

BEFORE THE QUEENSTOWN LAKES DISTRICT COUNCIL

IN THE MATTER OF

the Resource Management Act 1991

AND

IN THE MATTER OF

of proposed Private Plan Change 51
to the Queenstown Lakes District
Plan

**STATEMENT OF EVIDENCE OF DR GARY BRAMLEY FOR PENINSULA
BAY JOINT VENTURE**

Dated 1 August 2016

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INTRODUCTION	1
SCOPE OF EVIDENCE	4
THE SITE	6
SIGNIFICANCE ASSESSMENT	10
The Ecological Context of the Area	12
Proposed District Plan	15
ASSESSMENT OF EFFECTS	15
Assessment of the Objectives and Policies of the Operative District Plan	19
SUBMISSIONS	20
CONCLUSION	25

INTRODUCTION

Qualifications, Experience and Code of Conduct

1. My name is Gary Bramley. I hold the degrees of Bachelor of Science (1992) and Master of Science (First Class Honours in Ecology, 1995), both from Massey University, and a Doctorate of Philosophy in Biology from the University of Waikato (1999).
2. I have worked as a consulting ecologist since 2000. In January 2016 I started my own business (The Ecology Company) where I am either retained directly by clients or subcontracted by larger consultancies such as Mitchell Partnerships Ltd, where I was employed between September 2008 and December 2015. Mitchell Partnerships Ltd is an environmental consulting firm with offices in Auckland, Tauranga and Dunedin. As a consulting ecologist I have undertaken a large number of ecological surveys of natural and semi-natural sites, incorporating both botanical and wildlife values throughout New Zealand. I have provided assessments of values and significance of sites for many Councils and private clients and assessed the ecological effects of a range of activities on those sites.
3. In the Queenstown Lakes area I have advised the Otago Regional Council with respect to ecological survey of the Shotover River, particularly in relation to vegetation values and threatened bird survey and monitoring in the presence of gravel extraction by commercial operators. I developed a threatened bird monitoring plan for the delta to assist the Regional Council in monitoring effects on threatened birds using the delta for nesting. In conjunction with Dr Ruth Bartlett (a former colleague), I advised the Queenstown Airport Corporation with respect to the proposal to extract gravel from the lower Shotover River delta for the construction of the proposed Runway End Safety Area ("RESA") in 2009. I have also carried out ecological surveys and assessments of effects on short tussock grassland near Twizel, Lake Ohau and Tekapo. I recently carried out ecological survey at Roy's Peninsula near Wanaka and have contributed to the Proposed Otago Regional Council Plan Change 2 to the Water Plan (Regionally Significant Wetlands). I have also provided advice with respect to plan changes in Marlborough and Auckland. I advised the applicant in the concession application for the

proposed Fiordland Link monorail and have provided advice to many ecological restoration projects at a range of scales throughout the country, including biodiversity offset projects.

4. Mitchell Partnerships Limited was retained in late May 2015 to identify the ecological values at the site and provide advice as to the potential locations of building platforms so as to reduce the impact on the ecological values present. We were also asked to provide advice on the extent and location of enhancement planting for the site.
5. I visited the site and undertook a walk through survey on 2 June 2015.
6. I prepared a report relating to the plan change titled "Peninsula Bay Joint Venture – Peninsula Bay North Plan Change – Terrestrial Ecology Assessment – November 2015". I refer to that report in my evidence. My assessment report sets out the background to the proposal, the ecological setting, the significance of the site's ecological values, the effects of the proposal on those values and recommends mitigation such that the plan change proposal is expected to result in a positive ecological outcome.
7. My technical report can be summarised as follows:
 - (a) The plan change site contains some areas of kanuka shrubland and areas of depleted¹ tussock grassland (both of which are indigenous vegetation) which meet some of the criteria for significance in the District Plan. It also contains areas of predominantly exotic grassland. The areas of indigenous vegetation are small and degraded and can only be considered significant at the local or district scale.
 - (b) Historically the vegetation at the site was probably forest. The grassland habitat appears to be undergoing succession to (and will gradually be overtaken by) shrubland. The shrubland is poorly diverse and natural seed sources to address this are rare

¹ "Depleted" Grassland is the technical term used to describe areas of short tussock grassland in the drier eastern South Island high country which have been degraded by over-grazing, fire, rabbits and weed invasion. Short tussocks usually occur, as do exotic grasses, but bare ground and weed species are more visually prominent. LCDB4 does not discriminate short tussock grassland as a habitat type with it being included in both the "depleted grassland" and "low producing grassland" categories.

in the near vicinity, therefore the shrubland is (and will continue) to be poorer quality in ecological terms.

- (c) Development across the site may require the removal of up to approximately 0.9894 ha (9894 m²) of kanuka shrubland and depleted tussock grassland.
 - (d) Just under half of the kanuka shrubland and approximately 60% of the tussock grassland on the site will be retained, enhanced and protected.
 - (e) Approximately 2.5 ha (24, 795 m²) of new planting is proposed, most of which (approximately 1.6 ha of the site, and 66% of the planting proposed) would be located in areas that are currently dominated by exotic pasture. The remaining areas of enhancement planting (34% of the planting proposed) would expand, connect and enhance existing habitats at the site. In addition, wilding trees and broom would be removed.
 - (f) The proposed structure plan has been amended to include a rule which prohibits removal of tussock vegetation outside the building platforms on private lots and this will reduce the amount of tussock removal.
 - (g) The new planting would result in a significantly increased area of indigenous vegetation, and improved ecological integrity, diversity, function and connection between the patches of habitat.
 - (h) The plan change proposal is expected to result in a positive ecological outcome.
8. I do not wish to amend or resile from any of the findings or conclusions in my assessment report.
9. I have read the Code of Conduct for Expert Witnesses contained within the Environment Court Practice Note 2014, and agree to comply with it. I have complied with it in the preparation of this evidence. This evidence is within my area of expertise and I confirm I have not omitted to consider material facts known to me that might alter or detract from the opinions I have expressed.

SCOPE OF EVIDENCE

10. This evidence addresses submissions on the proposal as they relate to ecological matters, and the Council officer reports.
11. I met with Ms Dawn Palmer (who is advising the Queenstown Lakes District Council in relation to this proposal) on the 29 June 2016 to discuss our conclusions in relation to this site.
12. Ms Palmer and I are agreed as to the high value of the affected Land Environments which continue to contain indigenous vegetation.
13. The crux of our difference in opinion relates to:
 - (a) The nature of the original vegetation at the site (which is relevant to the types of plants proposed to be used in the new plantings); and
 - (b) The feasibility of retaining tussock grassland at the site in the face of threats from pests and weeds; and
 - (c) The ecological benefits of the proposal.
14. My opinion as to (a) is supported by observation of the lake edge elsewhere and previous peer reviewed research undertaken by the late Dr Peter Wardle and others. I remain of the opinion that shrubland and forest is an appropriate vegetation type for this site and has the additional values of being easier to sustain in the long term with lower management inputs, being less attractive to rabbits and providing better ecological connection with other similar habitats in the vicinity.
15. With respect to matter (b), tussock grassland at the site is being overtaken by shrubland and therefore is not sustainable in the longer term without significant management (including eradication of pests such as rabbits which would be near impossible in that area given its setting, the level of pest control which would be required within a much wider area and the recreational use of the area by dog walkers). Cyclists biking over the tussock are also causing chronic adverse effects on the low growing vegetation.

16. With respect to (c), in my opinion the proposed plan change will result in an increased area of indigenous vegetation and will have a positive effect on the terrestrial ecology of the site. It will reflect the pre-human vegetation of the site, as well as the natural successional outcome which I expect will occur there.
17. The reasons for the disagreement between Ms Palmer and myself include:
- (a) Although she states in her evidence that her estimates of the amount of vegetation to be removed are conservative², her estimates are in fact overstated³. The amount of vegetation to be removed has also been reduced further by the recent amendments to the plan change which Ms Palmer was not aware of when she prepared her report; and
 - (b) The level of detail Ms Palmer is seeking will be addressed in the planting plan that will be developed at subdivision consent stage. The Landscape Concept Plan was not intended to provide detail on exact plant locations and does not contain specific detail around proportions for each species. More detail will be included in the site specific plan which will show, for example, that green leafy species susceptible to frost damage will be interplanted under the existing canopy to protect them, rather than out in the open where they might succumb to frost. In addition, a "hard" line of hedging was never proposed, rather a more gradual ecotone between tussock and shrubland and this will be addressed in the site specific plan prepared as part of the subdivision consent process.

² Ms Palmer's evidence at paragraph 41

³ I note that Table 1 referred to in Ms Palmer's evidence as containing her calculations appears to be missing from her evidence.

THE SITE



Figure 1 Aerial view of the plan change site (February 2015)

18. The plan change land is located northwest of Sticky Forest, as shown in Figure 1 above.

Historical Vegetation

19. Ms Palmer and I disagree as to the vegetation that likely existed in parts of the district in pre-human times.
20. In Ms Palmer's opinion, it likely consisted of scrub, shrubland and tussock grassland.
21. However in my opinion it probably comprised a mosaic of shrubland and forest with patches of tussock vegetation limited to the drier or higher sites. Burning by early Māori created a mosaic of shrubland communities of kanuka, matagouri (*Discaria toumatou*), mikimiki (*Coprosma linariifolia*) and porcupine scrub (*Melicytus alpinus*) as well as tussock grassland communities dominated by fescue tussock (*Festuca novae-zelandiae*). This mosaic existed until more recent times, but has been significantly affected by farming and other human activities, particularly where the topography is gentler.

22. The reasons for my view as to the likely vegetation of the district in pre human times are as follows:

- (a) At this site, the predominant ecological drivers of the vegetation community would likely be topography, soils, climate and disturbance history.
- (b) The southern end of the upper Clutha valley falls within the Central Otago climatic district and there is a precipitation gradient from the main divide eastwards.
- (c) Wardle's (2001)⁴ review of forest distribution in the upper Clutha area, along with Bruce's (1986)⁵ survey of the Glendhu area, Johnson's (1984)⁶ survey of Stevenson's Island and Harwich Island, Lee *et al*'s (1979)⁷ survey of Silver Island (Lake Hawea) and Meurk's (1997)⁸ synthesis of vegetation in the Wakatipu Basin are consistent in their assertion that the pre-human climax vegetation gradient from west to east would have comprised beech forests (silver beech dominating at wetter sites and mountain beech at drier sites), broad-leaved forests, mixed scrub, kanuka and then matagouri or grey shrubland and tussockland in the more eastern (drier) locations. Both Wardle and Meurk's work was peer reviewed and therefore I am confident in its findings.
- (d) Situated at around the 650 - 700 mm isohyet, Wanaka would sit at the boundary between silver beech dominated forest, remnants of which Wardle mapped in the Cardrona Valley and Luggate Creek, and the mountain beech forest zone, remnants of which occur at the southern end of Lake Hawea.

⁴ Wardle, P. 2001. Distribution of native forest in the upper Clutha district, Otago, New Zealand. *New Zealand Journal of Botany* 39(3):435-446.

⁵ Bruce, D.L. 1986. Botanical Report – Glendhu Bluffs and Diamond Lake Areas, Glendhu Pastoral Lease, Wanaka Ecological District, Central Otago. Botany Division, DSIR, Dunedin. 13 pp.

⁶ Johnson, P. N. 1984. Wanaka Area Reserves Botanical Report. Botany Division DSIR, Dunedin. 22 pp.

⁷ Lee, W.G., Williams, P.A. and Begg, J. 1979. Botanical report on Silver Island, Lake Hawea. Botany Division, DSIR, Dunedin. 8 pp.

⁸ Meurk, C. 1997. Rediscovering and Restoring natural heritage in the Wakatipu Basin. Landcare Research Contract Report 9697/081. Landcare Research, Lincoln. 47 pp.

- (e) Being a dry ridge, I consider it more likely that the site would have had a mosaic of mountain beech and mixed broadleaved species (including kanuka and kowhai) than silver beech alone. Wardle (2001a⁹) found no evidence of forest (charcoal, stumps, logs) amongst “the tall bracken (*Pteridium esculentum*) and kanuka-manuka scrub on the lower slopes surrounding Lakes Wanaka and Hawea” but noted that he considered that “those areas are well within the climatic range of native forest”. Wardle went on to state “It seems likely that any logs (in those areas) would have been consumed by frequent, hot fires” during the Holocene period (i.e. the last 10 000 – 12 000 years) and particularly since human settlement. In other words the original vegetation has been substantially modified by repeated burning and grazing. Around half (49.8%) of the 255 charcoal sites identified by Wardle (2001a) were located within the 450 – 900 isohyet (i.e. the isohyet within which the site occurs), which indicates to me that rainfall at that level is sufficient to support forest vegetation.

Existing Vegetation

23. Ms Palmer and I agree that the vegetation at the site currently comprises a mixture of predominantly exotic pasture, depleted tussock grassland and kanuka shrubland.
24. Kanuka shrubland and isolated kanuka trees are common across the site reaching a height of approximately 4 – 5 m and with diameters at breast height of up to 15 cm, although some trees have multiple leaders. The canopy of these shrublands is almost exclusively kanuka. Even in the understorey layers, other species are only occasionally encountered and are usually limited to canopy gaps or edges. Examples of the shrubland vegetation are shown in Plates 4 and 5 on page 6 of my report.
25. Within the larger canopy gaps, particularly near the ridgeline at the south-eastern end of the site (nearest Sticky Forest), there are small areas of depleted tussock grassland. These are dominated by fescue tussock (*Festuca novae-zelandiae*) and include a limited range of

⁹ Wardle, P. 2001a. Holocene forest fires in the upper Clutha district, Otago, New Zealand, New Zealand Journal of Botany, 39:3, 523-542.

other native species. Two examples of this tussock grassland vegetation are shown in Plates 6 and 7 on pages 7 and 8 of my report.

26. At the north-western end of the site (nearest the new road known as Bull Ridge) there is an expanse of exotic grassland dominated by browntop (*Agrostis capillaris*) with occasional isolated kanuka trees and common pasture weeds such as briar (*Rosa rubiginosa*), yarrow, Californian thistle (*Cirsium arvense*) and the like. An example of this vegetation is shown in Plate 8 on page 9 in my report.
27. The area encompassed by Lots 1 – 12 does not include substantial indigenous vegetation, rather vegetation there is limited to isolated kanuka trees within exotic pasture. The short tussock grassland is concentrated predominantly in the area within proposed Lots 13 – 24.
28. The continued spread of kanuka and other native shrubs into the tussock and exotic grassland areas within the site is to be expected because of the local source of seed and the good germination conditions for kanuka there.
29. Ms Palmer agrees with the LENZ assessment in my technical report¹⁰.
30. She and I however disagree as to whether the current vegetation mix would be maintained in the longer term without management.
31. In my opinion, this is unlikely. Tussock grassland in particular is unlikely to be self-sustaining because of the small size of the area, the ongoing invasion of kanuka from the adjacent shrubland, continued browsing by rabbits and hares and chronic adverse impacts from cyclists on the low growing vegetation. I consider it is most likely that if left, kanuka shrubland would develop across the whole site in the medium – longer term.

Fauna

32. Ms Palmer recorded a NZ falcon 'eastern' within the plan change site at her site visit on 22 June 2016¹¹.

¹⁰ Ms Palmer's evidence at paragraph 17

¹¹ Ms Palmer's evidence at paragraph 20

33. This is consistent with my assessment report which states that New Zealand falcon have been recorded in the area, but that falcon range over large areas and are unlikely to be affected by the proposal.
34. Ms Palmer¹² and I agree that the site is not expected to provide valuable habitat for native lizard species of conservation concern. Common native species may occur there, however these are unlikely to make extensive use of the exotic grassland areas.

SIGNIFICANCE ASSESSMENT

35. I assessed the ecological significance of the site's values against the criteria in Appendix 5 of the operative Queenstown Lakes District Council District Plan. A summary of my assessment of the site's values against these criteria and a description of where Ms Palmer agree or disagree in terms of assessment is set out below.

The Ecological Values of the Area

(i) Representativeness – Whether the area contains one of the best examples of an indigenous vegetation type, habitat or ecological process which is typical of its Ecological District.

36. Although the areas of tussock grassland are small and likely to be undergoing a natural successional progression to shrubland, Ms Palmer and I agree that they could be considered representative of the natural ecological values (and processes) of the Wanaka area. Kanuka vegetation is also representative of shrubland within the district. However in my opinion neither vegetation type is "one of the best" examples of an indigenous vegetation type within the Pisa Ecological District. Ms Palmer agrees that the vegetation present is not "one of the best"¹³, therefore we agree this criterion is not met.

(ii) Rarity – Whether the area supports or is important for the recovery of, an indigenous species, habitat or community of species which is rare or threatened within the Ecological District or is threatened nationally.

¹² Ms Palmer's evidence at paragraph 21

¹³ Ms Palmer's evidence at paragraph 22

37. Ms Palmer¹⁴ and I agree that this criterion is met.

(iii) Diversity and Pattern – the degree of diversity exhibited by the area in vegetation, habitat types, ecotones, species, ecological processes.

38. It is my assessment that this criterion is not met. While ecological processes are clearly at play, the vegetation does not meet the diversity and pattern criteria because it is substantially modified and lacking in species diversity typically encountered in good examples of short tussock grassland and kanuka shrubland. Ms Palmer does not address this criterion explicitly in her evidence.

(iv) Distinctiveness/Special ecological character – the type and range of unusual features of the area itself and the role of the area in relationship to other areas locally, regionally and nationally, including:

- ***presence of indigenous species at their distribution limit,***
- ***levels of endemism, e.g. the presence of endemic species,***
- ***supporting protected indigenous fauna for some part of their life cycle (e.g. breeding, feeding, moulting, roosting), whether on a regular or infrequent basis,***
- ***playing a role in the life cycle of migratory indigenous fauna,***
- ***containing one of the best examples of an intact sequence, or substantial part of an intact sequence of ecological features or gradients,***
- ***supporting predominantly intact habitats with evidence of healthy natural ecosystem functioning***

39. Neither the tussock grassland nor the kanuka vegetation meet the distinctiveness criteria. Ms Palmer agrees¹⁵.

¹⁴ Ms Palmer's evidence at paragraph 23

¹⁵ Ms Palmer's evidence at paragraph 24

The Ecological Context of the Area

(v) Size and Shape – the degree to which the size and shape of an existing area is conducive to it being, or becoming ecologically self-sustaining.

(vi) Connectivity – the extent to which the area has ecological value due to its location and functioning in relation to its surroundings. An area may be ecologically significant because of its connections to a neighbouring area, or as part of a network of areas of fauna habitat. For example an area may act as a corridor or stepping stone for movement/migration of species between or to areas of important habitat.

40. Ms Palmer¹⁶ and I agree that this site meets this criterion.

c) The Future Ecological Value of the Area

(vii) Long Term Sustainability – the degree to which an area is likely to maintain itself, taking into consideration:

- extent to which criteria in paragraphs A and B above are met**
- degree of historic modification to the area and its surroundings which affects its future**
- degree of resilience of species and habitats present**
- the effects of current management on identified ecological values**
- the extent to which the area has achievable potential, with management input, for restoration of ecological values which are significant in the Ecological District.**

41. In terms of sustainability I am of the opinion that it is unlikely that the current vegetation mix will be maintained in the longer term without significant management. Ms Palmer agrees¹⁷.

¹⁶ Ms Palmer's evidence at paragraph 24

¹⁷ Ms Palmer's evidence at paragraph 25

42. As I noted earlier in my evidence, the tussock grassland in particular is unlikely to be self-sustaining because of the small size of the area remaining, invasion of kanuka from the adjacent shrubland, the ongoing browsing by rabbits and hares and trampling and damage to plants by recreational users and their pets. I consider the most likely outcome at the site in the absence of significant management input would be that kanuka shrubland with a reasonably high weed presence would develop across the whole site in the medium – longer term. The area has been highly modified in the past. The vegetation at the site does not meet this criterion.

Other Matters

43. The District Plan notes that the fact that a particular area satisfies one or more of the above criteria does not necessarily mean the area is significant in the District Plan. The District Plan provides that in order to determine whether an area should be included as significant in the District Plan, the Council will also have regard to other specified matters. I addressed those in my assessment report at pages 12-13 and found:
- (a) The land is adjacent to residential housing and has been substantially modified in the past, including when it was formerly farmland.
 - (b) The Department of Conservation was advised of the proposal and did not provide any feedback (nor has it lodged a submission);
 - (c) The structure plan will ensure the remaining values and the areas of new planting are recognised and protected;
 - (d) The presence of both animals pests and weeds is high. Evidence of this is very obvious, particularly within the grassland areas;
 - (e) Implementing protection via a structure plan within the district plan is proposed as part of the plan change process;
 - (f) In general terms the values are under threat, with depleted tussock grassland in particular becoming increasingly rare both within the Pisa Ecological District and nationally. The degree of protection for tussock grassland within the Ecological District as

a whole is generally low. However in the absence of the plan change proposal, maintenance of the grassland is not guaranteed and the natural regeneration of the site is expected to be slower and more uncertain as to outcome. In my view the potential outcome for tussock grassland is better if the plan change is approved provided the management is carried on into the future.

- (g) Indigenous vegetation within the specific land environment is regarded as acutely threatened. Depleted grassland of the type found at the site is very rare and the degree of protection is generally low. Manuka or kanuka is rare and moderately poorly protected elsewhere. Again, in my view the long term outcome for kanuka will be better if the plan change is approved.
44. Ms Palmer does not refer to these 'other specified matters' directly in her evidence but relies on the presence of 'At Risk' species within an 'acutely threatened' land environment where there is vulnerability to further loss (through a lack of pest and weed control) as elevating the site to one of at least District significance in her view¹⁸.
45. I remain of the view that while the tussock grassland and the kanuka shrubland vegetation within the plan change site would trigger two of the significance criteria articulated in Appendix 5 of the District Plan (rarity and ecological context), because of the small extent and the highly modified nature of the vegetation, it can only be regarded as significant at a **local scale** or **a district scale at the best**.
46. As set out above, in the absence of the proposed plan change, I have very significant reservations about the sustainability of the very small area of tussock grassland at the site without substantial and ongoing attention to weed and pest control and management of recreational users (e.g. by construction of formed tracks). This degree of management would come at significant cost, and might also inconvenience users of the site (e.g. laying of poison might restrict dog walking on a regular basis). Furthermore I consider it most likely that the pre-human vegetation at the site would have been forest, and that shrubland is the most sustainable, and easily achievable, vegetation type at the site.

¹⁸ Ms Palmer's evidence at paragraph 26

Proposed District Plan

47. The criteria for assessing ecological significance in the proposed district plan according to Policy 33.2.1.9 are slightly different to those articulated in the operative plan which I have discussed above. Having reviewed Policy 33.2.1.9, I am of the opinion that the vegetation would still be regarded as significant under the regime in the proposed plan. Specifically the site would meet the representativeness, rarity and distinctiveness and possibly ecological context criteria (relating to the connectivity of shrubland habitats around the Lake). Ms Palmer does not specifically address this policy in her evidence.

ASSESSMENT OF EFFECTS

48. As stated earlier in my evidence, the plan change is expected to have less than minor adverse effects on fauna. Ms Palmer appears to accept that this is the case.
49. Approximately 60% of the tussock grassland and around half of the kanuka shrubland on the site will be retained, enhanced and protected. The locations of the grassland and shrubland to be protected and enhanced are shown in the Landscape Concept Plan attached to my evidence as Appendix 1.
50. In addition, approximately 2.5ha (24,795 m²) of new planting is proposed. The areas proposed for new planting are shown in green on the Landscape Concept Plan and include replacement of exotic grassland with native plantings as well as plantings to connect existing habitats and enhancement plantings within existing shrublands to increase diversity at the site.
51. These calculations reflect the changes made to the proposal after notification. The planting areas have been increased (Lots 5 and 6 have been removed and will be planted, the grassland planting on Lots 20 and 21 have been increased, and a large strip of planting is proposed along the north eastern edges of Lots 23 and 24). In addition, the planting that was proposed to occur on Lots 4, 7 – 12, and 20 – 22 are now within the Open Space zone.

52. I note that Ms Palmer disagrees with my calculation of the extent of vegetation clearance proposed in my assessment report. This matter is discussed further in the evidence of Mr Botting. In my assessment I relied on surveyed calculations provided by Patterson Pitts and I note that they did not include the proposed new short section of cycle track and the new walking tracks on the basis that the final alignment could be adjusted to limit vegetation removal. The same approach was applied to the fencing. I maintain that this approach is appropriate. Furthermore Mr Botting confirms in his evidence that most of the fencing (198 m of the 287 m) is located within the area proposed for replanting in any event. Ms Palmer has also included large parts of tussock grassland within Lots 13 – 15 for removal which were not included in my estimates on the basis that I expected owners would retain vegetation outside of building platforms. With the recent amendments to the proposal the amount of clearance proposed has been reduced to approximately 0.9894 ha (9894 m²) while the amount of planting proposed has increased to approximately 2.5 ha.
53. The goals of the enhancement and new planting are:
- (a) To retain tussock vegetation where practicable.
 - (b) To introduce diversity as part of the plantings using eco-sourced plants that are typical of shrubland habitat in the Wanaka area and specifically the Pisa Ecological District, but currently only rarely found at the site. In particular I have proposed including species that provide seasonal food for birds to assist in seed dispersal in the wider area and species that are not bird or wind dispersed (such as beech, *Fuscospora* spp.).
 - (c) To maintain or restore local ecological connectivity between patches of similar habitat (kanuka or tussock).
 - (d) To establish dense edge vegetation along new cut edges to buffer the changes brought about by clearance of kanuka and reduce weed invasion in both tussock and kanuka habitats.
 - (e) To increase the proportion of green leafy plants (i.e. those that are less flammable than kanuka) to reduce fire hazard closest to the proposed house sites.

- (f) To locate plants at appropriate microsites with respect to topography, drainage and aspect to positively influence their survival.
- 54. The planting has been designed to maximise ecological benefits. Locally sourced plants which would have been or are typical of shrublands in the Pisa Ecological District, but are not found currently at the site, will be used as well as kanuka and other species already present. This will aid in the functional restoration of the site and assist in revegetation in the wider vicinity which is currently limited by the lack of suitable seed sources for many species which could otherwise be expected to be present.
- 55. The species proposed to be used are listed in Table 1 on page 14 of my report. Some of those are plants are either "At Risk – declining" or "Threatened – nationally endangered".
- 56. These plants were chosen after considering which plants would naturally occur at the site, the growth habits and requirements of those plants, commercial availability (or able to be sourced), their success at similar sites elsewhere in Wanaka, and what rare or threatened plants could be included. As well as my own knowledge and discussions with the landscape designer for the project (Ms Stanford) I also referred to Meurk (1997), the plant distribution maps for species available on the New Zealand Plant Conservation Network website and the published flora with respect to plant preferences and distribution.
- 57. In addition to the plants listed in my report, I now have recommended that transplanting of prostrate blue grass and cushion pimelea be included in the planting plan. Specific mitigations for these species (and other grassland species occurring within affected areas) could include transplantation to a reserve area and monitoring to ensure survival and collection of seed/propagation to insure against loss of transplanted individuals and for use in the revegetation enhancement. Both of these matters are addressed in the Landscape Concept Plan.
- 58. In areas where there are isolated kanuka trees or small stands, these will be incorporated into the new planting.

59. Dense edge plantings are proposed along any newly cut edges to buffer habitats and improve ecotone quality by reducing weediness and minimising edge effects.
60. Notwithstanding my opinion that kanuka represents a more sustainable ecological community at the site, the obvious place where the fescue tussock grassland community could be protected, maintained and enhanced and mitigation for the species of conservation concern could be carried out is within the former Lots 5 and 6. The Landscape Concept Plan now addresses that matter.
61. Historically the tussock grassland at the site would have been maintained by grazing and other human activity. If left alone, the kanuka will likely continue to expand and come to dominate the tussock areas, replacing the existing species. Retention of tussock grassland at the site will likely require active management in perpetuity, whilst succession to kanuka, although requiring significant initial effort, would likely require less intervention in the longer term.
62. The presence of hares and rabbits, the thick thatch of exotic grass, the regular influx of kanuka seed, the small size of the area and distance from similar habitat as well as the regular disturbance by recreational users creates difficulties when seeking to protect and enhance the tussock grassland community at the site. Some of these difficulties are more easily dealt with if trees are planted.
63. In the longer term succession would likely also replace the kanuka with a different forest association. The form of that association will depend on the seed sources available.
64. The overall benefits of the enhancement planting proposed, include:
 - (a) Increased diversity of both plant species and habitats present;
 - (b) Opportunity to include threatened and at risk plants to assist in their conservation;
 - (c) Improved ecological connection between habitats (particularly shrublands at a landscape scale);

- (d) Enhanced ecological function with respect to buffering of habitats, seed dispersal, successional progress and seasonal food sources;
 - (e) Reduced edge effects and improved ecotone quality; and
 - (f) Contribution to improved ecological integrity as a result of the enhancement planting.
 - (g) Forest or shrubland vegetation is not preferred by rabbits and hares and as such once established, the habitats proposed would be less likely to support populations of these pests at levels that would require management.
65. I consider that the planting proposed is consistent with the objectives and policies of the operative District Plan which encourage the retention of existing indigenous vegetation in gullies and along watercourses as well as the maintenance of tussock grass-lands and other natural ecosystems in outstanding natural landscapes as part of subdivision developments¹⁹.
66. The incorporation of existing significant vegetation into developments and enhancement of native vegetation along with increased connectivity/ecological linkages is a preferred outcome of subdivision as articulated in the district plan. The plan change will result in improved connectivity, linking the kanuka shrublands between the edge of Lake Wanaka generally, Beacon Point, the banks of the Clutha River, the nearby Hikuwai Conservation Area and the Mt Iron Scenic Reserve, although the quality of the vegetation in those areas varies.

Assessment of the Objectives and Policies of the Operative District Plan

67. Ms Taylor has addressed the objectives and policies in Section 4.1.4 of the Operative District Plan (which relate to Nature Conservation Values) in her evidence. Her assessment is informed by my advice and I concur with her assessment.

¹⁹ Section 4.1

SUBMISSIONS

68. Some of the submissions on the plan change refer to the effects of the proposal on vegetation and bird life. I have addressed these effects in my assessment report and in my evidence. To the extent that I have not addressed those issues in my report or my evidence already, I deal with four of the submissions in more detail below.
69. The submission by Nick Brown (51/25) states that in Dr Brown's opinion, the tussock grassland would "be easily replenished with adequate rabbit control programmes and so is revertible to an improved natural state". I disagree with Dr Brown. As I have stated in my report and this evidence, there are multiple threats which reduce the potential viability of such a small area of grassland without considerable management input. These include the small size, isolation, the presence of exotic plant species, the presence of exotic animal species and regular disturbance. The costs of carrying out such management would be significant and the management (including kanuka removal) would likely be required in perpetuity. The cost burden of carrying out such management would probably fall on the Queenstown Lakes District Council, and I am of the opinion a forested habitat, whilst not necessarily easy to establish, is more achievable and sustainable at this site.
70. The submission by Nicola McGregor (51/33) raises the timeframe in which the new planting will become established and have positive effects. The proposal includes irrigation, mulching, annual fertilizer and protection from browsing as management actions to assist plant establishment. Assuming all those actions are implemented effectively, and allowing for the fact that growth rates will vary and some species live longer than others, I would expect shrubland vegetation to reach between 2 and 3 m tall within 5 – 10 years at this site and canopy cover to be achieved within 10 – 15 years. The time to maturity will vary, and some (precocious) species will produce seed more quickly than that, whilst others may not reproduce for many years.
71. The submission by the Council (51/155) suggests that the depleted tussock grassland could be improved when it is vested in Council "through pest management and better maintenance". I agree that

the existing vegetation could be improved through better custodianship, but as I have already discussed, such management will be expensive and is far from straightforward at such a highly used site adjacent to residential dwellings. It will also need to be carried out in perpetuity. I remain of the opinion that forest habitat is more sustainable at this particular site than tussock, particularly given the small size of the remnant area in question.

72. The Council also questions the viability of the planting proposed given the "exposed nature of the site from wind, maintenance, irrigation and pest control". I have noted above that the proposal includes irrigation, mulching, annual fertiliser application and protection from herbivores. I consider all those things necessary for at least the first few years to enable plant establishment given the exposed nature of the site and the large amount of rabbit and hare sign. The amended proposal requires the developer to do this work for 5 years and allows for up to 20% mortality.
73. The Council also questions whether the proposed ecological restoration will provide biodiversity benefits sufficient to compensate or offset the values of the vegetation removed. The amount of vegetation to be removed (approximately 9894 m²) is approximately one third of the combined amount of vegetation proposed for planting (approximately 2.5 ha) and enhancement (approximately 0.8 ha). Having taken into account the improvement in viability, connectivity, ecological integrity and ecological function that I expect would result from the proposal, and the fact that indigenous vegetation of the type occurring within the land environments affected are either acutely or chronically threatened and under-protected, I remain of the opinion there will be a net ecological benefit of the proposal.
74. The submission by Forest and Bird (51/162) does not oppose the development of Lots 7-12 and the associated planting provided the plants are indigenous and occur naturally in the area. I confirm that will be the case. The submission correctly identifies that Lots 7 -12 are located on exotic grassland and as such would not be considered ecologically significant.
75. The Forest and Bird submission raises a range of other issues. I respond to these as follows:

- (a) The submission alleges that the surveys which I undertook were inadequate in part because they were carried out in winter when certain native species cannot be seen. I agree that June is not an optimal time for ecological survey and for that reason (as well as time constraints specific to any particular project) species will always be missed. As such, my reference to published material such as the bird records provided by Robertson *et al.* (2007) and the ecosystem information encompassed within the Land Environment Classification and Threatened Environments Classification have an elevated importance because they contain information obtained over many years, from multiple observers, or from a diversity of similar sites. Given the scale and nature of the project, I do not consider that there were significant omissions that would have affected my assessment. I have concluded that the vegetation is significant at a local or ecological district level. While more species would have been recorded, I consider it unlikely that my assessment would have been materially altered by carrying out the survey at a different time of year (or carrying out multiple surveys).
- (b) The submission alleges that the species list in my report is incomplete and that two "At Risk" species were omitted. Ms Palmer, advising the Council, has identified prostrate blue grass (*Connorochloa tenuis*) and cushion pimelea (*Pimelea sericeovillosa* subsp. *pulvinaris*) at the site. When visiting the site recently I also noted cushion pimelea present. I have acknowledged that more species would have been detected had the survey been undertaken at a different time of year or if repeated visits were undertaken. Ecological surveys are always a trade-off between time spent and species recorded. It is not unusual for some species, particularly rare or visually cryptic species, to go undetected even after multiple visits by multiple people. The presence of at risk plants is to be expected given the rarity of the habitat type. The presence of rare species is relevant in the assessment of significance to the criterion "rarity" and I note that in my assessment I considered that the site met that criterion based on the rarity of the habitat (which as I have stated is indicative of the likely presence of rare

species). The only material difference that omission of any “at risk” or “threatened” species makes is that had they been identified, depending on their particular features, specific mitigation measures to protect those plants (such as inclusion in plantings or avoidance of their location) may have been proposed. I have suggested mitigation measures for these species above.

- (c) The National Priorities for protection of biodiversity on private land were not directly referenced in my report since they have no statutory weight. However they were a factor in my considerations. As explored in my report, indigenous vegetation within the affected land environments (N5.1c and N4.1d) are regarded as acutely threatened and chronically threatened respectively. The vegetation I have proposed for inclusion in the planting were derived from Wardle (1991)²⁰ as being typical of pre-human forests in the area. They are consistent with the studies I referred to in paragraph 22 of my evidence above. On the basis that the proposal includes planting with indigenous species typical of the area and protection of “acutely threatened” and “chronically threatened” land environments, it is consistent with National Priority 1²¹.
- (d) Forest and Bird consider that the proposed new woody planting would introduce alien species. I have considered the specific features of the site and the ecological district, including the botanical history, the apparently expanding kanuka at the site, the site’s location within what Wardle (2001) called “New Zealand’s steepest rainfall gradient” between the wetter Westland region where annual rainfall exceeds 3 m and the drier Otago and Canterbury, and other information available to me and described elsewhere in my evidence. In so doing I reached the conclusion that the most likely historical vegetation at this site is forest and that the short tussock grassland is a product of the history of disturbance and particularly pre-European burning and farming. On that basis I do not consider that the new

²⁰ Wardle, P. 1991. Vegetation of New Zealand. Cambridge University Press. 672 pp.

²¹ Department of Conservation and Ministry for the Environment 2007. Protecting our Places: Introducing the National Priorities for Protecting Rare and Threatened Native Biodiversity on Private Land. Ministry for the Environment, Wellington. 7 pp

planting introduces alien species, particularly since the species recommended are all native and all occur nearby. To the extent that they are not common within the vegetation at the moment, they are alien, but one of my objectives was to introduce additional diversity to assist in developing future ecological resilience.

- (e) Forest and Bird also consider there is insufficient protection of the short tussock grassland. I agree with Forest and Bird that short tussock grassland is a valuable and under-protected habitat. However after weighing up the various factors, I am also of the opinion that sustaining the small area of tussock grassland at the site in the longer term would be practically very difficult for the reasons I have outlined above, and that promoting and assisting the expansion of shrubland at the site is both ecologically appropriate and practically easier to achieve than seeking to maintain tussock grassland because of the specific ecological features of the site.
- (f) Forest and Bird also allege in their submission that the main purpose of these species is fire protection or screening. Ms Palmer and Dr Read also raise this. Neither of those assertions is correct. I am aware that shrubland would have the additional benefit of screening, but I was more concerned with ecological appropriateness of the species and introducing diversity and particularly fruiting species to the vegetation.
- (g) The concern about fire protection is one that originated with me. In my work at both Roy's Peninsula and in parts of the Far North District, concerns have been expressed to me about the risk to property of having expanses of dry vegetation such as bracken or manuka/kanuka, particularly near any buildings. In the Far North this has often contributed to a developer's desire to increase vegetation removal. Guidelines have been developed which are intended to reduce flammability of plantings near property and I considered these guidelines when developing the list of species. However, adherence with the guidelines was not my primary objective, and I am not an expert in fire risk reduction, rather my focus was on ecologically appropriate shrubland species, and increasing ecological connectivity at the

(very) local scale, so the resulting list cannot be described as primarily about fire protection.

- (h) Forest and Bird's position is that the ecological outcome for the site would be better if the land was left open space, woody weed species were controlled and some new species introduced. I disagree because the other threats I have discussed above (human disturbance, herbivores, small size, isolation and invasion by native woody species) would continue to operate and gradual diminution of the values of the grassland is the most likely outcome.
- (i) Forest and Bird consider that covenants would be insufficient to protect the vegetation (particularly tall vegetation) and would be hard to enforce at the site. I note the proposal has been amended with respect to covenanting, and I support the proposed change.
- (j) Forest and Bird state that this proposal would result in permanent loss of approximately 5 ha of indigenous vegetation in Acutely and Chronically Threatened Land Environments and submit there should be no further loss of indigenous vegetation in these environments. Their estimate of loss does not appear to have considered that the area encompassed by Lots 1 – 12 does not include substantial indigenous vegetation, rather vegetation there is limited to isolated kanuka trees within exotic pasture. The extent of the plan change site has now been reduced to approximately 4.37 ha and only approximately 0.9894 ha of vegetation will be removed.

CONCLUSION

- 76. Overall, the proposed plan change will result in an increased area of indigenous vegetation and will have a positive effect on the terrestrial ecology of the site and reflect the pre-human vegetation of the site, as well as the natural successional outcome which I expect will occur there. The ecological functioning, diversity and resilience of the site will be improved, as will the local connection between patches of shrubland habitat. I consider that this is consistent with the district plan which encourages the incorporation of existing significant

vegetation into developments, enhancement of native vegetation and increased connectivity and ecological linkages.

77. After considering the loss of approximately 0.9894 ha of indigenous vegetation and the planting and enhancement of around approximately 2.5 ha, as well as the other improvements in ecological function I have discussed, I remain of the view that the proposal will result in a net positive effect on the ecological values of the site.

Gary Bramley

August 2016

Appendix 1 – Landscape Concept Plan

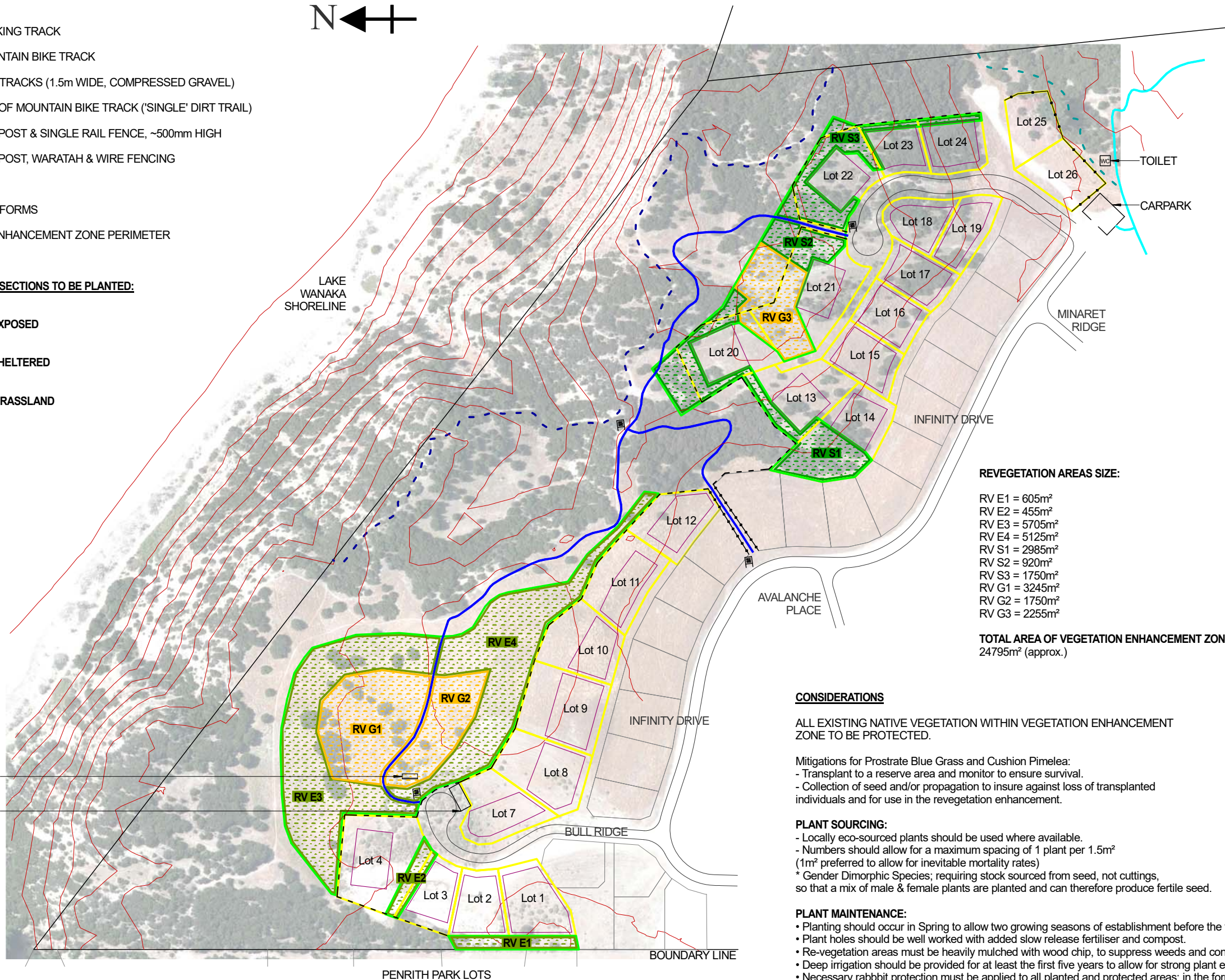
- KEY**
- EXISTING WALKING TRACK
 - EXISTING MOUNTAIN BIKE TRACK
 - NEW WALKING TRACKS (1.5m WIDE, COMPRESSED GRAVEL)
 - NEW SECTION OF MOUNTAIN BIKE TRACK ('SINGLE' DIRT TRAIL)
 - MACROCARPA POST & SINGLE RAIL FENCE, ~500mm HIGH
 - MACROCARPA POST, WARATAH & WIRE FENCING
 - TRACK SIGNS
 - BUILDING PLATFORMS
 - VEGETATION ENHANCEMENT ZONE PERIMETER

REVEGETATION SECTIONS TO BE PLANTED:

- SECTION 'E' - EXPOSED
- SECTION 'S' - SHELTERED
- SECTION 'G' - GRASSLAND

VIEWPOINT:
TIMBER BENCH SEAT
WITH DEDICATION PLAQUE

CARPARK



**SPECIES LIST FOR REVEGETATION SECTIONS 'E':
(EXPOSED TO SUN, FROST & WIND)**

Carmichaelia petriei
*Coprosma intertexta**
*Coprosma rugosa**
Corokia cotoneaster
Fuscopora cliffortioides
Griselinia littoralis
Hebe salicifolia
Leonohebe cupressoides
Melicytus alpinus
Olearia avicenniifolia
Olearia hectorii
Phormium cookianum
Phyllocladus alpinus
*Pittosporum tenuifolium**
Plagianthus regius
Chionochloa rigida
Chionochloa macra
Kunzea species -ecosourced from region

**SPECIES LIST FOR REVEGETATION SECTIONS 'S':
(SHELTERED AMONGST KANUKA, SHADY)**

*Aristotelia serrata**
*Coprosma lucida**
*Fuchsia excorticata**
Fuscopora fusca
Hoheria glabrata
*Podocarpus laetus**
*Pseudopanax colensoi**
Sophora microphylla
*Coprosma propinqua**
*Coprosma intexta**
*Coprosma crassifolia**
*Coprosma virescens**
Carmichaelia petriei
Olearia lineata
Teucrium parvifolium
Kunzea species -ecosourced from region

**SPECIES LIST FOR REVEGETATION SECTION 'G':
(TUSsock GRASSLAND)**

Hebe subalpina
Muehlenbeckia axillaris
Teucrium parvifolium
Festuca novae-zelandiae
Poa colensoi
Poa cita
Pimelea sericeovillosa
Anthosachne solandri
Melicytus alpinus
Carmichaelia petriei
*Coprosma petriei**
*Coprosma propinqua**
Kunzea species -ecosourced from region

REVEGETATION AREAS SIZE:

RV E1 = 605m²
RV E2 = 455m²
RV E3 = 5705m²
RV E4 = 5125m²
RV S1 = 2985m²
RV S2 = 920m²
RV S3 = 1750m²
RV G1 = 3245m²
RV G2 = 1750m²
RV G3 = 2255m²

TOTAL AREA OF VEGETATION ENHANCEMENT ZONE:
24795m² (approx.)

CONSIDERATIONS

ALL EXISTING NATIVE VEGETATION WITHIN VEGETATION ENHANCEMENT ZONE TO BE PROTECTED.

Mitigations for Prostrate Blue Grass and Cushion Pimelea:

- Transplant to a reserve area and monitor to ensure survival.
- Collection of seed and/or propagation to insure against loss of transplanted individuals and for use in the revegetation enhancement.

PLANT SOURCING:

- Locally eco-sourced plants should be used where available.
- Numbers should allow for a maximum spacing of 1 plant per 1.5m² (1m² preferred to allow for inevitable mortality rates)
- * Gender Dimorphic Species; requiring stock sourced from seed, not cuttings, so that a mix of male & female plants are planted and can therefore produce fertile seed.

PLANT MAINTENANCE:

- Planting should occur in Spring to allow two growing seasons of establishment before the first winter.
- Plant holes should be well worked with added slow release fertiliser and compost.
- Re-vegetation areas must be heavily mulched with wood chip, to suppress weeds and contain moisture.
- Deep irrigation should be provided for at least the first five years to allow for strong plant establishment.
- Necessary rabbit protection must be applied to all planted and protected areas; in the form of rabbit proof fencing, individual plastic sleeves around plants and poison programs.

CLEARANCE: ALL PINUS, PSEUDOTSUGA & CYTISUS ON SITE TO BE REMOVED.

SITE:

**PENINSULA BAY
NORTH END
PROPOSED PLAN CHANGE**

PLAN:

FOR:

**LANDSCAPE CONCEPT
INFINITY INVESTMENTS**

1 August 2016

REVISION:

L

