

Part A Introduction

1. My name is Elizabeth Anne Steven.
2. I am a Registered Landscape Architect. I have been practising on my own account since 1994 and have over 20 years experience in landscape architecture. I moved to Wanaka in 2001 and established my practice there. In the last nine years I have assessed and presented expert evidence at a number of hearings at Council and Environment Court level, mostly associated subdivision and building platform developments. I also prepared and gave evidence on Project Hayes, a large wind power utility proposed for the Lammermoor Range, Otago on behalf of the Maniototo Environment Society.
3. I have been extensively involved in the tenure review process for South Island high country pastoral leases. Between 1996 and 2007 I was engaged by the Department of Conservation (DOC) to undertake landscape assessments on some 40 pastoral leases, mainly in Canterbury. This information was used alongside botanical, invertebrate, bird and lizard and recreation/historic information to prepare the DOC's recommendations to Land Information New Zealand (LINZ) on the tenure review of these pastoral leases. I carried out assessments on Killermont, Simons Pass, Simons Hill, Mary Burn, Irishmans Creek and Godley Peaks pastoral leases, among others in the Mackenzie Basin.
4. I am also involved in tenure review as a member of Forest and Bird. I am on the committee of the Central Lakes-Otago branch and we inspect and submit on most tenure review proposals in Otago and northern Southland; we also work with the South Canterbury branch to prepare submissions on properties in the Mackenzie, Waitaki and Hakatamea area. I have also made personal submissions on some proposals, based on my expert knowledge and assessments.
5. I am here to give expert evidence today on behalf of the Mackenzie Guardians, on the landscape effects of some of the proposed irrigation schemes.
6. I have had no involvement in recent planning processes in the Mackenzie Basin (the Basin) such as Plan Change 13.
7. I am very familiar with the Mackenzie Basin. I was raised on Ferintosh Station on the western shore of Lake Pukaki. I have explored many different parts of the Basin in the course of my work, alongside work for Balmoral Station on a forestry application and for the Ministry of Defence in regard to the defence land at Balmoral. Living in

Wanaka, I have travelled many times through and around the Basin and flown over it regularly in the last 10 years or so.

8. I specifically travelled through the Basin on several occasions in the last few weeks to assess the potential impacts of the proposed developments.
9. I have prepared my evidence in accordance with the Environment Court's Code of Conduct for Expert Witnesses and I agree to comply with all its provisions.

Scope of Evidence

10. My evidence is on the matters of appeal submitted by members of the Mackenzie Guardians:
 - a lack of assessment of actual, potential and cumulative landscape effects including assessment of the natural and natural landscape values the environment currently contains
 - the potential direct and indirect landscape and visual effects
 - effects on natural character
 - effects on landscape values through intensification of land use as a result of irrigation
11. The purpose of my evidence today is to explain the significant inherent values for landscape contained in the properties of Mary Burn, Simons Hill, Simons Pass and Killermont Stations; and how they will be affected by the proposals to develop irrigated pastoral farming.. These are properties for which I have undertaken landscape assessments in the course of their tenure reviews under the Crown Pastoral Land Act 1998 (CPLA).
12. My evidence is specific to these properties. Ms Lucas has covered the broader context of the Mackenzie Basin, as an outstanding natural landscape. Dr Walker's evidence is also complementary and describes contextual ecological matters.
13. I base my evidence on my assessment work for the DOC and on my general knowledge of the Basin landscape. I have undertaken specific field work in the last two months to consider the effects of these applications.

Issues and Conclusions

14. The main issues with these proposals are:

- effects on natural landscape character
- further loss of a highly distinctive natural landscape element of the Basin that contributes in a major way to the identity and outstanding status of the Basin landscape
- further loss of a naturally rare threatened lowland dryland ecosystem (inland outwash plain) and the rare and threatened species it supports, many of which are endemic to the Basin and even the outwash plain
- visual effects and diminished landscape quality
- loss of distinctive landscape features (braided outwash plain patterns, erratics, old terminal moraine remnant on Simons Pass, historic elements)
- effects on the natural character of the margins of streams, rivers and wetlands
- effects on the quality of recreational experience

15. My main conclusions are:

- large parts of the application sites coincide with areas of significant landscape value, including ecological, geomorphic and historic values.
- these values support the status of the Mackenzie Basin as an outstanding natural landscape
- there would be significant adverse effects on these values; they would not be sustained under the proposed development
- there would be a shift in the actual and perceived naturalness of the landscape to a substantially lower degree of naturalness, outside of areas already cultivated and developed
- there would be substantial loss of distinctive natural landscape that contributes in a major way to the identity of the Mackenzie Basin landscape
- opportunities to restore degraded natural landscapes of the Basin to more natural landscapes that would make an enhanced contribution to the natural character of the Basin would be irretrievably lost

Methodology

16. Before I talk about the different properties, I will explain the methodology used for assessment.

For Mary Burn, Simons Hill and Killermont my assessment process included the following;

1. Examine the landscape context and determine the significance of the subject property
2. Describe the landscape of the property in detail, breaking it down into landscape units within the broad land types Ms Lucas has described. This provides the framework for assessment and recommendations
3. Evaluation – landscapes were assessed in consideration of the following factors:
 - Naturalness – the extent to which natural elements, patterns and processes are present ; but also the degree of apparent naturalness
 - The potential for recovery to a more natural state
 - The degree of intactness (to what extent landforms remain in original form and in uninterrupted sequences, and the degree to which indigenous ecological communities remain in healthy and functioning interconnected states including with surrounding land)
 - Factors of rareness and uniqueness
 - Factors of legibility (expressiveness), coherence, distinctiveness, vividness, memorability
 - Importance for “sense of place”
 - Degree and nature of visibility
 - Considerations of recreational landscape experiences (actual, potential)
 - Importance of Historic features and their contexts
 - Vulnerability of the values

Practical considerations included relationships with other areas of conservation interest and ease of fencing off or other management issues.

More recent tenure reviews also used a set of guidelines devised by the DOC in 2004. This is an extract from my Simons Pass report 2006:

Areas of Highest Significance

106. The highest significance will be accorded to the best remaining representative examples of landscapes that characterised New Zealand before humans arrived.

107. The highest significance will be accorded to the natural character of the margins of lakes and rivers. *The ‘margin’ includes those landforms that surround a water body and define its character and qualities. Note ‘natural’ is not limited to indigenous but refers to elements, patterns and processes of nature rather than man-made ones.*

Areas of High Significance

108. High significance will be accorded to other remaining examples of landscapes that characterised New Zealand before humans arrived. (*'Humans' interpreted here as generally referring to Europeans, ie referring to pre-1850 landscapes – as there are few areas on pastoral leases that are representative of pre-maori landscape and we don't know for sure what it looked like anyway*)

109. High significance will be accorded to generally recognised iconic high country landscapes or scenery. *This can include natural and cultural landscapes.*

110. High significance will be accorded to opportunities to restore or increase the natural character of recognised iconic high country landscapes.

Other Significant Areas

111. Significance may be accorded to areas that can be restored or managed to contribute landscape linkages between generally recognised or iconic natural landforms and features (including vegetation). (*Landscape areas of strategic value*).

112. Significance may be accorded to landscapes that have high qualities of coherence, pleasantness and intactness including working landscapes. *Distinctiveness, vividness and legibility are additional quality attributes considered.*

113. Significance may be accorded to widely recognised and/or classic, visually striking or unique discreet landscape elements such as natural landforms or vegetation features; and to their visual and physical context which is necessary to sustain them. (this criterion was included in early drafts and should be retained).

Other criteria of relevance to this property are:

32. High significance will be accorded to sites which, while they are of a type known elsewhere, have attributes of intactness, rarity and a strong association with particular historical events.

35. Significance may be accorded to sites that have a strong association with particular historical events but the remaining fabric is not intact. *With these criteria, as much importance will be placed on maintaining the integrity of the landscape context as the feature itself. Point 41 in the guidelines explains this “ a setting that is much like it was in history can help us journey into the past in our imaginations”.*

86. The highest significance will be accorded to securing recreational opportunities identified in CMS and securing the ability to deliver public enjoyment.

Whilst it is not within my scope of work to identify recreational opportunities per se, it is important to identify where they would be valuable and to ensure the qualities of the landscape setting which largely underlie the recreational value are protected.

Points 121 and 122 are also noted:

121. High significance will be accorded to vulnerable geopreservation inventory sites ranked nationally important and those of a kind that are at risk of being totally lost.

122. Significance may be accorded to other geopreservation inventory sites.

Understanding that an area has value for its geomorphic forms, patterns and processes enhance the perceived values of that landscape. This criterion is closely tied with the quality attribute of legibility.

Scenic and visual values are also discussed briefly for each Unit, as these can raise the significance of a particular area. Aesthetic values per se (which relate to all areas) are covered under the criteria 112 as the quality attributes listed there (as well as the attribute of naturalness) underlies perceived aesthetic quality.

Relevance to Canterbury Regional Policy Statement (CRPS)

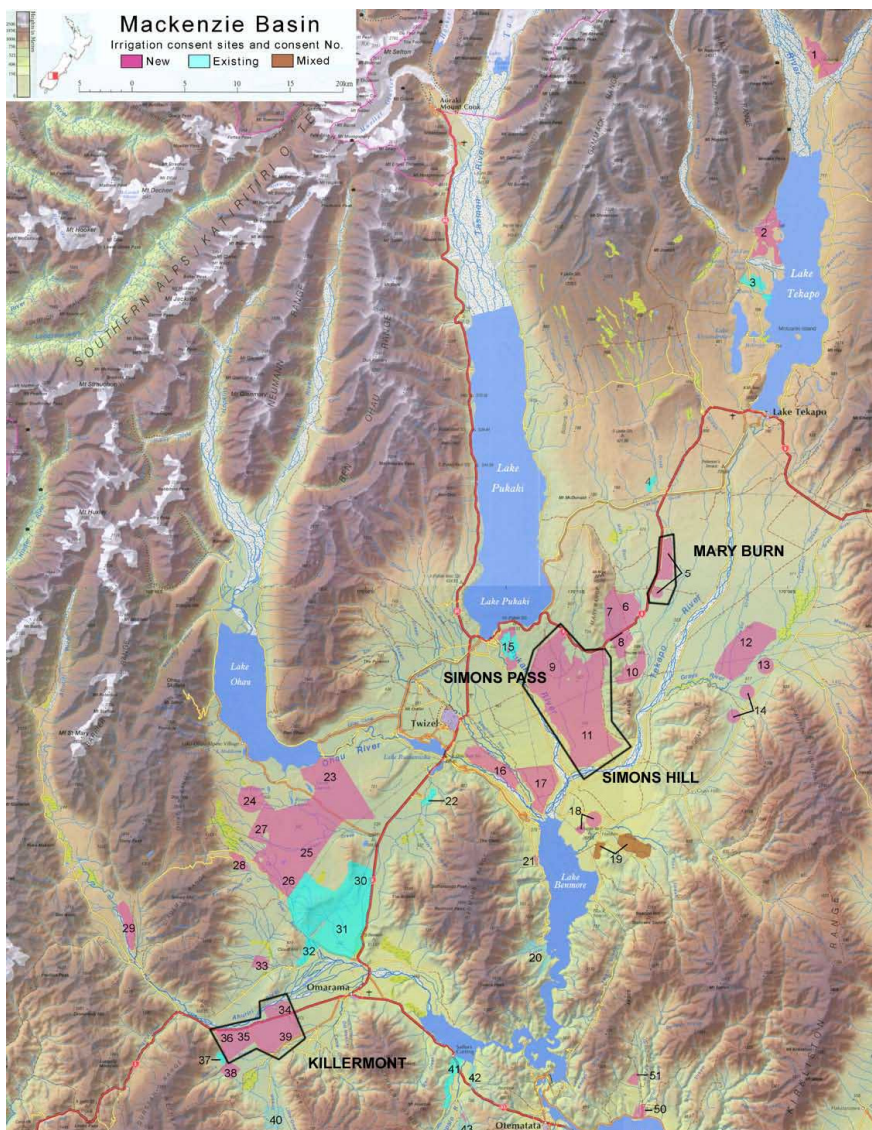
17. The wording of objectives and policies in the CRPS is easily comparable with the wording of the assessment matters set out above. Conclusions drawn about landscape values (ie, 'significant inherent values') and the values identified in the tenure review assessments would strongly overlap those drawn out within the terminology used in the CRPS.
18. I extract the following CRPS text from Mr Steven's evidence¹ for the sake of efficiency:

¹ Statement of General Evidence of M Steven 12 Nov 2009

- 35 Chapter 8 of the Canterbury Regional Policy Statement includes the following objective and policies that deal with landscape and amenity issues:
- 36 Objective 2 requires:
- 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.
- 37 Policy 3 requires:
- Natural features and landscapes that meet the relevant criteria of 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. Activities that may have adverse effects include those involving the clearance or modification of areas of indigenous vegetation (particularly tall tussock), earthworks, alteration to landforms, tree planting, or the erection of structures.
- The particular sensitivity of these natural features and landscapes to regionally significant adverse effects in terms of sub-chapter 20.4(2) should be reflected in the provisions of district plans in the region.
- Assessments of effects should be made by considering:
- (i) aesthetic values;
 - (ii) expressiveness;
 - (iii) transitory value;
 - (iv) natural science factors.
- 38 Sub-chapters 20.4(1) and 20.4(2) of the CRPS, referred to in Policy 3, above, address matters of regional significance. Regionally significant matters and regionally significant effects are identified in Sub-chapter 20.4. Among these matters are:
- (e) Landscapes and natural features that are distinctive, unique to, characteristic of, or outstanding within the Canterbury region, including the processes that maintain them;
- ...
- In identifying soils, landscapes and natural features, factors to be considered include whether a site, place or area is:
- (i) Identified as being a regionally outstanding landscape or natural feature in the Canterbury Regional Landscape Study;
 - (ii) A geopreservation site of regional significance and/or identified in the Geopreservation Inventory of the New Zealand Geological Society;
 - (iii) An area identified as an Area of Significant Conservation Value;
 - (iv) An area identified as a Recommended Area for Protection in a Protected Natural Areas Report; or
 - (v) In the sub-alpine or alpine zone.
- 39 Regional significance can also be identified for heritage reasons in terms of 20.1(4)g and the associated factors listed for consideration:
- (g) Heritage sites, places or areas that contribute to or reflect the cultural or spiritual identity, or evolution of the Canterbury region, including the different stages of human occupation.

PART B Mary Burn, Simons Hill, Simons Pass and Killermont Application Sites

19. In the following sections I will address each of these properties in turn. For each I will describe the landscape of the application sites and outline the values I identified; I will respond to matters of value raised by the Applicants' landscape architects; and I will discuss potential effects on the values, again responding to matters covered in the assessments of other landscape architects. My description of values has been augmented by the findings of the other survey reports for each property, which I have been able to access (botanical, entomological, herpetofauna and avifauna survey information and recommendations). Understanding of these natural values enriches the appreciation of landscape and enhances and widens values attributed.
20. My evidence is based on my tenure review assessments; my general knowledge; aerial overviews, and specific site visits in relation to these applications.
21. The map below identifies these application sites:



General Effects of Irrigation

22. Before I discuss individual properties I will describe the range of effects on landscape that these applications will have or are likely to have. This is with respect to landscape that currently is extensively grazed (or not grazed at all in the case of Simons Hill) and uncultivated with a low producing tussock grassland/cushion/mat plant cover. Some areas will have been topdressed and oversown and have an exotic sward in between tussocks.
23. Most directly, land that is to be irrigated will be ploughed up, cultivated and sown in pasture and crop species. This results immediately in;
- removal of any existing vegetation cover including all indigenous species (usually an irreversible loss) and also weed species
 - complete disruption of invertebrate and lizard habitat (a few bird species are more adaptable)
 - disturbance of previously undisturbed soils (original soils are also on scientific interest especially in areas of very limited occurrence now such as lowland plains)
 - removal of any surface features such as boulders, trees, shrubs, existing fences, shelter belts (depending on operational requirements)
 - smoothing out of landforms and surface terrain
24. Indigenous biodiversity is reduced to virtually nil or to very low levels due to monocultures of pasture and fodder crops or high value commercial crops. Few indigenous plant, insect and bird species are likely to survive in or make use of the altered habitat.
25. The exotic pasture and crop species are not able to survive in the ambient conditions and require constant input of water and fertiliser. These inputs change the environment from a stressed environment to which indigenous plants are best adapted to one that is less stressed. The indigenous plants adapted to a stressed environment cannot compete with the exotic and are displaced, even if the ground is not cultivated with possible exceptions of silver tussock and matagouri.
26. The destruction of wetlands through drainage, vegetation clearance and cultivating has been an outcome of this kind of development.
27. Peripheral tree shelter belts may be planted. Whilst patterns are likely to be unnatural, there may be benefits in respect of general biodiversity (indigenous biodiversity is unlikely) and habitat and visual effects (as long as trees do not block

important views). Removal of pine shelter belts (and wilding trees on developed land) is also beneficial in removing wilding seed source and potentially opening up views that are appreciated.

28. Natural patterns and homogeneity of cover with strong relationships to landform and soil pattern are replaced by geometric ordered patterns of contrasting colours bearing little relation to landform or soil patterns. Centre pivot irrigation is superimposed on the landscape in a 'cookie cutter' fashion. Centre pivot pie graph patterns are very distinctive from elevated view points or the air. Attributes of coherence, intactness and legibility are diminished.
29. In terms of landscape character, there is a fundamental shift from a timeless natural desert like or extensive savannah character, almost wilderness in some areas, to a more environmentally amenable domesticated farmland character, albeit of a large scale agribusiness quality. Distinction is replaced by mediocrity and 'anywhere-ness'. Highly natural character becomes very unnatural character. There is opinion that the shift in natural landscape character is actually small because the landscape being transformed actually lacks the level of naturalness attributed to them because of the degree of degradation. I will address this matter later in my evidence.
30. There may be introduction of cultural elements to previously open naturalistic landscapes:
 - lots of fences
 - insertion of irrigators and other infrastructure such as pump sheds, utility sheds and canals and storage ponds
 - animal barns, stock handling facilities, paved stock lanes
 - rows and mounds of plastic wrapped silage
31. Stocking patterns change markedly. Instead of typically Merino or cross bred sheep spread out across an open landscape, there are concentrated mobs of stock including greatly increased numbers of beef and dairy stock. Concentrations of large numbers of cattle have visual effects in terms of ground pugging, and deposition of waste.
32. Other effects associated with this kind of development are the visual effects of construction of intakes and canals and buried pipelines to move water around, and associated access tracking. There is significant visual scarring associated with the Benmore Irrigation Scheme for example. Destruction of natural habitat and landscape elements may also result, for example, when native shrubs are uprooted or boulders are removed to install a pipeline.

33. Other indirect effects relate to changes in water quantity and quality in wetlands, stream and rivers and lakes which can be expressed in shifts in natural values and visual effects.
34. The presence of the irrigators which can be over 1km long has effects on visual access to landscape. The visual interference and impact of these structures is reduced by their skeletal nature and their low height (except when operating). Distance from viewer and orientation to viewer are very important. Maximum impact occurs when the irrigator is parked parallel to a road or public access way and pivots from a point along that shared boundary.
35. A longer term outcome that may occur is increased domestication of the landscape. There are very large areas being proposed for development and it is foreseeable that these areas may be subdivided into independent farms, requiring more dwellings promoting a denser pattern of settlement.
36. The overall effect will be a substantially more domesticated farm landscape with an agribusiness flavour because of its scale, orderliness and degree of mechanisation. It would express a fundamental shift from the traditional extensive pastoral system based on extensive grazing of low productivity unirrigated grasslands that has characterised the Mackenzie Basin since European settlement.

Mary Burn Pastoral Lease

37. My evidence in this section relates to the Mary Burn pastoral lease application:

Classic Properties Ltd CRC063106 (Lucas 5)

The application site is shown on my Fig. 1 in my attachments.

38. These application areas are in the Rural Zone of the District. Relevant overlays that have been identified in the applications and assessments carried out include:
 - Scenic Viewing Area 13 on SH8
 - Site of Natural Significance 50

Prior Assessment

39. The tenure review survey work on Mary Burn pastoral lease was carried out in Spring 2001 and I completed my assessment report in October 2001. I inspected or viewed all of the property at that time. The tenure review proposal for this property has not yet been advertised.
40. I was engaged by the Doc in 2007 to review the assessment of landscape values of the pastoral leases in the central Mackenzie Basin. Mary Burn was in that review². This assessment was to assist in the development of an envisaged “Drylands Park.” This Drylands Park concept was acknowledged in the PCE report³ as being potentially the only low altitude area in the whole parks network and therefore of high value in contributing to the overall range of ecologies protected in the parks. Achieving a full representative range of natural values within the conservation park system was a recommendation of this report with a focus on achieving better protection of low altitude ecosystems and representative landscapes.
41. The areas that are being applied for have been identified as having significant inherent values (SIVs) and protection of these areas was recommended in the tenure review survey reports for Mary Burn. The values map is attached. I note the map available on the LINZ website which Ms Bartlett relied on is incorrect. As this tenure review has not been advertised yet, there is no certainty that the application land will be available. A Part II objective of the Crown Pastoral Land Act 1998 is the protection of significant inherent values, preferably. It would be entirely consistent with the Act for the Doc to retain management of the outwash plain especially for its special values and to permit recovery to a more natural state with greater indigenous biodiversity.
42. Furthermore, in other tenure reviews, such as Killermont, LINZ has permitted unencumbered freeholding of pastoral lease land with SIVs on the grounds that RMA provisions can be relied on for protection of landscape values. We don't know yet whether the same approach will be taken with Mary Burn.
43. Additionally, you will also be aware that application has to be made to the Commissioner of Crown Lands for consent to clear indigenous vegetation, cultivate, oversow, topdress, fence and install structures. In the assessment of that application, the Commissioner (as advised by the DOC) must take into account:

“The desirability of protecting the inherent values of the land concerned (other than attributes and characteristics of a recreational value only), and in particular the

² Review of Assessment of Landscape Values of the Central “Dryland” Mackenzie Basin – Balmoral, Irishman Creek, The Wolds and Maryburn Pastoral Leases – A Steven June 2007 for the Department of Conservation

³ p.40 and pp80-81 Change in the High Country: Environmental Stewardship and Tenure Review – PCE April 2009

inherent values of indigenous plants and animals, and natural ecosystems and landscapes”; (CPLA Part I 18 (2)).

44. There are also restrictions under the District Plan. Buildings are not permitted in Scenic Viewing Areas (which partly cover the application sites); part of the application site falls into a Site of Natural Significance; and there are rules that may be applicable about the clearance of indigenous vegetation. For example, there is likely to be more than 15% tussock coverage or 50% total indigenous species coverage, more than 20 indigenous species are likely to be present, and the area is within 150m of an SNS. Furthermore, I understand the rule about clearance of short tussock and cushion and mat vegetation communities is under review.

Landscape Description and Values of the Application Area

45. The application area is a strip of land alongside SH8 from the northern boundary of Mary Burn Station, where it adjoins The Wolds, to a point about 6km to the south. This strip includes most of the tussock grasslands in the immediate foreground of views east from SH8, over the Irishman Creek and Tekapo River outwash and alluvial plains towards the peripheral Basin ranges (Rollesby, Grampians, etc).
46. This area is part of what I described as the Mary Burn Flats - Older Outwash and Terraces. They lie within the H4 Land Type. These were formed in the (oldest) “Balmoral” glacial period, so they are an old surface and have deeper soils. The surface has a variable braided mound and hollow pattern, ancient, typical and characteristic of outwash surfaces formed by water and wind. The surface has a relatively dense cover of modified short tussock cover suffused with low matagouri. Typically the tussock is on the deeper soils and mat plants, lichens and mosses occupy the thinner stonier substrate of the hollows.
47. Ecologist Geoff Walls carried out the ecological survey for this property⁴. He describes the vegetation on this older surface:

“The highest oldest terrace is clothed in a mosaic of fescue tussock of varying density, scattered native shrubs (matagouri porcupine shrub ... tauhinu ... common broom ...and shrub daisy ...) and exotic pasture plants ... Hawkweed is very common. Native scabweeds (mainly Raoulia australis and R. parkii) and dwarf shrubs (particularly Leucopogon fraseri and Coprosma petriei) are common in places.

⁴ Botanical Assessment for Tenure Review: Mary Burn Pastoral Lease - Geoff Walls Nov 2001

“Within the prehistoric water channels.. is very low growing vegetation grazed by sheep and rabbits. ..Also present are some extremely rare native plants especially adapted to such open places where water occasionally collects. They include NZ mousetail (Myosurus minimus var. novae zealandiae) which was first found in the flats in 1993 and was reconfirmed during this survey. .. Also found in this survey were Leptinella “Clutha”⁵ a little grey button daisy previously known only from Pisa Flat in Otago and Galium “Clutha” a tiny green herb with creamy flowers previously only known from Pisa Flat, the Maniototo and Kaitorete Spit.”

48. He reports too that the fescue tussock cover is not as good on the lower surfaces further east, and these tiny rare plants were not found.
49. The flats are an integral part of the highly natural landscape of the central basin floor – a mix of outwash plains and the more recent floodplain of Irishman Creek. Altogether it appears as an extensive, intact and visually cohesive landform surface with subtly varied topography and vegetation patterns dominated by indigenous species. There is a sense of vast scale, simplicity and homogeneity, and an openness and horizontal emphasis that is memorable. The absence of development over such a large area is an impressive quality. The degree of naturalness, intactness and coherence is high to very high, even though the short tussock grassland is in a degraded state.
50. SH8 passes through these flats, with the proposed irrigated area lying along the eastern margin of the highway. The perceptual qualities just described are able to be fully enjoyed from the highway; and there are long views across these plains to the eastern Basin ranges some 20-30km away. I regard the view east from the stretch of SH8 between the Wolds boundary with Maryburn, and the southern edge of the older outwash surface, as one of the classic views and landscape experiences in the Basin. This is echoed in the Scenic Viewing Area overlay adjacent to the highway, which considers the first 400m or so of the tussock plain to be of value for scenic/visual purposes, primarily as open uncluttered space.
51. The outwash plains I considered to be the most significant area on Mary Burn, due to the qualities I have just described. They have a very special character that is unique to the Basin and they are a key biophysical and visual element. It is my view that this area contributes in a major way to the outstanding natural qualities of the Basin landscape and its strong sense of place. Only the surfaces on the other side of the

⁵ Dr Walker advises this species is now called *Leptinella conjuncta* and it is classified as a Category 1 (Nationally Critical) threatened plant. Ref ⁵ de Lange PJ, Norton DA, Courtney SP, Heenan PB, Barkla JW, Cameron EK, Hitchmough R, Townsend AJ 2009. Threatened and uncommon plants of New Zealand (2008 Revision). New Zealand Journal of Botany 47: 61–96.

Tekapo River are of similar scale and quality. Together these two largely intact surfaces are a very special element of the Basin.

52. The whole of the Mary Burn outwash surfaces I identified as having significant inherent value including the application sites. The wholeness of the landforms and the presence of intact sequences, together with their vegetation and the absence of development were key factors.
53. Mr Wall recommended a wide rectangular belt of land across the flats between SH8 and the Tekapo River as conservation land. His reasons were:
- It encompasses the two Recommended Areas for Protection (RAPS 14 and 15 in the Mackenzie PNAP survey) (this area is similar to the SNS in the District Plan – the SNS omits an area on the upper surface)
 - The full suite of landforms and the full range of vegetation communities and species is included
 - The area includes a scientific study site (an enclosure for studying grazing effects)
 - There are rare and endemic species:
 - the NZ mousetail, *Leptinella* “Clutha”, *Galium* “Clutha” (and a few others on other surfaces within the area including *Lepidium sisymbrioides* and *Carmichaelia vexillata*)
 - the area contains substantial and representative amounts of the natural landforms and water features of the part of the Mackenzie Basin where it occurs, along with their soils
 - the vegetation is dominated by native plants
 - it is habitat for a variety of indigenous fauna
54. Invertebrate values included habitat for the robust grasshopper *Brachaspis robustus*⁶. The diversity of fauna was also typical and representative and likely to have a high endemic component adapted to the habitats encountered on the terrace plains. He describes a number of other insect groups and species such as moths, butterflies, beetles and grasshoppers.
55. He concludes by saying because of the high enclosing ranges, the Mackenzie Basin is like an island and the distribution of many species of insects is very likely to be limited and in many aspects unique for this region. He recommended a similar area for protection for invertebrates, so that the full range of habitats and interconnectivity between plants and insects can be sustained.

⁶ Invertebrate Survey for the Tenure Review of Mary Burn Station Pastoral Lease – F R Schnitzler Dec 2001

56. My description of the landscape and the qualities within are similar to the description by Mr Andrew Craig⁷.
57. When I did my assessment there was no cultivation through the application area. There has been cultivation since, in two or three places which I have endeavoured to map. However there still remain large areas of healthy looking short tussock and I would not say that “*most* [of the application site] ... *consists of exotic pasture*”⁸. Mr Craig implies that the tussock is now left to a strip running between the highway and the poles of a power line some 100m further out. Tussock cover is the dominant cover still over most of the application site. The cultivation occurs down a tongue of land in the north; and in a patch several km further southern the southern end of this surface.
58. One cultivated area is within the area I understand was meant to be conservation land where rare *Myosurus* and *Leptinella* species were located (both are ranked Category 1, Nationally Critical⁹, i.e. in the highest category of risk of extinction nationally).
59. I have requested information on the consent application for these areas of cultivation from the Commissioner of Crown Lands. They advise they have no record of a consent application. In the absence of further information, it appears then that this cultivation was done without consent.

Proposed Development

60. Classic Properties proposes to place 4 centre pivot irrigators along the tussock land margin to SH8, set back east of the power line, which is about 130m away from the road. It is assumed all the land under the irrigators will be cultivated and fenced into paddocks. It totals some 416ha.
61. Water would be supplied by buried pipeline from the Tekapo canal to the north or from the canal at the Tekapo Stilling Basin.
I am not aware of any details about where this pipeline would go. However it would pass through a complex of glacial moraine landscape with a tussock-shrub cover. It is possible visual scarring and undesirable disturbance of landform, boulders and shrubs could occur.

⁷ A Craig Evidence Sept 2009

⁸ para 3.7 A Craig Evidence

⁹ de Lange et al. 2009. New Zealand Journal of Botany 47: 61–96

Assessment of Effects

62. Mr Craig is of the opinion that there would be no adverse effect although his assessment of values accorded with mine. Mr Glasson's view was that there would be significant adverse effect and that they should be declined.
63. Mr Craig's opinion appears to be founded on a misconception that the irrigation is going to only take place on land that is already cultivated. This is incorrect as my map shows. Only part of the large semi-circle and a small part of one of the other pivot areas overlays land that has already been cultivated. The remainder is all uncultivated outwash plain under an indigenous tussock cover including rare species. It appears he possibly thought the only area of irrigation was the very northern area as he states at para 6.4 that "*there is no intention to break in new land*" and essentially there would be no change to land cover. He also was of the opinion that natural character was not high, because of the cultivated nature of the land. This further suggests he was only looking at the northern end.
64. I agree that setting back the pivot irrigators 130m plus the fact they would be perpendicular or angled to the highway, and have skeletal form, reduces the visual impact of the structures, except maybe when they are irrigating depending on weather and light conditions.
65. However my assessment of the effect on this classic view of the central plains concurs with Mr Glasson's. The displacement of open natural grassland landscape with patchy cultivated and irrigated paddocks is not appropriate and would be significantly adverse. Development would significantly reduce the current degree of natural character as well as directly removing important dryland indigenous vegetation and habitat. There would be visual fragmentation and loss of the currently high levels of coherence and intactness. This view is the best there is of expansive short tussock grassland uninterrupted by structures and I consider it to be a part of the Basin that is outstanding natural landscape. This would be particularly appreciated from tour buses.
66. I did not include the very northern end of the terraces in my area of significant inherent value. Irrigated development could probably occur here without compromising the extensive and impressive view to be had across the outwash plains south of the northernmost gravel pit next to SH8.

67. Conclusion

- the proposed development is located in landscape that has important values
- the development would significantly compromise those values
- the proposed setback does not address the fundamental change to landscape and effect on its inherent natural values
- only the northern most development area would be appropriate, as it is already cultivated and was not in the area identified as having significant inherent value
- the proposed pipeline will need careful routing to avoid damage to landform and native vegetation

Simons Pass Pastoral Lease and Simons Hill Station

68. My evidence in this section relates to the Simons Pass and Simons Hill applications:

Simons Hill Ltd CRC062842/082304 (Lucas 10,11) (Simons Pass and Pukaki Flats irrigated areas; supply pipe from Tekapo Stilling Basin)

Simons Pass Station Ltd CRC062867/082311 (Lucas 9) (irrigation area, supply pipe from Tekapo Stilling Basin)

The application site is shown on my Fig. 2.

69. These application areas are in the Rural Zone of the District. Relevant overlays that have been identified in the applications and assessments carried out include:

- the Scenic Viewing Area on SH8 on Simons Pass;
- the Sites of Natural Significance along the Pukaki River; the Tekapo River; the northeast side of Simons Hill from basin floor to ridgeline; and a small isolated wetland area on Simons Pass just north of Simons Hill. I note that the SNS for Simons Hill does not actually match the conservation area, which is linked to the wetland rather than isolated from it. I show the correct areas on my attachment.
- an unformed legal road passes from the Tekapo River through Simons Pass proper and across the flats to the Pukaki River. It is my understanding that the legal road is approximately the line of the Bullock Track, purported to be the first road through the Mackenzie. Another historic feature is the 1880's Rabbit Fence which passes through the middle of the flats from Southeast to northwest.
- There is a large geopreservation site of national significance over the entire moraine area around the southeast end of Lake Pukaki, within Simons Pass station

Prior Assessment

70. The tenure review survey work on Simons Hill pastoral lease was carried out in December 2000 and January 2001 and I completed my assessment report in March 2001. I inspected or viewed all of the property at that time. I made a personal submission on the Simons Hill tenure review proposal, based on my assessment. The tenure review was publicly notified in 2004 and completed tenure review in 2005.
71. The tenure review survey work on Simons Pass pastoral lease was carried out in spring 2006 and I completed my assessment report in November 2006. I inspected or viewed all of the property at that time. The tenure review proposal for this property has not yet been advertised.
72. I included Simons Pass in my review of the central Mackenzie Basin pastoral leases in 2007.
73. As with Mary Burn, there are limitations related to the fact this is a property still in tenure review and subject to the provisions of the CPLA. Large parts of Simons Pass have been identified as having significant inherent value and have been recommended for retention in Crown ownership for conservation purposes. I have seen the map showing the current proposed area for conservation area¹⁰. It does not include all the areas identified as having significant inherent values. An alternative outcome for this property may be continuation of pastoral lease status. Discretionary consent from LINZ is required in any case for all the activities associated with this development.
74. Discretionary consent may also be required under the District Plan, in respect of indigenous vegetation clearance, and development within the Geopreservation Site.

Scope of Evidence

75. Like Mr Steven, I will only briefly comment on the proposals for irrigated development immediately east and west of Simons Hill, as these areas are already well modified by pastoral development including centre pivot irrigation.
76. In my assessment of Simons Hill in 2001, I did identify an area next to the Mary Burn as having significant inherent value as undeveloped short tussock grassland however a good part of that has now been consumed by a large whole centre pivot development consented in 2005. The current application is over the last remaining

¹⁰ Peter Glasson evidence p26

part of the tussock land with a half circle pivot development. There has and will be further loss of natural character; however my main concern here would be protection of the wetlands and riparian margin from the effects of intensive farming and preservation of the natural character of the Burn and its margins. A large buffer would be appropriate. The land left over from development would provide a buffer of 190m or more. The new development should maintain a similar buffer.

Landscape Description of the Application Area

Overview

77. Simons Pass and Simons Hill stations lie in the heart of the Mackenzie Basin, and are solely basin floor properties comprising moraine and outwash plain terrain, alluvial river terraces (Pukaki and Tekapo rivers) and isolated hard rock hills (Simons Hill and Mary Range).
78. The applications fall mostly within the H4 Basin Floor Outwash Plains Land Type, with the northern part of Simons Pass also falling within the H3 Glacial and Fluvial Floor Class. Simons Pass has the unique status of being the only property in the Mackenzie Basin to straddle a complete sequence of terminus moraines and outwash gravel of Pleistocene age.¹¹
79. All of the outwash and moraine terrain on which the irrigation is proposed support threatened lowland dryland ecosystem types dominated by grassland broadly with shrub, mat and cushion and herb plant components, described in Dr Walker's evidence. They are the most extensive and relatively intact examples of New Zealand's very few near-desert ecosystems. These "inland outwash gravels" are originally rare ecosystems¹².
80. They are typically species-rich in invertebrates; and much of the flora and fauna is endemic to the Mackenzie Basin or to the dryland ecosystems of the eastern South Island high country (Central and North Otago to Mackenzie mainly). Large parts of the ecosystems remain in a relatively natural state with good species diversity and generally representative appearance, or in a much degraded state but still containing some important native species as well as uncultivated soils and original undisturbed landforms.

¹¹ Chinn W 2006 – Invertebrate Survey, Simons Pass Pastoral Lease Tenure Review

¹² p18 National Priority 3 in Protecting our Places: Introducing the National Priorities for Protecting Rare and Threatened Biodiversity on Private Land - MFE 2007

81. Wardle¹³ sums up her assessment of Simons Pass as “*a whole sequence of highly significant ecosystems that include lowland hill country shrubland, dryland shrubland, stony fans and terraces associated with fluvio-glacial outwash plain kettleholes and turf communities of ephemeral tarns.*”
82. SH8 passes through Simons Pass station around its northern edge, and much of the property forms a visual corridor of more natural landscape and/or foregrounds to distant panoramic views of the surrounding ranges. There are also more contained views of the moraine landscape itself, where the details of the landscape such as ‘erratics’ (boulders dumped by retreating ice) become more important. The outwash plain is distantly and obliquely visible from the highway as a wide uniform horizontal band. The experience of driving through relatively natural moraine landscape is not common in the Basin, being restricted to this part and the moraine south of Lake Ohau (not on SH8).
83. The western margin of both properties is part of the Pukaki river landscape corridor. Most of the time the access road is contained within the river terraces and is focused on the river bed, but occasionally it rises up to reveal expansive views across to the outwash surface.
84. The Pukaki Conservation Area lies across the river from Simons Pass Station, and there would also be views across the application sites from here. The Te Araroa trail crosses through this area.
85. Birds eye views across the whole of the two properties and almost all the proposed irrigation area can also be gained from the Simons Hill conservation area, which can be freely accessed from the Tekapo River bed. Alternative access to this area is along the Mary Burn, from which the proposed irrigation area east of Simons Pass proper can also be viewed.
86. Elevated panoramic views of the Basin floor in the Twizel-Pukaki area can also be enjoyed from the walking track up the northern flanks of the Benmore Range, where the basin floor forms an impressive, broadly homogenous and natural looking foreground to expansive views of the Alps and Lake Pukaki. The Pukaki flats on Simons Pass/Simons Hill (as well as Rosehip and High Country application sites) form much of this natural looking basin floor.
87. There are also panoramic views of the basin floor looking southeast from the Rhoboro Hills – another vantage point from where the glacial/fluvio-glacial landscape

¹³ Simons Pass Botanical Survey – K Wardle Oct 2006

of the basin floor including the Pukaki moraines and outwash can be interpreted under its homogenous low stature cover (ie, uniform low cover of grasses, herbs and shrubs).

88. More oblique views looking southeast over the Pukaki moraine and outwash can be obtained from the Pukaki Kettlehole Conservation Area.

Landscape Description

89. For the purposes of this evidence I have broken the proposed irrigated area into three landscape units corresponding with those used in my assessment report.

1 Pukaki Moraine (in H3 Land Type)

89. This is a large part of a vast complex of moraine and meltwater channel and minor outwash plain landforms from the last 3 glacial advances spread around the southern end of Lake Pukaki. The whole area is a Geopreservation Site of national significance¹⁴ for its sequences of glacial landforms.
90. Vegetation cover is a homogenous dryland short tussock grassland and shrublands of a variety of native species. Ephemeral tarns in kettleholes are a feature with specialised turf vegetation.
91. The irrigation is proposed to be over the large ridge of 'Mt John' terminal moraine forming lower more subdued terrain of the eastern part of the Geopreservation Site, between the Farm Block and the long fence line east of the large meltwater channel. A number of lichen-encrusted boulders (erratics) across this terrain give visual texture. Short tussock is structurally dominant here but having been oversown and topdressed and regularly grazed the cover in between is largely exotic grasses and herbs although there are typical native grassland species present too as well as patches of matagouri, porcupine shrub and other shrub species.
92. Wardle¹⁵ describes the vegetation cover:
- "Native intertussock species diversity is the greatest at the northern end of this area (within the Lake Block and the northern Upper Downs Block) and where fescue rises up onto moraine outcrops. Native species include mat daisy (Raoulia subserica), Geranium sessiliflorum, mat coprosma (C.petriei), occasional matagouri, danthonia*

¹⁴ Inventory and Maps of Important Geological Sites and Landforms in the Canterbury Region – J A Kenny and B W Hayward Geol. Soc. of NZ, Misc. Pub. 98 first ed. 1998

¹⁵ Simons Pass Botanical Survey – K Wardle Oct 2006

grasses *Rytidosperma pumilium* and *R. sp. tussocks*, *Deyeuxia avenoides* grass, orchids, scattered native shrubs including common broom, porcupine shrub and native daphne *Pimelea* "eastern South Island" shrubs, patotara, and red wood sedge (*Luzula rufa*).

*In the vicinity of the Farm Blocks (ie, Lower Lake, Pylon, western Lower Downs and southern Upper Downs blocks) the fescue has been pastorally improved. Fescue tussock and Mueller's sedge are extensive and dominant with many young tussocks evident. ... Localised within this landscape are areas of turfland, commonly located in drainage channels, old kettleholes or depressions. This community is dominated by exotic low growing species.... The native bindweed *Rumex flexuosus* and Buchanan's bidibid.... are also a common component."*

93. Invertebrates in this area were identified as being representative of typical grassland species (beetles such as the darkling beetle, moths, flies, and the distinctive flattened jumping spider)¹⁶. The jumping spider and darkling beetle are distinctive "*being representative of the few invertebrate guilds able to tolerate the dry freeze/thaw environment*".
94. No special lizard species were reported seen in this area¹⁷ but I would expect skinks to be present. Porcupine shrub is ideal fodder and shelter for lizards.

2 Balmoral Moraine (H3 to H4 Land Type Transition)

95. The middle part of Simons Pass comprises older gentler undulating "Balmoral" moraine with a necklace of hummocky terminal moraine dumps in a broad arc around the south to east margin of this area. This intriguing and distinctive feature is littered with lichen encrusted boulders, and in the outwash surface, the moraine is reduced to islands, like stepping stones.
96. Native shrubs (matagouri, *coprosma*, *olearia*, porcupine shrub) are often found around the boulders. The threatened shrub *Coprosma intertexta* is here, ranked Relict (Category 6)¹⁸.
97. Wardle reports that:
"A series of elevated summit depressions associated with the terminal moraine deposits..... have accumulated silty soils, and provide important habitat for a

¹⁶ Invertebrate Survey, Simons Pass Pastoral Lease Tenure Review – W Chinn Nov 2006

¹⁷ Assessment of the fauna values (birds and lizards) of Simons Pass Pastoral lease – S Elkington DOC 2006

¹⁸ ¹⁸ de Lange et al. 2009. New Zealand Journal of Botany 47: 61–96

threatened spring annual species Ceratocephala pungens (ranked nationally critical) and Buchanan's bidibid"

98. The fauna report (Elkington 2006) indicates the terminal moraine provides habitat for at least 3 common species of skink and gecko. The invertebrate report (Chinn 2006) recorded the spider *Taiera erebus* (Data Deficient), two carabid beetles (*Metaglymma tersatum*, *Holcaspis bidentella* – not threatened but both endemic to the Mackenzie Basin) and the grasshopper *Sigauss minutus* (Status: Gradual decline) on and around the moraine loop. The entire moraine loop was seen as important habitat for these species.
99. The area contains the Farm Block, the area of pine shelterbelts enclosing exotic pasture with only remnant short tussock and little species interest. Generally vegetation cover in this area is modified short tussock grassland.

3 Pukaki Outwash Plain (H4 Land Type)

100. This unit includes the entire outwash plain surface through Simons Pass pastoral lease and Simons Hill freehold, terminating at the Tekapo River. This is a large and intact fluvio-glacial surface exhibiting the typical 'signature' braided mound and hollow micro-topography created by thousands of years of water and wind action. This can be best appreciated from elevated viewpoints such as Simons Hill or from the air. Some deeper stream channels are incised in its surface, petering out as they flow south. The surface flows seamlessly from its meltwater channel which in turn is well-defined and intact within its moraine setting.
101. There are intact relationships with the moraine features to the northwest and the alluvial terraces of the Pukaki and Tekapo riverbeds to the west and south. There is an impressive degree of legibility and overall intactness to these inter-related landforms, due to the absence of development to fragment and obscure and a homogenous vegetation cover of low stature and fine texture.
102. The environmental conditions are semi-arid with a shallow, stony, infertile, and exceedingly well-drained silty-sandy-gravel substrate, swept by drying eroding winds and subject to winter freeze-thaw. Landcover is severely degraded grassland and cushion/mat vegetation, a result of overgrazing and drought periods and possibly insect predation or disease, allowing subsequent ingress of hieracium. Exotic weed and pasture species are now dominant. Sparse sweet brier is prevalent by the Pukaki River, where root raking has been carried out in an effort to clear it.

103. Mr Fastier¹⁹ claims that tussock grassland is not a natural state for the Basin floor. My understanding from Dr Walker and other's work is that historically, a variable short tussock and shrub mosaic covered these surfaces, with a rich diversity of mat and cushion plants, mosses and lichens, small grasses and herbs, and sub-shrubs, among taller dryland scrub (matagouri, *olearia*, native broom, etc). Wardle states that the original vegetation cover of the outwash plain was likely to have had a significant fescue tussock component²⁰, which was the dominant cover in early European times as described in Dr Walker's evidence.
104. The braided mound and hollow pattern and occasional stream channels provided subtle micro-habitats naturally supporting a complex pattern of vegetation. In healthier parts of the outwash this can still be seen, eg, tussocks on deeper soils forming ochre ribbons, matagouri along channels, lichens on soil-less cobbly swales; and mat plants on mounded areas of deeper soils.
105. Formerly, a good part of these plains were a Recommended Area for Protection under the Protected Natural Areas programme²¹, comprising an extensive and representative area of healthy fescue tussock grassland. Mr Fastier's evidence confirms the presence of reasonably healthy short tussock cover in the early 1990's. The Simons Pass survey in 2001²² recorded fescue tussock cover of up to 20% in places with an abundance of smaller/juvenile tussocks, and a variety of native inter-tussock species including *raoulia* spp, *muehlenbeckia*, small grasses and sedges, and *Thelimytra* orchid. At that time retention of a part of the outwash on Simons Hill pastoral lease as conservation area was recommended because of its representativeness, its relative naturalness and the scale of the area remaining.
106. Rare and threatened species recorded on the surface by Wardle in 2006 on Simons Pass are the native cress *Lepidium sysimbrioides* (Chronically Threatened - now *Leptinella solandri* ranked 2 Nationally Endangered), button daisy *Leptinella serrulata* orchid *Hymenochilus tristus* and the mat daisy *Raoulia beauverdii* (all 3 now ranked Naturally Uncommon); and *Raoulia monroi* and the trailing bindweed *Convolvulus verecundus* (both ranked 4 Declining). Buchanan's bidibid (formerly Chronically Threatened, now not ranked), is also present in the man-made depression where the thousands of NZ mousetail (ranked 1 Nationally Critical) described Mr Espie are, and around the moraine dumps.

¹⁹ Evidence of Fastier para 47

²⁰ p27 K Wardle

²¹ unnamed Simons Hill botanical values report

²² unnamed Simons Hill botanical values report

107. Wardle also identifies *Pimelea pulvinaris* and *Raoulia parkii* on the outwash plain, species restricted to these semi-arid plains now very limited in occurrence. I attach her map showing where she recorded rare species and the pink dots on my Fig 2 approximate these locations.
108. Mr Espie's and Mr Fastier's evidence suggests that the process of degradation is almost complete now with very few tussocks or other native species left. I have not inspected the surface since 2006 but it appears very barren.
109. In terms of fauna values, the dry open outwash surface is habitat for the threatened, drylands-endemic grasshopper *Sigauss minutus*, and the western margin of the outwash over a width of around 1.2-1.5km (2km including the river terrace) was seen as important habitat worthy of protection by Warren Chinn, the entomologist on the Simons Pass survey. Unfortunately cold weather prevented insect survey on the Simons Hill outwash at the time of survey in 2001²³. Morris stated that *Sigauss minutus* and *Brachaspis robustus*, which he described as New Zealand's rarest grasshoppers, have been observed around the boundaries of Simons Hill pastoral lease.
110. In terms of avifauna, the threatened (gradual decline) banded dotterels have in the past been seen on the outwash plain, feeding and nesting. Mr Espie however is of the opinion that a lack of recent sightings suggests the cover has become too degraded for them.
111. It is important to recognise however that surveys for flora and fauna were brief and possibly not at the right time of year for some species. With more detailed and comprehensive survey over different times of the year, other species or more of the rare species may be found.
It must also be recognised inland outwash plains are a naturally rare and threatened ecosystem, which has not been cultivated. In the absence of rabbits, wilding pines and possibly brier, and with no stock grazing, it is my understanding there is a possibility native species could return to the land, given enough time.
112. The only vertical and cultural elements are the occasional stock fence, the pylon line and a few trees (willows marking stock troughs and a few wilding pines).
113. Two features of note cross through the outwash plain and the south end of the moraine. A vague track crosses the outwash from Simons Pass heading west. It is thought to be the first road made in the Mackenzie, from Burkes Pass to the Pukaki

²³ Entomological Survey Report to the DOC – S Morris March 2001

River and beyond, known as the Bullock Trail. It approximates an unformed legal road line.

Another historic feature is the Rabbit Fence erected across the Basin floor in 1888 in an attempt to keep the rabbit plague from getting through to Canterbury. This fence was a good working stock fence in 2006.

Landscape Values

114. I present here a summary of the values identified in the tenure review of these two pastoral leases relevant to the proposed irrigation areas. I attach copies of the original assessments from my work and Ms Wardle's work in my appendix.

Representative or Characteristic Landscape and Ecology

115. Almost all areas proposed for application are relatively unmodified and retain an appearance and an ecology that is not dissimilar to that existing prior to European occupation. They still have low stature grass, herb and shrubland cover and a very open expansive character. There is a variable presence of native species ranging from very poor to a reasonable diversity, even rich in some places. Structurally, short tussock and in places, shrubland and specialised communities such as ephemeral tarn turf communities, are apparent. Shrub cover probably would have been more widespread in the past. Soils are uncultivated and landforms remain intact and undisturbed. Wardle states that the outwash plain together with the meltwater channels and moraine behind is representative of the range of continuous landform and vegetation sequences.

116. As stated earlier, Simons Pass is a place where there remains a remarkably intact sequence of inter-related glacial landforms over a large and compact area.

117. Mr Steven at para 15 states

"there is no evidence that this channel [outwash surface] is an outstanding example of its type. There are more original examples complete with intact indigenous vegetation communities elsewhere in the Basin."

118. He does not say where. This may be true, but it overlooks two things. Firstly, in a wider sense the outwash plains are not common, and the ones in the Mackenzie I understand to be the best and largest intact examples. They are also much drier than outwash plains elsewhere (Nick Head, DOC ecologist, pers, comm.). Collectively they are significant, not just as individual surfaces. Secondly, the one at Simons Pass is

very well connected to other glacial landforms. The value here is on the whole sequence of landforms being all together, intact, in one place. In Mr Chinn's words²⁴,

"Simons Pass has the unique status of being the only property in the Mackenzie Basin to straddle a complete sequence of terminus moraines and outwash gravel of Pleistocene age".

119. A third factor which has been overlooked is the restoration potential. There has also been no acknowledgement or reference to the Canterbury Biodiversity Strategy 2008 which has a goal of avoiding any more loss of rare, distinctive or threatened ecosystems and indigenous biodiversity, especially where less than 20% of the type remains with indigenous cover or where environments are poorly protected but facing increasing threats²⁵.

Ecological Parameters – diversity, complexity, linkages, rarity, naturalness

120. Wardle assesses the areas has having a diversity of habitats and plant communities despite a narrow altitudinal range. There is a complex pattern of landforms and ecology. On the outwash plain she describes species richness as high with a micro-patterning effect. Ecological linkages remain intact at present. A number of rare and threatened plant and fauna species exist over the outwash plain and moraine areas. The outwash plain has a higher proportion of threatened species. Naturalness varies from low to moderately high.

Potential for Restoration of Natural Character and Viability

121. Because of the presence of threatened species and rare and threatened ecosystem status generally, this factor is important. It is understood there is potential for restoration both in an ecological sense and in a landscape sense (the former supporting the latter).

*"Fescue tussock expansion will take place slowly on the outwash plain given release from regular grazing"*²⁶; and

*"there is an area of healthy fescue tussockland (northern River Block) where tussock recruitment is evident. This area will provide seed source for self restoration elsewhere on the outwash plain."*²⁷

²⁴ ²⁴ Invertebrate Survey, Simons Pass Pastoral Lease Tenure Review – W Chinn Nov 2006

²⁵ ²⁵ p27 A Biodiversity Strategy for the Canterbury Region March 2008

²⁶ ²⁶ p22 K Wardle report

²⁷ ²⁷ p27 K Wardle report

122. The large size and intactness of remaining natural areas raises long term viability, combined with proximity to other conservation areas.

Natural character of river margins

123. The western margin of the outwash, on and near to the edge of the scarps, is a part of the natural landscape character of the Pukaki and Tekapo River. Currently the character is natural with a sense of remoteness due to the absence of overt development and human activity especially once away from the High Dam.

Generally recognised iconic elements of Mackenzie Basin landscape; Scenic Values

124. The outwash plain is a highly distinctive and classic and definitive natural element of the Mackenzie Basin. It is perceived from many places within the Basin as a wide featureless horizontal band, a foil or plinth above which hills and mountains rise; or as a large homogenous planar surface from more elevated viewpoints (such as Simons Hill). From within they are a vast and empty space, evoking strong emotions for example, exhilaration with the sense of lightness and immense space, solitude, desolation, vulnerability. The ancient, intricate braided mound and hollow pattern is highly characteristic, found only on these surfaces.
125. The moraine areas too with a short tussock and shrubland cover and distinctive features of meltwater channels, erratics and tarns in kettleholes are recognisable elements of the Basin.
- The moraine however is more significant as highway corridor landscape, particularly where it is foreground to views of the Alps.

Perceptual Qualities – Naturalness, Coherence, Intactness, Legibility, Vividness, Distinctiveness

125. These attributes underlie perceived landscape quality. Mr Steven discusses naturalness in his evidence²⁸. I agree that there are variable levels of naturalness depending on the degree of modification present. I concur that the outwash has a moderate to high level of naturalness despite its degraded state. This is due to the absence of overt modification or fragmenting land use patterns, and a very limited presence of structures, over a very large area. The natural homogeneity remains present; the landform itself is intact and undisturbed; the soil is uncultivated; and species are naturally established. The only thing missing really is the dominant presence of native species. There is potential for them to return however.

²⁸ M Steven Evidence – Simons Hill and Simons Pass pp4-5

126. He does not assess the moraine areas. I assess them as also having moderate to high natural character, in the context of the Basin. They are affected by cultural elements such as shelterbelts and fences and have a more obvious greening through topdressing and oversowing. However homogenous short tussock grassland covers the landforms, which remain largely intact.
127. Coherence, Intactness and Legibility all rank high over the land units. These are important attributes for the Geopreservation site, enabling it to be 'read'.
128. The outwash plain and the moraine 'necklace' are distinctive and, from some perspectives, are vivid elements. Erratics too can be vivid features within an open rolling moraine terrain. The meltwater channels also tend to be strongly defined leaving a strong visual impression.

Significant Features

129. The presence of rare and threatened flora and fauna is a significant feature except in a visual sense as these are diminutive species as are the moraine 'necklace' and the braided pattern on the outwash.
- The Rabbit Fence and the Bullock Trail are cultural features of significance.

Historic Context

130. The 1888 Rabbit Fence is a recognised historic element. The open desolate outwash in its apparently natural state is an appropriate setting for this element; also for the Bullock Trail.

Recreational Settings and Enjoyment

131. The open undeveloped landscape character provides the setting for recreational trail opportunities along the unformed legal road/Bullock Trail. The open expanses of outwash plain linking through to meltwater channels and moraine can also be appreciated from elevated public viewpoints.

Landscape Classification

132. All consent sites fall within the area that has been regarded as outstanding natural landscape at regional level. There has been much discussion over the status of the Basin landscape at district however, in the course of considering Plan Change 13.

There are varying professional opinions about the ONL status of the Basin or parts of it²⁹. The evidence of Chris Glasson 11 Sept 2008 specifically addressed the basin floor landscape of Simons Hill and Simons Pass. In his opinion they did not qualify as Outstanding Natural Landscape. Likewise, Mr Steven's opinion is that the landscape of the application sites is not worth of outstanding status because it is not natural enough (para 14); yet I note he assigns a moderate to high rating for naturalness to the outwash plain. The Council as yet has not completed an assessment of the Basin to determine whether all, or some, and which parts of the Basin are ONL or other classes of landscape.

133. Mr Steven's opinion is that there are other landscapes within the Basin that are more convincingly outstanding³⁰. I know from the tenure review assessments that there are outstanding values present on Simons Pass and Simons Hill – both biophysical and aesthetic/visual. These application areas involve a considerable part of the outstanding Mackenzie Basin landscape in an area that is largely undeveloped. SH8 passes through this landscape and parts of it are highly visible, in conjunction with Aoraki and other alpine elements. I find assessments of landscape are often dominated by aesthetic considerations and are distracted by the stunning and dramatic. They tend to overlook the more subtle values of lowland landscapes, and important ecological and landform/geologic factors are under recognised. Landscapes do not have to be dramatic or picturesque to be outstanding. A wide range of factors is used to determine outstanding status some of which may not be immediately obvious in a fleeting highway view or to the casual observer.
134. My assessment for significant inherent value concluded that almost all the application areas had significant inherent value. In my view this would probably support ONL status.

Proposed Development

135. The extent of development proposed is shown on my Fig. 2.
136. I have described the generic effects of irrigated development at the beginning of Part B of my evidence.
137. Essentially it is a raft of centre pivots over almost all the Pukaki Flats and the eastern moraine areas, a total irrigated area of 4800ha. Exclusions include a 600m buffer along the south side of SH8 including the large meltwater channel and Scenic

²⁹ Professional landscape architectural evidence given for the Plan Change 13 hearings – C Glasson; M Steven; R Kruger; M Wallace

³⁰ M Steven evidence para 16

Viewing Area; a variable buffer along the Pukaki riverbed (the centre pivots will come to the edge of the outwash surface in some places) and exclusion of the Pukaki and Tekapo river terraces. Some of the moraine 'necklace' would also be excluded, although surrounded by development.

138. The application also states that development will be undertaken "outside of the moraine areas". However a large part of the proposed development does occur within moraine areas – the northernmost 7 centre pivots on Simons Pass.
139. The proposed development envelops almost the entire Rabbit Fence, and the Bullock Trail and unformed legal road. There is no information about how these features will be integrated into the development save that they will be protected "as far as can be achieved."³¹
140. Water is proposed to be delivered to the area via an open canal system from the Pukaki Canal or Lake Pukaki; or by buried pipeline from the Tekapo Stilling Basin (Applicant's preferred option). The exact details of these infrastructure options are not provided.
141. A consequence of this more intensive development over some 4800ha is likely to be the construction of a number of buildings for utility purposes and storage and stock management. Further housing and residential occupation may be facilitated as well.

Assessment of Effects

Effects on Naturalness and Natural Character

142. The exclusion of the Scenic Viewing Area (SVA)/meltwater channel – a large and well defined landscape element highly visible from SH8; the lower river terraces; and the exclusion of the bulk of the Pukaki moraine area from development will protect naturalness and natural character. Although I am not aware of any covenants being offered to protect its open natural character in perpetuity, eg, from tree planting or AOSTD.
143. The applicant claims that the terminal moraine 'necklace' in the middle of the application area will be excluded as well. This is not shown on any application map I have seen. I show the extent of this feature on my Fig. 2. There is no certainty that this distinctive landscape element would be protected. It is likely that it would have to

³¹ J Kyle evidence

be dismantled to make way for the irrigators, if they were included in the irrigable area.

144. Similarly the fate of erratics within the irrigable area may well be removal.
145. Mr Steven, at para 37, states the irrigation area is outside the Geopreservation Site. According to my copy of the inventory it extends as far as the Farm Block and across to the SVA. I show this area on my Fig. 2. The area would be affected by 4 pivot systems. Because of the patterns pivot irrigators make, the subtle patterns of the macro moraine landforms whilst not physically destroyed would be much less able to be appreciated. Micro features such as kettleholes or erratics could be compromised or removed. The intactness of the whole sequence of landforms would be broken.
146. Mr Steven makes the distinction in his evidence between 'naturalness' and 'natural character'. The former he refers to a measure of biophysical intactness, how original or indigenous the landscape is. The latter is a measure of the perception of the degree to which products of nature (with no distinction between exotic and indigenous) dominate over cultural products. Both I believe are relevant to considerations of outstanding natural landscape or to effects on naturalness of landscape. The biophysical naturalness by and large does determine and inform the perceived naturalness.
147. I agree that perceived 'natural' landscapes are not necessarily ecologically robust; nor are they necessarily natural in the biophysical sense.
148. Mr Steven maintains:
1. that the existing ecological significance is considerably overestimated (para 38)
 2. that the development would result in a minor shift in the biophysical naturalness (para 33).
 3. that irrigated development with associated reduction in naturalness is the only sustainable alternative to on going degradation (para 68)
149. It is accepted that loss of tussock and other species on the outwash has been ongoing since I visited in 2001 and 2006 and this is evidenced by the photos in Mr Fastier's and Mr Espie's evidence. In his analysis, Mr Steven has not given any evidence of knowledge or understanding of the types of ecosystems, plant communities and flora and fauna actually present, nor the significance of these ecosystems and species, even in their degraded state.

150. Another aspect that appears to have been overlooked is the very nature of these environments. They are harsh and desert-like, the wind does blow soil away and has done for thousands of years (the braided pattern of the plains is due to wind re-organising glacio-fluvial material), and plant life does struggle and will go through oscillations of decay and recovery. These arid barren environments – which are naturally rare - are part of our heritage and an important part of the remarkable natural diversity of habitats and landscapes in New Zealand.
151. I disagree that the biophysical change from the existing state of naturalness of the outwash and moraine is only a minor shift. Soils would be cultivated for the first time. The remaining native species including possibly rare and threatened species would disappear. The dry open insect habitat would be lost. Biodiversity would drop markedly in the areas of healthier indigenous cover. Natural processes would be replaced by entirely cultural processes; and natural patterns by cultural patterns.
152. The cultivation of virgin land and sowing of mono-specific crops of grass and forage crops is a crossing of a threshold in my opinion. Once over there is no opportunity to restore a more natural landscape, not in the foreseeable future anyway.
153. A broader more important outcome is the contraction of the remaining areas of threatened lowland dryland ecosystems and further loss of threatened species. This is entirely inconsistent with the National Biodiversity Strategy, the Canterbury Regional Biodiversity Strategy, and the National Priorities for Conservation - all of which require no further loss of those environments that are naturally rare or with less than 20% remaining in indigenous cover, especially those that are poorly protected.
154. Another matter that he has not considered in his evidence is the possibility of an alternative future for these degraded lands as conservation land. Evidence suggests it is incorrect to assume that that without irrigated development the only future is one of wilding pines, hieracium and rabbits, and soil erosion.
155. Given a long time, recovery of a much healthier degree of indigenous biodiversity on these dryland ecosystems is thought to be possible with gradual decline of hieracium. There is evidence of this in the Tekapo Scientific Reserve (see Photos in my Attachment). It was a severely degraded area of outwash and moraine with barely a tussock left and rampant hieracium and rabbits in 1992. Following its transfer to the Doc and de-stocking and rabbit fencing, tussocks have returned and are vigorous, inter tussock biodiversity is returning, wilding pines are few and rabbits are at low levels. I have two before and after photos of this reserve in my attachments.

156. The alternative scenario for a more natural landscape is still a potential reality for Simons Pass. It is a pastoral lease in tenure review. A Part II objective of the Crown Pastoral Land Act 1998 is the protection of significant inherent values, preferably. It would be entirely consistent with the Act for the Doc to retain management of the outwash plain especially for its special values and to permit recovery to a more natural state with greater indigenous biodiversity. I am aware of the map in Mr Peter Glasson's evidence that is purported to indicate the area the DOC wishes to retain; however this proposal has not been released for public comment and it certainly does not cover all the areas of significant inherent value.
157. Mr Steven also maintains that perceptions of naturalness in the Mackenzie Basin are tied to a visual aesthetic notion of what is natural, and that what people are really looking at is a severely degraded and modified landscape with low levels of biophysical naturalness, ie, it is not natural at all. That may partly be true, in a biophysical sense taken at one point in time, but in my view preference for 'brown' land colorations (in conjunction with wide open spaces) is not just a simple aesthetic response. If that were the case, many people would probably opt for the 'green' landscapes. One could hardly describe dry unrelieved barren looking outwash plain as being visually pleasant.
158. When people prefer 'brown' landscapes - more, vast open brown (and grey) landscape - they are also looking at, often knowingly, all that is left of once widespread and healthy natural landscapes and ecosystems. These have potential to become more natural and some people know and value that. They represent rare and/or threatened ecosystems and contain rare and threatened plants and animals, and some people know that – probably an increasing number of people as we learn more about these places.
159. Mr Steven (para 104) also states a “pro-brown view to be misplaced”, as a brown colour can represent a healthy short tussock grassland or a highly modified and degraded grassland with a predominance of browntop. While it is true that at a distance it is difficult to distinguish between the two at least to the lay observer, it is not difficult to tell the difference between brown and green. Because no indigenous Basin communities are green, a 'green' cover is likely to be entirely exotic. It represents very low biodiversity, especially if it is in developed pasture. It typically represents substantial if not complete loss of natural ecosystem functioning with no indigenous species (except maybe birds and some insects); and a critical dependence on continuing inputs of water and fertiliser (ie it requires constant manipulation of the ambient conditions).

160. I read in the Waitaki District Plan that an equivalent of 2000mm per annum is necessary to sustain dairying. This contrasts starkly with the natural rainfall of around 400-500mm over much of the Basin floor application areas. In my view 'green' also means a diminishing of the recreation resource as the appeal of such landscapes as a recreation setting wanes, and possibly, any access that might previously have been granted by a landowner over extensively grazed land, would now be refused because of conflict with operations or at least, be impeded by many fences and infrastructure.
161. In my opinion, the 'brown' (and grey) landscapes are also more likely to be important for sense of place and identity than 'green' ones which have an 'anywhere' character. Irrigated development is in my view at the expense of the special character of the Mackenzie, with its formerly numerous expanses of arid plains and rolling tussock and shrub covered moraines.
162. They will also hold more inherent or intrinsic values, such as ecosystem services (insects for pollination, biodiversity itself, hydrologic functions, etc).
163. Therefore, contrary to Mr Steven, I conclude that 'brown' landscapes are simply likely to hold more values for people than green ones. In my opinion, it is the meanings associated with these colours that determine preference.

Legibility and Other Aesthetic Factors

164. Mr Steven (para 107) considers legibility – or geologic clarity - as being both an aesthetic and a natural science factor, with which I agree. He considers this factor is really only relevant to the informed. Certainly those with the knowledge would get more out of a landscape's landforms and patterns; however there is simple aesthetic appreciation that anyone can see in landform patterns that are expressed in detail through light and shadow under homogenous cover or through strong complementary vegetation patterns eg, tussocks following the deeper braids on the outwash plain. Legibility also protects opportunities for future learning by generations to come.
165. He maintains that the intricate braided outwash plain pattern is hard to determine at ground level and can be maintained under cultivated and irrigated development. He demonstrates this with an image of channel patterns seen in an aerial view of a Canterbury Plains location.
166. Braided patterns can be picked up at ground level due to the micro variation in indigenous vegetation and substrate, but I agree they are best perceived from the air, or from elevated vantage points such as Simons Hill.

As for their perpetuation under development, this depends on the degree of ground modification. For good pasture production I would expect braided patterns to be redistributed, to even out soil depth and fertility. There is certainly earthmoving machinery capable of carrying this out. It is hard to see the clear and detailed pattern of the Ohau outwash surface under the pie graph centre pivot development there. And it certainly cannot be appreciated at ground level any more. This is particularly due to the mono-specific ground cover
In my view the pattern is literally a shadow of its former self under development.

167. The factors of coherence and intactness would both be reduced by irrigated development due to the imposition of alien patterns of landcover, contrasting land cover, and the additional clutter of fencing. The landscape would lose its simplicity and open space quality.
Intactness – one of the key attributes of this particular area – would be compromised, as the visually homogenous cover is replaced by pie graph patterns of variably coloured and textured vegetation, unrelated to landform. Some moraine features would most likely be physically removed to make way for the irrigators.

Visibility Analysis

168. I agree with Mr Steven's analysis that the visual impacts of development from the highway would be significantly mitigated by the proposed 600m setback and exclusion of the SVA.
169. No assessment of the impact of visibility on views from Simons Hill has been undertaken. From here the full spread of the development would be seen, although possibly not all at once. The development on both sides of the hill would be seen as well. It is from this viewpoint that the degree of change to the landscape and loss of naturalness would be most appreciated, on a landscape scale.
170. Other elevated view points that have not been considered are from the Benmore Range and Rhoboro Hills. These are more distant but the landscape of the Pukaki moraine and outwash is still clearly visible. Images of the view from Benmore Range and Simons Hill can be found in my Attachments.
171. There has been no assessment of the impacts on the experience from the unformed legal road and Bullock Trail. This would pass right through the development.
172. Generally I agree that with distance, in the order of 600m, irrigated development is unlikely to impinge on visual access to landscape, or interfere significantly with views of surrounding mountains.

173. Mr Steven states (para 40) that the vertical elements of the mountains and ranges are the dominant visual elements and implies that it does not matter whether the foreground is open and brown-grey or green and cluttered with pivot irrigators, as long as you can see the mountains. The Mackenzie is not just about mountains and lakes. The vast basin floor is just as important for defining the Basin as a 'place'; and it is often the simple combination of a brown-grey basin floor moraine or outwash ground plane with rugged brown-grey-blue and white mountains that is what is most vivid and memorable, not just the mountains on their own, as the photo below shows. I cannot agree with Mr Steven that the two can be managed independently of each other.



174. To my knowledge, there has been no assessment of the effect of installing the pipe line from the Tekapo Stilling Basin. A trench will have to be dug and tracked machinery will leave trails over the ground. The terrain it has to pass through is complex moraine and meltwater channels. There is potential for visual scarring and uprooting of native shrubs and disturbance of boulders.

Effects on Bullock Trail and Rabbit Fence

175. The Rabbit Fence and the Bullock Trail are two significant cultural features within the proposed development area. Although there is a proposal to protect them, it is "only as far as can be achieved."³² There is no specific proposal to protect these elements

³² Evidence of John Kyle

wholly or in part, or for an appropriate context to be provided for them. It appears they may disappear in the course of development, to make way for the pivots. However consultation with the NZHPT will be required.

176 Conclusions:

- large parts of the proposed irrigation development area coincide with areas of significant inherent value for landscape geomorphic and ecological reasons
- these values support the outstanding status of the Mackenzie Basin landscape
- there is potential for significant adverse effects in particular the loss of a rare and threatened dryland ecosystem and the remaining indigenous species it supports
- there would be a significant weakening of natural landscape character
- a highly distinctive and definitive natural landscape element of the Basin would be radically altered so that it is no longer distinctive, natural and defining
- the proposed mitigation measures are of merit and do protect important landscape values related to the visual corridor of SH8
- irrigated development of the outwash plain, terminal moraine area south of the Farm Block and the moraine within the geopreservation site would not sustain the landscape values these area hold

Killermont

177. My evidence in this section relates to the Killermont Station Ltd and Southdown Holdings (Williamson Holdings Ltd):

Killermont Station Ltd CRC041777 (Lucas 35), on the homestead block
Killermont Station Ltd CRC041331 (Lucas 34) on the Pebbly Block
Southdown Holdings Ltd CRC073115/041788 (Lucas 39) on the central block

A Map of the application areas is Fig. 3 in my attachments

178. The homestead block, the central block and most of the Pebbly block are in the Rural Scenic Zone. The river margin of the Pebbly block is currently proposed as part of the Outstanding Natural Landscape (ONL) of the Ahuriri River and Clay Cliffs, with an underlying Rural Scenic zone.
179. All consent sites fall within the area currently recognised as outstanding natural landscape at regional level. Whether it is outstanding or not at District level is still being determined, but at present the sites largely fall outside of this class. The Ahuriri

River adjacent has several designations as described by the planner including a Water Conservation Order, giving it overall outstanding status for wildlife and fishery values.

180. The Clay Cliffs is a geopreservation site with a QEII Open Space covenant over it.

Prior Assessment

181. The tenure review survey work on Killermont pastoral lease, which includes all these application sites, was carried out in December 2001 and I completed my assessment report in January 2002. I inspected or viewed all of the property at that time. The tenure review was publicly notified in 2005 and completed tenure review in 2006. The Central Otago Lakes F&B branch - known then as the Upper Clutha branch - made submissions on the tenure review, on parts of the areas that are now the subject of consent. I contributed to those submissions.

Landscape of the Application Sites

182. The basin floor part of Killermont falls within the H4 basin floor outwash plains category. The floor here comprises broad sweeping alluvial terraces bordering the Ahuriri River, separated by a low scarp from a slightly higher older outwash plain surface formed after the last "Aviemoore" glaciation. The scarp is well defined and highest immediately east of the homestead. Further north it is a more subtle landform but still high enough to prevent views on to the upper surface from SH8, which traverses the alluvial terraces. The whole area slopes gently from west to east, over altitude range 560-480m asl. The surface of the outwash displays the typical braided mound and swale pattern but it is not so pronounced here either in scale or by vegetation pattern.
183. Brown³³ describes the area incorrectly as being a "colluvial terrace" and being devoid of any features of significance. It appears he is totally unaware of the geopreservation site affecting both the homestead block and the central block. The boomerang shaped hump in the middle of the area is a reverse fault feature called The Knot³⁴ (refer Fig. 3). It was formed around 20000 years ago and includes a unique 90degree bend. It is rated as a Site of International Significance. It is monitored for fault movement, as it is part of the active Ostler Fault.

³³ para 22 S Brown Evidence

³⁴ Inventory and Maps of Important Geological Sites and Landforms in the Canterbury Region – J A Kenny and B W Hayward Geol. Soc. of NZ, Misc. Pub. 98 first ed. 1998

184. I would agree with descriptions provided with Brown³⁵, that the surfaces appear as an arid or barren weed-infested expanse of little used pasture, and I would agree largely that there is little of interest on the plains themselves, apart from the Knot.
185. The botanical assessment for tenure review³⁶ also dismissed the plains completely as not being of any significance; but it must be borne in mind that the survey was done over a very short time frame, possibly at the wrong time of year for some species, and was not comprehensive. It cannot be regarded as conclusive. No information was provided on LENZ classes or threat status.
186. Much of the area, which is naturally semi-arid with thin soils and low fertility, has never been cultivated before. The pre-European short tussock grassland community has been severely degraded through a history of overgrazing and lack of inputs to a simple community of sparse mainly exotic grasses and hieracium with scattered sweet brier. I have observed native species present such as mosses and lichens; occasional fescue tussocks; dwarf heath, prostrate *coprosma* and *raoulia* species; and porcupine shrub and native broom on the scarp but it appears species-poor compared to other outwash plains I have visited. Nevertheless, many native species on these surfaces are spread widely and are diminutive and may include spring annuals. These may be difficult to detect, as Dr Walker explained. Furthermore, given a respite from grazing including rabbits, high-stress tolerant native species could slowly return as seed sources remain in the area and the re-establishment of native species in the Tekapo Scientific Reserve demonstrates. It is not certain therefore that there is no flora or potential flora of any significance.
187. There may also be insects of “moderately precious species”³⁷ present such as ground dwelling wetas and spiders. It is likely a more diverse invertebrate component would return if there was recovery of a diverse range of native species.
188. Therefore in my view, it cannot be said for certain that there are no “natural science” values worthy of consideration, either now or in the future under alternative management. The area may have potential for persistence and recovery of indigenous biodiversity. Understanding this elevates the perceived value of these degraded landscapes. They can be viewed as a potentially significant opportunity for enhancement of indigenous biodiversity and recovery of some of the unique and distinctive landscape character of the Basin (rare high-stress near-desert outwash plain ecosystems).

³⁵ paras 22 and 70 S Brown Evidence

³⁶ Killermont Lease – Ecological Assessment for Tenure Review - N C Simpson March 2002

³⁷ Killermont Station – Invertebrate Survey 31 Jan 2002 – R P Macfarlane

189. Part of the area on the homestead block is developed farmland fenced off into paddocks. The above analysis would not apply to this area.
190. Naturalness/natural character is moderate to high in my view in the context of the Basin. The level of degradation and lack of indigenous cover has reduced naturalness. To the uninformed it may appear more natural, albeit barren, as there is extreme open character, a dominance of natural landform and self-established vegetation in natural patterns and very little overt modification. It also is viewed in association with more natural areas – the Ahuriri River and the Clay Cliffs, and the surrounding hills and mountains, which tends to elevate the perception of naturalness.
191. The whole has only been extensively grazed in large blocks. There are a couple of grass airstrips and a few small buildings in the southeast corner (model aircraft club); and a water race has been constructed through the middle of the Pebbley and Central Blocks with several offshoots to the east, feeding water to Tara Hills adjacent. Small gravel extraction areas have been cut into the scarp in a couple of places; and a narrow shingle road (Short Cut Road) crosses the area between SH8 and Broken Hut Road. I note that this (public) road was not mentioned in any of the assessments. SH8 also bisects the surface west to east.
192. There is a high degree of agreement in my analysis of the perceptual qualities with Mr Brown and Mr Glasson’s analysis. Collectively, characteristic attributes are:
- vast scale, extreme openness (lack of vertical elements) and strong horizontal emphasis offering expansive unimpeded views all around, some very long, up to 80km or so (to Braemar uplands, Mt Stevenson); a distinctive quality of the Mackenzie Basin;
 - “the outwash surfaces..are the fore and mid ground for the impressive panoramic views across the Basin to the enclosing ranges. They enable the ranges to be seen with great clarity from base to summit ridge and right along their length. They are critical to imparting the sense of being in a basin... a key attribute of the wider Mackenzie Basin”;³⁸
 - important as open natural foreground or frontispiece to views of the Clay Cliffs, a view that is enjoyed continuously over several kilometers of highway as it approaches and passes opposite the feature, providing an ever-changing perspective of the “badlands” which is intriguing when viewed under different light conditions
 - high legibility and impressiveness of landform under a very uniform low stature and simple vegetation cover

³⁸ Part 5.3 A Killermont Pastoral Lease - Assessment of Natural Landscape Values- A Steven 2002

- high levels of coherence and unity, subtle coloration of a limited range of colour and fine texture
 - highly to extremely visible and therefore sensitive to change and low absorption capacity for dissimilar activity and elements
193. The corridor of land either side of SH8 in its apparently natural state is critical for perceptions of the Basin, especially looking northwest to the Clay Cliffs. The scarp to the south, running more or less parallel to the highway, limits views of the ground beyond 250-500m except possibly for tall tour bus viewers.
194. Broken Hut Road is a local rural road. Until recently public use would have been light as it was a dead end. However now public access for 4WD (and mountain bikes, horse riders and walkers) has been secured over the Omarama and Camp Creek saddles at the end of this road, it is likely recreational traffic along this road will increase. I agree with Mr Brown that there is much more of a developed working farm character now along much of this road. There are good views from the road of the Clay Cliffs, and the open expansive plains are critical to allowing this view.
195. There has been no assessment of views from Short Cut Road, which passes through the middle of the applications area and from which there are long uninterrupted views of the plains. There is also a wide and clear view of the Knot, as the road crosses right over the middle of it. There is a sense of expansive elevated views from the top of the Knot.
196. There also appears to have been no assessment of the landscape experience from the two public walking easements on Killermont, or from the river margin. At present open expansive very extensively grazed plains surround walkers, allowing wide unimpeded views of surrounding mountains. Developed farmland is far away, except where the walkway crosses through about 1km of developed paddocks from about 2.2km in from Short Cut Road, where it enters Manuka Stream valley. The walk to the river from SH8 could be described as remote, if it were not for the highway.
197. In my attachments is a copy of my assessment map for Killermont, which shows the extent of significant inherent values identified. With respect to the plains, the hatched area encompasses those areas critical to the quality of landscape experience from the public roads. A covenant was recommended over these areas to protect their natural open character.

Values Identified in Submissions on Preliminary Proposal for Tenure Review

198. There were 6 submissions on the proposal for tenure review that discussed the landscape values of the basin floor and in particular the portion north of SH8. The values described were of similar nature to the values just described, lending weight to the “shared and recognised” layer of values. They include:

Upper Clutha branch, Forest and Bird:

- The Red Flats as they are known locally, are an impressive landscape; they are essentially “McKenzie Country”; seen and appreciated by countless thousands of people as they travel along SH8

Professor Alan Mark:

- The terrace landforms in the Mackenzie Basin have been largely unprotected to date and remain a recognised threatened LENZ Environment Type

Federated Mountain Clubs:

- The landscape values alongside SH8 are important because this is the tourist route between Christchurch and Queenstown.
- The highway also provides a deep sense of space which is a key attribute of the wider Mackenzie Basin as well as offering good views of the Clay Cliffs

ECAN:

- The most highly threatened environment on Killermont ... is that of the recent soils on terraces adjoining the Ahuriri River classed as Chronically Threatened and habitat for rare and endangered bird species
- These montane and lowland communities although modified...have high representative significance and remain important habitats for indigenous fauna

Southern Office Forest and Bird:

- The flats north of the road contribute to the integrity and natural functioning of the Ahuriri River which has nationally outstanding status and is protected by a water conservation order. This includes natural undercutting of banks and lateral movement by the river. The dry land of the terraces is important as a buffer for the river, from effects of grazing and more intensive land uses.
- Further comment on LENZ category: Class N62a extensive glacial outwash and alluvium with recent soils with threat level of Chronically Threatened (ie, less than 20% nationally remains in indigenous cover) and only 6.5% of this class is protected nationally. Although much modified they contain a component of native species and continue to support a diversity of indigenous insects, lizards and

birds. It is possible these flats may provide habitat for banded dotterels (now a threatened species). It is important these river terraces are protected as they are representative of what are now critically scarce habitats.

- The fault feature is unique. This is probably the only example of a recent fault scarp making a bend in New Zealand. As this active fault is used for monitoring, it is important it is not interfered with in any way.

198. All submitters requested that the fault feature, the alluvial terrace south of the highway enclosed by the scarp, and the land north of the highway be retained as Crown land and managed for conservation or at least have a landscape covenant over it to protect the natural appearance and open character, and preferably avoid development to allow recovery of nationally scarce habitat. Views to the Clay Cliffs were to be protected.
199. Three submitters also requested that a visual corridor of open natural landscape be provided along the highway, to a suggested distance of 600m at least. The curving terrace scarp towards the homestead was requested as the outer edge of a natural visual corridor although the submitter also pointed out that a further 200m of top of the scarp would need to be protected against intruding trees and vertical structures if the open views of the hills were to be retained.
200. Whilst the Crown (through LINZ) did accept these values, none of the requested amendments were made. The Crown decided “the district planning process is believed to be the most appropriate tool for addressing ongoing landscape and development issues within this area”³⁹ and that “a covenant over this area was not necessary whilst there are other mechanisms to achieve this protection (such as the Resource Management Act).”
201. It would not be credible to say that the tenure review process has taken care of all the important natural values. It is now up to this process to decide how these values can be protected.

Waitaki Landscape Study 2004 – G Densem

202. Preparatory to Plan Change 2, the Waitaki District Council engaged landscape architect Graham Densem in 2004 to carry out a district-wide landscape assessment to identify outstanding landscape. Mr Densem has also prepared a planning officer

³⁹ p5 Final Analysis of Submissions Killermont Tenure Review July 2005

report⁴⁰ for the hearings just completed on Plan Change 2. He had in the intervening period reviewed his assessment at council's request.

203. In his 2004 assessment, Mr Densem identified all of the application area as outstanding landscape at a district level. He described the landscape as being seen in wide uninterrupted sweeps and was simple and grand, affording extensive long views to surrounding snow capped mountains. He listed "sere land colours, visual openness, continuity [homogeneity], wide visibility, unimproved or only lightly improved grassland vegetation and low rates of occupation as landscape values. The extensive continuity of the grasslands enabled a strong sense of landforms to be appreciated."
204. He described the unit as a "*significant public 'window'*" for the district because it is traversed by SH8, and as having strong scenic values of grandeur, openness and naturalness.
205. He identified that the foregrounds of views were just as important as the subject of views, as the "*heart of the tourist value of the Upper Waitaki district*". Focusing on the highway views, he said "*the unity of long vistas across consistently patterned landscape, the natural patterns discerned in various landforms..*" contributed to the quality.
A "*sense of difference*" to the downland areas was ascribed.
206. Mr Densem's assessment is complementary to my and Mr Brown's and Mr Glasson's assessments - although I would use the word impressive rather than grand for this part of the Mackenzie Basin.
207. In the subsequent Proposed Plan Change 2 process and subsequent to consultation and review, the outstanding status of the landscape of the Killermont flats was lifted. It simply reverts to the Rural Scenic Zoning, which is more restricted than the Rural General Zone. Amendment Plan R9/3 is attached being the latest rendition as I understand it.
208. Partly this was due to using Outstanding Natural Landscape (ONL) rather than just Outstanding Landscape given pasture improvement had since occurred generally over the Basin floor or was envisaged to occur over these areas. A part of the true right margin of the Ahuriri River in the Pebley Block remains as outstanding natural landscape, although it was still denoted as "outstanding landscape". Surprisingly the

⁴⁰ Technical Report L6: Landscape Assessment of Proposed Changes in the Upper Waitaki District: Kurow to Lindis Pass, Ahuriri, Benmore and Ohau – G Densem July 2009

Clay Cliffs and the Knot were not identified as significant or outstanding natural features.

209. Mr Densem's July 2009 report⁴¹ states that he maintains the extent of ONL shown on Plan R9/3 is still valid.
210. Given the importance of the river flats north of SH8 as foreground to the outstanding natural feature Clay Cliffs and to impressive panoramic views of hills and ranges to the north; the fact they are part of the nationally recognised Ahuriri river system and margin; the fact they are an uncultivated remnant of a nationally threatened natural ecosystem that could recover with dedicated management; as well their inherent value as perceived open natural landscape adjacent to a major tourist route; it is my opinion that they should be part of the ONL, as originally assessed by Mr Densem. This status would provide the appropriate protection.
211. An alternative might be a visual amenity class, as in the Queenstown Lakes district where landscape that is foreground to ONL is afforded a higher level of recognition and protection, for naturalness especially, and maintenance of views of ONL. But in this case, openness and open space values are just as important, and in the Queenstown district, that is a key issue in ONL
212. There is inconsistency however between what Mr Densem says in his July report and the Variation Plans 3 and 4 Amendment Plan R9/3 (attached). Densem states that Plan R9/3 shows the boundaries as per Variation 2 and states also that this Plan reflect his recommendations (para 12 and 13 of his report); yet at paras 255, 260 and 262 when discussing the Killermont submission V2 -153 he describes the land between SH8 and the Ahuriri River as being shown as ONL on the Variation Maps and his conclusion is that this delineation should be upheld.
213. The Knot could be easily defined as an outstanding natural feature; and it may be desirable to do this to protect it from further gravel extraction and other earthworks, building and surface fragmentation. It would be best left as a natural entity, with fragmentation limited to the road and fence.

Proposed Waitaki District Plan Incorporating Variations 2 & 3 and Plan Change 2

214. The Waitaki District Plan recognises certain values in the landscape of Killermont. Generally the vast spacious high country landscapes with subtle colourings from landform and vegetation patterns are considered an "*endowment*" (part 16.8.1). The

⁴¹ para 24 Technical Report L6: Landscape Assessment of Proposed Changes in the Upper Waitaki District: Kurow to Lindis Pass, Ahuriri, Benmore and Ohau – G Densem July 2009

Plan recognises the importance of the more natural high country landscape as “undoubtedly a drawcard for recreationalists and tourists” (part 16.8.1). The attributes of openness and naturalness along with unity and coherence underpin outstanding landscape status and in the Rural Scenic Zone, the dominance of open-space vistas and landforms and the lack of intensive subdivision and landuse and the overall absence of buildings and structures give the particular visual amenity valued in the district (part 16.8.5).

215. ONL are permissive, allowing cultivation of previously uncultivated land (where it does not meet the significant indigenous vegetation criteria) and more intensive pastoral land uses; and any number of buildings up to 10m with requirement for setbacks from highways of 20m. This is inconsistent with the description of the RS Zone as being characterised by extensive pastoralism with pockets of forestry and arable. I note that shelterbelts are a discretionary activity although amenity planting is permitted.
216. I note that in Appendix C (1) Areas of Conservation Merit includes ⁴² :

Twizel-Omarama Grassland Large corridor of semi-natural short-tussock grasslands with a good degree of naturalness. Sparsely dotted with native shrubs and open low vegetation. Important area of short tussock grassland with good diversity of inter-tussock herbs. Invertebrate values are of significance. In terms of size, visibility and condition, it is of national significance.

217. There is very little of this corridor left now, now the area has been developed under the Benmore Irrigation Scheme. The Killermont area is very likely the last sizeable undeveloped area of a naturally rare outwash plains ecosystem in the south part of the Basin that could support and sustain a similar endemic invertebrate fauna (Dr Walker, pers. comm.).

Proposed Development

218. The proposed development is shown in my Fig. 3. I obtained the information from Steven Brown’s annexures 3A, 3B and 4A; and the plans attached to the S42a reports.

Killermont CRC041777 Lucas 35 Homestead Block

219. The 41777 proposal is to pipe water from the Ahuriri River to irrigate 216ha of outwash to the southeast of the homestead, on an elevated surface set back from SH8 by 600-800m or more. The water would be delivered by 5 large and two smaller

⁴² this part of the Plan is subject to references and is not operative.

centre pivot irrigators and by a linear irrigator over a rectangular area some 1000x400m. About 70% of the land to be irrigated is already cultivated and cropped in geometric paddocks. The remainder, under two of the large centre pivots and the rectangular area, comprise uncultivated outwash plain.

220. The irrigated areas are at their closest around 250 from Short Cut Road. The linear irrigator; two large; and one small centre pivot areas on the southeast boundary would be immediately adjacent to the public walking route to the Wether Range. At present this route passes through undeveloped open natural looking outwash plain for the first 2.29km then across about 1.2km of developed paddocks before carrying on up Manuka Creek. With this development much of this route would be through or pass very close to developed paddocks.

221. The Knot appears to not be affected by this proposal although the irrigated area is very close.

I note that the lower terrace next to SH8 and the Knot were originally included but are now excluded.

Killermont CRC041 331 Lucas 34 Pebbley Block

222. Two areas of river terrace either side of the existing Tara Hill water race are proposed for development using K-line irrigation. The total irrigable area is 216ha. An unirrigated strip about 250m wide is left between the public walking easement on the north boundary and the start of the irrigable area.

The irrigable areas will extend from the highway boundary to the property boundary on the terraces overlooking the river.

Southdown Holdings (Williamson Holdings Ltd) CRC07311/041788 Lucas 39 Central Block

223. This is a much larger development covering almost the entire block of land bounded by Short Cut Road, SH8, the northern boundary and Broken Hut Road. The only part that is excluded is the small section of lower river terrace in the southwest corner adjacent to SH8.

The development comprises 6 large centre pivot irrigators and 3.5 smaller ones. As they are laid out, the irrigator booms would be perpendicular or angled in relation to SH8. No centre pivots would be parked up alongside the fence as they are up the road. However the half circle pivot on top of the Knot would end up parked parallel to the highway more or less along the top of the scarp which would make it prominent. Earthworks may also be required for the half pivot as it crosses scarps.

I note that development is proposed over the entire part of the Knot within this block, and that it goes right to the road margins. I would expect this might breach the District Plan rules.

224. Three large cow barns are proposed. These would be simple rectangular structures of dimensions 30m wide; 6.7m to apex and 125-155 m long; and they would exist in pairs. A slurry pit measuring up to 140x140m would be immediately adjacent to each pair of buildings. The whole footprint therefore would be in the order of 4 ha, including yards and peripheral pavement areas. Mr Brown states they would be painted dark grey. Two are proposed out in the middle of the block, in the interstitial areas. The third is located either on or immediately adjacent to the Knot on its south side, and immediately adjacent to Shortcut Road.

Discussion of Effects

Pebbley Block

225. I am in full agreement with Mr Brown (para 90) and Mr Glasson (para 183 p 58) that development on this block is not appropriate and alternative land areas should be sought. The development would be highly visible and would form an inappropriate foreground to views of the outstanding landscape of the Clay Cliffs - what Brown describes as a signature feature of the upper Waitaki – and the Ahuriri River. I concur with Mr Brown's statement at para 24 that "*it is difficult to separate the foreground of this Block from the two key features that lie directly beyond it*".
226. I agree with Brown (para 57) that the K line irrigation system would be much less visually intrusive and that there would not be any blocking of the views to the west. However the development as a whole is an inappropriate level of domestication in my view and would unacceptably lower the perceived degree of naturalness of the landscape being viewed from SH8. The current high level of consistency and unity in the landscape would be weakened significantly, as the land is subdivided up into paddocks and lanes of contrasting cover and I expect shelter trees would be planted although this would be discretionary.
227. I would not agree with Mr Brown (para 85) that a high-input green pastoral landscape of fenced paddocks and irrigators would be favoured over the existing landscape especially so close to a nationally important river system. The apparent high level of naturalness and open space and remoteness from other more intensively farmed or settled areas would in my view be favoured in this case, because of the relationship with the Clay Cliffs and the river. I would expect too that a more natural landscape,

even one with obvious weed infestation, would be preferred from a walker's point of view on the access between SH8 and the river.

228. There is also the issue of national importance – preserving the natural character of the river margin. There is potential for the irrigated area to intrude into what is perceived as the natural margin of the river.
229. I agree with Mr Glasson that the visibility of irrigated development hard up against SH8 for a distance of almost 4km would be an adverse effect because of the marked reduction in naturalness so close to the highway. I agree it would be desirable to have a continuity of natural landscape across the highway and as far south as the natural rise in the land, beyond which it is less easy to see the ground surface. The scarp lies about 250-300m to the south. A 250-300m setback to the irrigators as well as their angled or perpendicular orientation to the road would render them much less intrusive
230. Mr Brown (para 70) finds the development acceptable because it is an incremental addition to irrigated development that has already occurred in the adjacent land. I do not find this reason a valid one, as there are cumulative effects.
231. With respect to Broken Hut Road, I accept that it has more of a working farm character with developed land along a good part of it. However there are views to the Clay Cliffs from this road, which is likely to support more visitor and tourist traffic with the securing of two public access routes over the passes at the end of the road. A setback of at least 200m would reduce the dominance of the irrigated development and avoid interference with views of the wider landscape.
232. Mr Brown (para 77) assesses the three cow barn clusters as having low visual impact. For two of them I would agree, given their location in the middle of the proposed development and wide spacing. Their long low forms and dark colour would render them reasonably unobtrusive at distance despite the 4ha footprint of the whole complex
233. However the third cluster at the western end would result in significant adverse effect. It is directly adjacent to Short Cut Road and would be very intrusive. It would block views of the Knot and would interfere with the integrity of the landform as a natural feature. According to one plan I have seen, earthworks would be required to build it, further interfering with the Knot. I recommend this building cluster be shifted to an alternative site well away from the Knot and any public road

234. Irrigated development right up to the road edge would be potentially intrusive and dominating. A setback of 100-200m would be appropriate combined with pivot booms being angled or perpendicular to the road.
235. Regarding the Homestead Block, the exclusion of the lower terrace and scarp from development is a positive feature. From SH8, I agree with Brown (para 81) that the development would not be visible. The pivot irrigators being centred some distance back from the scarp would only on occasion be potentially visible as they circled round.
236. However there has been no assessment of the effects from Short Cut road or the walking easement to the Wether Range.
237. The development is set back from Short Cut road and this should be sufficient to avoid interference with views to the hills behind. Additionally the closer irrigation is by linear irrigator which would be slightly less intrusive. A 100-200m buffer should be maintained.
238. The walking route however will have to pass right through the irrigated area, as the centre pivots are shown touching on the southeast boundary. As the setting is currently an open natural looking plain at least closer to the route, the proposed development would be in marked contrast with significantly lower naturalness and sense of open space. To balance this, the area is closer to the homestead and the development would be more in keeping with the 'home paddocks' pattern of traditional high country stations, ie, it is not entirely unexpected. I would recommend a set back for development here of at least 100m.
239. For these applications there appears to have been little, if any, assessment of effects on terrestrial ecology and consequences of loss of further large areas of a rare and threatened dryland ecosystem. As explained earlier, comprehensive survey at the right times of year by dryland specialist ecologists is required before these potential effects can be properly assessed. Furthermore, as these ecosystems and species are very poorly protected nationally, the alternative of conservation-oriented land management and recovery of indigenous biodiversity should be considered. The tenure review survey was rapid and incomplete. Moreover, submitters requested protection of parts of these plains and the Crown's response was that it was up to the RMA to protect these values.
- The potential for loss of threatened species and dryland habitat, if known to the viewer, would increase the perceived adverse effect on natural character as well as constituting an actual biophysical adverse effect.