

Before Queenstown Lakes District Council

In the matter of The Resource Management Act 1991

And The Queenstown Lakes District proposed District Plan Topic 12
Upper Clutha Mapping

STATEMENT OF EVIDENCE OF KELVIN LLOYD FOR

Allenby Farms Limited (#502 and #1254)

Dated 04 April 2017

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lloyd.**

Qualifications and Experience

- 1 My name is Kelvin Michael Lloyd.
- 2 I am a Senior Ecologist employed by Wildland Consultants Ltd since 2004, based in Dunedin.
- 3 I have a Ph.D and B.Sc. (Hons) from the University of Otago, where my studies were primarily undertaken in the Department of Botany. Subsequent to University study I was awarded a three year Post-Doctoral Fellowship from the Foundation for Research, Science, and Technology, during which I was employed by Landcare Research in Dunedin. I have 17 years experience as a practicing ecologist. I am a member of the New Zealand Ecological Society, the New Zealand Botanical Society, the Botanical Society of Otago, the New Zealand Plant Conservation Network, the Ornithological Society of New Zealand, and the New Zealand Biosecurity Institute.
- 4 I am an author of 18 scientific papers published in peer-reviewed national and international scientific journals, and have presented aspects of my research at national and international conferences. I have lectured in plant ecology at 3rd year level at the University of Otago.
- 5 My work as an ecological consultant has covered a wide range of habitat types, from lowland estuaries, wetlands, and forests, to montane and alpine wetlands, grasslands, shrubland, forest, and cushion vegetation. I have considerable experience as botanist and am also experienced with forest birds through a significant forest bird habitat relations study that I helped design and implement. I have undertaken ecological assessments throughout New Zealand, including sites in Northland, Auckland, Waikato, Hawkes Bay, Wairarapa, Horowhenua, Wellington, Chatham Islands, Marlborough, Nelson, Canterbury, Buller, Westland, Otago, and Southland. I am an author of 2014 contract reports covering these assessments and have provided expert evidence in 18 resource consent or district plan hearings and in 27 Environment Court or similar hearings.
- 6 I have considerable experience in the ecology of the upper Clutha basin, including recent ecological assessments on terraces above the Hawea and Upper Clutha Rivers, and on high country sites such as Cluden, Robrosa, and Lowburn Valley pastoral leases. I have undertaken other assessments within Queenstown Lakes District in the Kawarau Gorge, Glenorchy, and sites around Queenstown. I provided technical advice to Queenstown Lakes District Council in relation to rezoning requests at Coronet Peak, Remarkable Ski Area, and Coneburn. I wrote a report on ecological processes in the South Island high country for the Parliamentary

Commissioner for the Environment's investigation into tenure review of pastoral leases.

- 7 I am also very experienced in the assessment of significant natural areas. Wildland Consultants has undertaken assessment of potentially significant natural areas in Dunedin City District, and for the last three years has been undertaking SNA assessments within the southern part of Waitaki District. During the course of this work, I have assessed and reported on 37 potential SNA sites in Dunedin City District, and assessed approximately 45 potential SNA sites in Waitaki District. The Waitaki District assessments are ongoing.
- 8 I have helped to define ecological significance criteria in several district and regional plans. I wrote a report¹ for Dunedin City Council on ecological significance criteria in the proposed Dunedin City District Plan. I also peer-reviewed ecological significance criteria proposed for the Otago Regional Policy Statement (RPS)². Through a consultative process, I developed ecological significance criteria for the operative Canterbury RPS³. I also developed non-statutory guidelines to facilitate interpretation of the Canterbury RPS criteria⁴. I provided expert evidence on ecological significance criteria for wetlands in West Coast Region. I have also provided technical advice on ecological significance criteria for the Buller District Plan and expert evidence on significance criteria before the independent hearings panel for the proposed Auckland Unitary Plan.
- 9 I am also familiar with the Threatened Environment Classification. In 2007, when the classification was first produced, I helped Landcare Research present and explain the classification in workshops for councils throughout New Zealand, and at two additional workshops for the Department of Conservation. I am an author of the original user guide to the classification⁵. I routinely interpret the Threatened Environment Classification as part of my work as an ecological consultant.

¹ Wildland Consultants 2014: Ecological significance criteria for the second generation of the Dunedin City District Plan. *Wildland Consultants Contract Report No 3298*. Prepared for Dunedin City Council.

² Wildland Consultants 2014: Review of draft ecological significance criteria for the Otago Regional Policy Statement. *Wildland Consultants Contract Report No. 3494*. Prepared for Davis Consulting Group Ltd.

³ Wildland Consultants 2011: Revised ecological significance criteria for indigenous vegetation and habitats of indigenous fauna and wetlands in Canterbury. *Wildland Consultants Contract Report No. 2289e*. Prepared for Environment Canterbury.

⁴ Wildland Consultants 2013: Guidelines for the application of ecological significance criteria for indigenous vegetation and habitats of indigenous fauna in Canterbury Region. *Wildland Consultants Contract Report No. 2289i*. Prepared for Environment Canterbury.

⁵ Walker S., Cieraad E., Grove P., Lloyd K., Myers S., Park T., and Porteus T. 2007: *Guide for users of the threatened environment classification*. Version 1.1, August 2007. Landcare Research, Lincoln.

- 10 I am very familiar with the Mt Iron site, having undertaken several ecological assessments of it in recent years.
- 11 In June 2015 I undertook a brief ecological assessment of the Little Mt Iron property and wrote an Environmental Management Plan (EMP), addressing woody weed control, fostering of natural succession, grassland management, planting to increase biodiversity, and 'fire-smart' planting. The EMP was updated in 2016⁶ after delayed feedback from the consent authority. This property was recently purchased by Allenby Farms Ltd.
- 12 I visited the Mt Iron site on which Mt Iron SNA C is located in September 2015 to provide preliminary advice on the most appropriate boundaries of the significant natural area (SNA). A report was provided in the same month⁷. Subsequently, more intensive field work was undertaken on the site, targeting rare plant species, lizards, and invertebrates, during the period 10-14 December 2016, as the September 2015 survey was brief and undertaken too early in the season to fully detect some ecological features and values. I was project manager for the December 2016 field work, undertook the assessment of indigenous vegetation and plant species, and am the lead author of the report describing the findings and conclusions, entitled 'Evaluation of a Proposed Significant Natural Area at Mt Iron, Wanaka', dated March 2017, attached to this evidence as Attachment 10.
- 13 In preparing this evidence I have reviewed:
- (a) The reports and statements of evidence of other experts giving evidence relevant to my area of expertise, including:
- (i) The statement of evidence of Mr Glenn Alister Davis on behalf of Queenstown Lakes District Council, dated 6 April 2016.
- (ii) The statement of evidence of Glenn Alister Davis on behalf of Queenstown Lakes District Council, dated 17 March 2017.
- (iii) The reply evidence of Mr Craig Alan Barr on Chapter 33 - Indigenous vegetation and biodiversity, on behalf of Queenstown Lakes District Council, dated 3 June 2016.

⁶ Wildland Consultants 2016: Environmental management plan for Little Mt Iron, Aubrey Road, Central Otago. *Wildland Consultants Contract Report No. 3722*, dated October 2016. Prepared for Kate and Peter Martin.

⁷ Wildland Consultants 2015. Evaluation of a potential significant natural area at Mt Iron, Wanaka. *Wildland Consultants Contract Report No 3762*, dated September 2015. Prepared for Allenby Farms Ltd.

- (iv) The Section 42A report/statement of evidence of Craig Barr on behalf of Queenstown Lakes District Council. Group 2 Wanaka Urban Fringe, dated 17 March 2017.
 - (b) Survey reports on the SNAs scheduled in the Proposed Queenstown Lakes District Plan (PDP)
- 14 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Scope of Evidence

- 15 I have been asked by Allenby Farms Ltd to prepare evidence in relation to the most appropriate boundary for an SNA on Mt Iron and in relation to wider ecological values and opportunities at Mt Iron. This includes:
- (a) An evaluation of the relevance of the Threatened Environment Classification for determining the significance of sites.
 - (b) An evaluation of the approach used to determine ecologically significant sites in Queenstown Lakes District in general.
 - (c) An evaluation of the approach used to determine the proposed Mt Iron SNA C.
 - (d) The ecological values of the Allenby Farms site.
 - (e) Suggestions for a more appropriate SNA boundary on the Allenby Farms land.
 - (f) Active management requirements for indigenous vegetation and habitats at Mt Iron.
 - (g) Consideration of the ecological opportunities resulting from the recent purchase by Allenby Farms of the adjoining Little Mt Iron property.

Executive Summary

- 16 The Threatened Environment Classification classifies Level 4 land environments (Land Environments of New Zealand; LENZ) according to their national extents of remaining indigenous cover and legal protection. The classification uses the Land Cover Data Base (LCDB), for the extent of indigenous cover, as it is the only national database with indigenous cover information, but it has a number of deficiencies when applied at a finer scale.

- 17 The Threatened Environment Classification is an abstract classification that does not directly relate to vegetation, habitats, and species at a particular site. As the classification is national in scope, local patterns of cover and legal protection may differ from the national pattern. This is the case at Mt Iron, where land environment N4.1d, which covers most of Mt Iron, has 39% indigenous cover locally, compared with the national value of 18.6% indigenous cover. As a result of these issues, the Threatened Environment Classification should not be the only basis for assessment of ecological significance.
- 18 There is no evidence that the notified Mt Iron SNA C was assessed using information collected in the field at the Mt Iron site. This desktop assessment of significance does not represent best practice.
- 19 The Allenby Farms land at Mt Iron supports important indigenous biodiversity values, including four nationally Threatened and seven nationally At Risk taxa, a strong ecological gradient, diverse indigenous plant and invertebrate habitats, and good habitat for common indigenous birds. Many of these values are located outside the notified Mt Iron SNA C.
- 20 An alternate SNA, which would include all ecologically significant values, but exclude more modified kānuka woodland in the northern end of the notified Mt Iron SNA C, is proposed. The alternate SNA would achieve significantly greater protection of ecological values than the notified Mt Iron SNA C. Active management of the alternate SNA would enable maintenance of indigenous biodiversity values at the site, whereas passive management of the notified SNA would not.
- 21 Ecological management actions - such as control of woody weeds, monitoring and if warranted, control of pest animals, planting of indigenous trees and shrubs which were formerly present, and encouraging sensitive use of the site for recreation - would enhance the ecological values of the alternate SNA. This would represent a significant improvement compared to the management of SNAs required under the PDP.
- 22 Future management of the 'discard area' at the northern end of the notified Mt Iron SNA C would be subject to the Chapter 33 indigenous vegetation clearance rules. A forest restoration project would provide potential mitigation for any effects of clearance of kānuka woodland in this area. Kānuka woodland does not represent the original vegetation in this part of the site, which most likely comprised forest dominated by podocarps and broadleaved tree species.
- 23 Recent purchase of adjacent land at Little Mt Iron by Allenby Farms provides an excellent indigenous forest restoration site. Holistic management of this

land, together with the alternate SNA and Mt Iron Scenic Reserve, would enable Mt Iron to become a very important ecological area in the local landscape.

Relevance of the Threatened Environment Classification to ecological significance

- 24 The Threatened Environment Classification classifies Level 4 land environments according to the extent of indigenous cover remaining, and the extent of legal protection for indigenous biodiversity purposes, within each land environment. The amount of indigenous cover remaining is determined from LCDB, while protection status is taken from a protected areas database. The classification results in six levels (Table 1).

Table 1. Categories of the Threatened Environment Classification

TEC Category	Cover/Protection Attributes
Acutely Threatened	<10% indigenous cover remaining
Chronically Threatened	10-20% indigenous cover remaining
At Risk	20-30% indigenous cover remaining
Critically Underprotected	>30% indigenous cover, <10% protected
Underprotected	>30% indigenous cover, 10-20% protected
Less Reduced and Better Protected	>30% indigenous cover, >20% protected

- 25 The first three categories of the Threatened Environment Classification relate only to the amount of indigenous cover remaining, expressed in 10% thresholds (Table 1). Where land environments have at least 30% indigenous cover remaining, there are three additional levels that relate to protection status (Table 1). Cover thresholds in the classification reflect the general non-linear relationship between species and area, with species loss accelerating as the area of remaining habitat declines.
- 26 The Threatened Environment Classification for land environments within five kilometres of Mt Iron is shown in Attachment 1.
- 27 LENZ, which is used to express the Threatened Environment Classification spatially, is a national-scale layer that classifies land environments (it doesn't include rivers or lakes) according to a model based on climate, soil, and topographical data that is relevant to the distribution of New Zealand forest trees. LENZ includes no information on vegetation and is not a surrogate for vegetation types. A key difference of LENZ from other frameworks - such as ecological districts - is that similar environments are grouped together regardless of their geographical locations. While Level 4 of LENZ, which contains 500 land environments nationally, is the most detailed level of LENZ, this level still constitutes a broad scale with single land environments

containing many ecosystem, vegetation, and habitat types. The Threatened Environment Classification uses Level 4 of LENZ as its scale of reference.

- 28 Like LENZ, LCDB is a national scale habitat layer, but differs in that it maps broad cover types across New Zealand from aerial imagery. The land cover database has a number of deficiencies, including low resolution - which means that small and linear fragments of indigenous vegetation are not picked up - and low thematic resolution, which means that only broad cover types are mapped (for example there are only two indigenous forest classes). There are also many misclassification errors, where the wrong cover type has been assigned to a polygon. In addition, there are difficulties in mapping mixed indigenous and exotic shrubland and grassland, which are relevant when each broad type has to be assigned to either an indigenous or exotic type within the Threatened Environment Classification. All of these issues should be borne in mind when using information based on LCDB.
- 29 The extent of legal protection is taken from a 'protected areas database' that includes conservation land, QEII covenants, and other areas with legal protection for maintenance and enhancement of indigenous biodiversity.
- 30 Thus the key features of the Threatened Environment Classification are its national scale, and that it is an abstract classification that does not directly relate to vegetation, habitats, and species at a particular site. In my opinion the Threatened Environment Classification is not a substitute for site-based information, but can be used for purposes such as:
- Showing where it would be valuable to restore indigenous vegetation.
 - Defining areas where it is important to address the effects of additional indigenous vegetation clearance.
 - Prioritising areas where legal protection of indigenous biodiversity should be targeted.
 - Providing national or regional contexts to an ecological significance assessment.
 - State of the environment reporting where, for example, the location of restoration projects can be reported by threatened environment category.
- 31 The Threatened Environment Classification for land environments within five kilometres of Mt Iron is shown in Attachment 1.
- 32 The Threatened Environment Classification should not be used as the sole basis for determining the ecological significance of a site, as this requires

information on the actual ecological values present. As Mr Davis notes, where he is quoted in the Chapter 33 reply evidence of Mr Craig Barr⁸, the Threatened Environment Classification should not be used in isolation.

- 33 The original user guide to the Threatened Environment Classification⁹ - of which I am an author - explicitly states that the classification is not a substitute for field survey, and that there is a risk that it might give users a false sense of objectivity. The user guide states that the classification provides national context, but in protection and resource management decision-making, it cannot substitute for on-the-ground assessment of the indigenous biodiversity that is actually there. The guide notes that the classification is based on national data sets that have limitations at local and property scales.
- 34 I am aware that the proposed National Policy Statement on Indigenous Biodiversity suggests that land environments with less than 20% of their original cover remaining, which comprises the Acutely Threatened and Chronically Threatened categories of the Threatened Environment Classification, could be a significance criterion. Submissions on the proposed NPS include some that refer to the limitations of using the Threatened Environment Classification at smaller scales, particularly at the property level or for finer-scale analyses of ecosystems¹⁰. A significant number of submissions wanted the scope of the 20% criterion to be narrowed or for the criterion to be removed altogether¹¹.

Approach used to determine the ecological significance of sites in general

- 35 In Section 6 of his evidence dated April 2016, Mr Davis outlines the methods used to determine the ecological significance of sites listed in the PDP.
- 36 I note that the four national priorities listed in paragraph 6.6 of Mr Davis' evidence are not addressed by the ecological significance criteria that Mr Davis outlines in paragraphs 6.3-6.5 of his evidence, despite Mr Davis stating that the national priorities were important to the context and definition of the representativeness and rarity criteria¹². As the national priorities relate

⁸ Paragraph 5.9 of the Chapter 33 reply evidence of Mr Barr.

⁹ Walker S., Cieraad E., Grove P., Lloyd K., Myers S., Park T., and Porteus T. 2007: *Guide for users of the threatened environment classification*. Version 1.1, August 2007. Landcare Research, Lincoln.

¹⁰ Ministry for the Environment 2011: Proposed National Policy Statement on Indigenous Biodiversity Summary of Submissions.

¹¹ Ministry for the Environment 2011: Proposed National Policy Statement on Indigenous Biodiversity Summary of Submissions.

¹² Paragraph 6.8 of the evidence of Mr Davis dated April 2016

to rare and threatened indigenous biodiversity¹³, it is not clear how they would assist the definition of representativeness.

- 37 Mr Davis' evidence of April 2016 is inconsistent where he first states that the significance criteria - which don't refer to the Threatened Environment Classification - were the basis for assessment of potential SNAs¹⁴, but then states that the classification was adopted to determine significance where there was indigenous vegetation on land environments with less than 20% of their original cover remaining¹⁵.
- 38 As the Threatened Environment Classification is expressed at a national scale, Mr Davis is not necessarily correct where he states that "The Threatened Environment Classification provides a landscape scale map of areas within the district that contain less than 20% indigenous vegetation cover remaining"¹⁶. There is always potential that at the local level, land environments may have more than 20% indigenous cover remaining, with more loss occurring on the same land environments elsewhere in New Zealand.
- 39 For example, Level 4 land environment N4.1d, which is the land environment at Mt Iron that the classification shows has 18.6% (*i.e.* <20%) of its original cover remaining, occurs on lower hillslopes in Central Otago and the upper Waitaki Valley (Attachment 2). It is noted for warmer temperatures (in relative terms) and steep hills, compared to other level N4 land environments.
- 40 Wildlands GIS staff have mapped indigenous vegetation cover classes from LCDB version 4.1 on land environment N4.1d within a five kilometre radius of Mt Iron. In total, there is 297 ha of indigenous cover on land environment N4.1d within five kilometres of Mt Iron, principally mānuka and/or kānuka (172 ha), fernland (97 ha), and matagouri or grey scrub (24 ha) (Attachment 3). The total area within this five kilometre radius is 762 ha; thus based on LCDB4.1 there is 39% indigenous cover on land environment N4.1d locally.
- 41 Following completion of a desktop assessment incorporating many sources of information, the process of SNA identification moved to verification of the sites that had been identified using the desktop assessment. This is consistent with best practice for identification of SNAs. Field assessment is also important to identify non-forest habitats - including some wetland,

¹³ Paragraph 6.6 of the evidence of Mr Davis dated April 2016

¹⁴ Paragraph 6.9 of the evidence of Mr Davis dated April 2016

¹⁵ Paragraph 6.12 of the evidence of Mr Davis dated April 2016

¹⁶ Paragraph 6.13 of the evidence of Mr Davis dated April 2016

grassland, and rock outcrop habitat types - that are not easily identified using desktop methods.

- 42 At the completion of the field assessments, a total of 147 sites had been identified with values consistent with the significance criteria¹⁷. One of these sites is Mt Iron SNA C.

Approach used to determine the ecological significance of Mt Iron SNA C

- 43 Mt Iron SNA C primarily comprises 'kānuka woodland' on the Allenby Farms land, but also includes areas of open grassland and herbfield, two houses and their associated access roads, and two water tanks. Mt Iron SNA C does not appear to have had any field verification, because the report¹⁸ on this site does not contain any site-specific information based on field work that is typically found in other SNA site reports. The site report for Mt Iron SNA C contains no GPS waypoints or photographs, no vegetation description beyond 'kānuka woodland', no list of plant species, no lists of Threatened or At Risk, or locally important species, and only notes indigenous fauna that the site is 'expected' to provide habitat for. Similarly, the report states that no Threatened species are 'expected' to be present. Conclusions for significance note that the vegetation is degraded, but assess it as being significant due to its relatively large area within a Level IV land environment that has been estimated to have less than 20% of its original vegetation cover remaining. Thus the occurrence of the kānuka woodland within Mt Iron SNA C on a Chronically Threatened land environment of Threatened Environment Classification appears to be the sole basis for the assessment of significance.
- 44 Very similar ecological information and justifications of ecological significance are contained within the reports on Mt Iron SNA D and Mt Iron SNA H on the slopes of Little Mt Iron, suggesting that none of these SNAs were verified with information collected in the field. The reports for Mt Iron SNA D and Mt Iron SNA H do contain photographs from nearby viewpoints, but no photographs from within the sites.
- 45 In contrast, the assessments of the proposed Congreve SNA A and Coopers SNA B on the upper Clutha outwash plains near Mt Iron contain more detailed vegetation descriptions and photographs, identify At Risk plant and bird species, and were clearly based on field inspections.
- 46 As Mt Iron SNA C was only justified as being significant by virtue of being a relatively extensive area of indigenous vegetation within a Chronically

¹⁷ Paragraph 6.30 of the evidence of Mr Davis dated April 2016

¹⁸ Accessed 27 Mar 2017 from <http://www.qldc.govt.nz/planning/district-plan/district-plan-review/significant-natural-areas/group-e/>

Threatened land environment, it does not appear to be consistent with the ecological significance criteria outlined in paragraphs 6.3-6.5 of the evidence of Mr Davis.

- 47 In my opinion, the desktop-only basis of the assessment of Mt Iron SNA C does not represent best practice, and its assessment as significant based on its location on Chronically Threatened land environments should be viewed with caution, and needs to be supported by information on site features and values. Mr Davis does not exercise this caution where he discusses the boundary of the Mt Iron SNA C in paragraph 8.32 of his evidence dated 06 April 2016, though he stresses the need for it in paragraph 7.9. As I noted in paragraph 24 above, Mr Davis has also expressed an opinion that the Threatened Environment Classification should not be used in isolation.
- 48 In his more recent evidence dated March 2017, Mr Davis states that Mt Iron SNA C has significant ecological values¹⁹, but provides no additional information on what those values are, beyond referring to the assessment report.

Ecological values on the Allenby Farms Ltd land

- 49 Subsequent to the September 2016 field work Wildland Consultants staff undertook on the Allenby Farms land at Mt Iron, and in order to inform the preparation of this evidence, Wildland Consultants was requested to undertake additional site investigations, the results of which are detailed in a report dated March 2017 (Attachment 10). The Allenby Farms site is very important for the maintenance of indigenous biodiversity. It provides habitat for four Threatened and four At Risk plant taxa (Attachment 4), one At Risk bird species, two At Risk lizard species (Attachment 5), one At Risk invertebrate species (Table 2), and diverse indigenous plant and invertebrate assemblages. The Threatened and At Risk species occur mostly in habitats outside kānuka woodland, including turf habitats maintained by rabbit browse, large rock outcrops, and coprosma shrubland on the shady southern faces (Attachments 6 and 7). Thus the kānuka woodland that was identified as being significant after the desktop process, has proven on the basis of its actual site values to have relatively low ecological value compared to other habitats on the Allenby Farms land. The main value of the kānuka woodland is as habitat for indigenous bird and invertebrate species.

¹⁹ Paragraph 6.14 of the evidence of Mr Davis dated March 2017.

Table 2. Threatened and At Risk taxa recorded on Allenby Farms land at Mt Iron

Species/taxon	Group	Threat Classification
<i>Acaena</i> aff. <i>rorida</i> 'Poolburn'	Plant	Threatened-Nationally Critical
<i>Carmichaelia kirkii</i>	Plant	Threatened-Nationally Vulnerable
<i>Myosotis brevis</i>	Plant	Threatened-Nationally Vulnerable
<i>Rytidosperma merum</i>	Plant	Threatened-Nationally Vulnerable
<i>Acaena buchananii</i>	Plant	At Risk-Declining
<i>Mentha cunninghamii</i>	Plant	At Risk-Declining
<i>Pimelea sericeovillosa</i> subsp. <i>pulvinaris</i>	Plant	At Risk-Declining
<i>Leptinella serrulata</i>	Plant	At Risk-Naturally Uncommon
<i>Oligosoma</i> aff. <i>polychroma</i> Clade 5	Lizard	At Risk-Declining
<i>Woodworthia</i> 'Cromwell'	Lizard	At Risk-Declining
<i>Falco novaeseelandiae</i> 'eastern'	Bird	At Risk-Recovering
<i>Meterana exquisita</i>	Moth	At Risk-Recovering

- 50 As Allenby Farms is considering residential development activities in the northern part of the notified Mt Iron SNA C, we paid specific attention to this area. We found this part of the kānuka woodland to be the most modified by existing development activities and weed invasion, and also to have the lowest diversity and abundance of indigenous plant, invertebrate, and lizard species. On this basis, we recommended that a gully in this northern zone should be retained within Mt Iron SNA C as it supports large rock outcrops that are habitat for the At Risk Cromwell gecko (*Woodworthia* 'Cromwell') and Threatened grass *Rytidosperma merum*, and small examples of indigenous turf vegetation. Apart from one finding of Cromwell gecko, we did not record any other Threatened or At Risk taxa in the remaining part of this northern zone that is denoted 'discard from SNA' in Attachments 6 and 7.

Delineation of an ecologically appropriate SNA at Mt Iron

- 51 The March 2017 report confirms our earlier recommendation that Mt Iron SNA C be extended to the south to incorporate the entire ecological gradient across the Allenby Farms land - incorporating dry ridges that support indigenous turf plants, and diverse coprosma shrubland on the southern faces - capture all of the known indigenous vegetation and habitat types, and all of the known significant habitats of Threatened and At Risk plants, lizards, and invertebrates. A much greater range of values would be protected by this alternate Mt Iron SNA C, compared to the notified Mt Iron SNA C.
- 52 As described above, kānuka woodland on the lower northern slopes does not need to be included within Mt Iron SNA C, apart from where it is an integral component of the gully that should remain within the SNA. While this 'discard from SNA' area occurs within land environments that have less than 20% indigenous cover remaining nationally, these land environments

have 39% indigenous cover locally. In addition, we have shown through the site investigations that most important ecological values occur outside kānuka woodland habitat, and many occur in areas outside the notified Mt Iron SNA C. As noted earlier in my evidence, the kānuka woodland within notified Mt Iron SNA C was assessed as being significant primarily on the basis of information from the Threatened Environment Classification. This classification can provide useful context for an assessment of ecological significance but has limitations at the individual site level, and should not be used in isolation.

- 53 The alternate Mt Iron SNA C has much higher ecological value than the notified Mt Iron SNA C, and will deliver much better protection for the ecological features and values on the Mt Iron site.
- 54 A number of management actions should be undertaken within the alternate Mt Iron SNA C, including control of woody weeds, monitoring of pest animals and their effects, planting of ecologically valuable indigenous trees and shrubs, and encouraging less disturbance of rocky habitat. If these actions are undertaken they would represent a significant improvement under the rezoning proposal compared to under the reply version of Chapter 33, which would allow farming practices to continue and would require no ongoing management of ecological values.
- 55 These management actions would also be consistent with the management of SNAs that is required under the PDP, which primarily restrict clearance of indigenous vegetation from SNAs.

Future management of the Mt Iron site

- 56 As noted above, Allenby Farms is considering options for residential development in the northern part of the notified Mt Iron SNA C, which we have annotated as 'discard from SNA in Figures 6 and 7. I understand that the proposed building platforms in this area would require clearance of 1.1 ha of kānuka woodland, out of a total of 10.9 ha of kānuka woodland within the proposed zone (and a much larger extent of kānuka woodland elsewhere on Mt Iron and Little Mt Iron). This level of clearance would have minimal effect on indigenous forest birds given the extent of forest bird habitat available locally (Attachment 8), and the effects of indigenous vegetation clearance could easily be dealt with through positive actions that would be of benefit to the SNAs on Mt Iron. The outcome of minor loss of kānuka would be more than offset by the ecological benefits of the proposed ecological management regime.
- 57 Recent purchase by Allenby Farms of adjacent land at Little Mt Iron significantly enhances the opportunity to realise these benefits, as it contains

Mt Iron SNA D, which comprises two areas containing kānuka woodland and coprosma shrubland (Figure 9), and other areas of kānuka that are less dense but which will continue to regenerate naturally under appropriate management. The saddle between Mt Iron and Little Mt Iron provides an excellent opportunity for restoration of indigenous forest vegetation containing podocarps and broadleaved trees that are currently uncommon at Mt Iron or were formerly present but are no longer present. These include broadleaf (*Griselinia littoralis*), kōhūhū (*Pittosporum tenuifolium*), tī kouka/cabbage tree (*Cordyline australis*), kōwhai (*Sophora microphylla*), lowland ribbonwood (*Plagianthus regius*), narrow-leaved lacebark (*Hoheria angustifolia*), fierce lancewood (*Pseudopanax ferox*), and the podocarps matai (*Prumnopitys taxifolia*) and Hall's tōtara (*Podocarpus laetus*).

- 58 The recommended planting site is on a sheltered toeslope with relatively moist soil and, historically, would almost certainly have supported broadleaved forest. This site is directly adjacent to Mt Iron SNA D-1, helping to buffer it from edge effects such as weed invasion and exposure. The planted trees would ultimately provide a seed source for the colonisation of the planted tree species into kānuka woodland habitats elsewhere on Mt Iron and Little Mt Iron, including Mt Iron SNA C, Mt Iron SNA D, and Mt Iron SNA H (Attachment 9). Broadleaved trees provide greater shading and through natural succession will help to shade out Scotch broom (*Cytisus scoparius*) which is widespread on the eastern faces of Little Mt Iron. Scotch broom does not tolerate heavy shading.
- 59 Another important positive action required on both Mt Iron and Little Mt Iron is the control of existing wilding exotic trees, and ongoing control of any that invade in the future. Wilding exotic trees at the site include both wilding conifers and species such as hawthorn (*Crataegus monogyna*), elder (*Sambucus nigra*), wilding plums and cherries (various *Prunus* spp.), and sycamore (*Acer pseudoplatanus*). Eucalypt seedlings are also establishing around a mature eucalypt tree beside one of the existing residences within the 'discard from SNA' area. Control of these wilding trees is important, because if not controlled, they will ultimately form dense exotic forest that would exclude both kānuka woodland and rare plant habitats on Mt Iron. All of the Mt Iron SNAs would be vulnerable to these effects. As noted above, the PDP does not require active management of SNAs. Wilding tree control represents a significant positive action to deal with a significant threat to SNA condition.
- 60 Pest animal densities on Mt Iron are currently unknown, but possum (*Trichosurus vulpecula*), hedgehog (*Erinaceus europaeus*), and cat (*Felis catus*) sign was observed at the site, and mustelids (*Mustela* spp) and rodents (*Rattus* spp. and *Mus musculus*) will very likely be present.

Monitoring to better understand the activity of these pest animals on Mt Iron could be undertaken, and control of pest animals if warranted by monitoring results.

- 61 Potential adverse effects of residential development include inappropriate planting around residential areas, and escape of garden weeds into surrounding habitat. These issues can be dealt with by prohibiting the planting of pest plants within sites.
- 62 Another issue for residential development within stands of kānuka woodland is fire hazard. 'Firesmart' principles focus on reducing the amount of combustible fuel at ground level and maintaining green 'defensible space' around buildings²⁰. Kānuka, and its litter, is highly flammable and presents a medium through which fire will travel readily. Conversely, species such as broadleaf, fierce lancewood, lowland ribbonwood, and narrow-leaved lacebark have relatively low flammability and can be used in 'green breaks' or 'defensible space' to reduce the spread of fire²⁰. Planting of these species around residential areas would therefore both reduce the fire hazard and help to restore the former broadleaved forest that would have been present on these toeslope sites with deeper soils.
- 63 If residential development requiring kānuka woodland clearance is consented in the 'discard from SNA' area, it is my view that conditions should be attached to the consent that require:
- (a) Planting of kānuka, broadleaf, kohuhu, kowhai, ti kōuka/cabbage tree, lowland ribbonwood, narrow-leaved lacebark, fierce lancewood, matai, and Hall's totara in the 0.4 ha potential forest restoration site shown in Attachment 9.
 - (b) Initial knockdown and subsequent ongoing surveillance and control of wilding conifers, wilding plums and cherries, eucalypt saplings, hawthorn, elder, and sycamore.
 - (c) Monitoring of pest animal activity on Mt Iron, and control of pest animals if warranted.
 - (d) Preferential use of broadleaf, fierce lancewood, lowland ribbonwood, and narrow-leaved lacebark as components of any green breaks required around residential buildings for 'fire smart' purposes.
- 64 The Mt Iron site has the potential to become a very important ecological area within the local landscape if it is actively managed to benefit its current and

²⁰ National Rural Fire Authority 2004: FireSmart: protecting our communities from interface fires. National Rural Fire Authority, Wellington.

potential indigenous biodiversity values. Holistic management of most of the Mt Iron and Little Mt Iron landforms would certainly promote this.

Conclusion

- 65 The Threatened Environment Classification is a useful national and regional level tool, but should not be used on its own to determine the ecological significance of a site. Land environment N4.1d has less than 20% indigenous cover nationally, but locally has 39% indigenous cover.
- 66 Detailed site investigations of the Allenby Farms property on Mt Iron have shown that it is an important site for indigenous biodiversity and some of its ecological features and values have national-level threat categories.
- 67 The notified Mt Iron SNA C captures some of these values, but important populations of Threatened and At Risk plant, lizard, and invertebrate taxa, and diverse indigenous vegetation types and habitats, fall outside the notified SNA.
- 68 An alternate SNA incorporating almost all of these populations, containing all known vegetation types and habitats on the Allenby Farms Ltd land, and containing the most diverse habitats for plants and invertebrates, is proposed instead of the notified SNA. Much of the notified SNA would be retained, but an extension to the south is necessary to encompass the above features, and a more modified area of low diversity kānuka woodland in the north of the notified SNA does not need to be included.
- 69 Active ecological management of the SNAs on Mt Iron will be required if their indigenous biodiversity values are to be maintained in the long-term.

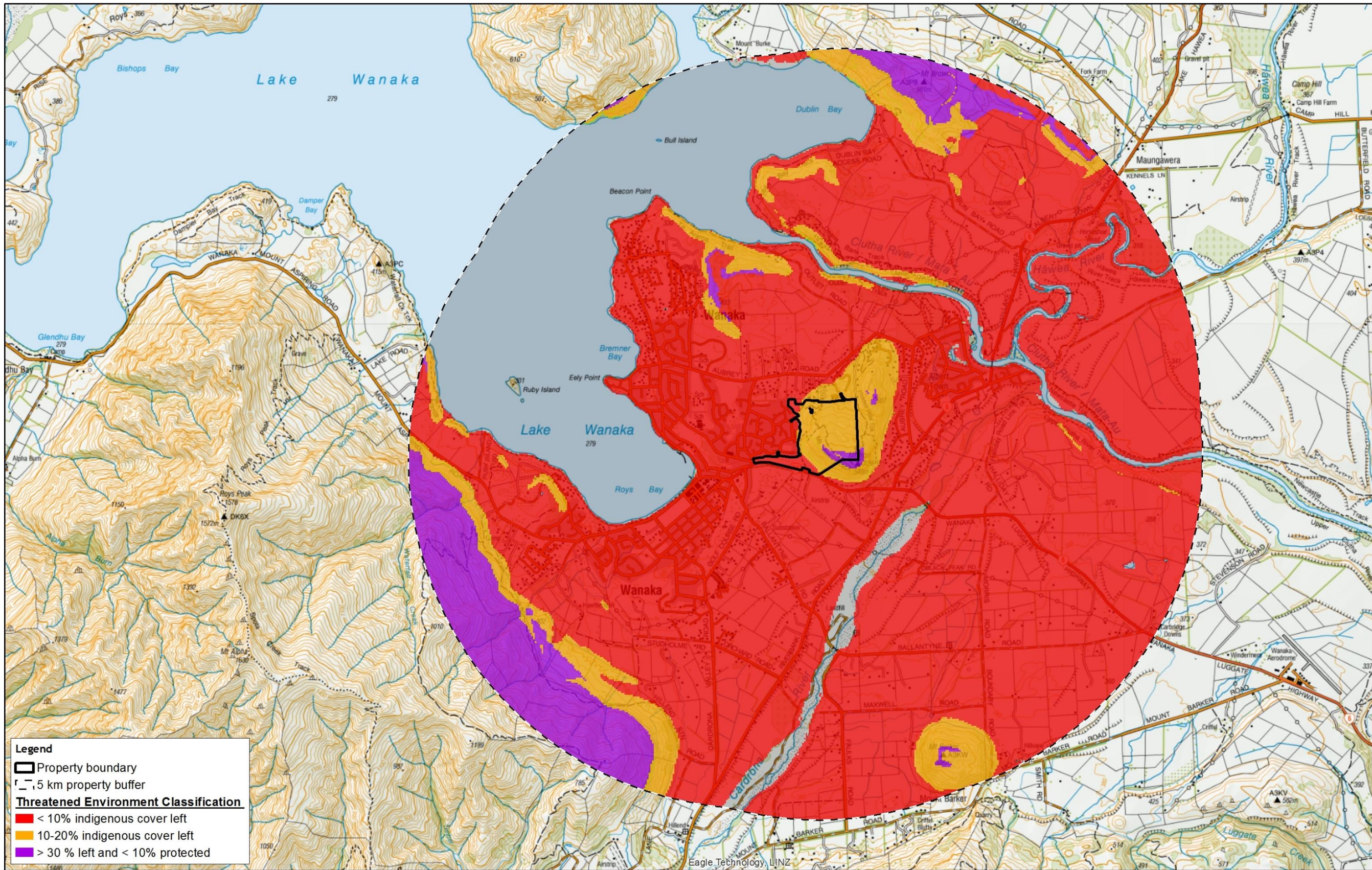
Dated this 04th day of April 2017

A handwritten signature in black ink that reads "Kelvin Lloyd". The signature is written in a cursive, flowing style.

Kelvin Lloyd

ATTACHMENT 1:

THREATENED ENVIRONMENT CLASSIFICATION
OF LAND ENVIRONMENTS WITHIN 5 KM
OF MT IRON



Legend

- Property boundary
- 5 km property buffer
- Threatened Environment Classification**
- < 10% indigenous cover left
- 10-20% indigenous cover left
- > 30 % left and < 10% protected

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Figure 1. Threatened Environment Classification of land environments within 5 km of Mt Iron

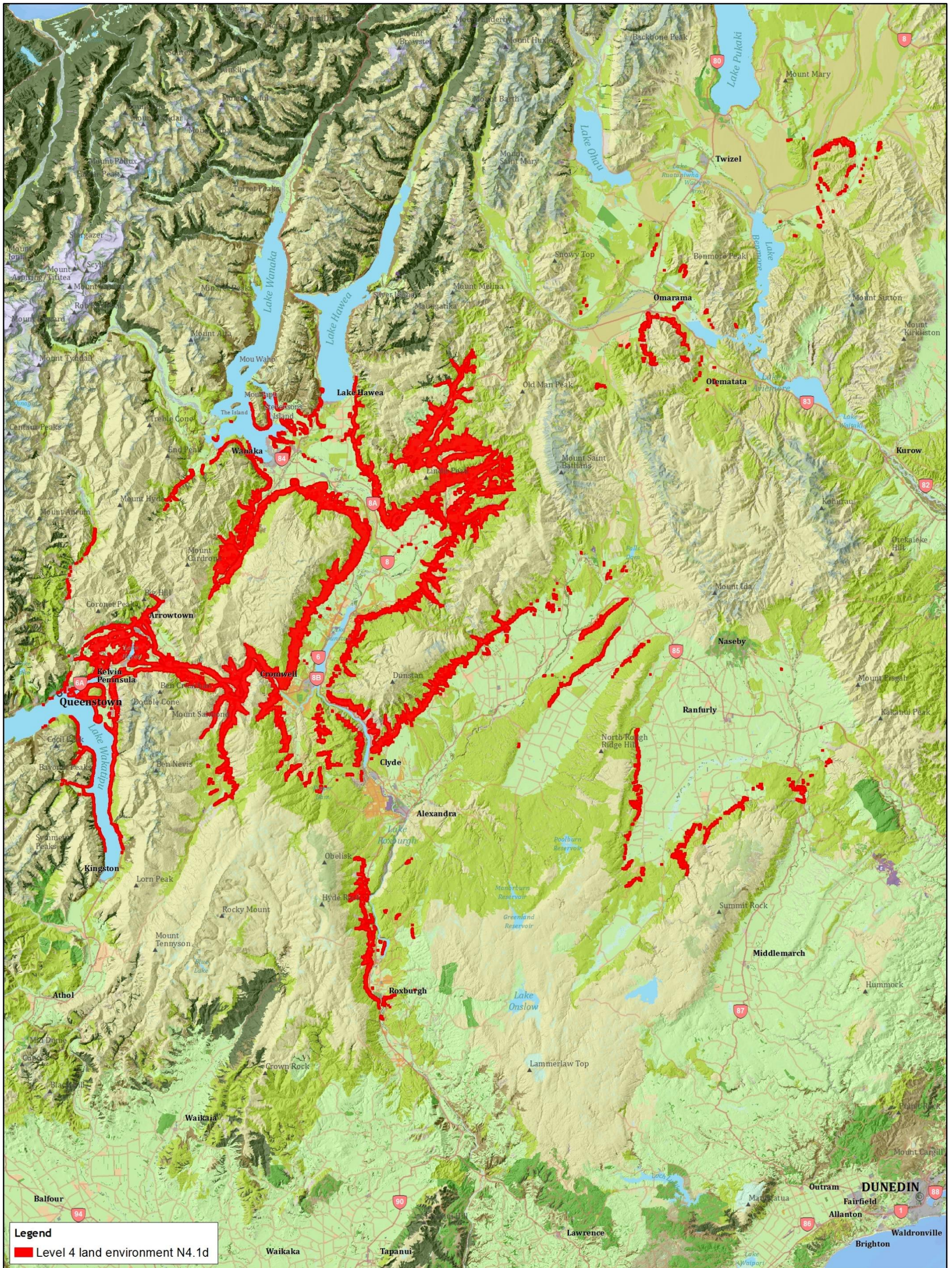


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Scale: 1:50,000
 Date: 28/03/2017
 Cartographer: FM
 Format: A3R

ATTACHMENT 2:

NATIONAL EXTENT OF LEVEL 4
LAND ENVIRONMENT N4.1D



Legend
█ Level 4 land environment N4.1d

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 File: Figures_N4.1d.mxd

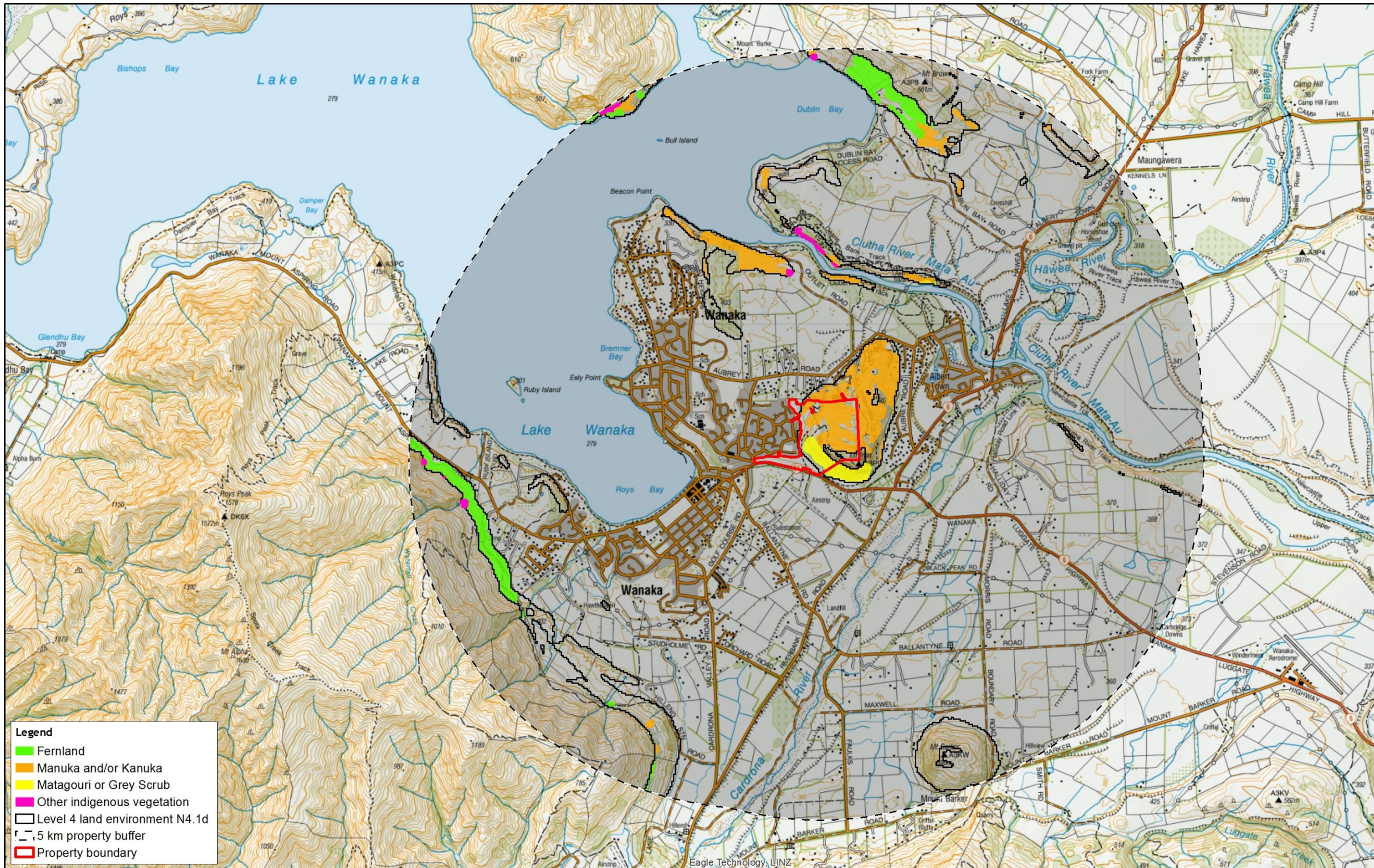
Figure 2. The national extent of Level 4 land environment N4.1d

0 10 20 km

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 Scale: 1:600,000
 Date: 28/03/2017
 Cartographer: FM
 Format: A3

ATTACHMENT 3:

**INDIGENOUS COVER TYPES (LCDB VERS 4.1)
ON LEVEL 4 LAND ENVIRONMENT N4.1D
WITHIN A 5 KM RADIUS OF MT IRON**



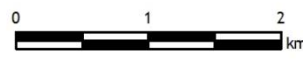
Legend

- █ Fernland
- █ Manuka and/or Kanuka
- █ Matagouri or Grey Scrub
- █ Other indigenous vegetation
- Level 4 land environment N4.1d
- 5 km property buffer
- Property boundary

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Figure 3. Indigenous cover types (LCDB vers 4.1) on Level 4 land environment N4.1d within a 5 km radius of Mt Iron



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 Date: 28/03/2017
 Cartographer: FM
 Format: A3R

SELECTED RARE PLANT SPECIES AND THEIR HABITATS
ON THE ALLENBY FARMS LTD LAND



Some of the rare plant species and their habitats on the Allenby Farms Ltd land.

Top left: *Acaena* aff. *rorida*

Top right: *Pimelea sericeovillosa* subsp. *pulvinaris* (At Risk-Declining).

Middle left: *Mentha cunninghamii* (At Risk-Declining).

Middle right: *Acaena buchananii* (At Risk-Declining).

Lower left: Turf habitat of several Threatened and At Risk plant species.

Lower right: *Myosotis brevis* (Threatened-Nationally Vulnerable).

AT RISK LIZARDS



Top: Southern grass skink (*Oligosoma* aff. *polychroma* Clade 5; At Risk-Declining) was recorded from exotic grassland within the site.
Bottomt: Cromwell gecko (*Woodworthia* 'Cromwell'; At Risk-Declining) is common in rocky habitats at the site.

ATTACHMENT 6:

LOCATIONS OF THREATENED AND AT RISK
PLANT TAXA WITHIN THE PROPOSED AND
ALTERNATE SNA SITES ON THE ALLENBY
FARMS PROPERTY, MT IRON

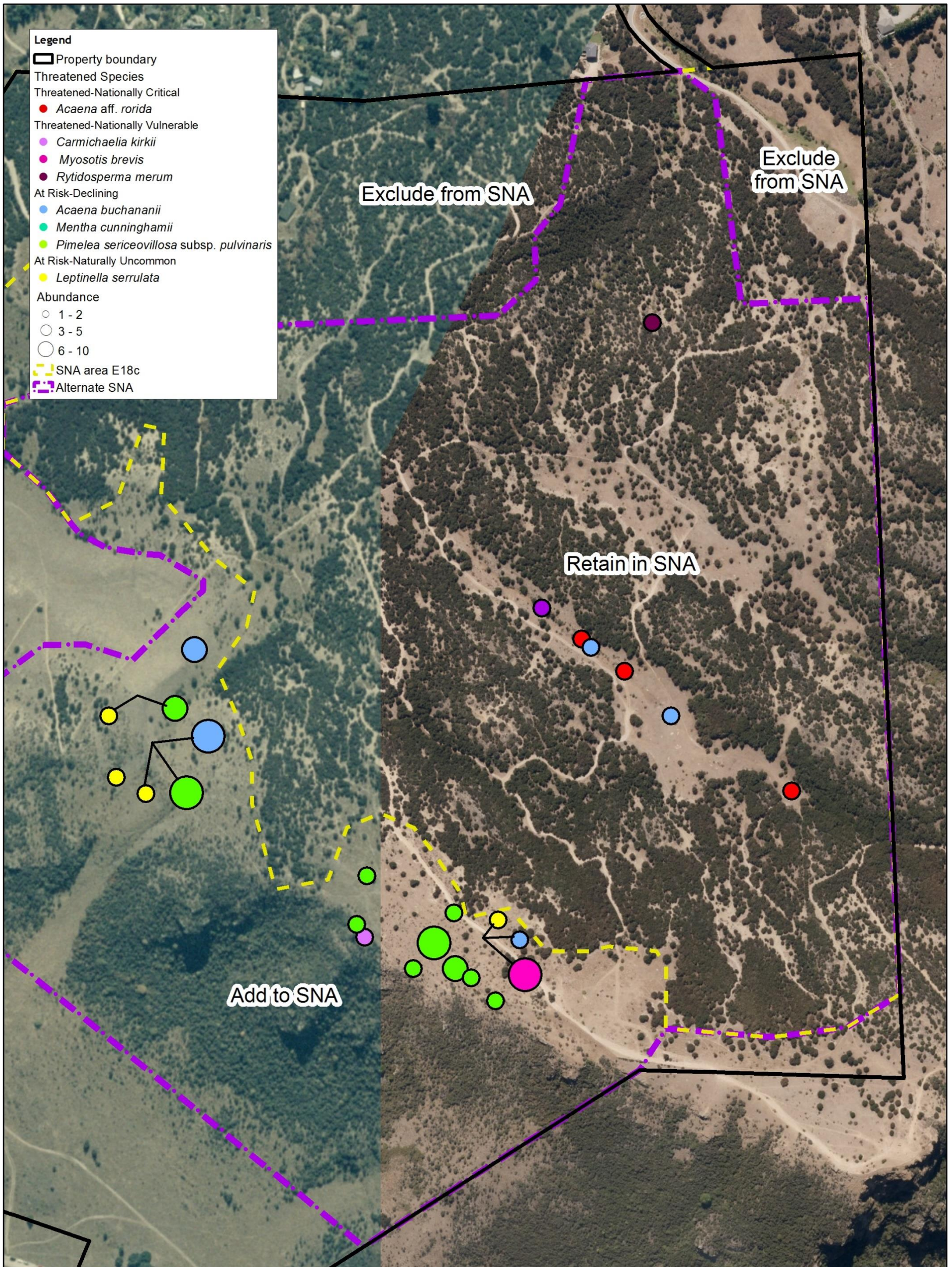


Figure 6. Locations of Threatened and At Risk plant taxa within the proposed and alternate SNA sites on the Allenby Farms property, Mt Iron

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 Date: 29/03/2017
 Cartographer: FM
 Format: A3

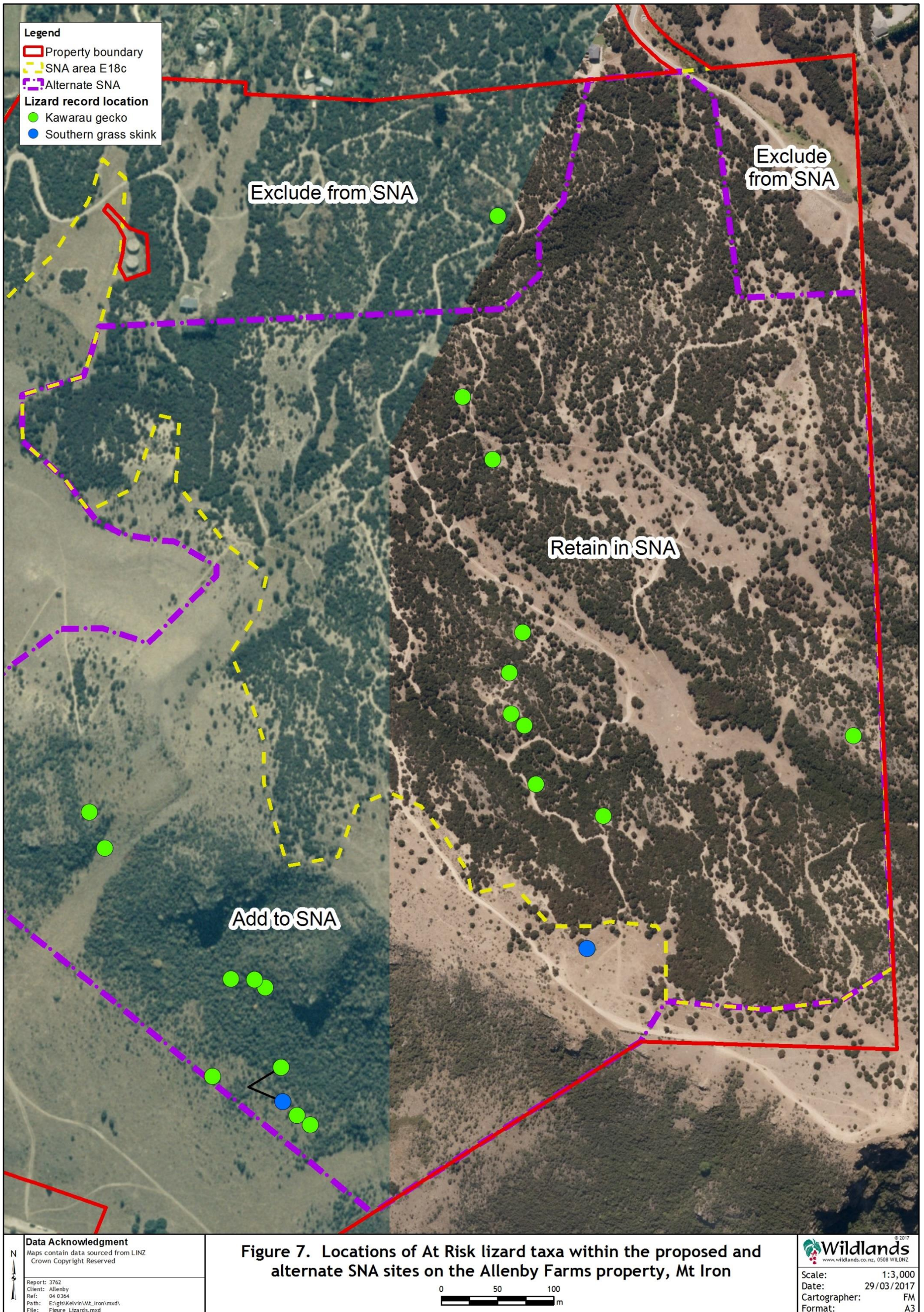
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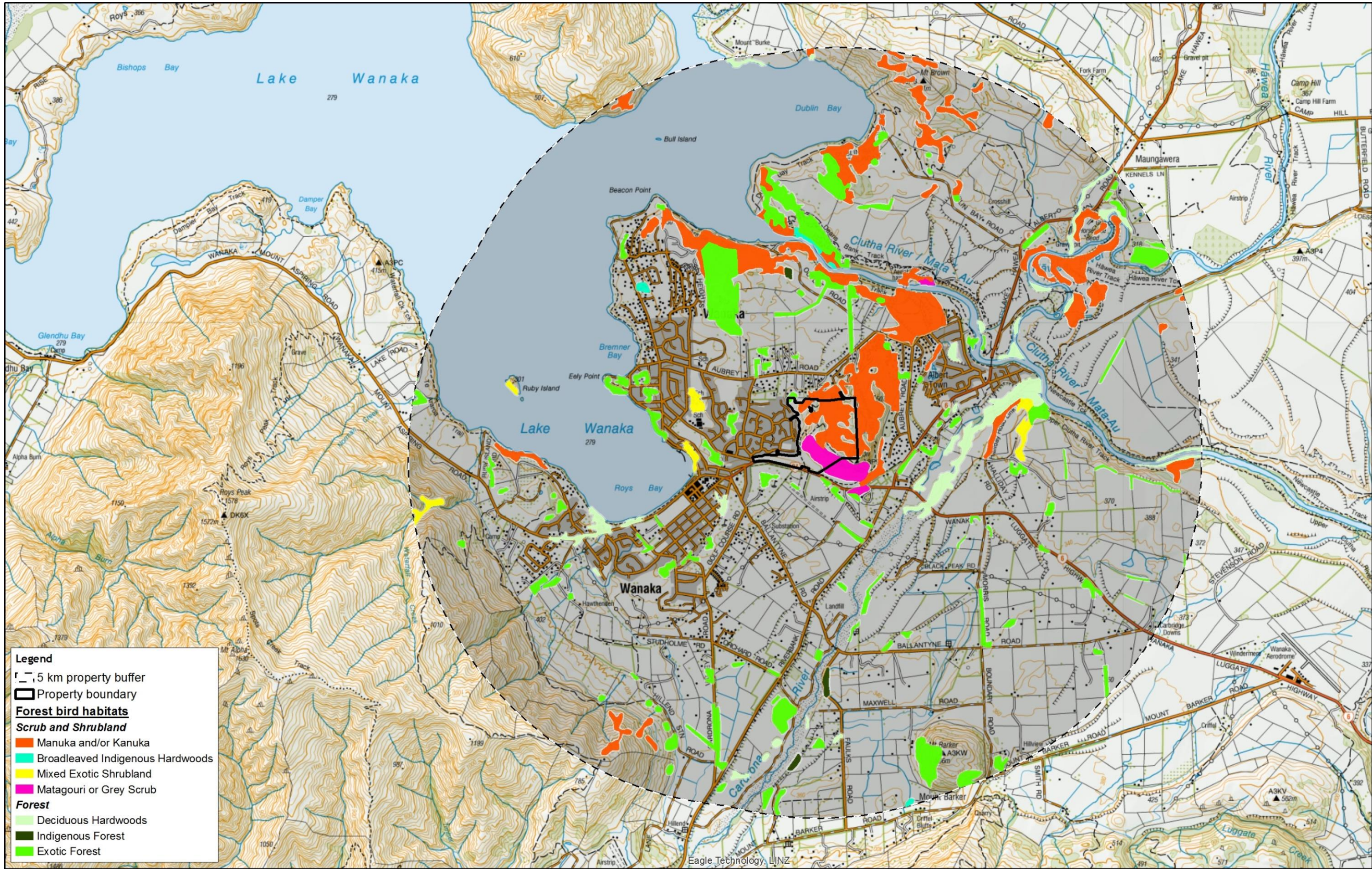
ATTACHMENT 7:

LOCATIONS OF AT RISK LIAZARD TAXA
WITHIN THE PROPOSED AND ALTERNATE
SNA SITES ON THE ALLENBY FARMS
PROPERTY, MT IRON



ATTACHMENT 8:

FOREST BIRD HABITAT
WITHIN 5 KM OF MT IRON



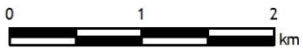
Legend

- ┌──┐ 5 km property buffer
- ▭ Property boundary
- Forest bird habitats**
- Scrub and Shrubland**
- Orange Manuka and/or Kanuka
- Cyan Broadleaved Indigenous Hardwoods
- Yellow Mixed Exotic Shrubland
- Magenta Matagouri or Grey Scrub
- Forest**
- Light Green Deciduous Hardwoods
- Dark Green Indigenous Forest
- Bright Green Exotic Forest

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 File: Figure_BirdHab_5Kbuffer.mxd

Figure 8. Forest bird habitat within 5 km of Mt Iron

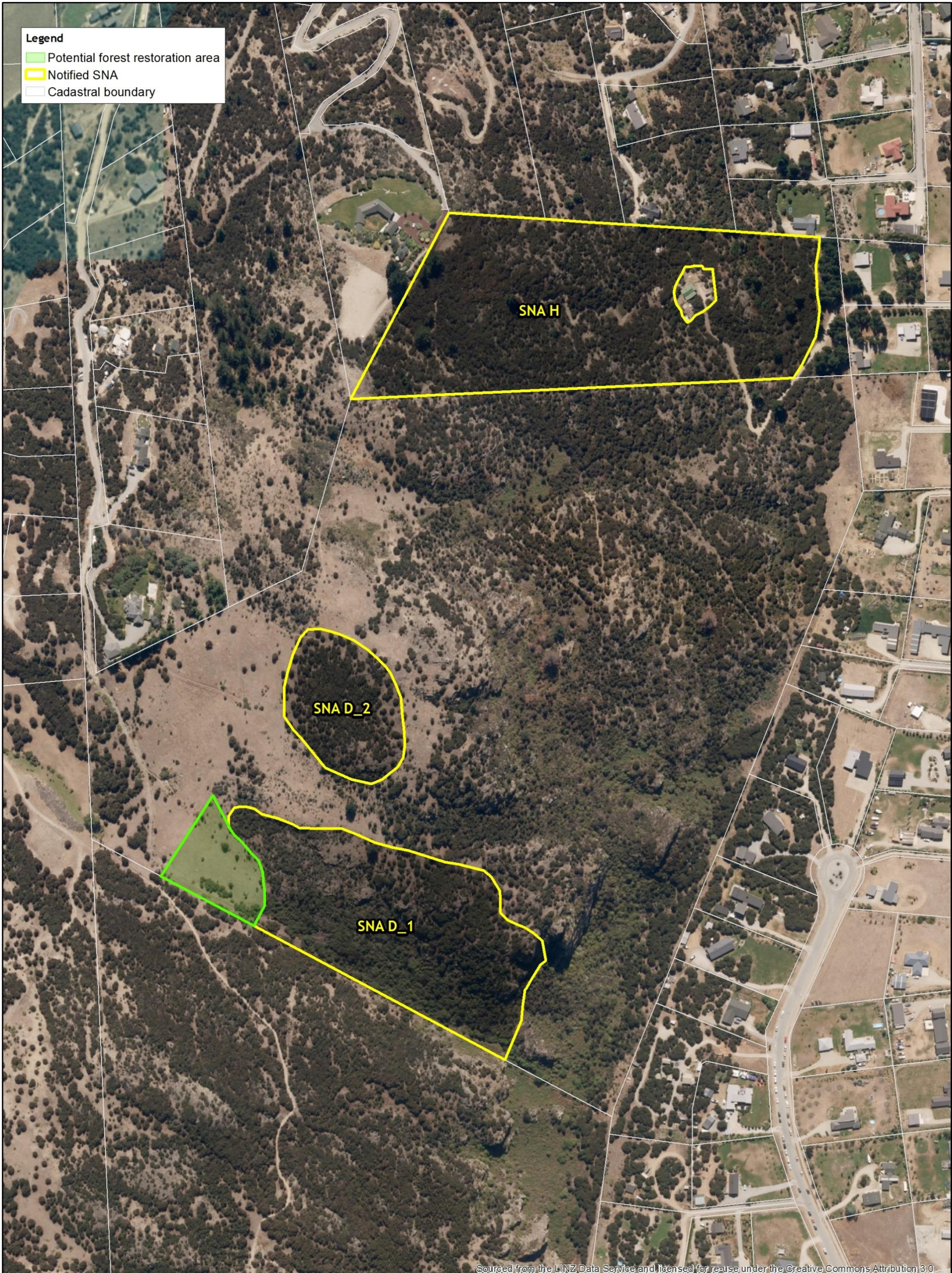


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Scale: 1:50,000
 Date: 29/03/2017
 Cartographer: FM
 Format: A3R

ATTACHMENT 9:

NOTIFIED SNAS ON LITTLE MT IRON
AND A POTENTIAL INDIGENOUS
FOREST RESTORATION AREA



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Figure 9. Notified SNAs on Little Mt Iron and a potential indigenous forest restoration area.

0 50 100
 m

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Scale: 1:3,000
 Date: 29/03/2017
 Cartographer: FM
 Format: A3

ATTACHMENT 10:

WILDLAND CONSULTANTS LTD ECOLOGICAL
ASSESSMENT OF THE ALLENBY FARMS LTD
PROPERTY