**BEFORE THE ENVIRONMENT COURT**

Decision No. [2011] NZEnvC 384

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| **IN THE MATTER** | of the Resource Management Act 1991 (**the Act**) and of an appeal pursuant to section 120 of the Act |
| **BETWEEN** | MAINPOWER NZ LIMITED |
| | (ENV-2009-CHC-100) |
| | Appellant |
| **AND** | HURUNUI DISTRICT COUNCIL |
| | Respondent |
| **AND** | |
| **IN THE MATTER** | of a direct referral under section 87 of the Act |
| **BY** | MAINPOWER NZ LIMITED |
| | (ENV-2010-CHC-200) |
| | Applicant |

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| Hearing: | at Christchurch on 20 – 23 June, 27 – 30 June, 1 – 3 August, 8 – 10 August 2011 |
| Court: | Environment Judge J E Borthwick<br>Environment Commissioner D H Menzies<br>Environment Commissioner H M Beaumont<br>Environment Commissioner D J Bunting |
| Appearances: | See Attachment 1 |
| Date of Decision: | 6 December 2011 |
| Date of Issue: | 8 December 2011 |

## DECISION OF THE ENVIRONMENT COURT

A: The appeal is allowed and the application for resource consent referred directly to the court is granted.

B: By **16 December 2011** the Hurunui District Council and MainPower New Zealand Ltd are to file and serve a joint memorandum confirming the amendments to the conditions (**attached**). Reasons are to be given if changes are proposed.

C: By **21January 2012** all other parties proposing amendments to the Conditions (or a revised set of conditions if changes are proposed by Hurunui District Council and MainPower New Zealand Ltd) are to file and serve their memoranda setting out the reasons for the changes sought.

D: By **28 January 2012** the Hurunui District Council and MainPower New Zealand Ltd may file a memorandum in response.

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## REASONS

### Introduction

[1] MainPower New Zealand Ltd proposes to establish and operate a wind farm at Mt Cass, Waipara.

[2] These proceedings are unusual in that the Court is considering both an appeal against a decision by the Hurunui District Council to decline consent for the wind farm and an application for resource consent referred directly to the Court in relation to the same proposal. This second application is the result of extensive mediation culminating in the modification of the proposed wind farm.

[3] While these modifications addressed the concerns of some of the parties on appeal, it attracted submissions from other persons who now considered themselves affected.

[4] It is the proposal as modified by the application for resource consent directly referred to the Environment Court which is the subject of this decision. MainPower is not seeking consent for its original application for resource consent heard by the District Council.[1]

### The location of the wind farm

[5] Mt Cass is located 3 km from the Omihi junction, 5 km to the south-east of Waipara and 10 km north-east of Amberley. These settlements are located in the Waipara Basin and Mt Cass is one of a series of ranges framing the south-eastern part of the Basin. The wind farm would extend 7.5 km along the ridgeline of Mt Cass at an elevation of between 400 m and 569 m and would be visible from the settlements.[2]

[6] Mt Cass is one of three peaks (Totara and Oldham Peak are further to the north-east) on a cuesta landform; an asymmetric ridge of sedimentary rocks – in this case principally limestone.[3] Typical of this type of landform Mt Cass has a steep north-west facing front slope (called a scarp or escarpment) and a gentle south-eastwards dipping backslope.

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[1] MainPower Memorandum of Counsel dated 22 November 2010.
[2] Hurley, EiC, at [2.1] – [2.2].
[3] Weka Pass limestone overlies Amuri Limestone.

[7] Just below the scarp slope and parallel to the ridge line is a wide flat area identified in the evidence as the 'northern terrace'. It is on this lithological feature that the main access road is to be sited. The northern foothills are rounded gentle features within the landscape. By comparison the land beyond the south-east dip slope and lying towards the coast is rugged hill country which terminates abruptly at the cliff face of an uplifted marine terrace.

[8] Located along both sides of the ridgeline are boulder fields and scree slopes. These are more prominent on the scarp which also has areas of cliff face. On the upper slopes of Mt Cass native forest and shrubland is found interspersed with patches of pasture. Pasture and silviculture (forestry plantations) predominate on the lower slopes.

[9] The site's five landowners farm the land (sheep and cattle)[4] and intend to continue farming if consent is granted. MainPower has in place agreements and easements enabling the development of the wind farm.[5]

[10] In the wider Waipara Basin, and some parts of the north facing foothills, viticulture is well established.

**The proposal**

[11] In the following section we provide an overview of the proposal (greater detail is found in our assessment of effects). The proposal is to build and operate a wind farm which will include the following activities:

- turbines and turbine platforms;
- roading (including connection to individual platforms);
- electrical plant (including a sub-station, operation buildings and switching yard);
- concrete batching plant and aggregate storage area;

[4] The landowners are MainPower New Zealand Ltd, Dovedale Farm Ltd, Hamilton Glens Ltd, Organic Farm Ltd and Tiromoana Station Ltd.
[5] Hurley EiC at [2.5]-[2.6].

- undergrounding of cables between the turbine sites and the substation;
- erection of overhead transmissions lines;
- excavation and deposition of excavated material not used for fill or roading (at 'soil disposal sites');
- stockpile areas for road aggregates and topsoil;[6]
- temporary storage of plant and equipment (at 'lay down' areas); and
- the extension of the existing Mt Cass walkway.[7]

**Application directly referred to the Court**

[12] Referred to as the *mediation layout* the principal amendments to the original proposal are as follows:[8]

- relocating some turbines from the area between Mt Cass and Totara Peak to other locations on the Mt Cass ridge;[9]
- relocating a primary access road from the top of the dip slope to the northern terrace*;*
- construction of three new ramp roads across the escarpment and other new roading to provide access to the new turbine locations;
- relocating the substation, switch and control buildings from the main ridgeline to the northern terrace;
- realigning the above ground transmission line along the northern terrace;
- relocated laydown areas.

[13] Consent sought is to authorise one of three different turbine layouts; the dimensions of which are shown. [10]

[6] Morrison EiC at [6.1].
[7] Morrison EiC at [6.1].
[8] The extent of the new works is shown on plans SK102-SK103 (reference Dr Steven, Appendix E, and J Whyte both in application for direct referral).
[9] The total number of turbines will remain the same under the mediated layout – refer to application for direct referral at 5.
[10] Hurley EiC at [2.14].

| Layout | Maximum height from ground level(m) | Maximum number of turbines | Maximum installed capacity (MW) |
|---|---|---|---|
| R33 | 55 | 67 | 34 |
| R60 | 95 | 40 | 40 |
| R90 | 130 | 26 | 78 |

[14] The three turbine layouts have different energy outputs. Adopting the titles given to the different layouts in the evidence the R33 layout will produce 67 GWh,[11] R60 will produce 103 GWh and R90 212 GWh.[12] These are all for the mediation layout. As the final turbine layout design is dependent upon the model of turbine chosen flexibility is sought in relation to the layout.[13]

[15] A 2 km 'Access Road' is to be constructed from the site of the former Mt Cass homestead to a point on the ridge line below Mt Cass Peak near the western end of the wind farm site. From about this point four spur roads, (two to the west, one to the north and one to north east), service turbines in these locations. 'North Terrace Road' drops down from Mt Cass Peak onto the northern terrace and then along the terrace on the line of an existing farm track to a point about 500m east of Totara Peak. From here the road climbs back up onto the ridge line before following the ridge line east to a point just north of Oldham Peak ('Ridge Road C'). Short spur roads extend north and east to service turbines in these locations.[14] In addition, access to a number of turbine sites is provided by three ramp roads,[15] each extending up the scarp face at intervals along North Terrace Road.

[16] The overhead transmission lines are to be routed along the Northern Terrace Road, and then down the southern slopes to meet the existing network at Tiromoana Homestead, near Mt Cass Rd. The transmission lines then follow, more or less, the existing power lines to Waipara Junction. From there the transmission lines run alongside state highway 7 terminating at the Waipara substation. If consented, the

[11] GWh is 1 million kWh and 1 MWh is 1,000 kWh.
[12] Sise EiC at [3.10].
[13] Hurley EiC at [10.5].
[14] Hurley EiC at [2.2] – [2.28].
[15] Referred to as Ramp Roads 1, 2,and 3.

existing power lines on Mt Cass Rd are to be removed or incorporated into the new transmission lines.[16]

[17] The height of the turbine determines the area of the platform required for the foundations and working space for plant and equipment. The largest platform is required for the R90 turbines and measures 51m x 22m. Platforms of 44m x 18m and 20m x 15m are required for the R60 and R33 turbines respectively.[17] After construction a proportion of the platform area will be planted or allowed to naturally regenerate with an area 15m x 15m being retained as a maintenance platform.[18] We understood that largest foundations are those required for the R90 turbines at approximately 16m square (or octagonal) and 3m depth.[19] Each of these foundations, which will be constructed of reinforced concrete, will occupy a relatively small proportion of the turbine platform.

[18] The location of the proposed wind farm is shown on the maps attached to this decision (Figure 1).

**Additional consents required**

[19] A number of additional resource consents may be required to authorise the proposal, but are not sought at this stage. If required until those consents are granted, the wind farm cannot be established. As these applications are not before us, nothing we say should be taken as an assessment of the merits.

[20] The additional consents are described in Appendix H of the Application for Direct Referral. It is recorded there that "[s]uch applications will <u>not</u> assist in the better understanding of the nature of this application" *(*our emphasis). The application for direct referral refers to applications for discharge permits and other land use consent applications that "may" be required subject to engineering design and the scale of the activity.[20] Other activities may yet be permitted or controlled under the Regional Plan.[21]

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[16] Hurley EiC at [2.29]-[2.32].
[17] Morrison EiC at [4.2].
[18] Morrison EiC at [4.10].
[19] Morrison EiC at [4.5].
[20] These concern discharge permits and land-use consents in relation to activities on private access roads, laydown and disposal areas and the substation.
[21] This includes consents for the storage of hazardous substances and overhead electricity reticulation in the bed of a river.

[21] The District Council did not take issue with this and we have no basis to determine now whether additional consents are required. It is on the basis that additional consents may not be required that we proceed to determine this application.

**The parties**

[22] We have recorded the parties to the appeal and the direct referral proceedings in Attachment 1 to this decision.

[23] The application directly referred to the Court attracted a large number of submitters some of whom are also parties to the original appeal. Of the 72 persons who made a submission on the direct referral, 24 gave notice of their intention to be heard. At the hearing eight parties either gave evidence and/or made representations (submissions).

[24] We have considered the submissions made on the applications for direct referral whether or not the submitter subsequently participated in the Court's hearing. We record now our indebtedness to those persons who appeared without legal representation. We appreciate court proceedings are time consuming and for some a daunting prospect. We found valuable their measured thoughtful evidence and informed perceptive questioning of witnesses.

[25] Of those who appeared, we summarise the parties concerns in the following paragraphs.

***The Energy Efficiency and Conservation Authority (EECA)***

[26] EECA presented legal submissions and evidence from Mr Thomas Torrens in support of the wind farm proposal. EECA highlighted the proposals many positive benefits (which were largely uncontested) and drew attention to the key provisions within the National Policy Statement for Renewable Electricity Generation (**NPS REG**) which took effect from May 2011. While the NPS REG does not set a national target for electricity generation from renewable resources the preamble refers to central government's strategic target of 90% generation.

[27] EECA also referred to a number of other draft national policy statements. We have considered these in the context of the matters for which they were raised, but have not placed any weight on them as they may yet change.

***New Zealand Wind Energy Association***

[28] The New Zealand Wind Energy Association appeared in support of the proposal. The Association's functions are to promote, encourage and enable the update of wind energy. Mr Fraser Clark highlighted the benefits of the proposal and how it fits with government policy.

***Dr Glen Metcalf***

[29] Dr Glen Metcalf made a submission opposing the wind farm. Dr Metcalf has a range of concerns including the effects of the proposal on the limestone ecosystems, the permanent loss or fragmentation of habitats, the effect on threatened, at risk and regionally uncommon plants, the loss of ecotones and sequences, the reduction of intrinsic ecosystem values and the increase in fire risk.

[30] Dr Metcalf was critical of the approach taken by MainPower in seeking consent for three different turbine layouts. As a consequence she is concerned that there is inadequate information by which to assess the proposal.

[31] Finally, Dr Metcalf expresses dissatisfaction with what she says describes as "provisos" in the conditions of consent.

***Mr Jim Young***

[32] While Mr Jim Young has a particular interest in the Canterbury gecko his submission also addressed wider issues. He agrees that this is the best site available to MainPower but doubts the economic analysis put forward in support of the application. He speculates that a series of small wind farms may be as productive. He is particularly concerned with the proposal to translocate Canterbury gecko from the construction site to other locations on Mt Cass. Like Dr Metcalf he expressed concerns about a condition wherein MainPower may not follow its experts' advice on the routings of roads and turbines.

[33] Mr Young is not opposed to wind farms per se, rather his objective in participating at this hearing is to ensure there is careful development of the wind resource at this site.

***Mr and Mrs Hamish and Katrina McLachlan (the McLachlans)***

[34] We received individual submissions from Mr and Mrs Hamish and Katrina McLachlan and Mrs McLachlan also gave evidence. The McLachlans farm a property west of Mt Cass. They estimate that the wind farm (or at least the north-eastern end) would be visible from 75% of their property, albeit not their house. The closest turbine would be 1 km from their boundary.

[35] The McLachlans are opposed to the wind farm. Their principal area of concern is for the health and wellbeing of one of their four children. This child is a person on the autism spectrum. They have concerns as to the potential effects of the wind farm and its impact on their child and, as a consequence, upon the family-at-large. These effects arise in relation to the level and characteristics of noise. We respond to their concerns in some detail in the noise section of our decision.

***Mr Christopher Herbert***

[36] Mr Herbert presented a submission opposing the wind farm proposal. He expressed concerns about a number of matters including the health of the McLachlans' child, that the presence of the wind farm could reduce the value of his farm and that the benefits of the proposal to the community are likely to be overstated particularly if MainPower was to transfer the consent to another party. He held strong reservations about the noise evidence particularly given the experiences with wind farm noise elsewhere and also held concerns about the management of the fire risk and bird-strike.

***Mr Barry Rich and Ms Lynette Atkinson***

[37] Mr Barry Rich and Ms Lynette Atkinson own a small landholding on the western foothills of Mt Cass. They oppose the wind farm. Before she retired Ms Atkinson was the principal of a primary school. She expressed concern about the visibility of the turbines from the Omihi and Waipara Schools (she estimated their location to be 3 km west of the site). These concerns arise also in relation to children with autism or Asperger's syndrome.

[38] Both are concerned about the loss of their visual amenity, the adverse effect on the landscape and noise effects. Mr Rich, in particular, has had a long association with this area and raised concerns about the stability of the site and the ecological effects of the wind farm.

***Mr Gary Thomas and Ms Phoebe Vincent***

[39] Mr Gary Thomas is a producer of fine wines with a vineyard situated on the western foothills of Mt Cass.

[40] Mr Thomas is concerned about the effects of the wind farm on tourism associated with Waipara's fledgling fine wine industry. This industry is located in Waipara because of its limestone soil types and mesoclimate. The industry derives significant earnings through wine tastings, vineyard sales and other related hospitality activities. The Waipara landscape is important as the setting for these activities and he is concerned the landscape will be adversely affected and that this will impact on sales.

[41] We heard separately from Mr Thomas' partner, Ms Phoebe Vincent. She shared many of her husband's concerns and responding to MainPower's witnesses emphasised the importance of the landscape as the context in which fine wine tourism has developed. She is concerned that the proposal jeopardises this, recreational opportunities, and generally the quality of life they presently enjoy. Mr Thomas and Ms Vincent doubted the benefits of/justifications for the proposal, including the need to generate power within the District.

***Mr Don Vincent***

[42] In common with other residents who gave evidence or made representations to the Court Mr Vincent sought that the application be declined. He spoke of the importance of the Mt Cass landscape, and its "iconic ridge". He too is concerned about the effects of noise, weed infestation and the like.

***Mr Michael Eaton***

[43] Mr Michael Eaton is a well known painter, successful winegrower and long time resident of Glenmark. He is concerned that the wind farm will be an "ecological

disaster" and that it will result in weed infestation of this ecologically significant area. The wind farm will give rise to "visual pollution" and consequently will have a deleterious effects on local tourism into which there has been considerable investment.

***Mt Cass Ridge Protection Society (the Society)***

[44] The Society was represented at the hearing by Mr Malcolm Wallace. The Society opposes the application; its concerns are wide ranging and include the adverse effects on the site's geology, ecology and landscape and the effects on the coastal environment. The Society says the recreational amenity of the existing Mt Cass walkway will be diminished. If consented, however, the Society supports the extension to the walkway but says the walkway should be unformed.

[45] The Society also submits that the offset/environmental compensation package is inappropriate and/or unnecessary. It says that the proposed conditions will be ineffective for their purpose. It has clear views on the lapsing of the consent and about site restoration.

***The Hurunui District Council***

[46] The District Council takes a neutral position in relation to the modified proposal. Counsel for the District Council, Mr David Caldwell, submits that subject to the appropriate conditions the modified proposal is "consentable ... that is, there is nothing which would, or indeed could, amount to a veto on the granting of consent".[22]

[47] The wind farm has been significantly modified from that considered by the District Council's commissioners in 2009. The District Council accepts the proposal's positive effects and recognises the importance of renewable energy.[23] Nevertheless the District Council's witnesses held a number of concerns about the effects of the proposal on a ridge feature (which it says is an outstanding natural feature), the effects on the landscape and visual amenity and also upon the site's ecological values and would have considerably more restrictive conditions imposed if consent was granted.

[22] D Caldwell Opening submissions at [7].
[23] D Caldwell Opening submissions at [15].

**The law**

[48] The site is zoned Rural in the Hurunui District Plan and land use consent is required for a number of activities which are described in the planning evidence of Ms Jane Whyte and Ms Helga Rigg. Under the District Plan the proposal is a discretionary activity and therefore must be considered under section 104B and 104(1) of the Act.[24] In particular section 104(1) requires that, subject to Part II, we must have regard to the following matters:

- the actual and potential effects of the proposal on the environment;
- the provisions of the relevant statutory documents, being:
  - the National Policy Statement for Renewable Electricity Generation 2011;
  - the New Zealand Coastal Policy Statement;
  - the Hurunui District Plan;
  - the Regional Policy Statement; and
- any other relevant matter.

[49] In terms of those other relevant matters we have had regard to the draft National Policy Statement on Indigenous Biodiversity although little weight can be given to this as it is a draft and may change. We have also had regard to the New Zealand Biodiversity Strategy 2000.

***The purpose and principles of the Act***

[50] The Act has a single purpose which we set out as follows:

> Section 5: Purpose
>
> (1) The purpose of this Act is to promote the sustainable management of natural and physical resources.
>
> (2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people

[24] We note that different provisions apply to the appeal than the direct referral. That is because the direct referral was lodged after the 2009 Resource Management (Simplifying and Streamlining) Amendment Act came into force. We have applied the Act as amended by 2009 Amendment Act but do not consider anything arises that would materially alter our assessment and exercise of discretion under the different provisions.

and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while—

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

[51] Sections 6 – 8 of Act are important as these inform and assist the purpose of Act.[25] Section 6 lists matters of national importance that are to be recognised and provided for in this decision. They include (relevantly):

(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:

(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:

(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

…

(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga.

And section 7 (again relevantly):

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—

(aa) the ethic of stewardship

(b) the efficient use and development of natural and physical resources:

…

(c) the maintenance and enhancement of amenity values:

[25] *Beda Family Trust v Transit New Zealand* Judge Whiting A139/2004 at [24].

(d) intrinsic values of ecosystems:

…

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

…

**[**(j) the benefits to be derived from the use and development of renewable energy.

Finally, section 8:

> In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

[52] On large infrastructure proposals such as this one it is not unusual to find tension between the values referred to in Part 2. As the Board of Inquiry into the New Zealand Policy Statement Renewable Electricity Generation 2011 (**NPS REG)** observed (and we agree):[26]

> ... the values referred to in Part 2 can be incommensurable because there may be no common factor or metric that can be used for balancing or weighing them when making a value judgement. A value choice is often required where one value is chosen and another is rejected.

[53] Under Part 2 we are required to make an overall broad judgment whether the proposal promotes the sustainable management of natural and physical resources. That recognises that the Act has a single purpose. Such a judgment allows for comparison of conflicting considerations, the scale and degree of them and their relative significance in the final outcome - *North Shore City Council v Auckland Regional Council*.[27] This means where, on some issues, a proposal is found to promote one or more of the aspects of sustainable management, but on others it is found not to attain, or to attain fully, one or more of the aspects described in subsections 5(a), (b) or (c) it would be wrong to conclude that the latter overrides the former with no judgment of scale or proportion.[28]

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[26] NPS REG at [49].
[27] 97 NZRMA 59 at [93].
[28] *Genesis Power Ltd v anor v Franklin District Council* A148/2005 at [51].

[54] As there are competing Part 2 values we have regard to the Act's statutory hierarchy as between sections 6, 7 and 8 as part of the balancing exercise.[29] In doing so we keep in mind the requirement that the matters of national importance stated in section 6(a) and (b) are to be protected from inappropriate development; but that section 6(c) is not qualified in this way. However, these sections are subordinate to the Act's primary purpose being sustainable management of natural and physical resources and are not an end or an objective in their own right. Nor are their provisions to be achieved at all costs. Rather:

> The achievement which is to be promoted is sustainable management and questions of national importance, national value and benefit, and national needs, must all play their part in the overall consideration and decision.[30]

[55] MainPower submits that the effect of the NPS REG is that a wind farm is appropriate "unless there are strong and compelling reasons to override this national interest".[31] We do not accept this submission.

[56] The provisions of the National Policy Statements together with the other statutory documents guide decision-makers when making value choices. The preamble to the NPS REG states that in some instances the benefits of renewable electricity generation can compete with matters of national importance as set out in section 6 of the Act, and with matters to which decision-makers are required to have particular regard under section 7. The objectives and policies are intended to guide applicants and decision-makers on an application for resource consent.[32] However, there is nothing in its language or provision that creates a presumption that the matters of national significance in the NPS REG are to be given greater weight than those in section 6 or to prevail over the statutory purpose.

[57] We agree with and adopt what was said by the Board of Inquiry in the *Upper North Island Grid Upgrade Project* (cited with approval by the Board of Inquiry – *Renewable Electricity Generation* at paragraph 52) that:

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[29] Ibid at [55].
[30] *NZ Rail Ltd v Marlborough District Council* 94 NZRMA 70 at [86].
[31] Opening Submissions, MainPower, at [5.31].
[32] NPS REG 2011 Explanatory Note at page 8.

> Subject to Part 2, the NPS is to be applied by decision-makers under the Act, but not as a substitute for, or to prevail over, the RMA's statutory purpose or the statutory tests. It is a relevant consideration to be weighed along with other considerations in achieving the sustainable management purpose of the Act. The objectives and policies of the national policy statement are intended to guide decision-makers in considering requirements for designations for transmission activities and in making decisions on resource consents.[33]

**Issues for consideration and determination**

[58] As all parties have accepted that Mt Cass has areas of significant indigenous vegetation and habitat of indigenous fauna, the key issues for consideration and determination for the proposed wind farm are:

***The wind resource***

- the quality of the wind energy resource at Mt Cass;
- the benefits of the proposal in the context of New Zealand's electricity market; and
- the potential benefits and costs of the wind farm on the regional and local economies.

***Geomorphology, geology and hydrogeology***

- the effects on the geomorphology, geology and hydrogeology of the site from the construction and operation of the wind farm.

***Fire***

- whether the wind farm creates a risk of fire and if so, can the risk be managed?

***Ecology***

- the effects on indigenous biodiversity and ecosystem function; and
- whether these effects are able to be avoided, remedied or mitigated by the proposed biodiversity offset.

[33] Final Report (September 2009) at [221].

***Landscape***

- whether there is an outstanding natural feature in the area of the proposed wind farm;
- whether Mt Cass is within the coastal environment; and
- will the wind farm result in an adverse effect on the landscape (including any natural features) and the values derived from or supported by the landscape?

***Noise***

- are the levels of sound and the characteristics of sound produced by the wind farm adverse and if so then to whom?

***Statutory documents***

- to what extent is the proposal consistent with the provisions of the statutory documents?

[59] We consider these issues in turn setting out our findings and our evaluation in the context of the district and regional plans.

**The wind resource**

[60] We commence our evaluation by considering the wind resource at Mt Cass, which after all, is the subject matter of the resource consent application.

***What is the quality of the wind energy resource at Mt Cass?***

[61] Evidence on the wind resource at Mt Cass was provided on behalf of MainPower by Mr Philip Wong Too a senior engineer with specialist international wind energy consultancy, Garrad Hassan. Mr Wong Too has over 13 years of experience in wind monitoring and energy assessments as well as in the design, construction and operation of wind farms.

[62] We draw on Mr Wong Too's evidence (which was largely uncontested) to provide a general overview of the site's wind energy. We also address a related issue and that concerns the degree to which the project's economic viability might be affected by uncertainties in the assessment of the wind resource.

[63] Mr Wong Too's evidence was that following several years of monitoring, Mt Cass has been assessed as having a Class 1/Class II[34] wind resource, acceptable turbulence levels and an expected output of between 75% and 90% of the time.[35] It is his assessment that Mt Cass has the best wind resource for a wind farm in North Canterbury.[36]

[64] While existing or consented New Zealand wind farms are located primarily in areas with Class I wind speeds, most of these Class I sites have been used up with the result that sites on the borderline between Class I/Class II such as Mt Cass are now becoming economically viable to develop.[37]

[65] From his analysis of the wind resources at sites throughout New Zealand, Mr Wong Too is of the opinion that a wind farm at Mt Cass will positively add to the geographical diversity of the country's wind energy generation.[38]

[66] Mr Wong also notes that the capital cost of wind turbines can be as high as 70% of the total cost of a wind farm. As such, developers normally seek to identify a range of suitable turbine options in their wind farm proposals in order to be able to optimize price competition when it comes to turbine supply. Hence MainPower's decision to include the three turbine options (R33, R60 and R90) at Mt Cass. Mr Wong Too considers each of these to be a viable alternative.[39]

[67] Mr Young questioned Mr Wong Too about his wind energy assessments and the potential for uncertainty in these assessments to affect the project's economics. Mr

[34] Based on International Electrotechnical Commission Classifications which vary from the highest, Class I (wind speeds 8.5m/sec to 10.0 m/sec) to Class III (wind speeds less than 7.5m/s.).
[35] Wong Too EiC at [5.10] and [7.7].
[36] Wong Too Transcript at 228.
[37] Wong Too EiC at [5.12].
[38] Wong Too EiC at [7.4].
[39] Wong Too Transcript at 231.

Wong Too advised that his company has its own specialised uncertainty analysis software although he could not recall whether this had been used for Mt Cass.

[68] His opinion on the potential effects of uncertainty in the wind energy assessment is best summarised in this exchange with Mr Young:[40]

Mr Young:

> But in order to judge whether your wind farm will be economic, isn't this important to know, you know, the degree of uncertainty you are facing here?

Mr Wong Too:

> Yes, but … at this stage of the game where there are a large number of uncertainties around turbine sizes, turbine types, things like that, say a 10 to 20% error uncertainty in the energy calculations will pale into insignificance in the (context) of a 20% exchange rate fluctuation over two years, or a 20% change in turbine prices over two years or, I mean 100% fluctuations in wholesale electricity prices on a year to year basis. I mean, the energy uncertainty is only one relatively small part of the overall uncertainties facing the project.

[69] We find that Mr Wong Too has undertaken a competent assessment of Mt Cass's wind energy.

***The benefits of the proposal in the context of New Zealand's electricity market***

[70] The evidence of Mr Greg Sise on the benefits of a wind farm at Mt Cass in the context of New Zealand's electricity market was taken as read and not contested. For completeness we include here a brief summary of the key benefits identified by Mr Sise:[41]

- a depression in electricity spot prices with these being passed on to consumers most probably through delays in future price increases;
- enhanced security of national electricity supply particularly in dry years when hydro outputs are reduced;
- a reduction in losses in the transmission grid; and
- reduced $CO_2$ emissions from the displacement of thermal generation.

[40] Wong Too Transcript at 222.
[41] Sise EiC at [8.1].

***The potential benefits and costs of the wind farm on the regional and local economies***

[71] Evidence on the economic benefits and costs of developing a wind farm at Mt Cass was provided by Mr Michael Copeland. This was also taken as read.

[72] Mr Copeland identified the same national energy benefits as Mr Sise. In addition he concludes that there would be improved economic wellbeing for the Canterbury region from:

- enhanced employment opportunities, income and expenditures particularly during the construction of the wind farm and to a lesser extent during its operation;
- opportunities for local businesses to supply goods and services; and
- an increase in economic efficiency from the better utilization of existing local infrastructure.

[73] Mr Copeland also discusses a number of economic costs which could arise from the construction of the wind farm. The economic costs and Mr Copeland's assessment of each are as follows:[42]

- a potential loss of agricultural production - Mr Copeland's opinion is that the cost of any lost production will be offset through land rental payments from MainPower, and that there will be no external costs from the wind farm which will need to be borne by the local community;
- a potential loss of tourism expenditure - based on the advice of Mr Greenaway and Dr Stevens that an enhanced walkway along Mt Cass Ridge should attract more visitors, Mr Copeland concludes that there should not be any reduction in local tourism expenditure as a result of the development of the wind farm. (More specific detail on the effects of the proposed wind farm on local tourism is set out elsewhere in the decision);

[42] Copeland EiC at [7.]1-[7.9].

- the timing of wind farm development - while Mr Copeland acknowledges that there has been a slowdown in New Zealand's current economic activity and a corresponding reduction in demand for more electricity, this slowdown is expected to last for only 1 or 2 years with increasing demand restored after that;
- whether there would be negative impacts on property values - Mr Copeland notes that some submitters have expressed concern that potential noise effects from the wind farm could have an impact on the value of their properties. As he is not qualified in property valuation and his comments are restricted to more generic economic matters. In fact we heard no expert evidence on the specific issue of the potential effects of the wind farm on property values; and finally
- the loss of biodiversity, landscape and recreational values - Mr Copeland's opinion is that it is better not to attempt to estimate monetary values for these effects but to leave them to be part of the overall judgement under section 5 of the Act. We agree with him and have considered both the costs and benefits to the local and regional economies in our overall evaluation of the proposal under Part 2 of the Act, where we consider also the benefits of the proposal in the context of renewable electricity generation.

**Geomorphology, geology and hydrogeology**

[74] We turn next to our consideration of the effects on the geomorphology, geology and hydrogeology of the site from the construction and operation of the wind farm, focusing in particular on the following sub-issues:

- the importance of Mt Cass's geomorphology;
- the protection of subterranean features from the effects of the wind farm and vice versa;
- the protection of the limestone pavement at road crossings;
- the design storm;

- the design and implementation of a monitoring programme for detecting and controlling potential contamination of underground water;
- the site's seismicity;
- the stability of boulders on the northern escarpment; and
- findings, including the conditions of consent for geomorphology, geology and hydrogeology.

[75] Evidence on these matters was presented for MainPower by Professor Paul Williams, an internationally recognised expert in the geomorphology and hydrology of limestone and karst formations; and for the District Council by Dr Jack McConchie, a principal water scientist from Opus International Consultants, also an expert in geomorphology, hydrology and regional planning.

[76] Professor Williams[43] (supported by Dr McConchie)[44] provided helpful explanations of a number of terms used throughout the hearing to describe the geomorphology and hydrology of the Mt Cass site. These are paraphrased here:

- *geomorphology* is the study of landforms with a focus on the form of the ground surface and the processes which mould it;
- *hydrology* is the study of water in the environment, in the atmosphere, on the surface and below ground;
- *hydrogeology* is a branch of hydrology which is concerned mainly with underground water (or groundwater);
- *karst* is the germanicised form of the word *Kras,* with karst landscapes being limestone topography characterised by sinking streams, underground rivers, caves, dry valleys and springs;
- *dolines* (often referred to as "sinkholes") are enclosed depressions in karst formed by the dissolution of bedrock ("solution dolines"), by the collapse of a roof of a cave ("collapse dolines") or by the movement of superficial deposits such as soil or alluvium down widened joints into underground cavities leaving a dimpled surface (typical of the Mt Cass dolines);

[43] Williams EiC at [3.1-3.10].
[44] McConchie EiC at [15].

- a *cuesta* is an asymmetric ridge built of sedimentary rocks elongated along the strike of the strata, with a steep front slope (called a scarp or escarpment) and a gentle back slope more or less parallel to the dip. At Mt Cass the scarp runs more or less along the north side of the ridge and the dip more or less along the south side;
- a *karrenfield* is an assemblage of limestone pavements.

[77] Professor Williams and Dr McConchie met in November 2009 to discuss the geomorphology and hydrogeology of the wind farm site. A document signed by both experts on 18 January 2010 titled *Final Agreement on Geomorphology Following Caucusing on 23 November 2009* records what they refer to as their agreement in principle on all matters surrounding the geomorphology (and hydrogeology) of the site (we refer to this as the **joint statement**).

[78] We heard also from Matthew Naylor, who is a senior engineering geologist from MWH Ltd with specialist geological and geotechnical expertise in the investigation, design and construction of roads and embankments and cuttings in karstic features. Mr Naylor was engaged by MainPower to develop a site-specific methodology for mapping the Mt Cass landforms and to carry out a preliminary geological and geotechnical review of the proposed wind farm roads and turbine foundations.

[79] The mapping undertaken by Mr Naylor was entered into a GIS database which was then used by a number of experts to evaluate the effects of the proposed development on the different types of landform. Table CG172.2, 27 May 2011 attached to Mr Hurley's rebuttal evidence sets out, for each type of limestone landform, the total area within the Mt Cass ecosystem, the disturbance required for each of the three turbine options, and the area of the disturbance as a proportion of the total area. For all intents and purposes the areas for the three turbine options are the substantially the same.

[80] Mr Naylor's definitions of the different types of limestone landform, the disturbances required and their proportion of the total area are as follows:

- *pavement* – a continuous relatively flat or moderately inclined surface with an organised system of open near-vertical joints which fully penetrate the surface limestone bedding. Disturbance required including areas which are to be buried, 1.21 ha or 0.87% of total area (R60 option);
- *boulder field* – areas to the *south* of the ridge crest with 30% to 50% of the natural ground surface covered with boulders supporting vegetation other than just pasture grass *or* over 50% of the natural ground surface covered with boulders and supporting any form of vegetation. Disturbance required, 0.48 ha or 0.50% of total area (all options);
- *scarp face boulder field* – boulder fields to the *north* of the ridge crest. Disturbance required, 0.67 ha or 1.49% of total area (R90 option);
- *cliff* – steeply inclined areas of exposed in-situ rock forming parts of the slope *north* of the ridge crest. Disturbance required, 0.02 ha or 0.49% of total area;
- *scree* – sloping areas *north* of the ridge crest with over 50% of the ground surface predominantly free of topsoil and vegetation, with a surface cover of gravel sized limestone fragments. Disturbance required, nil.

[81] We note in particular the major reduction in pavement disturbance from that required for the original layout to that required for the mediation layout. For example, for the R60 option, the disturbance reduced from 4.29 ha to 1.21 ha.

[82] Dr Lloyd for the District Council sought an amendment to Mr Naylor's definition of boulder field.[45] We accept Mr Naylor's response that from a geomorphological perspective, he considered that his definition was little different from that proposed by Dr Lloyd and that it should not be changed. Further, as the definition, mapping and areas of disturbance specified in the proposed conditions are linked and interdependent, any change in one definition would necessitate remapping and revision of the overall clearance figures.[46]

[45] Lloyd EiC at [227].
[46] Williams EiC at [3.1]-[3.10].

[83] In response to a concern raised by Mr Davis as to the accuracy of the limestone mapping, Mr Naylor advised that a contingency of 20% had been added to his assessments so as not to underestimate the extent of each of the disturbance areas.[47]

***The importance of Mt Cass's geomorphology***

[84] In the joint statement, Professor Williams and Dr McConchie agreed that the Mt Cass ridge is a fine example of a cuesta and is a geomorphic feature of regional significance. They also agreed that the listing of Mt Cass in the Geopreservation Index of the Geological Society of New Zealand is justified, although they note that the index is compiled from relatively unscreened material, is not peer reviewed and has no legal standing in its own right.

[85] In his evidence-in-chief Professor Williams concludes that while Mt Cass ridge is a fine example of a cuesta of regional significance, in proportion to its total area the impact of the wind farm would be small and that even though the potential impact on the karrenfield would be greater, in his view it would not be a major effect.

[86] For his part Dr McConchie concludes that the karst of the Mt Cass cuesta has significance at a regional and district level and "its diverse and distinctive and impressive range of karst features" are unlikely to be replicated elsewhere.[48] It is his opinion that the revised layout will avoid what he describes as the "best" landscape elements, and that the uncertainties of the proposal and its potential effects can best be accommodated through independent project reviews and comprehensive monitoring.

***The protection of subterranean features from the effects of the wind farm and vice versa***

[87] In their joint statement the two experts recorded their agreement that little is known about the site's subterranean karst features such as drainage paths and caves and that it was difficult to evaluate the degree of risk these features might pose for the development of the wind farm – and, conversely, the potential for the development to damage the karst and its biota. They went on to say that to protect these subterranean features, drainage works should be designed to diffuse run-off through vegetated areas

[47] Naylor Rebuttal at [2.1]-[2.2].
[48] McConchie EiC at [26].

rather than through discharge into the sinkholes. The filling of sinkholes should also be avoided to preclude the risk of natural re-excavation from below by upward stoping (or mining) and subsequent collapse.

[88] The joint statement also included the experts' recommendations for roads and structures to avoid areas with sinkholes, and for measures such as ground penetrating radar and proof drilling to be used to confirm sub-surface conditions at the proposed locations of the turbines.

[89] Mr Naylor did not see any foundation difficulties for constructing turbines at Mt Cass provided suitable measures are followed. The measures he identified included locating the turbines at least 20 metres away from the scarp face to avoid areas of potential instability; avoiding sites with large open joints and sinkholes; where joints or small sinkholes were present, adopting remedial measures such as using piles or grouting open joints to improve bearing capacity; and developing protective measures for preventing sediment discharge into the joints or sinkholes.[49]

[90] Mr Naylor also agreed with Professor Williams and Dr McConchie that a range of engineering investigations should be undertaken as inputs to the detailed design of the wind farm and the determination of its final layout. He listed ground penetrating radar to identify depths to rock and potential voids, foundation borehole drilling, test pits, geotechnical hazard mapping, and laboratory testing to determine the properties of landslide materials.[50]

[91] Likewise, he identified a range of measures for ensuring that the turbine access roads can be constructed safely and to minimise their impact on the overall geomorphology of the site. These include stabilisation strategies for roads cut through limestone and, as for the turbine foundations, developing protective methods for preventing sediment discharge into the joints or sinkholes.[51]

[49] Naylor EiC at [4.2].
[50] Naylor EiC at [4.6].
[51] Naylor EiC at [4.3].

***The protection of limestone pavement at road crossings***

[92] In their joint statement, Professor Williams and Dr McConchie agreed that where access roads cross limestone pavement at a low gradient, covering the surface with limestone rubble will armour the surface and minimise destruction. This approach is supported by Mr Naylor.

[93] Referring to the two experts' joint statement for protecting limestone pavement at road crossings through burying, Mr Hurley notes that the adoption of this approach at three locations on the ridge between Mt Cass and Totara Peak will mean that no areas of limestone pavement will be permanently removed by road construction. While this may be so, in the ecology section of this decision, we address Dr Lloyd's concerns over the loss of limestone 'habitat' through the proposed burying.

***The design storm***

[94] In response to questions from the Court as to the appropriate design storm to be used for the design of detention features for run-off and sediment control, Professor Williams and Dr McConchie eventually agreed a 5% AEP (Annual Exceedance Probability) storm for the construction period and a 2% AEP storm for the permanent roads.[52] Dr McConchie pointed out that a 5% AEP design storm meant that there was a 5% chance of this design storm occurring every year. It was also preferable to use this terminology as opposed to that of a 1 in 20 year storm which could imply that such a storm would occur only once every 20 years.

[95] The agreement of the two experts on the design storm is reflected in Condition 39 which requires a design storm of 5% AEP of the appropriate design duration for the construction period and a design storm of 2% AEP for permanent roads.

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***The design and implementation of a monitoring programme for detecting and controlling potential contamination of underground water***

[96] In answer to a question from the Court about the potential for contamination of underground springs from wind farm construction activity, Professor Williams advised that although Mt Cass is underlain by about a hundred metres of limestone, it is only the top Weka Pass layer which is well karstified. He had accompanied the biologist who

[52] Transcript at 902-906.

had undertaken the water sampling and saw that most of the springs are at the junction of Weka Pass and the underlying Amuri limestone layers. Surface drainage would pass quickly through the wide open joints of the Weka Pass layer, reach the top of the Amuri layer and then flow under gravity down the dip slope over a maximum of one or two days to the nearest spring.

[97] In their joint statement, Professor Williams and Dr McConchie had agreed that water quality monitoring should be undertaken at the main springs draining the site prior to, during and after construction, with this monitoring to include both aquatic indicator species as well as suspended and dissolved contaminant or pollutants including hydrocarbon indicators.

[98] They stressed that the monitoring programme should include records of bio-data such as stoneflies, mayflies and snails. These would give a clear indication of the presence of pollutants as evidenced through deaths or reductions in abundance of the bio-data.[53] If the monitoring detected pollutants at a particular spring, it should be possible to quickly find the source of this pollution by following the dip directly up the slope from the spring, identify the closest construction work site (the most likely pollution source), and then institute remedial measures to stop the contamination.

[99] Dr McConchie proposed a geomorphological consent condition which had the objective of the "prevention of any sediment and other contaminants from entering the subterranean karst and drainage lines".[54] In response to a question from the Court, he acknowledged that the conditions as drafted by MainPower used the word "minimise" which, even though much less certain than "prevent", he would somewhat reluctantly accept.[55] Professor Williams said that he would be happy with "minimise" provided the clear intent of the water and soil erosion management focussed on prevention. This opinion in our view balances the desirability of absolute prevention with practical reality.

[100] In addition to the proposed water quality monitoring sites at the springs on the south facing dip slope, in answer to a question from the Court the two experts agreed

[53] Transcript at 885.
[54] McConchie EiC at [74].
[55] Transcript at 887.

that monitoring should also be undertaken in the stream(s) on the northern side of the wind farm as these provide farm stock water.[56] As a result, Condition 41 has been amended to include an additional site at Smothering Gully Stream below the northern terrace.

***The site's seismicity***

[101] Mr Naylor notes that the site is in a zone of relatively high seismic activity although in his opinion no more than in other parts of New Zealand. It is also his opinion that the turbines and their foundations can be designed to withstand the level of seismic shaking anticipated for the site, with the design level to be confirmed through a site specific hazard assessment.[57] None of this was disputed.

***The stability of boulders on the northern escarpment***

[102] During its site visit, the Court observed a number of large limestone boulders located below the scarp face and above the realigned terrace road and the site of the proposed sub-station. During an earthquake, some of these boulders appeared to us to have a high potential for dislodgement, thereby posing a risk to the safety of personnel involved in the construction and operation of the wind farm.

[103] At our request Mr Naylor provided us with supplementary evidence on the stability of these boulders. In doing so, he advised that during a further site visit he had identified that most of the boulders were between 0.5 m and 1.5 m in diameter although some were up to 10 m. Included was a small number of very large boulders (less than 10) which had been significantly undercut and had only marginal stability with the potential to cause damage unless they are stabilised. Mr Naylor identified a number of boulder stabilisation techniques including removal, anchoring or propping as well as the construction of safety fences. He also noted that a seismic risk assessment will be undertaken at the design stage of the project and that this will be used in the design of individual stabilisation measures.

***Findings, including the conditions of consent on geomorphology and geology***

[104] Based on his assessments to date, the proposed risk and foundation design stage assessments and the mitigation measures proposed including the condition in the

[56] Transcript at 891-892.
[57] Naylor EiC at [4.5].

Construction Management Plan requiring minimisation of the visual impact of these measures, Mr Naylor considers that Mt Cass's geomorphology and geology is suitable for the safe construction and operation of the proposed wind farm.

[105] Dr McConchie is of the view that the proposed conditions of consent should ensure that the effects of the development of the wind farm on the site's geomorphology and water quality should be minimised in the first instance and mitigated whenever some effects are inevitable.[58]

[106] Professor Williams is satisfied that while the hydrogeology of the karst drainage system has not been fully explored, large caves are unlikely to be present, local catchment areas are small and aquifer volumes will be modest especially as these are freely drained by gravity. Overall he is of the view that if the wind farm is constructed and operated in accordance with the proposed conditions of consent including the proposed water quality monitoring regime, the potential effects on the site's hydrogeology and water quality will be minimised.[59]

[107] We find no reason to dispute the conclusions of these three experts and find also that the proposed conditions of consent relating to geomorphology, geology and hydrogeology should:

- adequately protect sub-surface drainage pathways;
- adequately protect existing cave features;
- result in an acceptable level of disturbance for the different types of limestone and in particular the pavement where this is crossed by access roads;
- following the stabilisation of the boulders on the northern escarpment, provide a safe working environment for personnel involved in the construction and operation of the wind farm; and
- with the proposed construction management plan and monitoring programme, minimise the potential for contamination of underground water sources.

[58] McConchie EiC at [89].
[59] Williams EiC at [8.1]-[8.5].

**Fire risk**

[108] In this section we examine the probability and consequences of a turbine catching fire. Evidence on this was provided by Mr Philip Wong Too. In addition, a submitter, Mr C Herbert raised concerns about the adequacy of MainPower's Draft Fire Management Plan.

[109] Mr Wong Too advised that the most likely source of a fire was from a malfunction in a turbine transformer. Transformers located in the nacelles of older turbines were not necessarily designed to be robust enough to accommodate the constant vibration of the turbine and this sometimes caused damage to the electrical wiring which could result in a fire. Conversely, modern transformers are designed with better protection and many were now being located in a cabinet on the ground adjacent to the tower base.[60]

[110] Mr Wong Too went on to say that other more recent safeguards for fire prevention included improved generator wiring, changes to the pitch valves and improvements to the bearings in the turbine gear boxes.[61] Operator competence and experience are also very important factors for minimising the risk of fire.

[111] Mr Wong Too pointed out that, even with the best safeguards, fires do occur from time to time.[62] For example, there is always the potential for human error and he quoted one instance where following the failure of a protection system, the turbine operator failed to complete adequate checks before reactivating the turbine and a fire resulted.

[112] There was little that could be done to extinguish a fire in a nacelle some 60 or 70m above the ground other than waiting until it had burnt out and there was the possibility that ground cover below the turbines could be set alight by falling debris. If a fire did occur, the wind farm turbine supervisory control and data acquisition system (**SCADA**) should enable rapid detection of the fire and trigger the earliest possible

[60] Wong Too Transcript at 232.
[61] Wong Too Transcript at 233.
[62] Wong Too Transcript at 232.

mobilisation of firefighters with the wind farm turbine roads providing speedy access for firefighting.[63]

[113] Mr Herbert was critical of MainPower's Draft Fire Management Plan claiming, for example, that the nearby Waipara Fire Brigade had not been identified in the plan.[64]

[114] MainPower's proposed Conditions 119 to 121 set out the requirements for the preparation of a Fire Management Plan (**FMP**). Condition 121 makes specific reference to the FMP including relevant contact details from Appendix G of the Ashley Rural District Fire District Plan 2009-201. We have not sighted a copy of this plan to establish whether or not the Waipara Fire Brigade is included in Appendix G but we would presume that it would be. In any case, we would not expect the conditions for the wind farm to include this level of detail.

[115] While we did not hear evidence on this, it would seem that the incremental risk of a fire from a wind turbine over the status quo for the Mt Cass site should be minimal. During the construction and operation of the wind farm, MainPower will have in place greatly improved access and a detailed FMP which currently do not exist for the site.

[116] We conclude that while the risk of fire cannot be eliminated, the design and operation of the turbines proposed for Mt Cass should result in an acceptable level of risk and that if there is a fire, MainPower's FMP will provide a sound approach for responding to this.

[117] Finally, Condition 120 has been amended to delete reference to "all parties", which at the time of drafting the condition was a reference to the parties to the proceeding.

***District Plan - assessment of natural hazards including the risk of fire***

[118] A wind farm at Mt Cass will be vulnerable to seismic events and geomorphologic processes. Objective 14 of the District Plan (the Plan) requires that the effects of natural hazards on the environment are to be avoided or mitigated, with

[63] Wong Too EiC at [9.3, 9.4].
[64] Transcript at 714.

priority given to community protection. Policy 14.3 requires that development is to take into account risks from natural hazards.

[119] Objective 10 and Policy 10.4 of the Plan require the provision of safe environments with the latter being "[t]o encourage development which fosters a healthy and safe built environment".[65.]

[120] Objective 15 and Policies 15.4 and 15.5 include provisions for minimising the risk of damage from hazardous activities and the use of hazardous substances. The wind farm will require the use and storage of hazardous substances such as oil and fuel, particularly during the construction period. Having had regard to the assessment matters for natural hazards and hazardous substances set out in Section A9, we are satisfied that these are able to be controlled through careful design and site management and through the conditions of consent.

[121] Other requirements of Section A9 include an assessment of the extent to which the proposed development meets the objective, functional requirement and performance provisions of the New Zealand Building Code. We heard no evidence on the consents MainPower might require under the Building Code for the design and construction of the wind farm – nor did we expect to. Suffice to say that what we did hear was based on technologies and construction techniques well proven on other wind farms already built in New Zealand.

[122] We are satisfied that the FMP, once in place, will provide acceptable procedures for the management of the risk of fire and suppression if a fire should occur.

[123] Finally we consider the requirement of Section A9 for an assessment of the anticipated natural hazard damage and costs and the estimated benefits to the community of the proposed development. (Costs and benefits to take into account both monetary and non-monetary costs and benefits).[66]

[65] Similar provisions are contained in the RPS at Chapter 16 in objective 1 and policy 1.
[66] Section C1: Resource Consent Procedures, Assessment Criteria C.1.2.4 (h).

[124] Starting with the estimated monetary and non-monetary benefits to the community, we address these in our overall Part 2 evaluation of the wind farm proposal and do not repeat them here.

[125] The only obvious natural hazard we have been able to identify which could have the potential to affect the community (adjoining farmers) would be if there was a breakdown of the proposed water quality control procedures with stock water becoming contaminated and the health of farm stock being threatened.

[126] This is directly related to Objective 4 and Policy 4.1 of the Plan which are concerned with the protection and enhancement of the quality and quantity of the District's freshwater resources. Some parties did raise concerns about the contamination of water resources used in farming. These are important resources and their values are to be recognised. In this regard Condition 41 has been amended to include water quality monitoring at the main springs (which are listed) on the south facing dip slope and at the Smothering Gully Stream on the north slope.

[127] We accept the advice of the geomorphology and hydrogeology experts that if MainPower's proposed wind farm at Mt Cass is constructed and operated in accordance with the conditions of consent including the proposed water monitoring regime, then these will satisfy the freshwater provisions of the Plan. On this basis, we find that the natural hazard risk of the wind farm contaminating farm stock water is at an acceptably low level.

*Other matters – unrelated to geomorphology or natural hazards including fire*

[128] Having had regard to the evidence presented on behalf of MainPower (which was uncontested) and the assessment matters set out in the Plan we are satisfied that the proposal also achieves those policies concerning the maintenance of air quality (Policy 10.10),[67] efficient production and use of energy (Objective 11, Policy 11.1), and the safe and efficient use of the transportation network (Policy 12.10).

[129] In the next section we consider the area's ecological values.

[67] Conditions 32, 35 and 63.

**Ecology – the effects on biodiversity and ecosystem function at Mt Cass**

[130] The Mt Cass range supports a delightful mosaic of native bush interspersed with grasslands largely comprising silver tussock and exotic pasture. The bush remnants are most evident on the south facing dip slope of the cuesta being concentrated on areas of limestone pavement and outcrops or in deep gullies. While grazed by cattle and sheep, and hosting various animal pests, the range is also home to native animals, with lizards and birds being of particular interest in this case.

[131] The combination of the limestone features, regenerating bush along the ridge and relict forest communities on the dip slope provides a series of distinctive habitats and a diverse range of ecotones between limestone pavement, boulder field, forest, shrubland and grassland communities. There is high species abundance, richness and diversity. It has been described as one of the best examples of a limestone ecosystem in the eastern South Island. Accordingly, there is agreement that the range qualifies as an area of significant indigenous vegetation and provides significant habitats for indigenous fauna in terms of section 6 of the Act.

[132] The ridge is currently farmed with grazing by sheep and cattle. Organic Farm Holdings Ltd owns the land to the west of Mt Cass. MainPower owns 168 ha of land extending along the ridge between Mt Cass and Totara Peak. Dovedale Farm Ltd owns the next 3 km to the east, including Totara and Oldham peaks, and Hamilton Glens owns the forked eastern end of the ridge.[68] There will be no change to farm management as a result of the proposed wind farm, on the properties not owned by MainPower.

[133] At the initial caucusing on the original proposal for the Mt Cass wind farm the ecologists were agreed that Mt Cass is an outstanding indigenous limestone ecosystem with the most significant values being concentrated along the ridge crest between Mt Cass and Totara Peak (some 3 km). They were also agreed that the potential adverse effects of the proposed wind farm could be summarised in ten categories:[69]

[68] Hurley EiC at [2.5].
[69] Ecologists' joint statement dated 13 January 2010 (thirteen experts).

- loss of limestone ecosystems, indigenous limestone vegetation and habitats;
- loss of a portion of threatened, at risk and regionally uncommon plant and animal populations;
- fragmentation of habitat, resulting in edge effects and isolation of populations;
- loss of part of ridge ecotones/sequences;
- disturbance/opportunities for weed/pest encroachment;
- reduced naturalness;
- interruption of ecological processes;
- increased risk of fire; and
- increased risk of contaminant/sediment discharge.

There was disagreement as to severity of these effects on the ecosystem and its constituent species and some experts considered proposed mitigation measures to also have adverse effects.

[134] As noted, following mediation the road network and turbine locations were revised and the 'mediation layout' proposed. The footprint of the wind farm and associated clearance of vegetation was set out in detail for each of the turbine sizes (and associated layout) proposed. The total area of each vegetation type within the Mt Cass ecosystem and the maximum vegetation clearances[70] (those for R60 turbine layout) are summarised below: [71]

| **Vegetation** | **Mt Cass** | **Original clearance** | | **Mediation layout**[72] | |
|---|---|---|---|---|---|
| | **(hectares)** | **(hectares)** | **%** | **(hectares)** | **%** |
| Pasture | 960 | 14 | 1.5 | 20 | 2.1 |
| Tussock | 58.4 | 2.0 | 1.2 | 3.0 | 5.2 |
| Shrubland | 200 | 2.9 | 1.5 | 0.71 | 0.36 |
| Forest | 185 | 2.3 | 1.2 | 0.09 | 0.05 |
| Other | 68 | 0 | | 0 | |
| **Total** | 1471 | 21.2 | 1.4 | 23.8 | 1.6 |

[70] Does not include temporary construction activities and fill areas in grasslands where any disturbance must be restored. Does include a 1 metre buffer and a 20% contingency in the calculation of the areas to be cleared.
[71] Figures have been drawn from Hurley rebuttal Appendix B and rounded.
[72] As further amended to avoid an area of forest on limestone as described in Hurley rebuttal at [47].

[135] It is clear from the table the mediation layout increases the clearance of pasture and tussock grassland while reducing the clearance of indigenous forest and shrubland. The biggest change is shifting the access road from the top of the ridge on the dip slope to the terrace below the scarp on the northern side. All ecologists were agreed that the mediation layout is an improvement and reduces adverse effects on the ecosystem. In a second round of caucusing, the ecological experts focused on four themes:[73]

- ecological values – agreed to be as described in the January 2010 statement;
- ecosystem resilience – given the current use of the site for grazing;
- effects of development – focusing on the limestone ecosystem, uncertainty associated with the possible presence of rare and cryptic species, and fragmentation effects; and
- biodiversity offset – limits of what can be offset and the adequacy of the model to demonstrate appropriateness.

[136] We heard evidence from ten ecological experts:

- Dr Sarah Flynn (called by MainPower) on the existing vegetation, proposed clearance and disturbance, changes to the grazing regime, and the biodiversity offset;
- Dr Raphael Didham (MainPower) on habitat fragmentation;
- Dr David Norton (MainPower) on rare plants and the metrics of the biodiversity offset;
- Dr Graham Ussher (MainPower) on the proposed biodiversity offset;
- Dr Kelvin Lloyd (District Council) on the importance of the ecosystem and the direct and indirect effects of proposal;
- Mr Mark Davis (Mt Cass Ridge Protection Society) on the adequacy of information, importance of ecosystem and effects of proposal;
- Dr Colin Burrows (Mt Cass Ridge Protection Society) on a holistic consideration of effects along the Mt Cass ridge;

[73] Ecologists' joint statement 9 April 2011 (Sarah Flynn, Kelvin Lloyd, David Norton and Graham Ussher) and Response to this joint statement (Colin Burrows and Mark Davis).

- Dr Richard Seaton (MainPower) on potential effects on avifauna;
- Ms Astrid van Meeuwen-Dijgraaf (District Council) on potential effects on avifauna; and
- Mr Trent Bell (MainPower) on potential effects on lizard fauna.

[137] Mediation, expert conferencing, and the subsequent exchange of evidence between the various ecological witnesses for the different parties have resulted in refinements to the rehabilitation and offset proposals, and amendments to the conditions of consent. The mitigation now proposed is to covenant[74] and protect 127 ha of land owned by MainPower. The land management, described and modelled as a 'biodiversity offset', involves:[75]

- exclusion of cattle;
- managed sheep grazing;
- trapping and removal of pest animals;
- natural regeneration of indigenous species;
- restoration planting of 1 ha trial plot with provision for a further 6 ha if required;
- weed control;
- monitoring of threatened plant species; and
- monitoring of biodiversity condition.

[138] While many issues and concerns have been settled or very much reduced, Dr Lloyd, Mr Davis and Dr Burrows remain of the opinion that the revised proposal will have significant adverse effects on the Mt Cass ecosystem.[76] Doctors Flynn, Norton and Ussher consider that the proposed biodiversity offset package would more than compensate for any adverse effects on the ecosystem giving a net gain in biodiversity values.[77]

[139] Given that we are dealing with an ecosystem here we cannot confine our assessment of effects to simply the immediate and direct effects on the wind farm

[74] MainPower's preference is a QEII covenant Memorandum dated 1 August 2011.
[75] Hurley EiC at [8.1]-[8.2].
[76] Lloyd EiC at [31]; Davis EiC at [90]; Burrows EiC at [44] to [46].
[77] Flynn ; Norton EiC at [6.5]; Ussher rebuttal at [4.5].

footprint. We must also consider the consequential effects over the longer term, the wider changes on the project site as well as interactions with the surrounding environment. This wider temporal and spatial context is critical to a full assessment of effects on the ecosystem. This raises issues of complexity and scientific uncertainty in the assessment of both the existing environment and the prediction of effects.

[140] After considering the position of the parties and the ecologists' joint statements explaining the areas of disagreement we identify five issues to be addressed:

(i) do we have sufficient information about the ecosystem?
(ii) what is the state and trajectory of the ecosystem under the current farming regime?
(iii) what is the significance of the proposed disturbance to vegetation and habitat?
(iv) does the proposed biodiversity offset make up for the loss and disturbance of vegetation and habitat?
(v) are the conditions of consent appropriate, certain and enforceable?

[141] Following cross-examination the experts giving evidence on ecosystems were empanelled as a group to answer questions of the Court (we refer to this as "hot-tubbing").

***Do we have sufficient information about the ecosystem?***

[142] The Mt Cass ecosystem area is long and narrow running about 9 km along the ridge and extending about 500 m down the scarp slope to the northwest and 800 to 1200 m down the more gentle dip slope to the southeast.[78] It sits within the Motunau Ecological District.[79] Exotic pasture extends up the northern face of the escarpment interspersed with tussock, mingimingi shrubland and forest remnants. The exposed ridgeline is a mosaic of mingimingi shrubland across pasture, mixed pasture and silver tussock grasslands, and broadleaf scrub on knolls and rock pavement. A variety of herbs occurs in cracks and cups on exposed limestone pavement. A series of forested ridges lie across the south facing dip-slope with shallow valleys in between covered in

[78] Flynn EiC Figure 1.
[79] New Zealand is divided into 268 ecological districts with characteristic landscapes and biological communities.

pasture and tussock grasslands. The low broadleaf dominated bush and scrub of the ridge crest grades into moderately high woodland (6-10 m) on the mid-slopes, and to tall podocarp/broadleaf forest further down the slope.[80] The forests on the upper slopes are mostly younger, regenerating since 1950, while those on the lower slopes are mature with emergent podocarps that may have persisted for some hundreds of years.[81]

*Vegetation communities*

[143] Dr Flynn (and others) had surveyed, described and mapped the vegetation communities of the Mt Cass ecosystem:[82]

| **Community** | **Description of vegetation**[83] |
|---|---|
| 1 | Pasture |
| 1(a) | Tussock grassland (>10% *Poa cita*) |
| 2 | Mingimingi – pasture grass shrubland |
| 3 | Broadleaf – (mingimingi) – (five finger) – (kohuhu) scrub |
| 4 | Kowhai – (broadleaf)/ongaonga forest |
| 5 | Mahoe – (houhere)/Raukaua – ongaonga – climbing fuchsia forest |
| 6 | Broadleaf – five finger – (mahoe)/(ongaonga) forest |
| 7 | (Matai)/mahoe – broadleaf – (lemonwood) forest |
| 8 | (Ribbonwood)/mahoe – kaikamako/ongaonga forest |
| 9 | Totara/five finger – mahoe/(pasture) forest |
| 10 | Totara – (matai)/kowhai – mahoe/kawakawa forest |

[144] Areas of matagouri shrubland, exotic pine forest, kanuka forest and scrub, and exotic willow forest were also mapped. While noting that the mapping of the vegetation communities was a combination of field surveys and extrapolation from aerial photographs, Dr Flynn was confident that it was an accurate and adequate description.[84]

[145] Mr Davis compared the mapping of pasture and tussock grassland communities at a number of locations on the eastern end of the Mt Cass ridge with his own observations in the field. While acknowledging the varying density of tussock in relation to the average 10% density cut-off he considered the mapping of tussock

[80] Flynn EiC at [2.7]-[2.9] and Burrows EiC at [28].
[81] Lloyd and Norton Transcript at 1121-1122.
[82] Flynn EiC at [2.4] and Figure 1 (as updated July 2011).
[83] The vegetation communities are named for the dominant species.
[84] Flynn EiC at [2.6] and rebuttal at [4.2].

grassland and the extent of clearance to be considerably under-estimated. He observed substantial tussock grasslands east of Totara Peak with cover from <5 to 50%.[85] Similarly Mr Davis considered the mapping of the woody vegetation and limestone features to have excluded a number of smaller patches and underestimated both the total area of such vegetation and the clearances.[86] Mr Davis noted that the vegetation on site was "very much a mosaic" and did not fit into the "neat categories" mapped.[87]

[146] Dr Flynn agreed that the tussock grasslands are patchy and vary widely in density. However, she considered the cut-off of 10% average cover to be conservative and the mapping to represent areas of reasonably consistent cover above 10%.[88] Her tussock survey used randomly selected sampling points and five one-metre quadrants along a 10 m transect. She considered this to be more objective and rigorous than Mr Davis' assessments and to result in accurate mapping of tussock grassland from the western extension through to Oldham Peak. She acknowledged that the sampling points were all along the proposed development footprint and did not extend down the dip-slope. The omission of tussock grassland areas on the lower slopes may have led to an underestimate of the extent of tussock within the Mt Cass ecosystem.[89]

[147] Dr Flynn also agreed with Mr Davis about the mosaic nature of vegetation and acknowledged the limits to the precision of the mapping given the inherent variability of all ecosystems. However she considered the mapping to be sufficiently accurate to enable an assessment of the scale and severity of effects in the context of the wider ecosystem.[90]

[148] The vegetation communities mapped provide a simplified representation of the complex mosaic of vegetation actually present on the site. While we accept that some individual plants, and groups of plants, have been missed in the mapping it is evident that some of the areas mapped as forest, shrubland and tussock also contain patches of exotic pasture. Similarly the different vegetation community types will grade from one to another and the boundaries drawn can only ever be an approximation of that

[85] Davis EiC at [18]-[24], [42].
[86] Davis EiC at [25].
[87] Transcript at 1147.
[88] Transcript at 1149.
[89] Flynn rebuttal at [4.12]-[4.15].
[90] Transcript 1148 and Flynn rebuttal at [4.17].

transition. Overall we are satisfied that the survey methodology and sampling carried out have adequately characterised and mapped the vegetation communities.

*Rare plants*

[149] Limestone ecosystems in different localities are known to support different assemblages of rare plant species.[91] Mt Cass hosts two nationally Threatened species, eight At Risk species and approximately 20 locally uncommon species.[92]

| **Risk category** | **Scientific name** | **Common name** |
|---|---|---|
| Threatened | *Australopyrum calcis* subsp *optatum* | Limestone wheatgrass |
| Threatened | *Heliohebe maccaskillii* | |
| At risk | *Aciphylla subflabellata* | Spaniard |
| At risk | *Carmichaelia kirkii* | Kirk's broom |
| At risk | *Raoulia monroi* | Fan leaved mat daisy |
| At risk | *Tupeia antartica* | White mistletoe |
| At risk | *Colobanthus brevisepalus* | Pin cushion |
| At risk | *Einadia allanii* | |
| At risk | *Pseudopanax ferox* | Fierce lancewood |
| At risk | *Senecio glaucophyllus* subsp *basinudus* | |
| Data deficient | *Senecio* sp aff *dunedinensis* | |

[150] Occurrences of the Threatened species, limestone wheatgrass and *Heliohebe*, have been identified and mapped across the site. Dr Lloyd considered the limestone wheatgrass to be "one of the most important values of the site".[93] In addition, the "conspicuous" At Risk species (including the Spaniard, Kirk's broom, fierce lancewood and white mistletoe) have been mapped. Mapping of less conspicuous At Risk taxa is not as comprehensive and has focused on the wind farm footprint. Dr Norton noted that many of the Threatened and At Risk species were plants of open sites and would have expanded their range given the deforestation of the site.[94] Dr Norton agreed with Dr Lloyd that not all instances of Threatened and At Risk species had been picked up in the

[91] Lloyd EiC at [37].
[92] Lloyd EiC at [38] and Norton EiC at [2.3]-[2.5] and Appendix B.
[93] Transcript at 1073.
[94] Norton EiC at [2.4]-[2.5].

survey work and "every time we go there we find something we haven't seen before".[95] None of the locally uncommon plant species have been mapped.[96]

[151] Dr Burrows noted the presence of a large number of plants of "exceptional interest" given the limestone substrate and local climate conditions. He commented on the lack of a comprehensive inventory of non-vascular plants. Dr Burrows considered the site to host species or subspecies that "appear to be confined to the location".[97] Dr Norton agreed that a range of species were present on the site although was not aware of any that were endemic to Mt Cass.[98]

[152] The mapping of Threatened and At Risk plant species gives an indication of the numbers and distribution across the site. While not comprehensive there is sufficient information to underline the importance and distinctiveness of the flora and to assess the potential adverse effects along the footprint of the wind farm.

*Invertebrates*

[153] While the ecologists considered the site to support an intact and regionally distinctive indigenous invertebrate fauna they were agreed that there had not been sufficient sampling in spring or summer to obtain an adequate understanding of its significance. Accordingly they could not agree as to the significance of potential adverse effects including loss of habitat along the ridge, reduced habitat connectivity, changes in habitat quality and alterations of species interactions and food web structures.[99]

[154] Dr Lloyd, Mr Davis and Dr Burrows considered the available data to be "inadequate to discount the possibility that the development footprint may intersect populations of fauna with poor dispersal capabilities and restricted distribution".[100] Dr Didham acknowledged that intensive sampling could better characterise the terrestrial invertebrates but there was little ecological information available to interpret such data. He considered such sampling to be unnecessary and simply assumed that highly diverse

[95] Transcript at 1152-1153.
[96] Lloyd EiC at [98].
[97] Burrows EiC at [33]-[36], [57].
[98] Norton rebuttal at [2.2].
[99] Ecologists' joint statement 13 January 2010.
[100] Ecologists' joint statement 9 April 2011.

and ecologically significant invertebrate fauna would be present.[101] Dr Didham had considered the possibility of impacts on species with low dispersal powers and was satisfied that this was a negligible concern given the mediation layout and proposed treatment of the two largest road crossings.[102] We further discuss these places where the road crosses the limestone ribs later in this decision.

[155] Doctors Flynn and Norton acknowledged the limitations in biological information on invertebrates. However, they maintained that high quality habitat would provide for conservation of the invertebrates.[103] Dr Burrows similarly observed "if the woodland at Mt Cass is thriving in a self sustaining way, so will be the fauna".[104]

[156] We accept that there is limited information on the invertebrate biodiversity at the site. We concur with Drs Flynn, Norton and Burrows that outcomes for invertebrates will depend on the quality of the habitat provided.

*Avifauna*

[157] Doctors Seaton and van Meeuwen-Dijgraaf were agreed[105] that the Mt Cass range provides a healthy and functioning ecosystem with respect to habitat for birds although noted that introduced predators and browsers could be limiting populations through predation and competition for food. The habitat is well connected within the site and has moderate connections to other indigenous forest and shrub, exotic forest and riparian vegetation. The bird population includes permanent residents and seasonal visitors, comprising 16 native and 15 introduced species. Most native birds are found in the dip-slope forests rather than on the scrub dominated ridgeline. Bellbird, silvereye and kereru are found in greater numbers during autumn and winter with falcon having only been recorded in June.[106]

[158] Four forest bird species are rare in the Motunau Ecological District – kereru, tui, rifleman and tomtit. Kereru have been recorded at the site, tomtits have been recorded in the past but were not seen in the latest surveys, and tui and rifleman are not known at

[101] Didham EiC at [9.22]-[9.23].
[102] Didham EiC at [10.9].
[103] Flynn rebuttal at [4.8]-[4.9] and Transcript at 980.
[104] Burrows EiC at [38].
[105] Avifauna caucus summary dated 15 January 2010.
[106] Seaton EiC at [3.6]-[3.8].

Mt Cass. In addition to tui and rifleman, other "missing"[107] species are kakariki and kaka.[108]

[159] The New Zealand falcon (Threatened) and the New Zealand pipit (At Risk) have been recorded at the site. Pipits are more likely to be found in areas of pasture or tussock grassland although have not been recorded in recent surveys.[109] Falcons have not been known to breed on the site and may be hunting or just passing through.[110]

[160] Dr van Meeuwen-Dijgraaf was concerned that the bird count methodology may fail to detect rare species or those that visit sporadically although accepted that the data indicated the range of species present.[111] Dr Seaton was confident that the bird count methodology would ensure the detection of even "more difficult to observe species".[112] In any event the ornithologists were agreed on the proposed monitoring programme (including two years' pre-construction baseline monitoring) should consent be granted.[113]

[161] Dr Seaton considered there to be a "very, very small chance" of migrant shorebirds passing through the site and Dr van Meeuwen-Dijgraaf agreed it was a "slim possibility" with the birds being more likely to follow the coast.[114] The pre-construction monitoring includes migrant shorebirds that may cross the site.[115]

[162] We are satisfied that there is sufficient information on avifauna to enable an assessment of potential adverse effects. We consider the adequacy of the conditions with respect to monitoring and mitigation of potential effects on avifauna later in this decision.

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[107] Birds that have not been recorded but could be expected at the site.
[108] Avifauna caucus summary dated 15 January 2010.
[109] Seaton EiC at [3.11].
[110] Seaton EiC at [3.22]-[3.24].
[111] van Meeuwen-Dijgraaf EiC at [14].
[112] Seaton rebuttal at [2.6].
[113] van Meeuwen-Dijgraaf EiC at [31] and Transcript at 566.
[114] Transcript at 581-582.
[115] Exhibit C Draft Mt Cass Wind farm Avifauna Management Plan.

*Herpetofauna*

[163] The herpetologists were agreed that there was suitable habitat for a number of lizard species although only three have been found on the site – Canterbury geckos, the common skink and McCann's skink. The Canterbury gecko population was high in abundance and conservation value although much less than it would have been in the absence of predatory mammals. Skink densities were considered to be low. There was an abundance of suitable habitat for Green geckos which are of high conservation significance.[116] While the early survey work had been "limited" Mr Bell has since carried out further surveys and is "reasonably confident" that the Green geckos (Jewelled and Rough gecko) and any large skink species have not persisted at Mt Cass.[117]

[164] The Canterbury gecko population was concentrated on the scarp face with the abundance being approximately twice that within the proposed wind farm development corridor. Mr Bell explained that geckos select deep narrow crevices with high levels of solar radiation.[118]

[165] We are satisfied that there is sufficient information as to the abundance and distribution of lizards on the site.

***What is the state and trajectory of the ecosystem under the current farming regime?***

[166] While the ecologists are agreed as to the values and significance of the site they do not agree on the state and likely future trajectory of the indigenous vegetation and associated habitat for fauna.

*The state of the site today*

[167] The ecologists were agreed:[119]

[116] Herpetofauna joint statement dated 10 January 2010 (Trent Bell and Marieke Lettink).
[117] Bell EiC at [2.6].
[118] Bell EiC at [2.10], [2.14].
[119] Ecologists' joint statement 13 April 2010 Appendix 3.

> The site contains one of the best examples of a limestone ecosystem, and the greatest extent of indigenous woody vegetation on limestone, in the eastern South Island, and the best dry, eastern podocarp-broadleaved limestone ecosystem remaining in New Zealand.
>
> The large size and relative compactness of the Mt Cass ecosystem is conducive to it being/becoming ecologically self-sustaining. Habitat patches are well connected internally.
>
> The site is less modified by human activity than other forest systems in the ecological district. The woody communities are in excellent condition despite the site being modified by historic Polynesian burning and subsequent European farming practices ... along with the incursion of exotic mammalian predators.
>
> The presence of regenerating forest and shrublands on limestone pavement as evidenced by comparison of 1950 and 2006 aerial photographs of the site, and high species diversity including endemic limestone taxa, demonstrates a high overall level of resilience within the ecosystem, but with variation across the site; significant risk of local population extinction for some species ...
>
> The potential for restoration and/or maintenance of significant ecological values (allowing for management input) is excellent.

[168] Dr Burrows described woodland vegetation as "tenacious and resilient at this site, despite inroads by stock".[120] In contrast Dr Didham considered the vegetation to be "obviously and unequivocally fragmented" and the remnants "heavily degraded by a range of disturbance processes".[121] Dr Flynn considered the condition of the vegetation to be variable across the site with "grazing impacts beneath forest and scrub ranging from moderate to severe, depending on accessibility to stock and feral deer".[122] Mr Davis accepted that there were severe localised effects from grazing but did not consider that to hold true for the site as a whole.[123]

[169] Dr Lloyd observed:[124]

> I believe this apparent contradiction reflects different scales of reference. Compared to the pre-human landscape, the indigenous forests of Mt Cass are certainly fragmented and degraded, as Dr Didham points out. However, compared to other areas of indigenous vegetation in the current

[120] Burrows EiC at [16].
[121] Didham EiC at [7.6]-[7.7].
[122] Flynn EiC at [6.12].
[123] Transcript at 1117-1118.
[124] Lloyd EiC at [59].

> landscape, the indigenous vegetation at Mt Cass is remarkably intact and considerably less fragmented than other indigenous forest fragments in the Motanau ED, or on other eastern New Zealand karst systems.

[170] We concur with Dr Lloyd and accept that while there is obvious degradation, including fragmentation, the site has extraordinary value for its indigenous biodiversity and the vegetation has demonstrated a remarkable resilience to the ongoing stresses of both farming and pests.

*The impacts of grazing and the future under farming*

[171] The ecologists were agreed that grazing animals are affecting different elements of the ecosystem differently – to the benefit of some and the detriment of others. Reduction in grazing would enhance the condition of the forest vegetation while the limestone wheatgrass populations may face competition from exotic grasses and herbs.[125] The ecologists were not agreed as to the extent or seriousness of the effects of grazing and the implications for the future of the ecosystem.

[172] Dr Lloyd considered ecological processes of succession and regeneration to be occurring on the site. While noting that the forest vegetation had been affected by grazing animals he thought the inaccessible areas were substantial, dispersed across the site and sufficient to ensure regeneration of canopy tree species.[126] Dr Burrows and Mr Davis considered the aerial photographs taken between 1950 and 2004 to demonstrate widespread regeneration across the site.[127] Dr Burrows suspected a lack of water to be restricting the spread of vegetation across pasture.[128] Dr Didham considered natural regeneration would eventually link the scarp face and boulder field habitats to the north with the podocarp forest remnants to the south. He noted the limitation of natural regeneration by livestock browsing except in crevices of limestone pavement.[129]

[173] Doctors Flynn, Norton and Ussher considered grazing to be suppressing regeneration and succession of woody vegetation to the extent that the biodiversity values and viability would be compromised in the long term. They based their opinion

[125] Ecologists' joint statement 9 April 2011.
[126] Lloyd EiC at [46]-[61].
[127] Joint statement 9 April 2011.
[128] Transcript at 1101.
[129] Didham EiC at [7.9]-[7.10].

on observations of browse within forest remnants and analysis of the aerial photographs indicating no succession of woody vegetation since 1995.[130] Stock density and accessibility has affected the composition of any vegetation that did establish.[131]

[174] There was discussion of this issue in the 'hot tub'. In response to questions from the Court Dr Lloyd maintained that the forest continued to recover in "extent and stature" despite the adverse effect from grazing by both sheep and cattle. Dr Norton considered there to be substantial differences in the under-storey vegetation of forest, particularly on the lower slopes, where there was ready access to domestic stock and other browsing animals such as deer.[132]

[175] Dr Flynn described the variation in stock accessibility and regeneration across the site – she considered the elevated limestone pavement features, with dense scrub vegetation, along the ridge crest to be inaccessible to stock while the taller more open forest was readily accessible and, consequently, the under-storey vegetation suffered.[133] While acknowledging continued regeneration within the browsed forest areas she observed that the diversity of the forest had suffered with the more palatable species heavily suppressed.[134] She also agreed with Dr Burrows that regeneration within pasture was likely to be limited by both a water deficit and stock grazing.[135]

[176] The regeneration and succession processes at the site are complex and affected by grazing from sheep and cattle as well as browse by a range of pest species (including deer, goats and hares). Competition from exotic pasture grasses and a lack of water are other factors. We accept that regeneration is continuing and the forest canopy is slowly advancing. This is likely to reduce fragmentation and enhance ecological processes across the site. However, we find that the diversity and quality of this forest cover is being adversely affected by both domestic and feral browsing animals.

[177] In considering the future of the site as a working farm we concur with Dr Flynn's opinion that management decisions by landowners are "a key determinant in the

[130] Ecologists joint statement 9 April 2011 and Flynn EiC Appendix I.
[131] Flynn rebuttal at [3.9].
[132] Transcript at 1112, 1119.
[133] Transcript at 1114-1115.
[134] Transcript at 1127-1128.
[135] Transcript at 1116.

composition and distribution of indigenous and pastoral ecosystem components".[136] While the historical pattern has been an advance of woody vegetation across exotic pasture there are no guarantees that this pattern will continue.

*Outlook for lizards*

[178] Mr Bell did not consider Mt Cass to be in an optimal state for lizards due to habitat destruction and fragmentation (as a result of farming), and introduced mammalian pests (including rats, mice, mustelids, cats, hedgehogs, rabbits and hares). He considered the prospects for maintaining a healthy lizard population under the current management regime to be uncertain and likely to be negative.[137]

***What is the extent and significance of the proposed disturbance to vegetation and habitat?***

[179] Dr Flynn identified the adverse effects of the mediation layout as the loss of indigenous vegetation and habitat from the development footprint and the resulting fragmentation and edge effects.[138]

*Loss of indigenous vegetation and habitat from the development of the footprint*

[180] Dr Flynn regarded the loss of forest and scrub to be of greater consequence than loss of shrubland, pasture or exposed limestone pavement. She predicted that tussock grassland and shrubland communities would increase in the medium term although ultimately revert to forest. Similarly she considered the herb field communities of open pavement would gradually reduce in their extent although light grazing would prevent them from being overwhelmed by exotic pasture grasses.[139] The condition of the forested areas would improve as a result of the controlled grazing.[140]

[181] In evaluating the significance of the adverse effects Dr Flynn noted that a simple measure of percentage of ecosystem affected is not determinative of the effect, but it is a very good indication of the likely effects when considered at both the detailed level and

[136] Flynn rebuttal at [3.3], [3.9].
[137] Bell EiC at [2.17]-[2.22].
[138] Flynn EiC at [7.2].
[139] Flynn EiC at [5.30]-[5.34].
[140] Flynn rebuttal at [6.6].

at the general level.[141] She concluded that the effect on the Mt Cass ecosystem would be negligible given the extent and condition of the habitat that would remain.[142]

[182] Dr Lloyd considered the wind farm to "constitute a major and novel disturbance to the site". Direct effects included loss of limestone habitat, indigenous vegetation and individuals of Threatened, At Risk and locally uncommon plant species. Indirect effects included loss of indigenous ground cover species as a result of competition from exotic grasses and herbs. Dr Lloyd was also concerned that it was not possible to predict all of the potential effects.[143]

[183] During cross-examination Dr Lloyd accepted that the percentage of an ecosystem affected is "an important indicator but not the only one". He agreed that the total amount of indigenous vegetation to be removed would be a small proportion. With respect to the clearance of indigenous forest he explained that national importance of the limestone ecosystem at Mt Cass provided the context for his assessment. He also noted the removal of forest, albeit small areas, from the most important part of the ridge where there were few ecological connections across it. He accepted that the mediation layout avoided the greater part of the ridge.[144]

[184] Dr Lloyd explained that he considered the loss of limestone pavement habitat to be significant, despite the very small area, due to a number of factors: [145]

- the loss was permanent and irreversible;
- limestone provides open or partially shaded habitat in the long-term;
- limestone pavement is a key factor in terms of the resilience of the indigenous vegetation on the site; and
- the importance of ecological function and connections across the ridge with respect to the three main areas[146] of limestone pavement to be disrupted.

[141] Flynn EiC at [5.21].
[142] Flynn rebuttal at [6.5].
[143] Lloyd EiC at [253]-[254].
[144] Transcript at 1058-1060, 1064.
[145] Transcript at 1129-1130.
[146] Those in the *Golf Course* and marked on Golder Associates Plan CG161.3 and CG163.3 attached to the Draft Conditions.

He maintained that effects on the limestone ecosystem should be completely avoided between Mt Cass and Totara Peak.[147] Dr Norton agreed with Dr Lloyd as to the importance of the Mt Cass ecosystem and agreed that any effect on a significant ecosystem is significant.[148]

[185] When asked if any loss of pavement would be acceptable Dr Lloyd considered that the loss of the smallest of the three areas, in the "golf course", would be of less concern if the other two, maintaining the connectivity across the ridge, were left intact.[149] We note that Conditions [45] and [46] require the two larger road crossings in the "golf course" to be covered with crushed material, to avoid cuts in the limestone pavement. When full access is not required for construction or maintenance the section of the road crossing the pavement must be partially rehabilitated (with soil and native vegetation) so that the width of the running surface is reduced from 6 m to 3.5 m.

[186] From the 'hot tub' Dr Flynn pointed out that some of the limestone pavement is proposed to be buried and there would be an opportunity to unearth those areas in the future. With respect to ecological function Dr Norton said he had modelled approximately 12 ha of karst limestone, presently under pasture, to naturally regenerate under the proposed management of the site. Dr Lloyd discounted the value of this 12 ha as he considered the regeneration to be ongoing in the absence of protection from stock and other browsing animals although he accepted that there may be areas where this was not occurring.[150]

*Fragmentation and edge effects*

[187] Dr Didham considered the increase in fragmentation of habitat, caused by the roads and turbine platforms bisecting vegetation patches, to be extremely small compared to the existing fragmentation of the site. He did not consider the type and scale of the increase in fragmentation to be a strong new disturbance regime given the burning of vegetation and farming activities of the past. As a consequence of even the small increase in fragmentation, there would be adverse effects on the spatial pattern of

[147] Transcript at 1165-1167.
[148] Transcript at 1170.
[149] Transcript at 1130-1131.
[150] Transcript at 1130-1133.

remaining habitat, a small loss of native vegetation, a decrease in fragment connectivity and an increase in edge habitat.

[188] While Dr Didham considered the short-term effects to be significant he concluded that the proposed habitat enhancement and pest control work would mitigate these impacts and even reverse the high degree of fragmentation at the site. In particular he considered the loss of ecological values from the destruction of limestone pavement areas could be offset by managing re-vegetation of areas of limestone pavement with limited or no native cover. In Dr Didham's opinion there would be a benefit to biodiversity in the long-term as the site would achieve a level of vegetation cover and connectivity that could not be achieved under the current land management regime.[151] Dr Didham's evidence having been admitted by consent was unchallenged.

[189] The question of the significance of the adverse effects of vegetation disturbance and loss of habitat is difficult to answer. While we accept that the importance of the ecosystem is a key factor in the evaluation we do not consider that to automatically confer significance on any adverse effect. The magnitude and scale of the effects must also be considered. We agree with Dr Flynn that the very small areas of loss and disturbance, and corresponding small proportion of habitat, within the Mt Cass ecosystem, are important factors. While the project site as a whole is large, the actual footprint of the wind farm is small and considerable efforts have been made to minimise the disturbance of indigenous vegetation by placing the roads and turbine platforms within pasture areas where possible.

[190] We agree with Drs Lloyd and Didham that fragmentation and associated edge effects and loss of connectivity exacerbate any adverse effects associated with the direct loss of habitat. We are persuaded by Dr Didham's analysis of historical fragmentation, as well as projected improvements, that increased fragmentation will be a minor and temporary effect. The relocation of the main access road has substantially avoided the extensive fragmentation and disruption of ecotones associated with the original proposal. We do not accept that the proposed wind farm would result in a major or novel disturbance of the ecosystem.

[151] Didham EiC at [4.3], [8.7]-[8.10], [9.9], [12.3]-[12.4], [12.8].

[191] While burial of some areas of limestone pavement is proposed we are not persuaded that we should regard this as a temporary effect. The removal of roads may or may not be a practical or sensible option as part of decommissioning. In addition the decommissioning may be some decades into the future. While it is possible to restore the pavement and reverse this loss, we do not consider it to be likely. We consider the burial of pavement to remove this substrate and potential habitat. However, we accept the evidence of Drs Didham and Norton that there are relatively large areas of pavement elsewhere on the site currently devoid of any significant native vegetation. These areas are expected to regenerate given the proposed change to the grazing regime and, over time, will more than compensate for the loss of pavement habitat.

*Threatened, At Risk and locally uncommon plant species*

[192] Dr Lloyd and Dr Norton are agreed that the *Heliohebe* predominantly occupies scarp habitats that will not be affected by the wind farm construction. Three clumps of limestone wheatgrass have been identified within the construction footprint, for the R33 layout only. Dr Norton noted that more than 700 clumps have been recorded at over 100 sites on the Mt Cass ridge.[152] During cross-examination Dr Lloyd accepted that destruction of the three occurrences of limestone wheatgrass might not be significant if the other occurrences were maintained in a healthy state.[153]

[193] A number of individual plants of the At Risk species have also been found within the construction footprint. Dr Norton did not consider any of the plant species would suffer local, regional or national extinction as a result of the wind farm. He considered that any impact would be compensated for in the long term by the enhanced habitat and viability of the site.[154] The Construction Management Plan requires the identification and relocation of Threatened and, where practicable, At Risk plant species within the construction zone.[155]

[194] Dr Lloyd was particularly concerned about the indirect effects of the proposed change in the grazing regime at the site. While he acknowledged that the proposed removal of cattle and management of sheep grazing would enhance forest health he was

[152] Lloyd EiC at [51] and Norton EiC at [2.6], Appendix B.
[153] Transcript at 1061.
[154] Norton EiC at [2.7], [2.14]-[2.15].
[155] Conditions [31j] and [32n].

uncertain as to outcomes for a range of Threatened, At Risk and locally uncommon species. He considered the consequential increase in exotic herb and grass species would have an adverse effect on indigenous groundcover species, including limestone wheatgrass.[156] During cross-examination Dr Lloyd explained that removal of feral animals and domestic stock "would remove one inhibiting factor" for the regeneration of native vegetation but promote another, being competition with exotic grass. He considered a managed grazing regime to be essential and suggested fencing to spatially separate areas of pasture (with and without limestone wheatgrass) for different management. Dr Lloyd also accepted that returning Mt Cass to pre-European or original land cover "would be a worthy goal".[157]

[195] Dr Norton noted this "dilemma" in managing plants adapted to open sites given the natural succession processes leading towards closed-canopy woody vegetation. While open-habitat species may decline he considered the areas of limestone escarpment and outcrops would retain populations of these species under appropriate management.[158] He noted the substantial populations of limestone wheatgrass on the adjacent Dovedale and Organic Farm Holdings properties.[159]

[196] Dr Flynn observed that exotic grasses increased in stature but not necessarily in extent following the exclusion of stock. Similarly, indigenous herbs increased in stature and did not necessarily decrease in extent. A comparison of ungrazed areas (Mt Cass Scenic Reserve), those grazed only by sheep (DoC covenant on adjacent farm), and areas grazed by sheep and cattle (on the "golf course") showed no difference in the numbers of species of "conservation interest" while a number of other native species appeared more abundant at ungrazed sites. Rank grass overwhelmed crevices and overhangs around limestone boulders on ungrazed sites. Dr Flynn concluded that both excluding cattle and managing the intensity of sheep grazing would be important to improving forest, shrubland and limestone pavement condition.[160]

[197] We have already noted that the footprint of the wind farm is relatively small and the direct effects on vegetation and habitat are small in scale. Given the survey work

[156] Lloyd EiC at [92]-[108].
[157] Transcript at 1048, 1062-1063.
[158] Norton EiC at [2.16]-[2.17].
[159] Norton rebuttal at [2.4].
[160] Flynn rebuttal at [5.20]-[5.22].

that has been undertaken to identify Threatened plant species and their distribution across the site we are confident that the direct effects on these species would be minimal. The potential for indirect effects is of more concern.

[198] We are satisfied that exclusion plots and observations of adjacent areas under differing grazing regimes demonstrate an improvement in overall outcomes for indigenous vegetation following a reduction in grazing pressure. However, we agree with Dr Lloyd that the outcome for the open habitat specialists is uncertain within the proposed covenant area. We consider the monitoring requirements for At Risk, Threatened and locally important plant species later in this decision.

*Effects on avifauna*

[199] The ornithologists were agreed that the potential adverse effects on avifauna were moderate overall and included the short term reduction in food sources, temporary disturbance during construction, and collision impacts. It was considered possible to offset the reduction in food sources by re-vegetation and rehabilitation over the medium to long-term. Given the lack of information on collision risk for native birds, particularly in a forested environment, a mortality monitoring programme was proposed.[161] Predator control would be required over the whole site, particularly leading up to and during the breeding season (June to August). Any additional mitigation effort would be determined after considering whether or not there is an adverse effect at the local population level.[162]

*Effects on herpetofauna*

[200] The direct effects on lizards were agreed to be mortality during construction and loss of habitat along the wind farm footprint.[163] Mr Bell considered that direct mortality during construction would be unlikely to affect the populations of any lizard species except in the very short term. Permanent loss of limestone pavement and boulder is estimated at 2.31 ha or around 1.36% of available limestone habitat for Canterbury gecko. Approximately 23 ha of grasslands, providing relatively poor skink habitat, will also be removed.[164] During cross-examination Mr Bell estimated that only 30 to 150

[161] Avifauna caucus statement dated 15 January 2010.
[162] Avifauna caucus statement dated 10 October 2010.
[163] Herpetofauna joint statement dated 10 January 2010.
[164] Bell EiC at [3.4].

Canterbury geckos would be disturbed during construction out of a population of potentially thousands at Mt Cass. He considered that a high proportion of these geckos could be retrieved.[165]

[201] The indirect adverse effects include habitat fragmentation, edge effects, road kill and altered predator behaviour. Mr Bell considered these effects to be low for the Canterbury gecko and moderate for the skinks. He considered the effects of the mediation layout to be substantially less than the original layout, largely due to avoiding fragmentation of the limestone habitat across the Mt Cass ridge.[166]

[202] Mr Bell outlined the proposed measures to remedy and mitigate effects on lizards:[167]

- avoiding sites of high impact through micro-siting;
- relocating and releasing affected lizards;
- habitat restoration and managed grazing;
- pest control within the covenant area.

[203] Mr Bell concluded that the lizard fauna would benefit from the improved habitat and predator control.[168]

*Overall findings on significance of effects on vegetation and habitat*

[204] While the direct effects of construction are significant in the short term they are temporary and small in scale. Given the extent and proposed management of the covenant area we find that the adverse effects on the vegetation and habitat for indigenous fauna are minor in the medium term and may well be reversed in the longer term. However, we are aware of the uncertainties inherent in predicting effects within any ecosystem and of the possibility for markedly different outcomes for some species. Given the importance of the Mt Cass ecosystem we consider that any such effects should be remedied and mitigated as far as is reasonably practical.

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[165] Transcript at 538-541 and Bell Transcript at 1-2.
[166] Bell EiC at [5.2]-[5.4].
[167] Bell EiC at [7.2].
[168] Bell EiC at [7.6]-[7.9].

***Does the proposed offset make up for the loss of vegetation and habitat?***

[205] The ecologists were agreed that the purpose of the biodiversity offset model is to determine the 'quanta' (type and amount) of mitigation actions/initiatives required to offset adverse effects on biodiversity values. However, they were not agreed that the "habitat hectares" model developed for the site is sufficient to assess the proposed biodiversity offset. Dr Lloyd and Mr Davis challenged the choice of attributes, assumptions of net gain, and the adequacy of information for invertebrates, lower plants and ecological relationships. They also considered the rarity of the ecosystem and the importance of the biodiversity on site to preclude an offset approach to adverse effects.[169]

[206] Dr Norton considered the biodiversity offset model to be robust and to demonstrate that the significant biodiversity values of Mt Cass would be in better condition in the medium to long term than would be the case under the current farm management. He considered the removal of cattle, control of pests, restoration plantings, and active management of threatened species would result in considerable improvements in biodiversity that would not occur without the wind farm.[170] Dr Ussher had reviewed the model and concluded that it provided a robust and transparent measure of the biodiversity. He was confident that the net gain predicted by the model was real and achievable.[171]

[207] Dr Norton had assessed the project against the 10 principles supported by the international Business and Biodiversity Offsets Programme[172] (**BBOP**) and the seven principles in Schedule 2 of the Proposed National Policy Statement on Indigenous Biodiversity[173] (**BioD NPS**). He considered the BioD NPS principles to be equivalent to those contained in the BBOP guidance material and his own earlier work on biodiversity offsets. Dr Lloyd considered the proposed BioD NPS to provide the most recent and explicit guidance for offsetting although noted that there may be changes.[174] Dr Norton

[169] Ecologists' joint statement dated 9 Aril 2011.
[170] Norton EiC at [4.46], [6.5]-[6.6].
[171] Ussher EiC at [3.1].
[172] Norton EiC Appendix C.
[173] Exhibit D Proposed National Policy Statement on Indigenous Biodiversity.
[174] Lloyd EiC at [149].

agreed that the principles of the proposed BioD NPS provided a useful framework.[175] The principles in the BioD NPS are in brief:

1. no net loss;
2. additional conservation outcomes;
3. adherence to the mitigation hierarchy;
4. limits to what can be offset;
5. landscape context;
6. long term outcomes; and
7. transparency.

*Modelling the biodiversity offset*

[208] Dr Norton described the "biodiversity offset calculator", outlined the major steps and assumptions, and summarised the outcomes. He noted that such methodology is still being developed and ecologists would not all have the same view as to the appropriate parameters.[176]

[209] In essence the methodology sets benchmark ecosystem types for the site (scrub and forest), maps the present day vegetation (pasture, tussock grasslands, shrublands, scrub and forest), determines the project impact (for both the construction footprint and an edge zone), and then predicts the future type and condition of the ecosystem.[177] The model is based on a set of attributes for the structure and composition of the vegetation and key species considered to be representative of the major groups present. The attributes chosen for this site were:[178]

- forest/scrub canopy cover;
- forest/scrub under-storey cover;
- forest/scrub ground cover;
- silver tussock grassland;
- falcon;
- kereru and bellbird;

[175] Norton rebuttal at [5.2].
[176] Norton EiC at [4.13]-[4.17].
[177] Norton EiC at [4.17]-[4.22].
[178] Norton EiC at [4.23]-[4.24], [40.69]-[4.70].

- small birds (fantail, grey warbler and brown creeper);
- Canterbury gecko; and
- limestone wheatgrass.

[210] The losses and gains in biodiversity were predicted for the restoration planting (1 ha), predator control, and natural regeneration under the managed grazing regime.[179] Assumptions were made as to the time taken to reach the benchmark ecosystem condition : 5 years for silver tussock, 50 years for scrub and 100 years for forest in restored ecosystems, 50 years for both scrub and forest with predator control, and 80 years for scrub and 130 years for forest for facilitated natural regeneration.[180]

[211] The Habitat Hectares approach was used to account for the biodiversity losses and gains for each of attributes chosen. The habitat score indicates the quality relative to the benchmark conditions and when multiplied by the area on the site it produces a measure of quality and quantity in habitat hectares (**HH**).[181]

[212] A discount rate of 3% was chosen to determine the present value of the gain in biodiversity – a gain of 10 HH after 50 years is discounted to a value of 2.3 HH today.[182] The uncertainty was set at zero for the restoration plantings and natural regeneration, and at 20% for predator control.[183]

[213] The calculated biodiversity losses (caused by the construction of the wind farm) and predicted gains (as a result of restoration, predator control and regeneration) for each attribute after 50 years are presented below:[184]

[179] Norton EiC at [4.56].
[180] Norton EiC at [4.47], Appendix F.
[181] Norton EiC at [4.34]-[4.36].
[182] Norton EiC at [4.44].
[183] Norton EiC at [4.45], [4.49].
[184] Drawn from Norton rebuttal at [6.10].

| Attribute | HH loss | HH gain | HH difference |
|---|---|---|---|
| Forest/scrub canopy | 0.11 | 0.77 | 0.66 |
| Forest/scrub under-storey | 0.05 | 2.29 | 2.24 |
| Forest/scrub ground cover | 0.02 | 1.31 | 1.28 |
| Silver tussock grassland | 0.65 | 0.28 | -0.37 |
| Canterbury gecko | 0.53 | 2.42 | 1.89 |
| Falcon | 0.26 | 0.83 | 0.57 |
| Kererеu and bellbird | 0.09 | 2.16 | 2.06 |
| Small birds | 0.29 | 2.15 | 1.86 |
| Limestone wheatgrass | 0.13 | 0.93 | 0.81 |
| | | | |
| **Total** | **2.14** | **13.14** | **11.00** |

[214] Net gains are predicted for all attributes except silver tussock. The conditions require the restoration of the same area of silver tussock as has been destroyed.[185] During cross-examination Dr Norton explained that the modelled loss of silver tussock was due to the time discounting in the calculation of the offset.[186]

*Choice of attributes and the model*

[215] Dr Lloyd was concerned that key biodiversity components were missing from the model – different forest types, vegetation composition, other measures of vegetation structure, At Risk and locally important plant species, and *Wainuis edwardi* (a potentially affected snail). He thought the choice of attributes fell well short of a fair representation of the biodiversity at Mt Cass and recommended additional species and measures of forest structure to enable objective assessment of milestones. Dr Lloyd considered a species-by-species condition-area model (Condition-Hectares) to be considerably more transparent and appropriate. He regarded the Habitat Hectares model as being well suited to ecosystems services provided by woody vegetation but not to the wider range of biodiversity values at Mt Cass.[187]

[216] Dr Norton maintained that a mix of surrogate and species attributes was more appropriate than a species only approach.[188] During cross-examination Dr Norton explained that the species selected in the model focussed on species affected by the wind

[185] Norton EiC at [4.81].
[186] Transcript at 997.
[187] Lloyd EiC at [154]-[166], [205]-[210].
[188] Norton rebuttal at [6.8].

farm, particularly Threatened species, and therefore did not include other species such as the *Heliohebe,* scrambling broom or holy grass. Invertebrates were not included as they are difficult to study and little is known about the population abundance or the way they use habitat. In his opinion a high quality habitat would provide for the conservation of groups such as invertebrates, microorganism and fungi.[189]

[217] Dr Ussher added that one of the constraints in modelling was the ability to obtain information and track attributes over time. Thus the Canterbury gecko, which is easier to monitor than the skinks, is to some degree used as a surrogate for other lizards on site.[190] He agreed that more attributes could be added to the model but he did not think it would be necessary and nor would it give a clearer answer.[191] Dr Ussher said that both the Habitat Hectares and the Condition-Hectares models were being tested for use in New Zealand and he did not know which approach was best. He considered the Habitat Hectares model, as used for Mt Cass, to both reasonable and appropriate and to provide a robust outcome.[192]

[218] The inclusion of a greater number of species and additional parameters in the attributes to be modelled would increase the level of detail and provide more information on the response of the ecosystem and it component parts. However, having more information is not necessarily going to lead to better outcomes for biodiversity at the site. We are satisfied that the model and the attributes chosen are adequate to assess the overall trends in biodiversity at the site. We return to the issue of monitoring of At Risk, Threatened and locally uncommon species when we consider the conditions of consent.

*Predictions of net gain and uncertainty*

[219] Dr Ussher considered the magnitude of the net gain in biodiversity to provide "a high level of reassurance" as to actual biodiversity gains on the ground. He noted gains overall as well as for all species of conservation interest while acknowledging the loss of silver tussock.[193]

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[189] Transcript at 979-980.
[190] Transcript at 1014.
[191] Transcript at 1016.
[192] Ussher rebuttal at [3.3]-[3.7].
[193] Ussher EiC at [8.11]-[8.12].

[220] Where silver tussock is disturbed for geotechnical investigation or construction purposes, Condition 92 requires rehabilitation to the pre-construction condition. Where tussock grassland of median density greater than 10% is permanently removed "an equivalent quantity must be established and maintained". Dr Ussher explained that the model assumed 17% cover in restored areas of silver tussock grassland rather than the 40 to 50% actually observed in the field. He considered the model to be "very, very conservative" for tussock. Modelling at 50% cover would result in a net gain of 0.2 HH for silver tussock.[194]

[221] Dr Lloyd concluded that gains in silver tussock would be readily achievable as it was easy to propagate and transplant and would benefit from the proposed changes to the grazing regime. He considered that a lower weight should be given to silver tussock than to the nationally threatened species and nationally reduced ecosystems at the site.[195]

[222] Dr Norton performed a sensitivity analysis of the calculated offset and concluded that it was fairly insensitive to the relative weights given to the different attributes. The model was sensitive to the discount rate yielding negative outcomes for discount rates of 11% and over.[196] He considered the model to provide confidence that the biodiversity gain would be substantially greater than the initial loss due to the development of the wind farm.[197]

[223] During cross-examination Dr Norton acknowledged that the model did not provide a precise or exact measure of the biodiversity offset but indicated the magnitude of the likely outcome. He agreed that the quality of the information was important.[198] Dr Ussher described the model as providing "an indicative ball park guideline" rather than a high degree of precision.[199]

[224] All of the ecologists are agreed that the remnant vegetation is in relatively good condition and would benefit from the removal of cattle, controlled grazing by sheep and pest control. There is little doubt that the indigenous vegetation and habitat for fauna

[194] Transcript at 1008.
[195] Lloyd EiC at [221].
[196] Norton EiC at [4.82]-[4.85].
[197] Norton rebuttal at [7.2].
[198] Transcript 980-982.
[199] Transcript at 1011.

will improve across the covenant area under the proposed management regime. The uncertainty is in the quantification of this net gain. Restoration and regeneration may not be as successful as anticipated and predicted by ecologists.

[225] We note that a discount rate effectively discriminates against benefits accrued in the future. This is an important factor for this project where the ecologists are generally agreed that slower natural regeneration processes (facilitated by active pest and weed control) are preferred to restoration planting. While we accept that discounting is appropriate we should not be blinded by the model and lose sight of the potential for very large benefits for the ecosystem at Mt Cass in the long term.

[226] Given the magnitude of the net gain predicted by the model, the sensitivity analysis and the time preference discount we are satisfied that the model does provide confidence as to the likelihood of substantial gains for biodiversity at the site in the medium to long term.

*Limits to offsetting*

[227] Dr Lloyd considered the offset to be inappropriate as it was inconsistent with the proposed NPS guidance[200], BBOP principles[201] and Dr Norton's own principles[202] with respect to limits to off-setting. Dr Lloyd noted the rarity of the karst limestone ecosystem (being less than 5% of the original extent) and the vulnerability of limestone wheatgrass (and other At Risk and locally uncommon plant species) to changes in grazing intensity.[203] Mr Davis considered the offset to be inappropriate and referenced Dr Norton's biodiversity offset paper where "he was suggesting a threshold of perhaps less than 10% if that was all that remained of a particular habitat type, it may not be suitable for a biodiversity offset".[204]

[228] During cross-examination Dr Ussher agreed that limestone ecosystems were naturally rare in New Zealand and the extent of indigenous vegetation associated with limestone had become rare. Dr Ussher considered that both the rarity of the ecosystem

[200] Exhibit D Proposed NPS on indigenous biodiversity.
[201] Norton EiC Appendix C.
[202] Norton DA (2009) *Biodiversity offsets – two New Zealand case studies and an assessment framework*. Environmental Management 43:698-706.
[203] Lloyd EiC at [189]-[194].
[204] Transcript at 1085.

and the effects should be taken into account when deciding if an off-set would be appropriate.[205]

[229] Principle 4 from the proposed BioD NPS reads:

> **Limits to what can be offset:** There are situations when residual effects cannot be fully compensated for by a biodiversity offset because the biodiversity affected is vulnerable or irreplaceable.
>
> These situations will be demonstrated:
>
> (a) when a comprehensive assessment has been undertaken to determine whether, and if so which, highly vulnerable and irreplaceable biodiversity components are present and are affected by the activity. In determining when offsetting is not appropriate local authorities should have regard to whether the vegetation or habitat:
>
> i. represents a non-negligible proportion of what remains of its type
> ii. is now so rare or reduced that there are few options or opportunities for delivering the offset
> iii. is securely protected and in good condition so there is little opportunity to offset the biodiversity components in a reciprocal manner
> iv. is threatened by factors that cannot be addressed by the available expertise.
>
> If there are residual effects on biodiversity that are not, or seem likely not, to be capable of being offset, any measures taken to address them, by way of environmental compensation or otherwise, should not be considered to be a biodiversity offset for the purposes of Policy 3.

[230] There is no doubt that the ecosystem at Mt Cass is rare and components of it are vulnerable. We agree with Mr Davis and Dr Lloyd that it meets some of the criteria to be considered with respect to limits to offsetting and considerable care needs to be taken at such a site. However, we agree with Dr Ussher that the extent and nature of the disturbance must also be taken into account when considering whether or not an offset is appropriate.

[231] All the ecologists acknowledged that it is the karst limestone and associated indigenous vegetation that is particularly valued. The clearance of this element is very much reduced given the revised mediation layout. In addition any direct disturbance of Threatened and At Risk plant species must be addressed by relocation where

[205] Transcript at 1024-1026.

practicable.[206] Nor are there any sizeable effects on the scarp face that hosts a number of Threatened and At Risk species. Looking at the spatial context of the ecosystem, the disruption of ecotones is now minor with only a small increase in fragmentation. The conditions require the indirect effects of the change in grazing management to be monitored by assessing under-storey vegetation, limestone wheatgrass abundance, abundance of shrubs and ground layer species typical of limestone pavements, and natural regeneration processes in open habitats.[207] We have already noted that Dr Norton has identified some 12 ha of limestone pavement, currently under pasture, that would be available for regeneration of vegetation. This provides ample opportunity for delivering a "like-for-like" offset.

[232] Given the small scale of the disturbance of the karst ecosystem, the limited disruption to ecotones across the ridge and minimal effects on the scarp face we do not consider that "highly vulnerable and irreplaceable components of biodiversity" are affected to such an extent the offsetting is out of the question. We note that the site is not at present securely protected and while the vegetation is in relatively good condition there are continuing pressures from domestic stock, pests and weeds. Given the nature and scale of the effects and the availability of limestone pavement for delivering the offset we find that biodiversity offsetting is both viable and appropriate on this site.

***Are the ecology conditions appropriate, certain and enforceable?***

[233] The proposed conditions of consent have been modified as a result of mediation and further revisions have been agreed between the parties during the course of evidence exchange and the hearing. The latest iteration, as proposed by MainPower, is dated 9 August 2011. The District Council and appellants sought further changes in their closing submissions, should consent be granted.

*Micrositing and certainty as to the extent of disturbance*

[234] The proposed turbine locations are shown in plans and Condition [8] provides for "micrositing" which allows the turbines to move by up to 140 m (for the R90 layout) or 100 m (for R60 and R33). This allowance raised concerns that the extent and nature of the vegetation clearance and disturbance of limestone features could change.

[206] Condition 32(n).
[207] Condition 89(a).

However, the proposed conditions constrain the extent and location of any potential clearance and disturbance.

[235] Condition [6] designates an "exclusion zone" to protect identified areas across the site and Condition [13] limits the total area of clearance or disturbance of indigenous vegetation and limestone substrates. Dr Flynn considered these conditions to provide a high level of control over the construction process and to minimise effects.[208] In addition, Condition [10] requires an ecologist and an expert in karst landscapes to advise on the final placement of turbines – a process that might further reduce effects. Condition [12] provides for the marking of any indigenous vegetation and limestone features which are able to be avoided as a result of micrositing.

[236] We find Conditions [6] and [13] to be adequate to control the potential effects of construction activities on indigenous vegetation and the limestone features. While we agree that the micrositing process will assist in minimising the potential effects at a very small scale, Conditions [6] and [13] provide sufficient constraints across the site as a whole.

[237] An additional clause was proposed for Condition [6] during the course of the hearing that essentially extended the exclusion zone following micrositing. We do not consider this to be necessary or practical. If there is any disturbance or clearance of the areas identified during micrositing those areas would have to be counted and included within the limits specified in Condition [13].

[238] As originally drafted Condition [6] precluded any activities authorised by the consents within the exclusion zone except the walking track and particular fences. As written this condition would prevent boulder stabilisation work that may disturb vegetation and even monitoring that could require fencing or installation of equipment. The intent of the condition is clearly to restrict the extent and location of disturbance to vegetation and limestone features during construction. During the operational phase the site will be protected by the terms of the covenant and other conditions of consent.

[208] Flynn EiC at [3.10]-[3.22].

[239] Accordingly we have made some changes to the drafting of this condition to improve both the clarity and practicality. Condition [6] is amended to read:

> No construction activities authorised by this consent shall occur within the exclusion zones identified in the Golder Associates plans referred to in conditions [3], [4], and [5] except for fencing, the walking track referred to in condition [143], and any stabilisation of rocks.

[240] Condition [13] specifies the maximum area of vegetation clearance and disturbance of limestone pavement and boulder field for each turbine layout. Various amendments were made during the course of the hearing. We amend and edit to clarify exactly what is and what is not included in the limits on clearance and disturbance of indigenous vegetation and limestone features. Condition [13] is to read:

> The total area of indigenous shrubland and forest clearance and limestone pavement and boulder field disturbance due to pre-construction geotechnical investigations and construction activities shall be minimised, but in any event must not exceed the following:
>
> **Vegetation clearance (hectares)**

| | **R33** | **R60** | **R90** |
|---|---|---|---|
| Indigenous shrubland | 0.71 | 0.71 | 0.71 |
| Indigenous forest | 0.09 | 0.09 | 0.08 |

> **Exposed limestone disturbance (hectares)**

| | **R33** | **R60** | **R90** |
|---|---|---|---|
| Pavement and boulder field | 1.99 | 2.29 | 2.04 |
| Pavement | 0.93 | 1.21 | 0.89 |

> For the avoidance of doubt, these limits do not include the impact from fencing and the construction of the walking track [conditions 14 and 143].

*Threatened, At Risk and locally uncommon species*

[241] The vision of the Environmental Management Plan[209] (**EMP**) is for the covenant area to be restored to a diverse mix of vegetation appropriate to the location – dense podocarp forest, mixed podocarp-broadleaf forest, broadleaf forest, shrublands and open escarpment communities after 300 years. The draft EMP outlines the first five-year cycle of a 50 year programme of conservation and restoration within the 127 ha

[209] Flynn EiC Appendix F.

covenant area. Four outcomes are sought over the next 50 years : vigorous regeneration of forest and scrub; animal populations increasing in abundance and distribution; restoration plantings facilitating succession in pasture; existing populations of threatened plant and animal species are secure.

[242] As acknowledged by the ecologists the issue of varying outcomes for different species under a changed land management regime does present something of a dilemma. Dr Norton explained:[210]

> One of the key results of the restoration management work proposed as part of the biodiversity offset is that the area of woody vegetation will expand (because of animal pest control and removal of cattle grazing) and there will inevitably be a reduction in the abundance of some indigenous ground layer species, especially those that require high light environments.

[243] Dr Lloyd was concerned about open habitat plants and ground layer species, particularly limestone wheatgrass, given the proposed grazing regime. He recommended hand weeding although acknowledged this was difficult across a large site.[211] Dr Flynn acknowledged that the distribution and abundance of these species would change within the Mt Cass covenant area. She considered hand weeding to be feasible although noted that two thirds of the known population of limestone wheatgrass colonies occurred outside of the covenant area.[212]

[244] While expressing some concerns Dr Lloyd acknowledged that the future biodiversity values of site could benefit from a change in management. When asked what he saw as the ideal outcome for the site Dr Lloyd replied:[213]

> I think all the experts agreed it would be an ideal site for conservation management, restoration of indigenous vegetation over as much of the site as possible, control of pest animals. You know, many of the things that are elements in the proposed mitigation.

[245] Conditions [31j] and [32n] require the identification and relocation of Threatened plants and At Risk plants (where practicable) within the construction zone. Condition [89] requires monitoring of effects of the reduced grazing regime on ground

[210] Norton rebuttal at [6.17].
[211] Lloyd EiC at [112], [175].
[212] Flynn rebuttal at [5.31], [6.6].
[213] Transcript at 1072.

layer species generally and on limestone wheatgrass. Condition [90] requires the EMP to include measures for Threatened plant species management including monitoring of *Heliohebe maccaskillii* and management of limestone wheatgrass. The District Council have suggested a number of additions to these conditions extending the objectives of the EMP, and the monitoring and management of flora to include populations of At Risk plant species. Dr Lloyd supported these conditions and an extension to include locally uncommon species.

[246] We acknowledge the dilemma identified by the ecologists in attempting to restore the ecosystem while securing the future of important species at the site. It is clear that the proposed management of the covenant area would result in a novel ecosystem – the species abundance, distribution, diversity and interactions will change. While the overall quality of the ecosystem would be improved it is not possible to restore the historical state of the site. Ongoing management will be essential particularly with respect to the control of animal pests.

[247] Given the likely evolution of the ecosystem under the proposed management of the covenant area we consider it would be unrealistic to manage individual species beyond the Threatened species and other key species already identified. We also note that the management of the adjacent farm properties, also hosting populations of open habitat plants, will not change as a result of the wind farm. We find that the overall gains for biodiversity outweigh any potential adverse effects on the abundance and distribution of individual plant species at the site. Accordingly we do not accept that At Risk or locally uncommon plant species should be subject to specific management or monitoring conditions.

*Level of detail in the conditions and the EMP*

[248] In response to questions from the Court Dr Lloyd stated that there needed to be a lot more detail in the conditions of consent to specify actions to be taken (such as hand weeding of limestone wheatgrass), performance indicators to measure outcomes for biodiversity and further trials of the proposed grazing regimes prior to wind farm construction.[214]

[214] Transcript at 1073-1074.

[249] Discussing the conditions of consent Dr Norton observed:[215]

> I think there's a real balancing act between how prescriptive you become in conditions versus what's in a management plan and to me the conditions should focus on the desired outcomes without necessarily being incredibly prescriptive and I think I'd prefer to leave the prescriptive detail to the management plan

[250] We accept the approach of having the detailed implementation plans contained with the EMP given that the general content and objectives are specified in the conditions of consent. We appreciate that the detailed monitoring required to support an adaptive management approach is also best left for the EMP. However, we agree with Dr Lloyd that there must be certainty with respect to outcomes for biodiversity. In ensuring this certainty of outcomes we are cognisant of the need to only impose conditions that relate to the effects of the wind farm development. The conditions of consent are not imposed to ensure conservation outcomes on the site beyond the objectives of the biodiversity offset programme.

[251] Conditions [89] to [91] set out the monitoring requirements and performance indicators for the Habitat Enhancement and Pest Control section of the EMP. We direct amendments to [89] and [91] to fill gaps, delete unnecessary repetition and remove some prescriptive detail on monitoring of vegetation that more properly belongs in the EMP. We have also deleted the requirement for measurable time bound performance targets for invertebrates. While some monitoring of invertebrates may well be considered useful as part of the EMP we do not consider performance targets are necessary in the conditions. Outcomes for invertebrates will be linked to the quality of the habitat provided and there are sufficient measures in place to determine the quality of that habitat.

[252] Condition [89a] is deleted and Condition [89] is amended to read (additions are <u>underlined</u> and deletions noted by footnotes):

[215] Transcript at 1202.

The Habitat Enhancement and Pest Control section of the Environmental Management Plan shall include a research and monitoring programme, developed in consultation with the Department of Conservation, that assesses whether the Habitat Enhancement and Pest Control Programme is successful in meeting the objectives and purposes outlined in condition **[85]**. The monitoring programme shall include appropriate measurable and time bound performance targets in relation to:

a) A pest animal control programme including deer, goats, pigs, rabbits, hares, possums, mustelids, rats, hedgehogs, cats and mice.[216]

b) The effect of reduced levels of domestic stock grazing on both forest regeneration and the potential increase in competition from exotic grasses and weeds. The programme shall include provision for annual monitoring of the effect of different sheep grazing intensities on:

   i. forest understory vegetation composition

   ii. limestone wheatgrass distribution and abundance, and

   iii. the abundance of indigenous shrubs and ground layer species typical of open limestone pavement sites; and

   iv. natural regeneration processes in shrubland and open limestone habitats.

c) Vegetation condition measured by monitoring permanent vegetation plots established in forest and scrub vegetation. The cover abundance of all vascular plants will be measured within each plot with tree diameter and seedling number and height recorded. The plots will be measured every three years and compared to the performance indicators set out in condition [91].[217]

d) Herpetofauna population abundance, as required by condition [79.f].

e) Avifauna abundance, including kereru, falcon and pipit, as required by conditions [69], [72] and [73].

f) Weed monitoring and control, as required by condition [80].

g) Threatened plant species, as required by condition [90].

[253] The performance measures for the habitat enhancement programme are listed in Condition [91]. A number of these are process measures – that is they require the establishment of fencing and various operational programmes. The key outcome measures are those related to eight of the nine attributes modelled for the biodiversity offset calculation – Conditions [91i] and [91j]. The ninth attribute, tussock, has been deleted as it is subject to different and very specific Conditions (Conditions 92] and

[216] The form of the pest control and the targets for each species, previously listed in Conditions [89a], are to be set in the management plan.

[217] The number and size of the monitoring plots and frequency of measurement have been deleted and are to be specified in the management plan.

[93]) requiring the planting out of an equivalent area whenever grasslands with more than 10% tussock are removed. The requirement for no woody weeds within the restoration plantings is removed given the overall controls on weeds (Condition [91d]) and requirement for post-planting maintenance and monitoring of the planted areas (Condition [91f]).

[254] Condition [91] is amended to read:

> The Habitat Enhancement and Pest Control section of the Environmental Management Plan shall also include the following performance indicators, which are to be used to establish whether the Habitat Enhancement and Pest Control programme is successful in meeting the objective and purposes of the programme outlined in condition **[85].**
>
> a) All fencing around and within the Mt Cass Conservation Management Area has been constructed or maintained to a standard that enables effective control of domestic and feral animals within the area including:
>
> i. The boundary of the Mt Cass Conservation Management Area has been securely fenced ~~to the minimum standard of a sheep and cattle proof standard seven wire fence with a barbed wire along the top~~ in accordance with condition **[86]**.
>
> ii. Internal fences are maintained to a standard that permits effective control of sheep within the area as required for management purposes.
>
> iii. Cattle have been removed from the entire Mt Cass Conservation Management Area, and if they do enter the area, they have been quickly and efficiently removed and the reasons for their ingress (e.g. damaged fence) has been remedied.
>
> b) The research and monitoring programme required by conditions [89] and [90] has been developed by MainPower, in consultation with the Department of Conservation, and has been implemented.
>
> c) The plant pest control programme required by condition [80], with regular surveillance surveys for new records, has been implemented.
>
> d) No plants of wilding conifers, European broom, hawthorn, barberry, wild rose, elderberry, cherry plum and old-man's beard (or any other species deemed to threaten biodiversity values such as wild thyme) are known to be alive within the Mt Cass Conservation Management Area, with any plants found eliminated within 3 months of their first record.
>
> e) A nassella tussock control programme is undertaken each year through the Mt Cass Conservation Management Area.
>
> f) The vegetation restoration programme required by condition [86c] has been established including propagation, site preparation, planting, appropriate post-planting maintenance and with appropriate outcome monitoring.
>
> g) A minimum of 1 ha has been planted within 3 years of commissioning of the wind farm with more areas planted depending on rates of natural regeneration of vegetation.

h) Plant survival of planted areas is >75% after 2 years, with replanting being undertaken where survival is <75% after 2 years.

i) The condition of the ~~nine~~ eight biodiversity attributes[218] used in the biodiversity offset model have not deteriorated at the end of 5 years from the commencement of activities authorised by this consent within the Mt Cass Conservation Management Area relative to the condition of these attributes at comparable sites that are not subject to the management actions being implemented through the plan.

j) The condition of the ~~nine~~ eight biodiversity attributes used in the biodiversity model are meeting the targets set out in the Environmental Management Plan in accordance with condition [89], measured at the end of 10 years from the commencement of activities authorised by this consent, and at 5 yearly intervals thereafter.

k) The establishment of a liaison protocol with the Department of Conservation in accordance with condition [156] whereby the Department of Conservation meets with MainPower at least once each year to review and comment on the conservation management achievements and proposed work as per its terms of reference.

l) Monitoring results are reported to the Department of Conservation in accordance with the liaison protocol in time for them to review and provide comment to the independent peer reviewer and the Hurunui District Council each year.

m) To enable annual reporting to the Department of Conservation and the peer reviewer, a GIS with associated databases has been established with appropriate documentation, and is updated on a regular basis where required.

n) The composition of planted vegetation contains only those species that are found naturally within the limestone ecosystem at Mt Cass.

~~o) No woody weeds are present in the planted vegetation.~~

*Extent of restoration planting*

[255] The extent of the restoration planting had been reduced from 23 ha to 7 ha to 1 ha in response to concerns expressed by the Director-General of Conservation. Dr Norton reported strong opposition to the extensive restoration plantings originally proposed so the focus was put into natural regeneration.[219]

[256] While acknowledging the value of passive regeneration of vegetation compared to "manufactured" plantings, Drs Flynn and Norton considered restoration planting to be appropriate, particularly where exotic pasture and weeds are inhibiting natural

[218] Composed of: Vegetation structure and composition (canopy cover; understory cover; ground cover) and species abundance (falcon; kereru and bellbird; small birds (fantail, grey warbler, brown creeper); Canterbury gecko; limestone wheatgrass).
[219] Hurley rebuttal at [33], Norton EiC at [4.9] and Transcript at 1210.

regeneration.[220] Dr Burrows agreed that "nature needs a helping hand" and recommended restoration planting in long thin areas of pasture between the forested ribs.[221] Dr Lloyd commented that restoration planting would be appropriate if it did not "offend the naturalness principle" and did not cause problems for other important species such as limestone wheatgrass.[222]

[257] In the draft EMP restoration planting is planned to reintroduce locally uncommon species such as *Carmichaelia kirkii*, fierce lancewood, *Aciphylla subfabellata*, kahikatea, totara, matai and titoki; and to re-establish escarpment communities where they have been lost using *Hebe, Coprosma, Raukaua, Brachyglottis* and *Olearia*.

[258] Given the extensive discussions that have taken place as a result of mediation and conferencing of experts we accept the position that has been presented and the conditions relating to restoration planting. One hectare of restoration planting is required as a trial and up to 7 ha may be planted depending on the outcomes of the facilitated natural regeneration envisaged for the site. The conditions of consent adequately manage the process and monitor the outcomes of the restoration planting.

*Conditions relating to avifauna*

[259] The ornithologists had agreed on the conditions of consent relating to avifauna. They were satisfied that more detailed monitoring provisions could be dealt with in the EMP.[223]

[260] In response to questions from the Court on the objectives for avifauna management Drs Seaton and van Meeuwen-Dijgraaf agreed there should be no net loss of indigenous birds overall with specific provisions for species such as the falcon, pipit and kereru.[224] During the course of the hearing there was considerable discussion of predictions for a net gain in biodiversity compared to the original objectives of the EMP to achieve no net loss. MainPower agreed that the overall objective was to achieve a net

[220] Flynn EiC at [7.4] and Norton EiC at [4.9].
[221] Transcript at 1208-1209.
[222] Transcript at 1209-1210.
[223] Avifauna caucus statement dated 10 October 2010 and Transcript 562-566.
[224] Transcript at 575-577.

gain in biodiversity values within the covenant area. Similarly, an overall net gain would be expected for avifauna.

[261] Dr van Meeuwen-Dijgraaf noted that the predator control is expected to result in an increase in bird numbers with the potential for an increase in bird strike.[225] When asked about what level of mortality would result in mitigation measures Dr van Meeuwen-Dijgraaf replied that further investigation would need to take place to determine if a net loss was occurring and to understand the species involved. She considered that the conditions of consent should provide for expert review and appropriate mitigation options to be implemented.[226]

[262] Dr Flynn commented on the potential for the biodiversity offset to become "a victim of its own success" using the example of increased bird strike as a result of increased populations of existing bird species on the site and, potentially, new arrivals. Dr Lloyd warned a scenario where birds (such as falcon) may be attracted into the covenant area and suffer from high mortality due to bird strike, resulting in a decrease in the local population. Doctors Flynn and Lloyd agreed that the monitoring results should be reviewed by an ecologist to determine the net effect on the local population and options for mitigation if required.[227]

[263] As with the indigenous vegetation the biodiversity offset programme is expected to result in a net benefit to avifauna although the relative abundance and distribution of individual species may change. We agree that the objective should be a net gain in the relative abundance of indigenous species without specifying a net gain for individual species. However, we find that specific provisions relating to the monitoring and management of the kereru, falcon and pipit should remain.

[264] We consider that the conditions relating to bird strike should be amended to clarify that bird strike is not to be regarded as an adverse effect unless there is an adverse effect on the local population. It would be perverse to require the wind farm to undertake additional mitigation if the monitoring shows a net gain in the population of a particular species, or the arrival of a new species, despite the loss of individual birds

[225] Transcript at 567.
[226] Transcript at 583-585.
[227] Transcript 1183-1186.

through bird strike. We agree with Drs Flynn and Lloyd that an appropriately qualified expert should be engaged to review the mortality and population monitoring information to determine whether or not there is an overall adverse effect. This review may require further monitoring to determine if the wind farm is acting as a sink for the population of any particular species within the Motunau Ecological District.

[265] Condition [68] is amended to read:

> The consent holder shall undertake a programme of avifauna monitoring and management the objectives of which are:
>
> a) to monitor for potential adverse effects of the wind farm on avifauna and manage those effects if necessary; and
>
> b) to achieve a net gain in the relative abundance of indigenous species present at Mt Cass.

[266] Condition [72] is amended to read:

> If evidence is found of injury and/or mortality of kereru, New Zealand falcon or New Zealand pipit through interaction with wind farm infrastructure the Consent Holder shall, as soon as practicable, provide a report to the Hurunui District Council detailing a suitable monitoring and management regime to be implemented to address any net negative impact at the local population level.

[267] Condition [74] is amended to read:

> The monitoring programmes required by conditions **[69] to [73]** shall be designed in consultation with the Department of Conservation, and the results of all monitoring shall be provided to the Hurunui District Council and the Department of Conservation annually. Whether any additional mitigation is required will be determined in consultation with the Department of Conservation and shall consider whether the effect will result in a net negative impact at the local population level of any indigenous species.

[268] Condition [76b] is amended to read:

> A protocol that outlines steps to be taken if a Threatened or At Risk species is found to be using the site (including injured or dead) that has not been previously recorded. Additional mitigation is only required if there is an net negative impact, due to the wind farm, on the population within the Motunau Ecological District.

*The environmental management plan and independent peer review*

[269] The conditions provide for an independent peer review of the EMP and the annual report detailing monitoring results and progress towards the objectives. The EMP itself must be reviewed and updated at regular intervals. We amend these to provide for recommendations to be made by the peer reviewer and considered in any subsequent review of the EMP.

[270] Condition [161] is amended to add:

> (c) may make recommendations.

[271] Condition [27] is amended to read:

> The Environmental Management Plan shall be reviewed by the Consent Holder at least once every three years for the first nine years, and thereafter at least once every five years and shall be amended taking into account any required actions identified as a result of monitoring under this consent, the annual report prepared under condition **[67]** and any recommendations from the peer review required by condition **[161].**

***Overall findings on ecology***

[272] The Mt Cass site has considerable value as a limestone ecosystem with high species abundance, richness and diversity. However, we are not dealing with an untouched, pristine natural environment – fire and farming have depleted and degraded the vegetation and habitat for fauna. Left as it is we have no doubt that ongoing farming, weeds and animal pests would continue to impact on the ecosystem. While the remnant vegetation may persist and the canopy cover could expand the quality of the habitat would continue to be compromised.

[273] The wind farm has a limited footprint of 24 ha and is largely located within exotic pasture. The layout has been modified to reduce fragmentation and disruption of particularly important ecotones. In return for the removal of 3 ha of tussock grassland and less than 1 ha of woody vegetation, conservation management, characterised as a biodiversity offset, is proposed to extend across 127 ha at the site. We acknowledge that this is not simply a question of scale and there are important considerations relating to edge effects, the indirect effects of altering the grazing regime and the outcomes for

open habitat species. All of these have been evaluated and appropriate conditions of consent imposed.

[274] In the end we consider the proposed offset programme and modelling to have demonstrated that the management actions both remedy and mitigate many of the adverse effects on biodiversity such that there will be net gain in the medium to long term. While Dr Ussher[228] and Dr Norton[229] regarded the rehabilitation of batters and temporary construction areas as a 'remedy' and the offset (including restoration plantings and pest control work) as 'mitigation' Dr Flynn[230] regarded the offset actions as having aspects of both. We agree with Dr Flynn.

[275] The overall effect on biodiversity is positive notwithstanding some changes in the abundance and distribution of individual species. We note that the management changes are being imposed on a dynamic and evolving ecosystem and there are uncertainties for some species under either farming or the proposed managed grazing regime. We consider that the conditions provide sufficient certainty as to the overall outcomes for biodiversity at the site and adequate safeguards for the particular species of concern.

***Planning provisions on ecology***

[276] All parties were in agreement that the site contains areas of significant indigenous vegetation and significant habitats of indigenous fauna and these are to be protected in terms of section 6(c) of the Act and also the Regional Policy Statement and Hurunui District Plan.

[277] The District Plan contains the following provisions, and as these are central to this proposal we set them out in full.

> Objective 2
>
> Protection and enhancement of the life supporting capacity and the ecological intrinsic, conservation and cultural values of the District's natural resources.

[228] Transcript at 1155, 1159.
[229] Transcript at 1168.
[230] Transcript at 1163.

> Policy 2.2
>
> To avoid, remedy or mitigate adverse effects on the ecological integrity, functioning, habitat values, natural character or amenity of resources of significant natural and cultural value.
>
> Policy 2.3:
>
> To promote the rehabilitation or enhancement of significant natural resources which have been adversely modified, where that enhancement will achieve a long-term improvement to the values of the resource and improve the biodiversity and life supporting capacity of indigenous ecosystems for areas with important ecological values.

[278] We are satisfied that the proposal will achieve objective 2 and Policies 2.2 and 2.3 of the District Plan. The biodiversity offset will both remedy and mitigate adverse effects from the construction and operation of the wind farm and provide benefits for biodiversity across a wider area. As will be apparent from the decision we have taken into consideration the assessment matters for significant natural areas assuming that these matters are not restricted to those areas identified in the planning maps. The planning maps do identify a significant natural area partially located on this site, but this is unaffected by the construction activities.

[279] The District Plan encourages land use practices which avoid or reduce animal plant pests (policy 1.12) and the proposal responds to this through its comprehensive weed control and pest management programs.[231]

[280] The physical and biological characteristics of the soils will be maintained (Section: Use of non-renewable resources, objective 1). This objective does not preclude land-based activities and will be provided for while avoiding a range of adverse effects on soils including soil erosion and contamination (polices 1.1, 1.2 and 16).

[281] We have had regard to the matters of regional significance noted in chapter 20.4 and objective 3 and policy 4 of Chapter 8 of the RPS and conclude that these provisions addressed through the proposal and its biodiversity offset programme.

[231] Conditions [31], [32], [82] – [84].

***The Commissioners' decision on ecological matters***

[282] The Commissioners concluded that there were very significant adverse effects on the indigenous vegetation and habitat for fauna. In particular they noted the fragmentation of the ecosystem and disruption of ecotones across the ridge caused by the ridge crest road creating "a linear swathe that would bisect the entire length of the significant natural area". They did not accept that the biodiversity offset (the earlier proposal comprising restoration planting of some 26 ha of degraded habitat plus pest and weed control) was appropriate as it was not "like for like and could not replicate the high habitat complexity and distinctiveness of the limestone pavement ecosystem". Nor were they convinced that the restoration planting and translocation of threatened plant species would be successful.[232]

[283] We note that the revised proposal considerably reduces the loss of vegetation associated with limestone pavement and places the main access road on the northern terrace avoiding the complete disruption of ecotones across the ridge. Rather than a "linear swathe" there remain only three relatively small road crossings which are to be partially rehabilitated to reduce the road width. The planting trials have demonstrated that restoration is feasible and observations of different grazing regimes have illustrated the potential for managed grazing to facilitate regeneration of indigenous vegetation. Given the changes in both the scale and nature of the disturbance to indigenous vegetation and habitat and the revisions to the biodiversity offset programme, our findings of a minor adverse effect in the short term and an overall benefit in the longer term are not inconsistent with the Commissioners' conclusions. The project proposal has evolved considerably since the District Council hearing.

[284] Against this context, including the landform and its flora and fauna, we next set out evaluation of the area's landscape and the amenity derived from the same.

**The coastal environment, landscape and amenity**

[285] The effects of a development on a community's attachment to a place are frequently to the fore when changes to rural areas are proposed. That is because communities and individuals may have a very strong and deeply held attachment to the place in which they live and work. When a wind farm is proposed, involving large

[232] Commissioners' decision at [741]-[743], [748] & [894]-[896].

structures in prominent positions, the effects on landscape, natural character and visual matters are generally raised as concerns and it was so in this case.

[286] The Hurunui District Plan has at its basis landscape typing, derived in turn from aggregation of land typing. The Plan takes a careful approach to landscape and while noting that many natural features and landscapes in Hurunui have been modified, it states that "both the community and visitors strongly identify with natural features and with landscapes of the Hurunui District."[233] The Plan acknowledges the difficulty in protecting landscapes as "they are hard to define and the values held for different types of landscapes" can vary considerably.

[287] Decisions made by the Hearing Commissioners for the District Council issued on 2 April 2009 included the finding that Mt Cass forms part of the coastal environment,[234] and that part of the site between Mt Cass and Totara Peak, incorporating the limestone platforms, the native woody vegetation and the limestone escarpment constitutes an outstanding natural feature in terms of section 6(b).[235] Since their decision, as an outcome of mediation, an amended layout and development plan is now proposed. However, the basis for parts of their decision, particularly with respect to the coastal environment and the finding of the outstanding natural feature identification remain.

[288] On these issues, as well as amenity derived from the landscape, we heard evidence from landscape architects Dr Michael Steven, Ms Di Lucas, Ms Elizabeth Briggs and Ms Nicki Smetham (the latter on some aspects of the mediated proposal). In addition the following planners presented evidence on natural character and relevant planning matters: Ms Jane Whyte and Ms Helena Rigg. Submitters also presented evidence and submissions on amenity issues, all of which we have taken into account, although not all have been referred to individually.

[289] Before we discuss the evidence we set out our understanding of landscape.

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[233] Issue 7 Management Strategy, Hurunui District Plan at 038.
[234] Hurunui Commissioners' decision at [648] and [878].
[235] Hurunui Commissioners' decision at [679] and [879]-[880].

***What is landscape?***

[290] The term 'landscape' is not defined in the Act and when employed by different disciplines and fields of expertise its meaning and usage is not the same. Even amongst landscape architects there appears no commonality of understanding.

[291] Landscape, as a concept used by landscape architects and related disciplines, is a cultural construct as are 'justice', 'arts', 'language' and 'nature'. The understanding of landscape therefore may vary according to the culture, and over time as cultural influences change.[236] Further, what is meant by 'landscape' may be understood in different ways by different fields of endeavour. What landscape architects mean by landscape may not be the same as say a geomorphologist or ecologist notwithstanding the same term is used.

[292] As a cultural construct we come to know the landscape through the values and perceptions held by people, be they expert landscape architects, people who have an attachment to a place, or those who have knowledge and experience of a region, area or site and its natural and physical resources - seen in that way "landscape is a conduit and a symbol for a wide range of attitudes and concerns".[237]

[293] Landscape attributes are often described in proceedings before the Environment Court with reference to the "modified Pigeon Bay factors".[238] A series of factors were formulated in the *Pigeon Bay* case relevant to the identification of landscapes (although not necessarily an assessment of their significance). These were subsequently reviewed in *Wakatipu Environmental Society v Queenstown Lakes District Council*,[239] and have been widely adopted for landscape assessment in the court for the last ten years. The factors were developed to provide a more systematic framework for identifying and assessing landscapes than was previously undertaken, bringing into account matters beyond visual or physical attributes in order that social relationships with place may be considered.

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[236] By way of example the majority of evidence presented in these proceedings is based on a European derived understanding of landscape, see Dr Steven Transcript at 419.
[237] Steven EiC at [8.9].
[238] *Pigeon Bay Aquaculture Ltd v Canterbury Regional Council* [1999] NZRMA 209.
[239] *Wakatipu Environmental Society v Queenstown Lakes District Council* at [97].

[294] Recent divisions of the court have encouraged landscape architects to move beyond description when giving evidence in relation to the modified Pigeon Bay factors. The difficulty is that no robust methodology has been developed for their application. Mere repetition of these factors without further methodological development is a barrier to better understanding the complex construct that is landscape. In addition landscape assessments, as in this case, have largely failed to engage with community views and values, although some have taken account of those views expressed through the Plan. Development of methodology for analysis to address the three groups of aspects we outline below may produce more useful outcomes for decision-making.

[295] In attempting to develop a working definition of landscape (particularly to describe and identify landscape significance), the Court in *Maniototo Environmental Society Inc and Anor v Central Otago District and Anor* (the 'Lammermoor' decision)[240] described the landscape as follows:

> … In our view a landscape is four-dimensioned in space and time within the given environment — often focussed on a smaller relevant space such as an application site — which is the sum of the following:
>
> (1) a reasonably comprehensive (but proportionate to the issues) description of the characteristics of the space such as:
>
> - the geological, topographical, ecological and dynamic components of the wider space (the natural science factors);
> - the number, location, size and quality of buildings and structures;
> - the history of the area;
> - the past, present and likely future (permitted or consented) activities in the relevant parts of the environment; and
>
> (2) a description of the *values* of the candidate landscape including:
>
> - an initial assessment of the naturalness of the space (to the extent this is more than the sum of the elements described under (1) above);
> - its legibility — how obviously the landscape demonstrates the formative processes described under (1);
> - its transient values;
> - people and communities' shared and recognised values including the memories and associations it raises;
> - its memorability;

[240] *Maniototo Environmental Society Inc and others v Central Otago District Council and Otago Regional Council, Decision* C103/2009, at [202]-[204].

- its values to tangata whenua;
- any other aesthetic values; and
- any further values expressed in a relevant plan under the RMA; and

(3) a reasonably representative selection of *perceptions* — direct or indirect, remembered or even imagined — of the space, usually the sub-sets of:

(a) the more expansive views of the proposed landscape; and

(b) the views, experiences and associations of persons who may be affected by the landscape.

[296] The Court continued: "To describe and delimit a landscape a consent authority needs at least to consider the matters in set (1) and, to the extent necessary and proportionate to the case, those in sets (2) and (3) also".[241]

[297] This description was referred to in the *Upper Clutha Tracks Trust v Queenstown Lakes District Council* (the 'Parkins Bay' decision).[242] The Court commented that the description

> ...seems to correspond generally with contemporary landscape practice in describing the landscape as having three sets of components:
>
> - biogeographical elements, patterns and processes;
> - the associative or relationship contributions; and
> - the perceptual aspects.

[298] The natural and physical attributes of a landscape can be both objectively and subjectively analysed. The natural environment including the land, water, air, flora and fauna can be described and assessed both quantitatively and qualitatively. Likewise, change to the natural environment which results from human endeavor through, for example, the presence of physical structures, buildings and roads or modification to landform or vegetation can be described and assessed.

[299] It is important to keep in mind that when considering what are loosely termed landscape or natural 'values', we take into account people's values, rather than assessing the landscape values as aspects apart from people.

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[241] Ibid.
[242] [2010] NZ EnvC 432, at [22].

*Conclusion on landscape definition and description*

[300] In attempting to respond in a way that may assist our decision-making, having discussed the matter with witnesses, we offer the following definition:

> Landscape means the natural and physical attributes of land together with air and water which change over time and which is made known by people's evolving perceptions and associations.

[301] In keeping with the Act such a definition enables the development of landscape assessment which takes account of:

- natural and physical environment; and
- perceptual; and
- associative aspects (beliefs, uses, values and relationships)

which may change over time.

[302] The definition responds, through reference to associative aspects, to our sense of, or attachment to, place. Thus we commence our evaluation of the landscape evidence with a working definition of landscape. In this case our assessment was informed by experts who understand the effects of change on the natural and physical landscape (and also consider people's response to this), visitors to the area and local people who have an attachment to the place.

***Simulations***

[303] Expert landscape evidence was provided on the effects of the project including road formation and the three turbine design and layout options. In addition visual simulations were provided of views from the State Highway and identified locations surrounding Mt Cass. We accept that the visual simulations are an accurate representation of the proposals for the purposes of understanding visual effects but were not intended to substitute for the human eye or experience.

[304] The landscape architects held a joint conference and reached agreement on the appropriate landscape scales of consideration and agreed that there were four relevant

scales. Although each had used different terminology they agreed that relevant landscape assessment scales were the Canterbury region, the Hurunui district, the Mt Cass range (that is the site and its environs), and Mt Cass ridge.[243]

***Findings on the physical attributes of the area***

[305] The Mt Cass range is a limestone cuesta. The steep scarp of the formation faces to Waipara Valley and the dip or backslope of the cuesta faces the coastline. The ridgeline of the cuesta aligns parallel to the coast, from north-east to southwest. The cuesta has been farmed for over 100 years resulting in modification of the earlier land cover. Prior to farming the forest cover had been removed by earlier inhabitants. The limestone rock including boulders and exposed pavement remain very evident on the range, providing shelter and habitat for remaining indigenous vegetation. On the seaward side a series of dry valleys extend in a splayed or fluted formation, from the eroding scarp face down to the base of the dip slope forming a distinctive pattern in the rural landscape.

[306] The mountain range is located within the Waipara Valley which is a well-defined broad plain surrounded by hills and ridges, one of which is the prominent feature of Mt Cass and is accessed by recently formed and older farm tracks, some cutting into the limestone rock, leaving the light-coloured limestone exposed, and others having a grass cover.

[307] The range is surrounded by farming, forestry and vineyards. Pastoral farming is undertaken along the range which is held and managed in different farm ownerships. On the eastern side, farmland predominates but there are pockets of native bush. This is a working landscape and present are the usual farm trappings including extensive fencing, water troughs and tanks.

[308] In various places along the summit of the ridge are a number of masts including facilities for telecommunications and wind recording and also a poled walking track. The surrounding farm land has differing land cover and appearance varying with ownership and pastoral management. The pastoral management at the summit has

[243] Caucus statement of Briggs Steven and Lucas 13 June 2011.

resulted in woody vegetation among limestone pavement, boulders and less accessible areas, and open elongated grassed areas, extending in various directions, which were likened to golf course fairways. We address later whether this ridge is a feature for the purposes of section 6(c).

[309] Apart from the effects of the proposal on amenity, there were two particular disputes in the landscape evidence presented. The first concerned the coastal environment.

***Is Mt Cass within the coastal environment?***

[310] Hurunui Commissioners concluded that Mt Cass ridgeline is within the coastal environment. Ms Rigg, the planner appearing for the District Council, Ms Briggs and Ms Lucas held the same view which was based, among other reasons, on the Hurunui District Plan, the Regional Policy Statement and the New Zealand Coastal Policy Statement 2010. The latter was not in force when the Commissioners made their decision.

[311] In Ms Lucas' opinion the site and its context lies within the coastal environment and should be considered under the relevant provisions of statutory documents.[244] We focus on Ms Lucas' evidence as she supported her opinion by giving detailed reasons.

[312] Ms Lucas found assistance in policies 13 and 15 of the New Zealand Coastal Policy Statement (**NZCPS**) when assessing what is 'natural character', 'natural features' and 'landscape' and 'amenity'. While Mt Cass ridge is some 500 m high and 4 km "back from the coastal edge*"* Ms Lucas took the approach that when dealing with a project which was of a large scale, then the coastal environment should in turn be appropriately considered at a broad scale.[245] On this basis much of the project would be located in the coastal environment.[246]

[313] To support this proposition Ms Lucas produced a map from a 1995 study documenting landscape types in the District depicting Mt Cass as being in an area of

[244] Lucas EiC at [113].
[245] Lucas Transcript at 389-390.
[246] Lucas EiC at [117].

'coastal hills'.[247] While the accuracy of this statement and the map was disputed, this is not a matter we need to determine as we did not find landscape typing notation informative of whether Mt Cass was within the coastal environment.

[314] Other reasons given to support her opinion included that Mt Cass is the dominant or defining ridge to the coast, streams drain from Mt Cass to the coastline, coastal processes influence the ridge, Mt Cass and its environs are uplifted – that is to say they had once been under the sea.[248]

*Discussion and findings*

[315] Defining landscape and coastal environment boundaries is not a straight forward task.

[316] The coastal environment is one of the environments of special concern in the District. The District Plan records that the coast is one of the District's most significant natural resources and that "coastal environment" can generally be regarded as the areas in which the coast is a significant part or element.[249] The Plan defines coastal environment based on the predominant character of a particular location and also factors including recent coastal processes and the presence of vegetation or habitats influenced by their coastal location. The Plan locates coastal environment in "coastal environment management areas" which are recorded in the planning maps with a distinctive blue 'zipper' line.[250] On Map 4a, which includes Mt Cass, the coastal environment is shown extending from close to the top of the coastal cliffs, to over half a kilometre inland. While Ms Lucas opined that the coastal environment management area line was "hazard driven", the presence of hazards is shown by a separate line generally seaward of the management area.[251] Our understanding therefore is that the District Plan has clearly defined the coastal environment and Mt Cass is not within it.

[317] We have considered what NZCPS has to say about the extent and characteristics of the coastal environment (in particular Policy 1 and the other policies referred to by Ms Lucas). In recognising that this varies from region to region and locality to locality,

[247] Ms Lucas was a co-author of the study.
[248] Lucas Transcript at 367 onwards.
[249] Issue 17, at 015-024 HDP.
[250] Chapter 11 Issue 17.
[251] Policy 17.8 explanation, Hurunui District Plan at 022.

policies 1(2)(c) and (f) contain two descriptors that might support a broader understanding of coastal environment. Policy 1(2)(c) restricts consideration to areas where coastal processes are significant. We did not understand witnesses to suggest this was the case for Mt Cass ridge. Policy 1(2)(f) refers to elements and features that contribute to the natural character, landscape, visual qualities or amenities. While this is more generally expressed, it does not appear to necessarily encompass land that is some kilometres distant from the coast. We could find no other support in the NZCPS for the relevance of a dominant ridge, and where that might be.

[318] The District Council planner Ms Rigg, who had administered resource consents in the area for a number of years, agreed in response to a question from the Court, that she had never applied the provisions of the NZCPS (including the previous Policy Statement) when assessing resource consent applications in the coastal hills area.[252] We therefore understand that she had not previously considered that Mt Cass ridge, and the coastal hills more generally, were within the coastal environment.

[319] In general there was a paucity of evidence concerning coastal vegetation which we would have thought a central consideration if the contention was to be made out. Concerning coastal vegetation evidence was led by counsel from Dr Norton and Mr Davies during the course of the hearing. In that regard we prefer the evidence of Dr Norton who, while acknowledging a small coastal influence in terms of the saline inputs of the wind and the presence of some coastal vegetation, said that he would "not regard the bulk of Mt Cass ridge as being coastal in terms of the vegetation composition (in terms of Policy 1, 2 (e)) NZCPS".[253] This opinion accords with what we viewed during our site visit. Further, we noted that significant or potentially significant natural areas on the Plan are identified in Schedule A7.1[254] including at Mt Cass. Unlike other entries, the presence of coastal vegetation is not noted.

[320] The Hurunui Commissioners, referring to case law, were persuaded that the coastal environment boundary should be at the dominant landward ridge, which they identified as Mt Cass. We accept that Mt Cass is a dominant ridge and that glimpses of it can be seen from some parts of the Hurunui coastline. In other cases before the

[252] Rigg Transcript at 847-848.
[253] Norton Transcript at 968.
[254] HDP Natural environment section at 099.

Environment Court a landward ridge has been adopted as a boundary to a coastal environment. However, where a dominant ridge may be a useful means to identify a coastal environment boundary, such a boundary should be relevant to the coastline and coastal environment. There is no necessity to identify a dominant ridge in each case, particularly one that may be kilometres away from the coast. In any event we are satisfied that the effects on natural character and landscape would not extend to that area which could properly be considered to be coastal environment of Hurunui.

[321] We find that Mt Cass ridge and the dip slope landward of the ridge is not within the coastal environment and neither is any part of the wind farm. By contending that the coastal environment has an extreme reach, we are concerned that attention could be drawn from the importance of the coastline and derogate from the focus of section 6(a). While it is not necessary for the purposes of our decision to identify an alternative boundary, we had insufficient evidence to make a finding that the boundary was not correctly located by the Hurunui community in their Plan.

***Is the Mt Cass ridge an outstanding natural feature?***

[322] No witness considered that the Mt Cass range was an outstanding natural landscape and neither did the Hurunui Commissioners, although there was general agreement on its significance to the Waipara landscape. Mt Cass is not identified as an outstanding natural landscape in the Hurunui Plan and having no evidence to the contrary, we accept that Mt Cass is not an outstanding natural landscape. However, there was considerable and detailed evidence on the question of whether Mt Cass ridge is an outstanding natural feature.

[323] The Hurunui Commissioners concluded that Mt Cass ridge (that part of the site between Mt Cass and Totara Peak incorporating the limestone platforms, the native woody vegetation and the limestone escarpment) is an outstanding natural feature for the purposes of section 6(b) of the Act.[255] Ms Lucas and Ms Briggs agree that there is an outstanding natural feature at Mt Cass, and that the escarpment is an integral part of the limestone landscape feature, as do the two geomorphologists. Ms Lucas goes further to

[255] Hurunui Commissioners' decision at [679].

include the northern most extent of the ridge terminating at Oldham Peak,[256] thus indicating a larger feature than had the Commissioners.[257]

[324] Dr Steven alone says that there is no outstanding natural feature at Mt Cass.

[325] The Hurunui Plan has a section on important landscapes, but notes in its explanatory provisions that a large proportion of the Hurunui District is a working landscape and that its management must be sufficiently flexible to enable activities to occur where adverse effects can be avoided, remedied or mitigated. Many natural features have been modified and that opportunities exist to restore and enhance those features and through policy this is promoted.[258] There is also policy to identify and monitor the significance of natural features but no specific criteria or clear methods for doing so. As outstanding natural features (as distinguished from landscapes) are generally referred to in the Hurunui Plan, we understand from this that they are thought to exist but have yet to be identified.

[326] The lack of identification in the Plan is not determinative of whether Mt Cass ridge is an outstanding feature, not least because there are no such features identified in the Plan and the regional landscape assessment, used to prepare the District Plan, was at a broad scale. We accept, as was held in *Unison*, that the evaluation of the quality of a particular landscape should be considered for district plans on a district-wide, as opposed to a regional or national basis.[259]

[327] We received very detailed evidence from a number of witnesses regarding the putative feature and thank them for their carefully developed opinions. The Court was assisted through the fresh thought and by the witnesses robust exchange of views, particularly those of Dr Steven although we did not always agree with him.

[328] We commence our discussion with the evidence of the geomorphologists who described the landform. They both agreed that the Mt Cass ridge is a fine example of a cuesta and is a geomorphological feature is of regional significance.[260] Professor Paul

[256] Lucas EiC attachment 14.
[257] Dr McConchie also identified a ridge extending to Oldham Peak.
[258] Policy 7.4.
[259] *Unison Networks Ltd v Hastings District Council* Decision W11/2009, at [81].
[260] Caucusing statement of McConchie and Williams 23 November 2009.

Williams, who gave evidence for MainPower, described the features of karst landscapes – all of which are present here – including sinking streams, underground rivers, caves, dry valleys, enclosed depressions, fluted rock outcrops, and springs; and also provided their various landforms such as the dolines, karren, grikes and clints.[261]

[329] In the opinion of Dr Jack McConchie, for the District Council, despite being an apparently unspectacular landscape when viewed from a distance, the Mt Cass-Oldham ridgeline and backslope exhibit a distinctive, potentially unique (within Canterbury) range of landforms and landscape elements.[262] While the landforms may not be dramatic on a global scale, he described them as "stunning" in the context of Mt Cass, the Hurunui district, and the Canterbury region.[263]

[330] The landscape architects agreed that a feature is a distinctive part of a landscape. And for the purposes of determining significance a feature can be considered separately from the wider landscape of which it is a part.

[331] In Dr Steven's opinion the Mt Cass ridge is part of the landscape (or even two landscapes, one either side of the Mt Cass ridge), and is not a distinctive landscape feature. The limestone escarpment, rock pavements and associated vegetation communities are loosely defined. The limestone elements, extending over a distance of 6.5 km, are simply typical of the underlying geomorphic processes. We understood that Dr Steven considered these as a series of small scale landscape elements and importantly, on his approach, they cannot be appreciated other than from within the site itself nor can they be viewed in their entirety from any single viewpoint.[264]

[332] That said, Dr Steven was able to distinguish Mt Cass ridge as a discrete entity when considering its naturalness concluding that the "[s]ummit ridge and plateau between Mt Cass and Totara Peak" was high. When considering naturalness he concluded that the entity was a significant natural feature.[265]

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[261] We have drawn on the evidence of Professor Paul Williams and Mr Matthew Naylor to provide descriptions of each of these landforms in the geomorphological section of this decision.
[262] McConchie EiC at [22].
[263] McConchie EiC at [36].
[264] Steven EiC at [3.10] and [3.11].
[265] Steven EiC at [3.15], [4.15] table 16, [4.18].

*Discussion and findings*

[333] We agree with Ms Lucas that site context must be relevant in a consideration of an outstanding natural feature, and that such an assessment is based on people's perceptions and relationship with place. Moreover it is natural features which are outstanding, not outstandingly natural features that are relevant.[266]

[334] Further, we understand that Dr Steven is striving for a 'test' to determine outstandingness. However we regard this is a matter of judgment, informed by both community values and expert opinion. There are no invariable criteria for outstandingness — it depends on the specific characteristics of the natural landscape [or in this case natural feature] being considered.[267]

[335] Opinions on a feature's boundaries may reasonably differ where there are no clear land form changes or geographic boundaries such as a river or coastal edge. Landscapes frequently blend from an area with a certain group of predominant characteristics, to an area with other characteristics. Land use and management may blur perceptions and features which are elements within them. We reject Dr Steven's view that since the feature may only be seen "within the site itself", the area could not be regarded as a feature.

[336] We reiterate naturalness is part of a continuum of meaning and that the construct extends from pristine landscape which is understood as having no human impact, to landscape which might be an intensively developed inner city landscape. "It is a cultural construct rather than scientific term": *Upper Clutha Tracks Trust v Queenstown Lakes District Council* at [62].

[337] Naturalness can be objectively assessed such as by quantifying buildings, roads and other infrastructure and modifications in the built environment and also variances within the natural environment. This assessment should then be related to the context

[266] The same observation was made in *Upper Clutha Tracks Trust and others v Queenstown Lakes District Council* at [65].
[267] *Maniototo Environmental Society Inc v Central Otago District Council* at [206].

and people's perception of naturalness. Community views and values are relevant and we return to these later in the decision.

[338] It follows we do not accept that the only truly natural is a pristine landscape – that is to set the bar too high.[268]

[339] We found Dr Steven's approach when describing and assessing Outstanding Natural Features (ONF's) difficult to grasp because, we suspect, different 'yardsticks' based on landform elements, changes to topography or visibility from viewing points were used when assessing 'naturalness' and separately the presence of a 'feature'. Thus at first blush his conclusions about naturalness and the presence (or absence) of a feature appear inconsistent.

[340] While different scales such as for the word 'natural' may assist understanding of that term, a reductionist approach applied at the level of a landform element, topography or visual catchment – as we understood to be Dr Steven's approach – gives the impression that the construct can be accurately measured and such scaling can be undertaken without consideration of context and people's values. We do not accept that this can, or should, be done.

[341] We have considered Dr Steven's opinion that the ridge and plateau represents no more than a series of small landscape elements. We note that Dr Steven also describes the plateau area as a stimuli-rich, micro-scale landscape.[269] That, we regard, as the distinctive quality of the site, although we do not accept that the area is small overall. The escarpment, pavement areas and boulder fields on the summit are significant elements of this feature.

[342] Recent farm management has created a distinctive separation of the forested limestone pavement areas from the pasture dominated dry valleys, and enabled accessibility of the site and the plateau. This presents as an integrated and interlinking landscape experience valued by sectors of the wider Hurunui and Canterbury community. We find the distinctive and characteristic qualities of the ridge extend

[268] Steven EiC at [4.6].
[269] Steven EiC at [5.62].

beyond consideration of the area as an amenity, which is about pleasantness rather than distinctiveness and significance.

[343] Returning again to the consideration of community values the landscape experts did not undertake any specific public consultation. However, the Court had the benefit of submissions to the amended proposal. We also heard evidence from local residents and other groups and found their evidence compelling, particularly concerning the values held about the Mt Cass ridge. We accept that there is a diversity of interest from the local community and beyond which values the Mt Cass ridge.

[344] We are satisfied that the ridge feature between Mt Cass and Totara Peak is distinctive within the wider landscape. We accept that as a geomorphological entity, the evidence was that the cuesta extends to Oldham Peak. However, the most characteristic and valued elements were located in the area between Mt Cass and Totara Peak.

[345] Having concluded this, there seemed to be no real dispute that this entity is an outstanding natural feature. The evidence presented to support the Mt Cass ridge (including the escarpment and upper dip slope) between Mt Cass and Totara Peak as being an outstanding natural feature includes the uncontested significant Maori cultural values attached to the Mt Cass ridge,[270] the evidence of the geomorphologists that the limestone pavement and boulders on the ridge have regional geomorphological significance, and the contribution that the vegetation makes to the distinctive feature. While some expert opinion was that the outstanding natural feature extends to Oldham Peak we were not satisfied that this should be included as not all of these elements are present. It follows that we agree with the Hurunui Commissioners' finding that the ridge from Mt Cass to Totara Peak is an outstanding natural feature.

[346] We reject MainPower's submission that to consider the contribution made by the significant indigenous vegetation to the feature is to 'double count' this attribute under section 6(b) and (c) because it is valued differently under these sub-sections.

[270] Briggs EiC quoting the Cultural Impact Assessment prepared by Joseph Hullen at [69].

***Findings in relation to whether development of the ONF is inappropriate?***

[347] That being our finding we are required to consider whether the proposed development is inappropriate in the context (section 6 (b)). Here we are considering those attributes which led to our decision that the ridge was an Outstanding Natural Feature. We address the visual (including amenity effects) separately.

[348] Dr Steven's opinion was that the short and long term effects of the development on the biophysical landscape would be acceptable. He based this opinion on his understanding that that no part of the ridge was an outstanding natural feature while we have found it to be such. In contrast, Ms Lucas' view was the effects would be significant and not acceptable. Ms Lucas had formed her view on the understanding that Mt Cass ridge was within the coastal environment, we have found that it is not.[271]

[349] Detailed evidence was presented on the landscape protection agreed in the course of expert mediation, leading to the amended proposal. While turbines continue to be located along the ridge we accept that following removal of some turbines, the new route of the central access road and relocation of aspects the substation, there is now a greatly reduced effect on the ridge feature. There is a sizeable section of the ridge, nearly a kilometre, from which turbines have been excluded and areas where no works are to take place have been identified as an exclusion zone. The exclusion zone protects much of the section of the ridge where characteristic aspects are most distinctive. This exclusion zone extends to the dip slope and to the north and south of the ridge. Minimization of effects in this location is in our view necessary and appropriate.

[350] Of the identified limestone pavement and boulder areas within the project area, only a small proportion now remains affected; similarly the effects on the clusters of forest vegetation are very much reduced. We also note that both geomorphologists have agreed conditions which in their view address effects on the limestone pavements and boulder fields, and that Te Runanga o Ngai Tahu, Te Ngai Tuahuriri Rununga and Waitaha ki Waitaha have agreed conditions which address their concerns relevant to the cultural aspects of Mt Cass ridge.

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[271] Lucas EiC [112]-[113]; Transcript at 366.

[351] We accept that particular care will need to be taken (and is provided for in conditions) to minimize impact on the natural character of the ridge. The biodiversity offset proposed as mitigation will effectively remedy some impacts. Changes will take place on the ridge as a result of grazing reduction and weed and pest management. This is expected to reduce the open space on the 'golf course' as regeneration of native vegetation advances. However, the proposal provides for a walkway which will enable continued access into the ridge area. Despite this, we accept that there would remain a likely perception of detrimental effects on the natural character of the feature, mainly deriving from the size and number of the wind farm turbines, the scale of some proposed works and the construction activities themselves.

[352] Addressing solely the effects on the outstanding natural feature we find that a wind farm (and the works that it would now entail, and conditions which would be imposed, including a proposed covenant in perpetuity over land identified as Mt Cass Conservation Management Area) on this farmland is not inappropriate. We do so taking into account that much of the most characteristic and distinctive section of the feature is excluded from development, that the area is to be protected for the future, that the vegetation and pavement will be managed for protection (including pest and weed management which we are confident will enhance natural aspects), and that cultural aspects have been protected.

[353] That an outstanding natural feature can be protected and become accessible though this development we find a beneficial aspect of the proposal. Through the development the public are to have controlled access and so be able to see, appreciate and understand this previously private site.

***What are the effects on amenity?***

[354] We must have particular regard to the maintenance and enhancement of amenity values, which mean those physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes. We received very little evidence on cultural matters, and understand that conditions have been agreed to address identified issues. So first we consider landscape amenity and then recreation and tourism aspects.

***What are the effects on landscape amenity?***

[355] In this section we address effects on the landscape and then the perception of those effects from beyond the site, particularly of the visual effects of the proposed turbines.

[356] The infrastructure and development proposed which may change people's appreciation of the site include the turbines with foundations and platforms, the access roads to the site and to turbines (and particularly the visible cut faces of the roads), temporary construction works, the substation, buildings and parking, the lay-down and fill disposal areas, the effects of underground cabling linking turbines and the substation, the pylon line between the substation and the Waipara exchange, and the proposed walkway, planting and landscape protection.

[357] The adverse effect on people's perception of the landscape and visual amenity derives (in this case) from the turbines. In all other respects we are satisfied that the negative effect on the ridge is short term. Many of the effects would be remedied following construction.

[358] Each turbine design and configuration would be evident on the hilltop: the smallest design would be 55 metres in height and the largest 130 metres. While a maximum of only 26 are proposed of the tallest, the shorter turbines would be more numerous. They are of a contrasting scale to structures elsewhere in the area.

[359] Thus there are likely to be two groups whose experiences of the wind farm will differ markedly. For the public at large most views (but not all) of Mt Cass are from of distances of 5km or greater. These views are generally eastward of state highway 1 which runs parallel to the ridgeline. From these viewpoints the effect of the proposal on the landscape and the visual amenity derived from the same will be minor.

[360] This includes the views from two schools, which we visited. The schools are located either side of State Highway 1. Both schools had dense screen and shelter planting and the class rooms were not oriented towards Mt Cass. We conclude that the turbines are unlikely to be a visual distraction from the schools.

[361] The second group comprises those whose viewing points are mostly east of State Highway 1 (largely from privately owned land) and closer to Mt Cass. For people within this group the proposal will not maintain the existing landscape character; the rural character of the area will change as a consequence.

[362] The evidence from the landscape architects was that while the turbines would be evident and noticeable they would not cause an adverse visual effect such that the proposal should be turned down. We heard from persons directly affected (predominately farmers). They were not so much concerned with views from dwellings, rather the change in landscape and visual amenity presently enjoyed as their workplace is outside. Some likened this – quite sincerely, to the "industrialisation" of the landscape.

[363] A wind farm must be located in an exposed area. The Mt Cass turbines would be clearly visible over a wide area and there will inevitably be mixed perceptions of their effect on visual amenity. While these views are not in the main from private dwelling houses, for many persons, particularly those living and working in the lee of the mountain, the change to the landscape will be adverse and very likely negatively impact on their appreciation of the landscape. These effects are not determinative but rather matters to be taken into consideration under Part 2 of the Act.

***What are the effects on recreation amenity***?

[364] Recreation is included in amenity values to which we are to have particular regard. Recreation generally increases wellbeing and may include simple pleasures such as walking and driving in the countryside, or more skilled activities such as golf or team sports. We heard from Mr Rob Greenaway, an expert in recreation, who presented evidence for MainPower, and also from Dr Mike Floate on behalf of the Mt Cass Protection Society. In addition Mr Gary Thomas, a section 274 party, presented submissions and evidence on an aspect of tourism, wine tourism.

[365] The question we are asked to decide is whether the visual and audible effects of the proposed turbines would have a negative effect on recreation and tourism. We address recreation first.

[366] There are two walkways which are open to the public in the vicinity of Mt Cass. Both were developed and are managed by Transwaste Ltd, and formed part of the mitigation proposals for the Kate Valley landfill. The poled routes have some rudimentary facilities such as signage, stiles and a portable lavatory and follow formed farm tracks with turf surfaces. Both walkways cover rolling farm land providing an easy recreation experience for families and individual walkers within less than two hours driving access of Christchurch. The walkways may be closed to the public from time to time such as for farm management reasons, fire risk and public safety. Views from the walking tracks are of the Pegasus Bay, farm land and the Waipara Valley, as well as closer more internal views of vegetation, limestone pavement, screes and boulder fields, and sheep and cattle. Both walkways have views of Mt Cass and walkers would have clear appreciation of the turbines, in close proximity in some places.

[367] MainPower proposes an extension to the Mt Cass track to provide further loops which would enable recreation access to the summit and plateau, north of the current track. There was dispute about how this might be developed and whether public access could damage the ecological communities in the plateau. We understand that as the result of mediation and the joint witness caucus, the combination of a poled route and formed track could be designed and formed with minimal threat to local ecology and limestone pavements.

[368] We find that the walkways already formed and the extension proposed will continue to provide recreation amenity and do not agree that the turbines will negate recreation enjoyment, although they may attract different people.

[369] Access to the sites of special ecological interest on Mt Cass has been available through the goodwill of the landowner previously. From evidence presented we recognise that there is benefit in providing public access to the area, and Mr Greenaway was confident that there would be more visitors to Mt Cass ridge than there are presently.[272] Those who perceive turbines as unattractive elements may be deterred from use of the area, but this would be balanced by the general improvement in access and would allow a broader range of people to enjoy the amenity provided by the site. This would include those who regard wind farms favourably because of their association

[272] Greenaway Transcript at 485.

with clean renewable energy. We find overall minimal negative recreational impact from the proposal.

[370] We found the suggestion by the Mt Cass Protection Society that the unformed legal road may be used as an alternative public access unconvincing and agree the wisdom of controlled public access.

***What are the effects on tourism amenity?***

[371] Tourism was addressed as a subset of recreation, (although it might also be considered as an economic activity). Mr Greenaway assessed how Waipara works as a tourist destination,[273] and concluded that the landscape as an attraction was secondary to the wineries destination in its own right.[274] He differentiated between passing visitors and wine tours where people set out to visit wineries. While he acknowledged that the landscape was a factor in a visit to a winery (it may enhance the enjoyment of a winery), he stated that the Waipara landscape had not led tourism development in the area,[275] and did not accept that there was a correlation between landscape and fine wine. He thought that tourism in Waipara was likely to increase as the result of the wind farm.[276]

[372] We heard from winegrowers, Mr Thomas, Ms Vincent, and Mr Eaton. They were concerned with the negative impact on landscape and the development of a wine industry including fine wines and wine tourism. Mr Thomas, who was developing a vineyard from which he hoped to produce fine wines in the future, gave evidence that there could be a correlation between uncluttered landscape and fine wines. He gave examples of areas around the world which produce fine wines and which have attractive landscapes. Mr Thomas presented detailed analyses and a heartfelt argument for the retention of the Waipara landscape in its present state. He outlined factors which he believed influenced fine wine production including limestone and limestone soils, particular landforms, mesoclimatic influences including low rainfall at the appropriate time of year, and the landscape setting.[277]

[273] Greenaway Transcript at 468.
[274] Greenaway Transcript at 488.
[275] Greenaway Transcript at 491.
[276] Greenaway Transcript at 499.
[277] Thomas Transcript at 860.

[373] We were not convinced that a wind farm would derogate from the perception of fine wine. While examples were presented of fine wine areas which do not currently have turbines or visually unattractive infrastructure, we would expect much more detailed evidence to justify a finding that there would be a negative impact on the perception of a fine wine, or on wine tourism. We accept Mr Greenaway's evidence that the Waipara wineries are a destination choice in their own right.

[374] In conclusion we find that the proposed wind farm would not have an appreciable negative effect on the recreation or tourism amenity in Waipara, but that a wind farm may increase tourism. We see no reason to accept that there would be a negative perception and therefore a business impact, on Waipara's wines from the proposed wind farm.

***Planning provisions on landscape***

[375] A central issue for determination is whether this proposal achieves the objective that natural features and landscapes valued by the community are protected and enhanced (objective 7).[278]

[376] Policy 7.2 encourages the use and development to be undertaken in such a way that all natural features and landscapes which contribute to the amenities of the District are protected and enhanced. Policy 7.3 has two parts. First, activities are to be controlled where these would have an adverse effect (relevantly) on an outstanding natural feature. Secondly, to avoid adverse effects on areas which have a high degree of naturalness, visibility, aesthetic value or expressiveness. The explanation to the policy refers to areas which have been identified as outstanding and which therefore may be particularly vulnerable to the adverse effects arising from change.. It states "[w]hile it is recognised that human activities and structures still need to exist and be provided for important landscapes and natural features should be protected".

[377] The Plan promotes the restoration and enhancement of important natural features and landscapes (policy 7.4) and this is to be done, amongst other means, through the resource consent process (methods) including the conditions of consent.[279]

[278] Section 7: Protection of resources with significant value, objective 1.
[279] Explanation to the policy.

[378] The relocation of the wind farm road and removal of some turbines off the ridge and escarpment between Cass and Totara Peaks was, in our view, essential if the feature was to be protected and adverse effects on natural character (at least) avoided. There will, however, always be tension between policies seeking to avoid areas with a high degree of visibility and a wind farm development.

[379] Related to this concern are the provisions for the protection and enhancement of environmental quality; these are:

> Objective 10
> A healthy and safe environment within the District and maintenance and/or enhancement of amenity values which the community wishes to protect.
>
> Policy 10.3
> To maintain and enhance environmental amenity by ensuring that the development and distribution of facilities and services avoids, remedies or mitigates adverse effects.
>
> Policy 10.5
> To avoid, remedy or mitigate the adverse effects of activities on amenity values.
>
> Policy 10.5a
> To avoid, remedy or mitigate the adverse visual effects of buildings and structures sited on prominent ridges or immediately adjacent to strategic arterial, district arterial and collector roads or to Lake Sumner Road.

[380] While the Plan does not identify the amenity values that attach to Mt Cass, that does not mean these cannot be ascertained – they can be through the public's participation in these proceedings and secondly, from expert evidence given at the hearing. The wind farm will be visible from various dwellings located east of the state highway and also from viewing distances of several kilometres. Placement of the turbines on a prominent ridgeline will therefore have some considerable effect on amenity, particularly for persons who work outdoors. To this extent the proposal is in tension with objective 10.

[381] We have considered chapter 8 of the Regional Policy Statement (RPS) which contains detailed provisions concerning the protection and enhancement of natural features and landscapes. For the reasons above there is tension also between this proposal and objective 2 of the RPS which provides for the: [280]

[280] Related to this is policy 3 which we have also considered.

> Protection or enhancement of the natural features and landscapes that contribute to Canterbury's distinctive character and sense of identity, including their associated ecological, cultural, recreational and amenity values.

[382] And policy 3, which states that those natural features and landscapes that meet (as this site does) the criteria in sub-chapter 20.4(1) "should be protected from adverse effects of the use, development, or protection of natural and physical resources, and their enhancement should be promoted."

[383] The proposal endeavours to address the thorny issue highlighted in section 9 of the Plan of meeting the demand for public access to resources of significant value to the community without conflicting with both the need to protect the environmental values of those resources and also recognising landowners' rights. MainPower does so by proposing to form a track extending the Mt Cass walkway and into areas containing indigenous vegetation and distinctive limestone features. We are satisfied that the proposed formed track meets the intent of objective 9 and policies 9.2 – 9.6.

[384] Finally, Maori resource management values are accorded proper recognition in the District Plan as being a matter of national importance under the Act (section 6(e)). MainPower, as a result of consultation with Te Runanga o Ngai Tahu, Te Ngai Tuahuriri Runanga and Waitaha ki Waitaha have proposed comprehensive conditions controlling what is to occur in the event that a site of importance to them is discovered.[281] The proposed mitigation is of importance to the resources and areas valued by Maori and include fencing off cattle, weed control and pest management and restoration of the natural environment. Given this we are satisfied that the provisions of the Plan are achieved (objective 5 and policy 5.1, 5.4, objective 6 and policy 6.2).

**Noise**

[385] In this section of our decision, we examine the effects of noise from the construction and operation of the wind farm. We heard from two noise experts, Mr Malcolm Hunt for MainPower and Mr Stuart Camp for the District Council, as well as from Dr David Black, a medical expert who was called by MainPower to address the potential for adverse health effects arising from the operation of the wind farm.

[281] Conditions [123]-[128].

[386] Prior to the hearing, the noise experts had reached a common understanding on most issues including the proposed conditions of consent. Issues for which we consider clarifications are required are:

- effects of construction noise - the control of noise from the concrete batching plant and, if used, hydraulic rock breakers;
- effects of non-turbine operational noise;
- wind turbine noise limits - the adoption of NZS6808:2010 for assessing wind turbine noise;
- monitoring sites - the substitution of the recently demolished Mt Cass Homestead with the Tiromoana Homestead as a noise monitoring site;
- predicted noise levels compared with background levels at Hamilton Glens;
- post-installation testing for noise with special audible characteristics (SACs);
- effects of wind farm noise on the health of a resident on the autism spectrum;
- cumulative noise effects from Mt Cass and possible future wind farms;
- noise effects for recreational users of the Mt Cass walkway;
- effects of low frequency noise and infrasound;
- effects on pupils at a nearby school; and
- effects on fauna.

[387] We address these in turn.

***Effects of construction noise***

[388] During construction, noise will be generated by on-site construction equipment and by vehicles transporting labour, equipment and materials to the wind farm site.

[389] Condition 130 of the proposed Mt Cass Conditions dated 9 August 2011 requires that all construction, earthworks, site remediation and decommissioning be designed and carried out in accordance with NZS6803:1999 Acoustics – Construction Noise, with the noise limits being within those set out in Table 2 of this standard (for works of ‘long

term' duration). This is the standard which is specified in the District Plan for construction noise.

[390] In his evidence Mr Hunt makes particular reference to the two noisiest types of on-site construction activity, the concrete batching plant and, if used, hydraulic rock breakers. He notes that careful siting will be required for the batching plant to minimize off site noise and that temporary screens or earth mounds could be used as barriers to mask the noise if rock breaking operations are undertaken.

[391] In his assessment, noise from on-site construction activities will barely be noticeable at any residential property, the closest being over 900 m from the wind farm.[282] In this context, it is his view that noise from all forms of construction activity received at dwellings should be below 55 $dBA_{L10}$ the maximum allowable daytime limit for permitted activities in the District Plan.[283]

[392] As none of this evidence was disputed, we accept that the proposed conditions for construction noise should apply.

***Effects of non-turbine operational noise***

[393] The District Plan at A1.2.9 requires that all activities be designed and conducted so as to ensure that the following noise limits are not exceeded at or outside the boundary of the site:

- 55dBA $L_{10}$ 7am to 7pm daily
- 45 dBA $L_{10}$ 7pm to 7am daily
- 75 dBA $L_{max}$ all days between 10pm and 7am.

[394] The Plan goes on to say that in the case of residential dwellings and/or zones, noise is to be measured at any point within the notional boundary of any residential zone, or the notional boundary of any habitable residential building in any other zone. The notional boundary is defined as a line 20 m from the facade of any rural building or the legal boundary where this is closer to the dwelling.

[282] Hunt EiC at [8.11].
[283] Camp EiC at [15].

[395] Condition 131 requires that the following limits should not be exceeded within the notional boundary of any dwelling:[284]

- 50 dB $L_{Aeq\ (15min)}$ 7am to 7pm
- 40 dB $L_{Aeq\ (15min)}$ 7pm to 7am
- 70 dB $L_{max}$ 7pm to 7am.

[396] The unit ($L_{Aeq(15min)}$) differs from that used in the Plan ($L_{10}$). Mr Hunt told us that the $L_{Aeq(15min)}$ unit is now being used in modern standards instead of $L_{10}$ and that for all intents and purposes at Mt Cass there will be little difference between the units.[285]

[397] There will be practical achievement of the Plan non-turbine operational noise standard with Condition 131 having noise limits up to 5 dB more stringent.

***Wind turbine noise limits***

[398] Mr Hunt contends that noise limits such as those specified in the District Plan are not suitable for assessing wind turbine noise and that instead turbine noise should be assessed against *NZS6808:2101, Acoustics-Wind farm noise.*[286] As this was not raised or disputed by any of the other parties, we accept that the New Zealand standard should apply for assessing wind turbine noise.

***Monitoring sites***

[399] Mr Hunt notes that the original modelling and monitoring of sound had been undertaken at the Mt Cass homestead. This homestead has since been demolished and can no longer be considered as a viable monitoring location although his evidence continues to refer to Mt Cass as a noise sensitive site because it is the closest site to the wind farm.[287]

[400] Mr Camp considers that, because the Mt Cass homestead site is one of the two closest monitoring sites to the wind farm, even with no residence, it should be retained

[284] Condition 131 of the 8 August 2011 Mt Cass Conditions.
[285] Hunt Transcript at 657.
[286] Hunt EiC at [7.6].
[287] Hunt EiC at [3.17].

as a monitoring site. As an alternative, he proposes that the nearby Tiromoana homestead could substitute for Mt Cass as the predicted sound levels at both sites are the same. This would require detailed monitoring to be undertaken at Tiromoana prior to construction.[288]

[401] Condition 132 confirms that the dwellings at Dovedale, Hamilton Glens and Tiromoana are the selected monitoring points for measuring and assessing sound from the wind farm. Condition 132 limits the wind farm sound level at these selected monitoring points to a maximum of 5 dB above background sound levels or 40 dB $L_{A90}$(10 min), whichever is the greater. This noise limit is in accordance with Clause 5.2 of NZS 6808:2010.

***Wind farm sound levels at Hamilton Glens and the McLachlan residence***

[402] The Hamilton Glens farm residence is located in a relatively sheltered area north of the wind farm and further north again, about 2.3 km from the wind farm, is the McLachlan residence.

[403] Mr and Mrs McLachlan, who are both parties to these proceedings, have a young child who has autism spectrum disorder. Mrs McLachlan questioned Mr Hunt about the difference at Hamilton Glens between the maximum predicted wind farm sound level of 36 dBA and the measured background sound level of 18 dBA. She was concerned that if there was a similar sound level difference at her residence, this could be very noticeable and potentially affect her child.[289]

[404] For Hamilton Glens, Mr Camp referred to the Marshall Day (Stuart Camp) report of 24 September 2010 titled *Mount Cass Wind farm-Additional Noise Analysis* attached as Appendix 3 to his evidence. This states that following a review of measured background noise:

> Wind conditions during noise monitoring at Hamilton Glens are not particularly representative of the overall wind statistics for the locality. Correcting for this gives more than 61% of night time noise levels less than 25 dBA.[290]

[288] Camp EiC at [20,21].
[289] Hunt Transcript at 639.
[290] Camp EiC at Appendix 3 at [2].

[405] Even with these extended periods of low background sound levels, with some as low as 18 dBA, he is of the view that "… a 35 dBA night time noise level is appropriate for properties such as Hamilton Glens which are clearly sheltered from some wind directions".[291] In this context NZS6808:2010 at 5.3.3 includes a recommendation that wind farm sound limits be set no lower than 35 dBA at any time.

[406] Compared with Hamilton Glens, the predicted maximum wind farm sound level at the McLachlans' dwelling is only 25 dBA.

***Post-installation monitoring for noise with special audible characteristics***

[407] Having considered the predicted maximum level of sound at the McLachlans, we now consider special audible characteristics as these have been shown to be of considerable concern for communities living near wind farms.

[408] All wind farms produce sound at source.[292] The received sound level is influenced by a number of effects and conditions including the distance from wind turbine generator, air turbulence, air and ground adsorption, screening effects of vegetation and wind effects.

[409] Nearly all sound produces special audible characteristics including the lower frequency sounds of tonality, impulsiveness and amplitude modulation.[293] C5.5.2 of NZS6808:2010 notes that as sound propagates from a wind farm, the higher frequency components attenuate more quickly than the lower frequency components. At a distance, it is the lower frequency sounds that are audible, albeit at a low sound level.

[410] Many parties expressed concerns about the emission of noise and the effects arising from SACs. However, Mr Hunt was very confident that MainPower could install R60 or R90 turbines that would produce "zero" SACs at the monitoring sites. Some manufacturers of R60 and R90 turbines certify these turbines do not produce SACs.[294] However, Mr Hunt had some doubt about R33 turbines. He said that he had not sighted

[291] Camp EiC at Appendix 3 at [2].
[292] Hunt EiC at [6.4] - sound at source is known as the *sound power level.*
[293] Camp EiC at [30].
[294] Hunt Transcript at 650-652.

any manufacturer's certificate and he referred to equivocal results in noise monitoring at Te Rere Hau wind farm where these are installed.

[411] Condition 133(a) of the 8 August 2011 version of the Mt Cass Conditions provides for an Acoustics Emissions Report to be submitted to the District Council confirming that the selected turbines "are not expected" to have special audible characteristics[295] (our emphasis). In response to a question from the Court, counsel for MainPower advised that in this condition MainPower now proposed to substitute the words "shall not have" for the words "are not expected to have".[296]

[412] Our understanding is that the Acoustics Emissions Report relates to the status of the turbines as tested by the manufacturer before delivery to the site. MainPower's proposed revised wording could be interpreted as applying to the turbines both before and after their installation when this is not the intent of this condition. We consider that the words "do not have" should substitute for "are not expected to have" as these more accurately capture the intent of the condition.

[413] The unexpected presence of SACs from the turbines following their installation at *Project West Wind* at Makara has heightened community sensitivity to wind farm noise in other locations where wind farms are proposed. For the Mill Creek wind farm,[297] which is close to *Project West Wind*, even with a requirement for a manufacturer's warranty for SAC free turbines, to protect the local community, all of the noise experts agreed that there should be a condition for post installation testing to be undertaken to ensure that the turbines are SAC free prior to the operational commissioning of the wind farm.

[414] The Court asked the noise experts for their opinions as to whether a similar condition should apply for Mt Cass. Mr Camp provided this response:

> …well firstly, it's in MainPower's best interests to make sure that that problem doesn't exist because as we saw at Makara, residents get highly annoyed by it and you never quite catch up. You solve the problem but people are still then sensitised to the noise whatever that's like. So, I think it would be sensible to have a condition that required assessment of special audible

[295] Hunt Transcript at 1434.
[296] Counsel for MainPower Transcript at 1434.
[297] *Meridian Energy Ltd and Ors v Wellington City Council and Ors* [2011] NZEnvC 232.

> characteristics on say, two turbines before commissioning the rest of them. And as Mr Hunt noted yesterday, assessing special audible characteristics is relatively simple because you don't do that out at a residential property. It's not about measuring the overall noise level, it's about measuring the character of that noise. So you would do that at the reference position that he referred to in the standard when you measure the sound power level of the turbine…. which is very quick and easy, it's a one hour measurement perhaps… I think that could be done on one or two turbines prior to running the remainder at night.[298]

[415] Despite this, the 8 August 2011 draft conditions do not provide for post installation testing for SACs. When asked why this was so, counsel for MainPower said:

> I've had discussions with Wind and Energy Association and…it's a matter I suppose of principle around the need for such a condition in all cases.[299]

[416] We consider MainPower's stance in this regard to be somewhat unreasonable. On other wind farms, even where turbines have been certified by manufacturers to be "SAC free", SACs have been detected and local residents, the McLachlans in particular, have considerable concerns over wind farm noise – which we discuss in some detail below.

[417] With Mr Camp's advice that such testing is straightforward and not costly, we have decided that SAC field testing should be undertaken on two turbines installed as part of the commissioning of the wind farm and that at the very least, a number of turbines closest to the McLachlan's residence should not be operated until it has been established that there are no SACs present. We have identified these turbines and the SAC testing requirements in a proposed new Condition 134(b) as follows:

> The sound from at least two wind turbines shall be measured prior to commissioning the wind farm. These measurements shall be conducted at a location within 1000m from the turbines. A compliance assessment report for the turbines shall be submitted to the Environmental Services Group Manager in accordance with Section 8.4.1 of NZS6808:2010. Turbines 61/75 to 69/75 in the R33 layout, 36/42 to 39/42 in the R60 layout, or 24/26 to 25/26 in the R90 layout shall not be operated until a report on this test has been submitted and it shows that no special audible characteristics are present, when assessed in accordance with NZS6808/2010. The reference test method for tonality shall be that prescribed as Annex C to ISO 1996 – 2:2007.

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[298] Hunt Transcript at 675.
[299] Counsel for MainPower at Transcript 1433.

Note: the intention is that testing is carried out prior to operating the turbines closest to the McLachlan property.

[418] The proposed wording of this condition has been adapted from a similar condition agreed among the noise experts on the Mill Creek wind farm[300] (footnote with decision reference). The parties are invited to comment on the suitability of this proposed wording and particularly on the location as to where the SAC measurements should be made.

[419] In the context of the rest of the wind farm, the noise level at the closest dwelling (Tiromoana) is predicted to be just under the allowable 40 dBA. If unexpected SACs were detected, it would be necessary to impose the 5 dBA penalty provided for in Condition 136, which in turn would require turbine de-rating or shut down until the cause(s) of the SACs had been identified and remedial actions put in place.

[420] Accordingly, it must be in MainPower's best interests to use the results of the post installation testing to ensure that none of the Mt Cass turbines exhibit SACs prior to commissioning of the wind farm.

***Effects of wind farm noise on the health of the McLachlans' child***[301]

[421] Dr Black was questioned extensively by Mrs McLachlan about the potential effect of the wind farm on the health of her child. We found this questioning to be most helpful and draw heavily on it to describe the concerns for the McLachlans if a wind farm is built close to their farm and home. Dr Black's area of expertise is in medicine and bio-physics. He does not regard himself as an expert in autism with his opinions on autism being obtained primarily from literature research.[302]

[422] At the suggestion of the McLachlans, Dr Black had contacted Dr Angela Arnold-Satiepe an Auckland based psychologist who is a specialist in the treatment and management of children with autistic spectrum disorders. This was to discuss the potential effects wind farm noise might have on this child. The discussion had taken place after Dr Black had prepared and submitted his rebuttal evidence.

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[300] See *Meridian Energy Ltd and Ors v Wellington City Council and Ors* [2011] NZEnvC 232.
[301] In order to protect the privacy of the child we have not included personal details in the quoted text of the decision, transcript or conditions of consent.
[302] Black Transcript at 601.

[423] Mrs McLachlan disputed Dr Black's recollection of his discussions with Dr Satiepe saying they did not match those of Dr Satiepe.[303] We could not confirm this one way or the other as we did not hear from Dr Satiepe but in any case we do not consider that this had any material effect on Dr Black's responses to Mrs McLachlan's questions or our understanding of these.

[424] In response to a question from counsel for MainPower as to whether he had any additional comment to make following his discussion with Dr Satiepe, Dr Black replied, inter alia:

> I think the important points that I found helpful from my discussion were that as I had already interpreted from the literature, the possibility of children with autism spectrum disorder being – behaving or reacting in an idiosyncratic way to either sound or to the arrival of something new in their environment is unpredictable and is something which is virtually – very difficult to mitigate, particularly with regard to noise. We discussed at some length the way in which such children can find particular tones or sounds for no understandable reason, even in retrospect, distressing at times.[304]

[425] This statement encapsulates for us the McLachlans' concern of the unknown with respect to the health of their child if a wind farm is built at Mt Cass.

[426] In response to a question on the protection afforded to the community by health standards and the effects on the health for those with autism, Dr Black had this to say (inter alia):[305]

> I hope I made it clear in my evidence that when a project like this is being undertaken it is incumbent on the designers to ensure that it complies with … public health standards which are designed to protect a normal population, and the normal population does not, by definition, include any hypersensitive population that might exist. Trying to protect a hypersensitive population with a standard designed for a normal population is both impossible and is also fraught with difficulties and failures.

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[303] Black Transcript at 629.
[304] Black Transcript at 592.
[305] Black Transcript at 601, 602.

[427] In confirming to Mrs McLachlan that autistic people are not catered for by health standards in the general, well and normal population:[306]

> …people with autistic spectrum disorder are not necessarily catered for by public health standards. They are not, in fact, catered for by quite a lot of facilities in the environment such as I've just mentioned, the normal procedures for education assessment and employment, and these are people who do require special care

and:[307]

> ….the New Zealand Standard for wind farm noise does provide protection for that contiguous general population, including the most sensitive people in it … the standard, like most public health standards, does not purport to provide protection for a separate non-contiguous, hypersensitive group.

[428] Mrs McLachlan then went on to ask if Dr Black agreed with the following statement:[308]

> A precautionary approach should generally be regarded as justified in cases where there is a possibility of an event with very serious consequences even though the possibility of occurrence is low. By adopting a precautionary approach the likelihood of an adverse outcome can be reduced, even if not eliminated.

to which Dr Black responded (inter alia):[309]

> …there are areas where there is incomplete information, in other words where the science is incomplete and so a precautionary principle is invoked if it is thought that there is a serious risk of something that we don't know about. In this case, I think you are arguing that, well not necessarily arguing, but suggesting that here is a possibility that there might be an effect to a hypersensitive group, that is not established that it will happen … but can't be excluded and that should result in a pre-cautionary approach being applied across the board to stop that happening. That is just not workable … to do that you'd have to apply that uniformly and it would defeat the whole point of having well formed standards based on population responses. Again I repeat and I know it sounds harsh, but the reality is that the only way to protect hypersensitive sub-groups is

[306] Black Transcript at 602.
[307] Black Transcript at 605.
[308] Black Transcript at 613.
[309] Black Transcript at 613-615.

to either treat or individually protect them. You can't protect them as part of a wider population protection mechanism.

[429] He then went on to say that:

> But I must add to this because it all sounds a bit bleak … in my view having looked at the literature and also yes, in my discussions with Dr Angela, the possibility of an effect on Autistic Spectrum Disorder people from noise hasn't necessarily got anything to do with the level of the noise or sound, it's more likely to have something to do with the character of it. (our emphasis).

Mrs McLachlan:[310]

> There is no escape we cannot, we cannot get, or [the child] cannot get away from it like a noise in the community?

Dr Black:[311]

> Mrs McLachlan, if it turned out that some aspect of a wind turbine did prove to be distressing for your [child] that would be most unfortunate and would require some individual management and… I don't know what that would be, but that management would have to surround looking after her rather than trying to modify the environment.

Mrs McLachlan:[312]

> Well would you not agree that [your child] already lives in an environment where [the child]… is more than settled and as far as I know there are not many of those triggers. Would you not agree that would be MainPower introducing something that [the child] could not find acceptable?

Dr Black:[313]

> …what you say is correct if that happened, but it is impossible to run the world on then having an idea like that flow on to regulatory controls and standards.

[310] Black Transcript at 615.
[311] Black Transcript at 615.
[312] Black Transcript at 615.
[313] Black Transcript at 615.

[430] In response to a question from Mrs McLachlan as to how her child might be affected by the predicted maximum 42 dB noise level at the boundary of the McLachlan's farm, Dr Black responded that he would be very surprised if the child was adversely affected through exposure to what he described as 42 dB of broad spectrum noise.[314] He amplified this further when he said:[315]

> It's not a matter of level of noise and it's far from certain that the nature of the noise would be of a type that would upset [the child]. In fact with modern wind turbines, the tonal component to the noise is largely eliminated. In some earlier turbines there could, at times, be quite a tonal component. The broad spectrum white noise which is typical of turbines once you get more than a few hundred metres away from them, is a noise of natural character and one which is generally readily accommodated by people because it becomes undistinguishable from natural noises which people are accustomed. I've had quite a lot of people in communities who were concerned about turbines say to me that after a while they really can't discriminate between the sound to the extent that they do hear it and the wind and if they want to really establish whether it is the wind or the turbine, they really have to face it with both ears facing it and really listen and think about it. (our emphasis)

[431] Following Mrs McLachlan's questioning, the Court sought confirmation from Dr Black that the issue with noise for those with autism may not necessarily be the level of the sound but rather the character of the sound. Dr Black said:[316]

> That's what my research has led me to believe, that there is – there are no characteristics of autism which result in people having hyperacusis, in other words excessively sensitive hearing, and it is not that they are more sensitive to sounds at a lower sound pressure level than normal people. It is that there are characteristics of sound which could – which they could find quite distressing. In fact, in my discussions with Dr Angela which I have referred to, she really quite emphasised that point to me.

[432] Having heard his submission, the Court asked Mr McLachlan whether he had a perception of what the effect might be at his home from an increase in noise level from the lowest reported background sound level of 18 dB to the predicted 25 dB, or indeed how loud 25 dB actually sounds. This led on to a question from the Court, as to whether MainPower had offered to arrange for the McLachlans to visit an existing wind farm so

[314] Black Transcript at 622.
[315] Black Transcript at 626.
[316] Black Transcript at 631.

that they could hear for themselves sound levels from turbines similar to those proposed at Mt Cass. Mr McLachlan responded that no invitation had been received.

[433] Following her closing submission and in response to a question from the Court, Mrs McLachlan advised that Mr Hurley from MainPower had been in contact and agreed that background noise monitoring would be undertaken at their dwelling.[317] We note also that Condition 133 confirms that the McLachlans will be considered a high amenity area for the purposes of NZS6808:2010 for as long as, but no longer, the child lives in the dwelling at this address.

[434] In his closing submission counsel for MainPower advised that MainPower and Meridian (who are in the planning stages for a separate wind farm north of Mt Cass) had offered jointly to assist with noise attenuation measures for the McLachlans' house but this offer had been declined.[318] He advised that MainPower had also offered assistance with a psychologist but that the McLachlans had responded that, while grateful, "…this was not something [their child] could cater for in [his/her] life at the moment".[319] Counsel advised that MainPower would continue to liaise with the McLachlans to offer any assistance they could.

[435] Short of deciding not to build the wind farm, we consider that MainPower has been responsive with its offers to address the McLachlan's concerns, although in doing so, we accept that even if they were to accept all of the offers, some uncertainty would still remain. Importantly, MainPower did not indicate that these offers were conditional on any matter and we commend them for their continued offer of assistance.

[436] Earlier in this section of our decision we concluded that there should be a condition requiring post installation testing for SACs to ensure that at least the turbines closest to the McLachlans' property are SAC free prior to their operational commissioning. The desirability of this testing has been strongly reinforced for us following our consideration of the evidence of the potential effects of wind farm noise on the McLachlans' child's health. In particular we note Dr Black's statement that it is

[317] Mrs McLachlan Transcript at 1230.
[318] Counsel for MainPower Transcript at 1456.
[319] Counsel for MainPower Transcript at 1458.

more likely to be the character of the sound rather than its level which those with autism could find distressing and that this view was also emphasized by Dr Satiepe. If Dr Black (and Dr Satiepe) are correct, ensuring that the turbines do not exhibit SACs (special audible characteristics) before the wind farm is commissioned is an important way of reducing the possibility of the child being affected by turbine noise.

[437] On the basis that SACs are avoided, we move on to consider Dr Black's statement that with modern wind turbines, the tonal component to the noise is largely eliminated. The broad spectrum white noise which is typical of turbines once you get more than a few hundred metres away from them is a noise of natural character and one which is generally readily accommodated by people because it becomes indistinguishable from natural noises which people are accustomed.[320.]

[438] Our understanding of Dr Black's statement is that as modern turbines should not have any tonal noise or other SAC components, the remaining broad spectrum noise should contain only the higher frequencies which he describes as being "noise of natural character".

[439] The predicted maximum wind farm sound level at the McLachlan's is 25 dBA within the notional boundary of the property. With no SACs, the remaining turbine noise should then be perceived primarily as "a noise of natural character". The noise level is also very low, in many rural locations being typical of the background sound level. Short of having no wind farm noise at all, this low noise level should be barely discernible.

[440] There is also Condition 133 which requires the McLachlans' dwelling to be considered as a high amenity area in terms of NSZ6808:2010 while the McLachlans' child resides permanently at the dwelling. We have amended the condition by removing the name of the child.

[441] In addition, Condition 134 requires post-installation testing to be undertaken at the McLachlans' dwelling for the purposes of ensuring compliance with the sound level limits of Conditions 132 and 133.

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[320] Black Transcript at 626.

[442] We acknowledge that even with assurances of no SACs, the very low 25 dBA predicted sound level at their residence, the high amenity area classification and the post installation testing to be undertaken at their dwelling, the McLachlan's concerns of an adverse effect from the wind farm may still remain. While it may not be the outcome the McLachlans are seeking, we accept Dr Black's advice that these concerns should be addressed through individual management rather than through us declining consent for the wind farm.

***Cumulative effects***

[443] One of the remaining issues we identified at the start of this section was submitter concerns over cumulative noise effects if another wind farm was to be built north of Mt Cass. Since the hearing closed applications for resource consent have been directly referred to the Environment Court in relation to a second wind farm in this area. The cumulative effects of the second wind farm are not something that we are able to consider as part of this Mt Cass consent decision.

***Effects of noise on recreational users***

[444] On the issue of wind farm noise for recreational users of the walkway, Mr Hunt advises that when wind farm noise levels on the walkway are high, then background noise levels from wind will also be high. We agree with his contention that the combined noise from the wind farm and general background noise should not detract from the experience for those who elect to use the walkway in windy conditions. Inevitably there will be users whose primary objective for using the walkway will be to see and hear the turbines at close range which for them will be a very positive experience.

***Effects of low frequency noise and infrasound***

[445] In his evidence, Mr Hunt notes that there is no evidence that low frequency noise or infrasound will have any adverse effects on health especially at the distances involved for Mt Cass.[321] This opinion is supported by Dr Black.[322] None of this was disputed.

[321] Hunt EiC at [9.10].
[322] Black EiC at [7.16]-[7.26].

***Effects on Omihi School***

[446] A number of submitters expressed concern that the noise from the wind farm could adversely affect children at the Omihi School. The predicted noise level at the McLachlan's dwelling which is 2.3 km from the wind farm is only 25 dBA. As the school is around 4 km from the wind farm, it is Dr Black's opinion that wind farm noise there will be barely audible and that it will have no effect on the pupils.[323] Dr Black's opinion was not disputed.

***Effects on fauna***

[447] Dr Black notes that one submitter (McKrone) is concerned that wind farm noise could drive away worms and that two others, Mr Francis and Ms Dineen are concerned about the effects on farm animals such as egg-laying chickens. Dr Black responds that the levels of vibration transferred to the ground are barely detectable and that these will not affect animals, chickens or earthworms.[324]

***Planning provisions concerning noise***

[448] Objective 10 (which we have referred to earlier) is also relevant in the context of noise, being:

> A healthy and safe environment within the District and maintenance and/or enhancement of amenity values which the community wishes to protect.

Policy 10.5 is:

> To avoid, remedy or mitigate the adverse effects of activities on amenity values.

And Policy 10.9 is:

> To control noise at levels acceptable to the community and, where they exceed those levels, generally maintain a separation distance between those noise- emitting activities and sensitive activities.

[449] Relevant also are the assessment criteria for resource consents. These provide in relation to noise:

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[323] Black EiC at [7.28].
[324] Black EiC at [7.29]-[7.30].

- that the proposed noise levels are not to create a nuisance to any person;
- that the frequency and duration of the proposed noise above the level in the District Plan is insufficient to cause a significant adverse effect on the amenities of the surrounding sites;
- the necessity for the frequency, duration and level of noise, having regard to the best practicable options, the nature of productive rural activities in the rural areas, and other land use activities within the locality;
- that the proposed noise levels will not adversely affect the health and safety of any person; and
- any recommendations from a suitably qualified person(s).[325]

[450] The proposal will practically comply with the noise standards in the District Plan. Secondly, as a minimum, noise levels at all rural residential sites are to comply with the guideline limits set out in NZS6808:2010 Acoustics – Assessment & Measurement of Sound from Wind Turbine Generators. The construction of the proposal is to comply with the noise limits set out in NZS6808:1999 Acoustics – Construction Noise.

[451] MainPower has offered a Condition (133a) that the turbines are not expected to have SACs. We have imposed a further condition requiring post installation testing to confirm the absence of SACs before the turbines closest to the McLachlans' residence are operated. If SACs are detected in the test turbines, MainPower must then identify the cause(s) of the SACs and eliminate these for at least for the 'McLachlan' turbines. In addition, for the reasons we have already set out, it must be in MainPower's best interests to use the results of the post installation testing to ensure that none of the Mt Cass turbines exhibit SACs prior to commissioning of the wind farm.

[452] Finally, there is also the provision in Condition 136 that if SACs should be detected at any time, a 5dB penalty will apply which would require MainPower to de-rate or shut down turbines until compliance is achieved.

[453] With these safeguards, we are satisfied that the proposal will achieve objective 10 of the District Plan.

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[325] Section C1: Resource Consent Procedures, Assessment Criteria C.1.2.4(a)(v).

**Part 2 matters**

[454] Opposition to MainPower's application to build a wind farm at Mt Cass centred on a number of key concerns. In summary these were:

- the effects of constructing a wind farm on a geomorphic ridge of regional significance containing significant indigenous vegetation and significant habitats of indigenous fauna;
- the loss of the amenity of the existing rural landscape and the values it supports (including tourism, recreation and viticulture industry); and
- the noise from the wind farm and its potential effects, including on the health and wellbeing of the McLachlans' child.

**Section 6**

[455] In our consideration as to whether we should grant consent for the wind farm (or not), we are required to recognise and provide for the matters of national importance listed under s6 of the Act.

[456] For Mt Cass, of the six matters listed in section 6, there are three that are relevant:

> (b) The protection of outstanding natural features and landscapes from inappropriate ... use and development;
> (c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna; and
> (e) The relationship of Maori and their culture and traditions with their ancestral lands ...

[457] While we have found the ridge and escarpment between Mt Cass Peak and Totara Peak to be an outstanding natural feature, we have also found that the siting of the proposed wind farm on this outstanding natural feature would not be inappropriate. We have reached this finding having taking into account that there is little disturbance of the most characteristic and distinctive sections of the feature. This area is to be protected for the future and the vegetation associated with the limestone pavement will be protected and enhanced.

***The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna***

[458] The effects of a wind farm on Mt Cass's ecology were at the forefront of concerns raised in both evidence and submissions. The Commissioners in the first instance hearing declined consent for the wind farm primarily on the basis that its effects on the site's ecology were unacceptable. The layout we considered *(the mediation layout*) included substantial revisions to reduce these effects. For this layout, we have found that:

- while the direct effects of construction will be significant in the *short term* these will be temporary and small in scale;
- with the development of the proposed Mt Cass Conservation Management Area, the adverse effects on the vegetation and habitat for indigenous fauna will be minor in the *medium term;* and
- in the *longer term*, these may well be reversed.

[459] MainPower proposes to address some of the adverse effects through "biodiversity offsets". What is meant by "offset" and how it fits within the framework of the Act was the subject of considerable discussion. This is a reflection of recent work (models and methodologies) aimed at ensuring conservation outcomes are measurable. In this regard we were referred to the international publication *Business and Biodiversity Offsets Programme*, the proposed National Policy Statement on Biodiversity, the National Policy Statement on Renewable Electricity Generation (2011) and to various judgments of the Environment Court.

[460] At times we found that the terminology associated with offsets was loosely employed and confusing. This may have occurred because the Business and Biodiversity Offsets Programme is concerned with "significant residual adverse biodiversity impacts after appropriate prevention and mitigation measures" thus begging the question.[326]

[326] NPS REG, policy C2 takes a similar approach - *residual environmental effects …that cannot be avoided, remedied or mitigated.*

[461] For the purposes of this decision we have adopted the approach taken to offsets in the decision of the Board of Inquiry into the New Zealand Transport Agency Transmission Gully Plan Change Request (October 2011):[327]

> What ultimately emerged from the evidence, representations and submissions of the parties was an acknowledgement that the term offsetting encompasses a range of measures which might be proposed to counter balance adverse effects of any activity, but generally fell into two broad categories. Offsetting which related directly to the values affected by an activity was in fact a form of remedy or mitigation of adverse effects and should be regarded as such. Offsetting which did not directly relate to the values affected by an activity could more properly be described as environmental compensation.

[462] This, as MainPower's witness stated, necessarily includes any residual effects. These are:

> … bundled together because you have to consider the management actions and whether those management actions are comprehensive enough to address the residual effects.[328]

[463] The offsetting for Mt Cass clearly relates to the values being affected, and secondly, it is being undertaken on the same site. Therefore we consider it to be a "form of remedy or mitigation of adverse effects" rather than environmental compensation.

[464] We acknowledge the uncertainties inherent in predicting effects within any ecosystem and the possibility for markedly different outcomes for some species. In this context, we have found that MainPower's biodiversity offset model including its sensitivity analysis and time preference discount provides us with confidence that there should be substantial gains for the biodiversity at the Mt Cass site in the medium to longer term.

[465] The conditions of consent, incorporating our changes, should provide sufficient certainty as to the overall outcomes for biodiversity at the site and adequate safeguards for the particular species of concern.

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[327] At [210].
[328] Transcript at 1155.

***The relationship of Maori and their culture and traditions with their ancestral lands***

[466] The Court heard no evidence or submissions on Maori issues. Conditions 122 to 128 set down the requirements under which the Consent Holder has agreed to enter into accidental discovery protocols with Te Rununga Ngai Tahu, Te Ngai Tuahuriri Rununga and Waitaha ki Waitaha. We accept that these protocols will satisfy section 6(e) by protecting the relationship of Maori and their culture and traditions with their ancestral lands at Mt Cass.

**Section 7**

[467] Section 7 which requires us to have particular regard to a number of matters. Of the eleven matters listed under section 7 there are seven that are relevant to Mt Cass:

| | |
|---|---|
| (aa) | The ethic of stewardship |
| (b) | The efficient use and development of natural and physical resources |
| (c) | The maintenance and enhancement of amenity values |
| (d) | Intrinsic values of ecosystems |
| (f) | Maintenance and enhancement of the quality of the environment |
| (g) | Any finite characteristics of natural and physical resources |
| (j) | The benefits to be derived from the use and development of renewable energy. |

***The ethic of stewardship***

[468] In the *Project West Wind* decision[329] the Court discussed the concept of stewardship, firstly in the context of preserving the landscape unaltered, and secondly, allowing some compromise of amenity to take advantage of non-polluting and renewable sources of energy. For Mt Cass we would extend the context of preservation to include the site's ecology. The Court in *Project West Wind* favoured some compromise of amenity as long as this did "… not impose unreasonable burdens on communities, individuals or the receiving environment."[330] We adopt this same approach of compromise for Mt Cass. We consider the Mt Cass Conservation Management Area to provide much better stewardship of the ecological values than would be possible under a working farm.

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[329] *Meridian Energy Ltd and ors v Wellington City Council and Wellington Regional Council*, W031/2007.
[330] at [369].

***The efficient use and development of natural and physical resources***

[469] The wind resource is well suited for renewable energy generation. A wind farm will result in considerable added value for the Mt Cass land as the wind farm can operate in parallel with the existing farming operations even if these are to be more controlled within the Mt Cass Conservation Management Area. The proposed extension to the walkway will provide visitors with expanded opportunities to experience close up the Mt Cass landscape, its landforms and ecology as well more distant views including those of Pegasus Bay. All of this will result in an efficient use of the natural and physical resources of the wind farm site.

***The maintenance and enhancement of amenity values***

[470] The development of a wind farm at Mt Cass will result in varying degrees of change to the amenity values experienced by both local residents and visitors for the landscape, ecology, recreation and tourism. The turbines will be clearly visible over a wide area and there will be mixed perceptions of their effect on visual amenity. For many who live within view of the wind farm, accustomed to the existing rural landscape, the addition of turbines along the ridgeline will negatively impact of their enjoyment of this landscape. Conversely others, including many visitors to the area as well as passers-by on the highway, will view the turbines as adding interest to the landscape as well as being a positive reminder that the modified landscape is now providing a valuable source of renewable energy.

[471] The recreational amenity of Mt Cass is centred primarily on the walkway. While some existing walkway users are concerned that the wind turbines will diminish the enjoyment of their experience, this will be offset by the proposed ecological conservation measures as, and when, these start to bear fruit. The extended walkway will provide opportunities to observe, appreciate and understand the landscape and ecology of the previously private properties along the ridge line. We conclude that the presence of the wind farm should have positive outcomes overall for recreational amenity. Waipara's tourism is unlikely to be negatively affected by the wind farm.

[472] There will be some loss of amenity for the local community. In particular, while the predicted wind farm sound level at the McLachlans is very low and conditions have been imposed to provide assurances for them of no special audible characteristics, we

accept that there can be no guarantee of absolute protection for the health and wellbeing of their child. If concerns do arise for the McLachlans, we agree with Dr Black that these should be addressed through individual management. Overall, we are satisfied that, provided there is full compliance with the noise conditions, a healthy and safe noise environment should be maintained for the local community.

***Intrinsic values of ecosystems***

[473] In our consideration of section 6(c) matters we found that the conditions of consent (with our changes) should provide sufficient certainty for the enhancement of the biodiversity of the site as well as adequate safeguards for species of concern. In addition, the proposed conditions of consent relating to geomorphology, geology and hydrogeology should protect sub-surface drainage pathways and that the proposed water quality monitoring programme should minimise the potential for the contamination of underground water sources. These measures should in turn protect aquatic biota as well as the quality of the drinking water for farm livestock.

***The maintenance and enhancement of the quality of the environment***

[474] The main effects of the wind farm on the quality of the environment will be the visual impact on the landscape, some loss of amenity due to noise and changes to Mt Cass's ecology. We have addressed each of these in some detail in our consideration of other section 6 and section 7 matters and do not repeat them here.

***Any finite characteristics of natural and physical resources***

[475] Wind farms have been constructed at various locations throughout New Zealand and there are resource consents approved for many more which have yet to be built. The wind at each of these sites is a finite resource. The scale and scope of each of these wind farms has been constrained by its adverse effects on local amenity. These constraints have often required layouts to be reconfigured or turbines deleted before consent was granted. Each deleted turbine has reduced the amount of energy able to be generated from the available wind resource.

[476] Mt Cass too has a finite wind resource. Many submissions sought that there be no wind farm at all because of its perceived adverse effects on the site's ecology and the general amenity of the local community. In response to these concerns, MainPower

made major changes to the proposed layout of the wind farm (but not its scale) to limit adverse environmental effects. We heard very detailed evidence on these effects but little if any on whether the wind farm might be more acceptable to some if its scale was limited through reducing the number of turbines. It was very much all or nothing. We assume that MainPower has scaled the wind farm to capture the maximum amount of energy it can from the wind at Mt Cass within the constraints of the site.

***The benefits to be derived from the use and development of renewable energy***

[477] The Mt Cass wind farm will have the following benefits which we recognise in accordance with the National Policy Statement on Renewable Electricity Generation (2011):

- it will capture a currently unused renewable energy wind resource of good quality for the generation of electricity;
- with its proximity to the main transmission grid, there will be low transmission costs and an efficient use of the electricity;
- it will increase electricity generation capacity while avoiding, reducing or displacing greenhouse gas emissions thereby countering the effects of climate change;
- it will increase the security of supply at local, regional and national levels through diversifying the type and/or location of electricity generation;
- it will assist with avoiding the reliance on imported fuels for the purposes of generating electricity; and
- it will assist in meeting New Zealand's obligations under the Kyoto protocol and the 2025 target of the New Zealand Energy Efficiency and Conservation Strategy for 90% of generation to be from renewable sources.

**Section 8**

[478] Section 8 of the Act requires us to take into account the principles of the Treaty of Waitangi in the decision-making process. As we have already noted, all matters affecting iwi had been resolved prior to the hearing.

**The Commissioners' first instance decision**

[479] We are required by section 290A of the Act to have regard to the decision of the Commissioners appointed by the District Council to decide the original application for

resource consent.[331] We have noted that the mediation layout is quite different from the wind farm considered by the Commissioners and the impacts on ecology have been considerably reduced. While we agree that a part of the Mt Cass ridge is an outstanding natural feature, we do not regard the Mt Cass range as within the coastal environment. Ultimately the changes in the layout and location of key elements of the wind farm infrastucture have led us different conclusions as to the extent and significance of the adverse effects.

**Exercise of discretion**

[480] Towards the beginning of this decision we set down the purpose and principles of the Act which guide us in determining whether or not granting consent achieves the purpose of the Act, namely the promotion of the sustainable management of natural and physical resources. To repeat, sustainable management is defined in the Act in these terms:[332]

> In this Act, **sustainable management** means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –
>
> (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
>
> (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
>
> (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

[481] Decisions on wind farms often come down to weighing up the (primarily) national level benefits and adverse effects at the local level. This particular wind farm proposal clearly demonstrates benefits at both levels. While there are undeniable adverse effects on the landscape, visual character and local amenity, when viewed overall the outcomes for the environment are positive; that is to say better outcomes for the local ecosystem in addition to the regional, national and global positives of renewable generation. The wind farm enables the creation and funding of the Mt Cass Conservation Management Area for the restoration of a significant limestone ecosystem.

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[331] Released 2009.
[332] Section 5(2) RMA.

The walkway will make this important site more accessible for both recreation and education purposes.

[482] Taking all these matters into consideration we are satisfied that the purpose of the Act would be best served by granting consent.

**Lapsing period**

[483] MainPower has sought a lapsing period of eight years from the date of the commencement of its consent. While this is supported by the District Council many submitters requested a shorter period being dubious about whether the proposal would proceed and wishing to have certainty – as much as they are able to gain, as to their future environment.

[484] We are satisfied, for the reasons advanced by MainPower that an eight year lapse period is appropriate.

**Result**

[485] The appeal against the decision by Hurunui District Council is allowed and the application for land use consent referred directly to the Court is granted for one of the following options:

- 67- R33 turbines, as detailed on CG151.4 in two sheets dated 27 May, 2011,or
- 40 - R60 turbines, as detailed on CG152.4 in two sheets dated 27 May, 2011,or
- 26 - R90 turbines, as detailed on CG153.4 in two sheets dated 27 May, 2011

all in accordance with the Mt Cass Conditions as revised by the Court and attached to this decision.

[486] We direct that MainPower and the District Council confer about any changes which they consider might need to be made to the attached conditions to reflect this decision. If so, a revised set of conditions is to be lodged with the court and circulated

to all parties for comment by **16 December 2011**. These conditions should be accompanied by a memorandum explaining the reasons for any changes or additions to the Court's version of the conditions (**attached**).

[487] By **21 January 2012** all other parties proposing amendments to the conditions (or a revised set of conditions if changes are proposed by Hurunui District Council and MainPower New Zealand Ltd) are to file and serve their memoranda setting out the reasons for the changes sought. By **28 January 2012** the Hurunui District Council and MainPower New Zealand Ltd may file a memorandum in response.

[488] We anticipate determining final conditions on papers. If any party seeks a hearing on conditions they should advise accordingly. The Court will release an untracked set of conditions at the parties' request.

**Costs**

[489] Costs are reserved. Parties are to note the presumption in section 285(5) of the Act that costs are not to be ordered against a person who is a party under section 274(1).

For the Court:

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**J E Borthwick**

**Environment Judge**

Issued[333]:

[333] JEB\WF\DM\MtCass Wind Farm Decision Dec 2011.doc