which are known to occasionally visit the proposed wind farm site:

'Even relatively small increases in mortality rates may be significant for populations of some birds, especially long-lived species with generally low annual productivity and slow maturity, and particularly when already rare (Percival 2000; Langston & Pullan 2003; Everaert & Stienen 2007), e.g. blue duck (Hymenolaimus malacorhynchos) and kaka (Nestor meridionalis).'

66. Powlesland (2009) concludes:

'Post-construction monitoring at New Zealand wind farms has been inadequate to accurately determine bird fatalities as a result of collision with turbines because neither systematic search procedures nor trained staff have been used. Fatalities have been reported to involve magpies, gulls, blackbirds and a kingfisher, but these results are probably not indicative of the full range of species killed.'

Increased risk of weed invasion and establishment

67. We submit that the Turitea wind farm will significantly increase the presence of invasive and noxious weeds within the Turitea catchment (see para 24 and 25). Initial vegetation transfer studies have already indicated the proliferation of exotic species (Figure 11). Mr Shaw describes⁵⁸:

'an annual systematic inspection and follow-up control operations'

⁵⁶ Evidence of Mr Shaw, para 107

⁵⁷ Powlesland R. 2009. Impacts of wind farms on birds: a review. Department of Conservation, Wellington. *Science for Conservation* 289: 53 pp.

⁵⁸ Evidence of Mr Shaw, para 131

68. Annual systematic inspections are insufficient in ecologically sensitive areas. On-going and continuous weed monitoring should be the norm in any ecologically sensitive area to prevent the rapid establishment of weeds. The establishment of noxious weed species during and post construction, in hitherto weed-free areas is contrary to section 7(d) and 7(f) of the RMA.

Proposed site layout

69. Of the 62 turbine zones proposed within the Turitea catchment area, 41 are described as having 'High' or 'Very High' Ecological values or Degree of Impact associated with construction. We are very concerned with the degree of vegetation removal associated with the construction of these turbines and access roads (where applicable). We believe that mitigation strategies do not adequately replace, for example, vegetation currently at or about 7m in height⁵⁹ associated with proposed turbine 041, or vegetation which is currently at or about 6m in height⁶⁰.
70. We remain extremely concerned with the lack of detail supplied by the applicant for the construction and new Turitea Catchment Access route between turbine number 0027 and 0034. A particular feature of this stretch of the Turitea Catchment Access Road is the tight corners associated with the area called 'Zig Zag' (Figure 12).

Mr Shaw describes⁶¹ (para 51):

'Between Turbine Zones 0027 and 0034, the existing road is steep, has sharp corners, and in places is very narrow. The ecological impacts of widening the Water Catchment Access Road along this stretch will be substantial due to the amount of recontouring that will be required and the associated vegetation clearance, particularly on steep sections, as described in Beca (2008).'

Furthermore, Mr James describes⁶²:

'A standard road design criteria will be used wherever possible. However, analysis of the site has identified that a section of the Water Catchment Access Road between turbine 0027 and turbine 0034 requires specific alternative design. Sections of the ridgeline in this area are too narrow to construct the required road width using conventional structural fills, so an alternative methodology will be used. This may consist of large gabion baskets and/ or no-fines concrete blocks that are anchored into the fills, as shown in Exhibit CDJ04.'

⁵⁹ Evidence of Mr Shaw, plate 19

⁶⁰ Evidence of Mr Shaw, plate 21

⁶¹ Evidence of Mr Shaw, plate 51

⁶² Evidence of Mr Janes, para 4.21

71. The simple line-drawing information supplied by Mr James⁶³ outlining this 'alternative design' is inadequate. Ideally photographs should be included giving examples of where these alternative road design criteria have been used under similar circumstances by Beca here in New Zealand. The roading between turbines 0027 and 0034 represents clear construction challenges for the applicant and is clearly an issue, being covered, albeit poorly, by both Mr Shaw and Mr James. The Ecological value/Degree of Impact on turbine zones 0027 to 0034 are described by Mr Shaw⁶⁴ as high or Very High. Some certainty is required around the likely effects of this construction and there is a clear requirement for an effective strategy and full description of the overall construction process for this area.

'EcoPark' concept

72. The EcoPark concept has been promoted by PNCC for the use of monies to be paid by the applicant for turbines located within the Turitea Reserve. As far as we are aware, the only stakeholder PNCC has involved in any discussions regarding an EcoPark, is the Department of Conservation. Thus far there has been only limited consultation with limited information made available (outlined below) with the public regarding what the EcoPark concept should include, the duration of its funding and the interaction with other stakeholders.
73. PNCC has a legislative responsibility under the Health (Drinking Water) Amendment Act 2007 (para 3) to maintain the bush integrity within the Turitea Catchment for the maintenance of a high quality drinkingwater supply for the residents of Palmerston North. Current expenditure on the reserve is of the order of \$320K per annum⁶⁵ (Appendix B). A significant level of pest management is occurring presently with likely mustelid/rodent by-kill associated with the possum control. Unfortunately no data has been provided by the applicant on the effectiveness of the present pest control on native plant diversity and regular bird counts.
74. Whilst there is some mention that possum control has taken place since 2004⁶⁶, surprisingly, Mr Shaw makes no mention of its effectiveness, nor the current level, financial or otherwise of investment into the reserve for pest management. It is anticipated that this current expenditure is related to current possum and weed control.
75. We submit that the vegetation clearance associated with the application is not adequately mitigated with the formation or establishment of an EcoPark. The application attempts to 'offset' the vegetation clearance associated with proposed turbine sites on exposed ridgelines with natural revegetation in other distinctly different parts of the reserve having a distinctly different set of ecological conditions. Similarly, the vegetation

⁶³ Evidence of Mr James, Exhibit CDJ04

⁶⁴ Evidence of Mr Shaw, Attachment WBS8 (page 101).

⁶⁵ Letter from PNCC to DOC, 15th May 2008

⁶⁶ Evidence of Mr Shaw, para 35

transfer and rehabilitation is not a like-for-like replacement for cleared vegetation and will take over 50 years to reach its present structure. If left untouched a further 50 year growth period for the current vegetation associated with the Turitea Catchment Access Road would lead to a tangible increase of secondary forest up towards the higher parts of the reserve.

76. We believe that the extensive biodiversity currently associated with the Turitea reserve (including Hardings Park) is significant and worthy of developing into a mainland island. Indeed within the Turitea Catchment we **already** have many of the criteria associated with mainland islands:

- an area represented by several different vegetation types
- the presence or uncommon or rare indigenous flora and fauna
- pest management
- comprehensive networks of tracks for laying bait stations (Appendix C)
- bird monitoring
- vegetation monitoring

77. Several local mainland islands, which are characterised by intensive pest management or predator proof fences, are examples that should be aspired to. Pukaha Mount Bruce, Boundary Stream, Ark in the Park, Trounson Kauri Park, are all areas where intensive pest management has improved native biodiversity. These are joint initiatives between territorial authorities, Department of Conservation, with community involvement and often with corporate sponsorship. None have necessitated the sacrifice of established native bush to a wind farm development to fund a shared vision. FOTR, since its establishment in 2006, have always been strong advocates of a Turitea mainland island without the need for a wind farm, based on strong partnerships between the owners, Palmerston North City Council, DOC and the local community. A strong vision, constructive engagement and empowerment of the local community would go some way to fulfilling this vision.

78. One such example of where volunteerism has been a key ingredient in the protection of indigenous species is in the Northern Ruahine Ranges. In the article 'Return of the titi bird'⁶⁷ (Appendix D) it states:

'One problem was that the traps would need to be checked every month. DOC didn't have the staff for that, but thought volunteers might help out. Fat chance you say. Who would want to head into such a remote area and slog along a set route checking traps every few hundred yards and recording the contents? Scores of people. There's a waiting list, in fact. "We're now taking bookings for 2010," says Mrs Lewis. "Some people who have been once are kindly standing down to allow others a turn."

⁶⁷ Manawatu Standard, page 17, 29th March 2008)

79. Similarly, in the newspaper article ‘Two years of sticking it to stoats’⁶⁸, (Appendix E) describes:

‘The initial 20-kilometre long trap-line is monitored monthly by volunteers.’

80. The EcoPark concept was originally outlined in the consultation document (Appendix F) made available during the addition of purpose (Generation of Renewable Energy) to the Local Purpose (Turitea) Reserve in 2006. In addition to activities more akin to a mainland island, such as the re-introduction of native fauna and flora, it highlighted opportunities to:

‘abseil off the dam wall, an eco battery powered boat could carry tourists across the reservoir, Flashpackers could be provided a high value experience which may include a stay in the Turitea Eco Lodge, soothing hot showers, hot meals together with a comfy bed for the night’

81. Unfortunately, the opportunities for further consultation and engagement on the Ecopark concept between PNCC and the local community have been limited. The 2006 Palmerston North Long Term Community Council Plan document⁶⁹ included mention of the Ecopark concept:

‘The Council will develop a regional Eco-Park in the Kahuterawa and Turitea Valleys. This will provide environmental, recreational and tourism opportunities. It will be funded with income from the windfarm (if it goes ahead).

The Council has entered into an agreement with Mighty River Power to allow the company to build a windfarm in the water catchment area (the Turitea Valley). The Council will lease sections of the land around the turbines to the company. The Council will use the income from the lease to develop an Eco-Park in the Turitea and Kahuterawa Valleys (see page 147). The Council and Mighty River will need to undertake statutory processes before a windfarm can commence. The windfarm will not affect the quality of the water supply’.

82. However, all reference to the EcoPark concept has disappeared from the PNCC Draft 10 year plan 2009-19⁷⁰.

Summary.

83. We believe that the package of mitigation strategies outlined by the applicant is overstated, poorly described and relies on a nebulous Ecopark concept whose adoption and management is independent of the applicant.

⁶⁸ The Guardian, page 26, 29th January 2009)

⁶⁹ <http://www.palmerstonnorth.com/content/6967/waterwaste.pdf> pages 147 and 216

⁷⁰ <http://www.palmerstonnorth.com/YourCouncil/CouncilActivities/PublicDocuments/Detail.aspx?id=53210>

We consider that the Ecopark concept fails to adequately mitigate the clearance of a unique vegetation community at the proposed turbine zones and access road locations, and fails to recognise the definitions of 'intrinsic values' and 'environment' as described within the RMA.

84. Overall the ecological assessment is inadequate and fails to provide an accurate and comprehensive account of the native fauna and flora already within the reserve and the likely impact of the development on the biodiversity already present. Further longer-term, co-ordinated investigations are required to detect the presence of for example, native snails and gecko/skink species. Similarly, ecological surveys have not been undertaken in a systematic way with seasonal assessments of for example, bird numbers moving through the reserve, of bird movement corridors, detection of gecko/skink species, butterfly species along the Turitea Catchment Access Road, etc. The question 'How do we know what we might lose' if a comprehensive year-long ecological survey has not been undertaken?

Conclusions and Recommendations.

- We consider that due to both the significantly adverse effects on ecological processes on the reserve and the adverse effect of turbines adjacent to the reserve, the application should be declined in full.
- The use of the Turitea Catchment with its key ecological values and extensive biodiversity, is inappropriate for the construction of a wind farm.
- These ecological values would be further adversely impacted by the construction of turbines adjacent to the reserve threatening the passage of birds to and from the reserve area.