

**Ecological Assessment of Environment Canterbury Long-Term Lease Land
Thompsons Road, West Melton
February 2019**



Report prepared by:
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Environment Canterbury
For: Selwyn District Council

Summary Table - SNA Ecological Assessment

Landowner	Environment Canterbury Regional Council	
Lessees	Name	Contact
	George McKay (Lot 16A)	03 3181824
	G Henderson (Lot 17)	03 3181701
Site Address	Thompsons Rd, West Melton.	
Valuation Numbers		
Lot 16A	2354101600	
Lot 17A	2354127000D	
Grid Reference (NZTM)	E1545297 N5185935 (Central point of the Site)	
Previous Survey Sources	Heenan and Molloy (2004) Tim Logan (2013) Jason Butt, Canterbury Botanical Society (2015) Boffa Miskell (2017) Patrick (2019)	
Ecological Region	Canterbury Plains	
Ecological District	Low Plains	
Site Description/Ecosystem Type	Dry grassland/shrubland/herbfield/mossfield	
Landform / Soils	Waimakariri River braidplain, recent soils	
Special Flora/Fauna of Note	Populations of: <i>Olearia adenocarpa</i> (Threatened – Nationally Critical); <i>Wurmbea novae-zelandiae</i> (Threatened-Nationally Endangered); <i>Carmichaelia corrugata</i> , <i>Geranium retrorsum</i> , <i>Muehlenbeckia ephedroides</i> , <i>Raoulia monroi</i> , <i>Rytidosperma merum</i> (all Threatened – Nationally Vulnerable); <i>Discaria toumatou</i> , <i>Leptinella serrulata</i> , <i>Raoulia australis</i> (all At Risk – Declining); range of locally uncommon indigenous dry plains tree, shrub, grass, herb, moss, lichen species. Southern grass skink (<i>Oligosoma</i> aff. <i>polychroma</i> Clade 4; Conservation status: At Risk - Declining). <i>Eurythecta robusta</i> (Naturally Uncommon).	
SNA Area	210ha	
Date of Ecological Assessment	December 2018 -February 2019	
Rational for overall significance	Largest remaining area of undeveloped Waimakariri River floodplain dryland habitat; one of the best representative examples of indigenous dryland vegetation in Low Plains Ecological District; supports populations of a wide range of nationally threatened and locally uncommon plants; habitat for nationally threatened and/or locally uncommon lizard and invertebrate species.	

Background

The history of the Canterbury Plains reveals an almost complete loss of the original vegetation cover due to fire and land development. Very little undeveloped land remains on the plains as it has been converted to farmland, lifestyle blocks, urban areas, plantation forestry.

Environment Canterbury holds land on the Waimakariri floodplain, historically for purposes of river protection and the generation of income to support protection works. Most of this land is leased for farming and is subject to conditions specific to individual lease agreements. The leasehold status of this land has protected it, to varying extent, from the intensive agricultural and urban land use that otherwise characterises the Canterbury Plains.

The Thompsons Rd sites assessed here occur within two long-term farm leases. Native trees are protected under lease conditions but there are few other formal restrictions on land use activities such as cultivation compared with some other short-term leases or grazing licences. The current state of these lease areas is as much a reflection of past and present lessees land use practices as it is lease conditions.

The ecological values of the Thompsons Rd lease lots have been documented in a number of published and unpublished survey reports carried out over the years by a range of botanists and ecologists. Site inspections continue to reveal new species and/or populations. This assessment collates information from Landcare Research, Environment Canterbury and Boffa Miskell staff, and members of the Canterbury Botanical Society and West Melton Enviro Community. Records within the online platform iNaturalist provide additional observations, reiterating that the site's species list is likely incomplete and that further ecological values will be identified in time.



Figure 1: Map showing the lease land parcels in which the SNA area occurs. Lot 17A - Henderson: Blue; Lot 16A - McKay: Red.

Figure 1 shows the boundaries of leased Lot 17A - Henderson: Blue and Lot 16A - McKay: Red. It appears a few meters of uncultivated land of similar ecological value occurs across a short distance east of Lot16A within the neighbouring land parcel – another Council Lease; Lot 16B. This area is effectively managed contiguously with Lot 17A due to its incorporation with Lot 16A by the current fencing. Note land parcel boundaries illustrated here may not be strictly accurate, and this may account for this apparent offset of fencing and land parcel boundaries.

It is important to note that the adjoining verges of Thompson Road also contain similar dryland vegetation and habitats for indigenous fauna.

Site Description

Landform and Drainage

The site is in the Low Plains ED, approximately 1km south of the currently active Waimakariri riverbed and includes areas both west and east of Thompsons Road within the Selwyn District. The site, historically once part of the Waimakariri floodplain, is located between two managed stop banks. The area has an elevation profile which drops approximately 10m from west to east (120m asl – 110m asl) and 2m north to south (119 m asl -117m asl). The fluvial soils are shallow sandy/stony loam and are very light and dry. While some cultivation has occurred across parts of the site, historic river braid contours can still be clearly made out on aerial imagery (Figure 2). Scattered kowhai trees originating from seed deposited during historic Waimakariri River flow paths (Figure 3) create the iconic dryland savannah landscape which can be observed on either side of Thompsons Road today.



Figure 2: Aerial imagery showing the historic river braid contours visible within the landform.

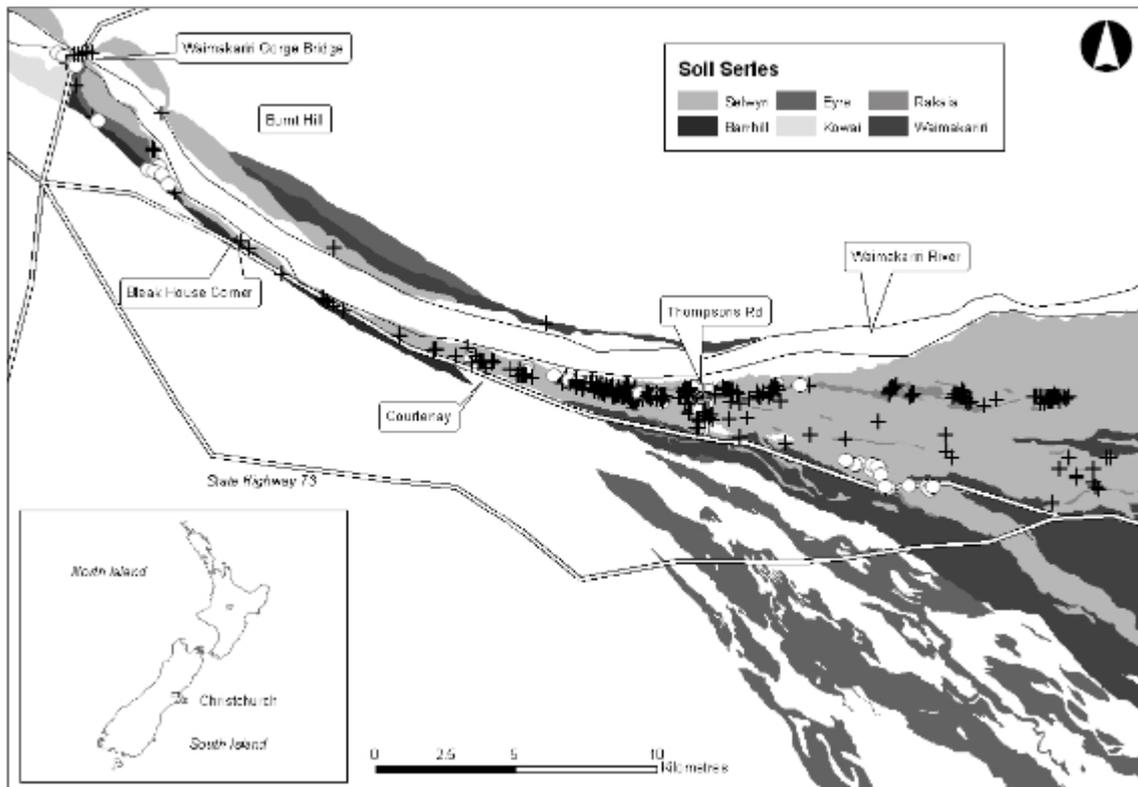


Figure 3: The distribution of kowhai (Fabaceae), *Sophora microphylla*, *S. prostrata* and their natural hybrids across soil classifications as mapped in 2011 by Godley et al. (2011)

Original vegetation

Prior to human settlement the vegetation across this area would have primarily consisted of dry short-tussock grasslands with patches of other native vegetation types influenced by the changeable flow paths of the Waimakariri river. The shifting braids of the river would have resulted in various successional stages of vegetation cover across the wider Canterbury Plains area. Lower stature tussockland, herbfield and mossfield through to scrub and treeland would have been present, while wetland areas would also have been present, fed by numerous springs. Small trees such as kanuka (*Kunzea robusta*), ti kouka/cabbage tree (*Cordyline australis*) and kowhai would have been present on higher terraces, while deeper soils would have supported broadleaf hardwoods such as horoeka/lancewood (*Pittsoporum crassifolium*), houhere/lacebark (*Hoheria angustifolia*) and karamu (*Coprosma robusta*). Taller podocarps would have been of only limited distribution here, on microsites with deep, moist soils.

Current vegetation

Following firstly Maori then European settlement, the area experienced widespread vegetation burning, clearing and extensive grazing. Since the 1930s stop-banks have prevented flood flows and river migration from influencing the vegetation, and today the area is predominantly in grassland. While introduced exotic grasses such as sweet vernal (*Anthoxanthum odoratum*) and brown top (*Agrostis capillaris*) cover much of the area, a range of low-statured native species, such as *Muelenbeckia axillaris* (creeping pōhuehue), *Microtis unifolia* (onion orchid), *Leucopogon fraseri* (patotara) and *Racomitrium pruinosum* (woolly moss), are common in this grassland. Discrete patches of native mossfield and herbfield also occur, principally within areas left uncultivated and typically of shallower stony soils where exotic grass competition is reduced. Small groups or individual indigenous trees and shrubs- kowhai (*Sophora microphylla*), plains daisy *Olearia*

adenocarpa and matagouri *Discaria toumatou* are scattered throughout the site. Occasional native fescue tussock (*Festuca novae-zealandiae*) and silver tussock (*Poa cita*) are also present.

Across deeper uncultivated soils extensive grazing (stock and rabbits/hares) appears to be maintaining some of the native turf vegetation. Fencing has been installed to protect palatable native shrubs species from stock and rabbit/hare browse. Most of the *Olearia adenocarpa* within Lot 16A have been fenced (see Attachment 1).

Threatened plant species occurring within the area include *Olearia adenocarpa* (Threatened – Nationally Critical); *Wurmbea novae-zelandiae* (Threatened-Nationally Endangered); *Carmichaelia corrugata*, *Geranium retorsum*, *Muehlenbeckia ephedroides*, *Raoulia monroi*, *Rytidosperma merum* (all Threatened – Nationally Vulnerable); *Discaria toumatou*, *Leptinella serrulata*, *Raoulia australis* (all At Risk – Declining).

Full species lists for surveyed areas within the two lease lots are provided in Attachment 2.

Fauna

Native birds which are likely to utilise the site include Grey Warbler, Swamp Harrier, South Island Pied Oystercatcher and Banded Dotterel. Black-fronted tern and Swamp Harrier were observed by the Author in 2019.

Lizards known from the site (see Attachment 3 for observation locations) include the endemic Southern grass skink (*Oligosoma* aff. *polychroma* Clade 4; Conservation status: At Risk - Declining) and McCanns skink (*Oligosoma maccanni*¹; Conservaiton status: Not Threatened). Possibly the Canterbury spotted skink (*Oligosoma lineaocellatum*; Conservation status: Threatened – Nationally Vulnerable) could occur within the site where suitable cover (i.e. shrublands) occur.

An invertebrate fauna characteristic of the dry Canterbury grasslands is expected. Although much of the native vegetation assemblages have been reduced, many native invertebrates have adopted exotic plant hosts (B Patrick *pers comm* 2019). Patrick (ibid.) notes that “These areas of semi-natural vegetation support a range of indigenous invertebrates, particularly grasshoppers, moths, beetles, spiders and flies. It is a small fauna in terms of species richness but does contain many characteristic species of these grasslands and cushionfields, many of which have become rare or locally extinct in many parts of their former range”. Invertebrates known from the site are listed within Attachment 4.

Additional observations of flora and fauna are provided within Attachment 5 and recent photographs of Lot 16A and 17A presented within Attachment 6.

Threats

Pests

Rabbits and hares pose a threat to palatable native plant species such as NZ broom, but their browsing pressure may be beneficial for low indigenous groundcover species which might otherwise be overgrown by more aggressive exotic grasses. A suite of predatory pests such as mustelid (*Mustela* spp.), mice (*Mus musculus*), rats (*Rattus* spp.), hedgehog (*Erinaceus europeaeus occidentalis*) and cats (*Felis catus*) are likely to occur across the site and these animals may be limiting populations of native invertebrates or lizards within the site.

¹ Although confirmation of *O. maccanni* is required.

Weeds

Plant species of concern include exotic grasses, shrubs and trees. The exotic grasses may invade the few remaining dominant indigenous vegetation types, notably the native mossfields. The dense sward which the exotic grasses create also prevents recruitment of native shrubs and trees. Gorse (*Ulex europaeus*) and Scotch broom (*Cytisus scoparius*) are present both within and adjacent to the site. However, it is noted that these exotic shrubs may provide habitat to indigenous fauna.

Any control of exotic grasses, shrubs or trees should avoid any sensitive native vegetation. For example, herbicide application to silver poplar directly adjacent to kowhai may adversely affect this native tree due to the likely interaction between the roots of the two species and the native tree's acute sensitivity to herbicides.

Stock Grazing

Intensive stock grazing incorporating high stocking rates, cultivation and irrigation would directly threaten the ecological values of this site. Extensive sheep grazing has been undertaken across the site for decades, and while this has grass control benefits, it may be resulting in the slow decline of native turfs as animals gradually introduce additional nutrients and seed material. The current differentiation between native mossfield and herbfield communities and exotic pasture grassland which comprises the current vegetation mosaic may become less discernible if the cover moves towards a homogenised exotic vegetation cover.

Stock browsing is limiting growth and regeneration of native shrubs, trees and tussock grasses. This is evident, for example, around unfenced kowhai trees where regenerating foliage at the base of the trees is heavily browsed.

Land use change

Neighbouring land use to the west of the site includes intensive irrigated farming where a pivot irrigator is installed. Care in the operation of such adjacent irrigation infrastructure is important to ensure water and other contaminants (such as soil, fertiliser, herbicide) does not spread onto this site and alter conditions in a way likely to encourage exotic vegetation dominance.

Retention of extensive dryland farming may assist with the maintenance of some elements of the indigenous vegetation of the site, however removal of all browse pressure (stock plus wild animals) would benefit other elements. Monitoring of vegetation cover across the site would be helpful to identify any change in exotic weed incidence or extent.

Other potential threats to ecological values within the site include fire and mining for gravel.

Significance Assessment

The ecological significance of the site has been assessed below using the criteria outlined within Appendix 3 of the Canterbury Regional Policy Statement (Environment Canterbury, 2013; Wildlands, 2013). Where any ecological characteristic of a site meets the threshold for significance under one or more criteria the site is considered ecologically significant. The evaluation is for the areas identified within Figure 1.

Criteria	Evaluation	Meets Threshold (Criteria#)
<p>Representativeness</p> <p>1. Indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity of the relevant ecological district. This can include degraded examples where they are some of the best remaining examples of their type or represent all that remains of indigenous biodiversity in some areas.</p> <p>2. Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district.</p>	<p>General Notes</p> <p>The original vegetation type in this area is likely to have been a mosaic of vegetation types, primarily of tussock-grassland and herbfields with scattered trees and woody shrubs. Their distribution would have been influenced by intermittent inundation by flood waters of the Waimakariri river.</p> <p>While the site is modified and is no longer influenced by flooding, it retains elements of original vegetation and faunal assemblages and is one of the largest remaining areas of undeveloped (and mostly uncultivated) Waimakariri River floodplain.</p> <p>Specific Notes</p> <p>Lot 17A</p> <p>The northern area of the lot while cultivated retains original trees which likely provide habitat to indigenous fauna. The Kowhai (<i>S. microphylla</i>, <i>S. prostrata</i> & hybrids) are representative of plains vegetation, and although scattered and isolated are one of the few remaining sites of this vegetation locally.</p>	<p>Y (1,2)</p>
<p>Rarity / Distinctiveness</p> <p>3. Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the Region, or relevant land environment, ecological district, or freshwater environment.</p> <p>4. Indigenous vegetation or habitat of indigenous fauna</p>	<p>The site supports indigenous vegetation and provides habitat for indigenous fauna that has otherwise been reduced to less than 10% of its former extent in the Low Plains Ecological District / Land Environment N1.1a</p> <p>Populations of Threatened species include:</p> <p>Flora</p> <p>North-west distributional limit of <i>Olearia adenocarpa</i> (Threatened – Nationally Critical);</p> <p><i>Wurmbea novae-zelandiae</i> (Threatened-</p>	<p>Y (3,4)</p>

<p>that supports an indigenous species that is threatened, at risk or uncommon, nationally or within the relevant ecological district.</p> <p>5. The site contains indigenous vegetation or an indigenous species at its distribution limit within Canterbury Region or nationally.</p> <p>6. Indigenous vegetation or an association of indigenous species that is distinctive, of restricted occurrence, occurs within an originally rare ecosystem, or has developed as a result of an unusual environmental factor or combination of factors.</p>	<p>Nationally Endangered); <i>Carmichaelia corrugata</i>, <i>Geranium retorsum</i>, <i>Muehlenbeckia ephedroides</i>, <i>Raoulia monroi</i>, <i>Rytidosperma merum</i>, <i>Myosotis brevis</i> (all Threatened – Nationally Vulnerable); <i>Discaria toumatou</i>, <i>Leptinella serrulata</i>, <i>Raoulia australis</i>, <i>Rytidosperma exiguum</i>, <i>Zoysia minima</i>, <i>Carex buchananii</i>, <i>Isolepis basilaris</i>, <i>Mentha cunninghamii</i> (all At Risk – Declining); a number of locally uncommon indigenous dry plains tree, shrub, grass, herb, moss, and lichen species also occur.</p> <p>Fauna <i>Oligosoma</i> aff. <i>polychroma</i> Clade 4 (At Risk – Declining). The moth <i>Eurythecta robusta</i> is considered Naturally Uncommon and two beetles <i>Neocicindela dunedensis</i> and <i>Metaglymma minor</i> are considered uncommon.</p>	
<p>Diversity and Pattern</p> <p>7. Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or has changes in species composition reflecting the existence of diverse natural features or ecological gradients.</p>	<p>Contains a moderate diversity of indigenous plants characteristic of Low Plains dryland habitats. The presence of competitive exotic grasses within deeper soils limits the expression of ecological gradients through changes in vegetation types. Some diversity of habitat with shallower soils supporting native herb-mossfields while deeper swales support remnant native shrubs.</p> <p>Changes in species composition/vegetation types across the site is evident in the underlying historic braid plain channels.</p>	Y(7)
<p>Ecological Context:</p> <p>8. Vegetation or habitat of indigenous fauna that provides or contributes to an important ecological linkage or network, or provides an important buffering function.</p> <p>9. A wetland which plays an important hydrological, biological or ecological role</p>	<p>The scattered indigenous trees and shrubs within this site are an important component of local populations of <i>Olearia adenocarpa</i> and <i>Kowhai spp.</i></p> <p>The site is part of a wider network of similar indigenous vegetation remnants to the south of the Waimakariri River.</p> <p>The site’s relatively low-disturbance land use regime has resulted in the area providing habitat and ecological linkages for grass skink across a relatively large area for the Low Plains and may be considered important habitat for</p>	Y(8, 10)

<p>in the natural functioning of a river or coastal system.</p> <p>10. Indigenous vegetation or habitat of indigenous fauna that provides important habitat (including refuges from predation, or key habitat for feeding, breeding, or resting) for indigenous species, either seasonally or permanently.</p>	<p>local skink population(s). The area exists on a likely interface between Canterbury and Southern grass skink species.</p> <p>While the exotic grasslands of the upper half of the Henderson block (see Figure 5) have been cultivated; their inclusion within the wider site evaluated to meet ecological significance is largely due to their context as an ecological buffer to surrounding values.</p>	
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This report confirms the areas outlined within Figure 4 & 5 hold ecological value which would be considered significant under the Regional Policy Statement criteria. The verges of Thompsons Rd hold similar ecological values and are considered part of the SES for the purposes of this assessment.



Figure 4: Area within Lot 16A assessed to hold ecological values which meet significance under the Regional Policy Statement criteria. The area is approximately 100ha.



Figure 5 Areas within Lot 17A assessed to hold ecological values which meet significance under the Regional Policy Statement criteria . The area is approximately 110ha.

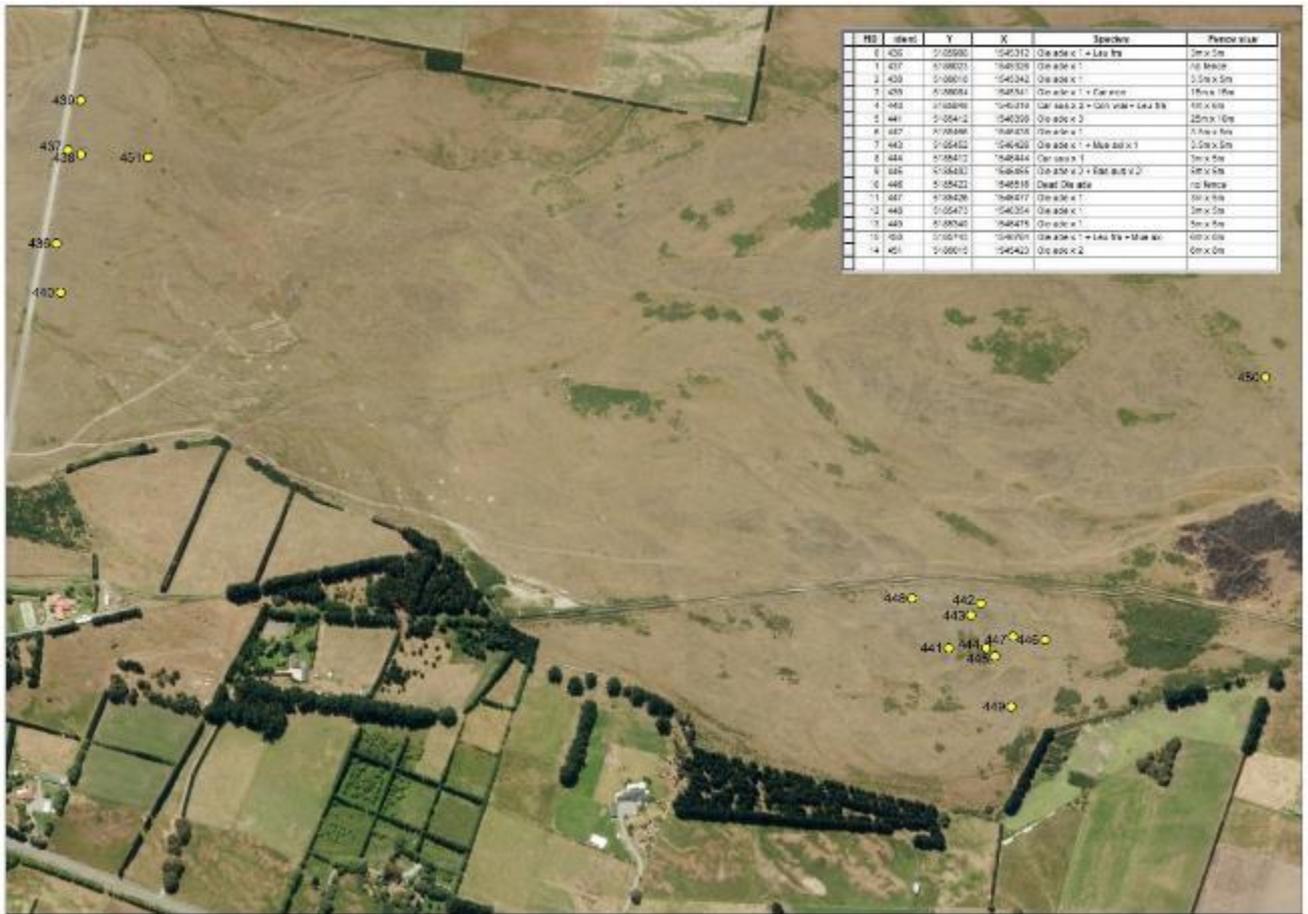
References

Godley EJ, Molloy BPJ, Grove PB (2011). Sophora (Fabaceae) in the lower Waimakariri catchment, eastern South Island, New Zealand. *Canterbury Botanical Society Journal*.

Heenan P. and Molloy BPJ (2004). Taxonomy, ecology, and conservation of *Olearia adenocarpa* (Asteraceae), a new species from braided riverbeds in Canterbury, New Zealand. *New Zealand Journal of Botany* 42: 21-36

Lloyd, K., McClellan, R., Hutchison, M., Patrick, B., and Shaw, W. (2013) *Guidelines for the application of ecological significance criteria for indigenous vegetation and habitats of indigenous fauna in Canterbury region*. Report prepared for Environment Canterbury by Wildlands Consultants, Rotorua, New Zealand.

Attachment 1: Top image: Locations of *Olearia adenocarpa* which were fenced to exclude stock and rabbit browsing in 2015. Since 2015 further areas have been fenced and monitoring of the plants by Environment Canterbury is ongoing. Lower image: One of the fenced *O. adenocarpa*.



Attachment 2: Lists of plant, mosses and lichen species recorded for the McKay² and Henderson lease lots and their conservation status. A locally uncommon category was added based on knowledge of species' distribution and abundance within the Low Plains Ecological District.

McKay Lease – Lot 16A		
Species	Common name	Conservation Status (2017)
<i>Carex breviculmis</i> *	Grassland sedge	Locally uncommon
<i>Carex resectans</i>		Locally uncommon
<i>Carex comans</i> **	Maurea tussock	Not threatened
<i>Carmichaelia australis</i> *	NZ broom	Locally uncommon
<i>Carmichaelia corrugata</i> *	Dwarf broom	Threatened - Nationally Vulnerable
<i>Cheilanthes sieberi</i>		Locally uncommon
<i>Clematis quadribacteolata</i> **	Clematis vine	Not threatened
<i>Cordyline australis</i>		
<i>Crassula sieberiana</i>		
<i>Dichondra brevifolia</i> *	Mercury Bay weed	Locally uncommon
<i>Dichondra repens</i> *		
<i>Discaria toumatou</i> *	Matagouri	At Risk - Declining
<i>Festuca novae-zelandiae</i> **	Fescue tussock	Not threatened
<i>Geranium brevicaule</i> *	Geranium	Locally uncommon
<i>Geranium retrorsum</i>		Threatened - Nationally Vulnerable
<i>Hypericum involutum</i>		Locally uncommon
<i>Leptinella serrulata</i> *	Dryland button daisy	At Risk - Declining
<i>Leucopogon fraseri</i> *	Pātōtara	Locally uncommon
<i>Microtis unifolia</i> *	Onion orchid	Locally uncommon
<i>Muehlenbeckia australis</i> **	Climbing pōhuehue	Not threatened
<i>Muehlenbeckia axillaris</i> *	Creeping pōhuehue	Locally uncommon
<i>Muehlenbeckia ephedroides</i> **	Leafless pōhuehue	At Risk - Declining
<i>Myosotis brevis</i>		Threatened - Nationally Vulnerable
<i>Olearia adenocarpa</i> *	Plains shrub daisy	Threatened - Nationally Critical
<i>Ophioglossum coriaceum</i>		Locally uncommon
<i>Oxalis exilis</i>		
<i>Poa cita</i> *	Silver tussock	Locally uncommon
<i>Poa maniototo</i>		Locally uncommon
<i>Prasophyllum colensoi</i>		Locally uncommon

² Plant lists incorporates lists provided in 2015 by Tim Logan for the McKay lease lot and in 2017 by Scott Hooson, Senior Ecologist, Boffa Miskell for both McKay and Henderson lease lots (*indicates the species was recorded in Tim Logan and ** indicates the plant was recorded in Tim Logan's list only). A third list for an area illustrated in the image below (referred to as Henderson Water Race Area) was provided by Jason Butt.

<i>Raoulia australis</i> *	Mat daisy	At Risk - Declining
<i>Raoulia monroi</i> *		Threatened - Nationally Vulnerable
<i>Rytidosperma clavatum</i>		Not Threatened
<i>Rytidosperma exiguum</i>		At Risk - Declining
<i>Rytidosperma maculatum</i>		Locally uncommon
<i>Rytidosperma merum</i> **	Slender bristle grass	Threatened - Nationally Vulnerable
<i>Scleranthus uniflora</i> *	Cushion plant	Locally uncommon
<i>Sophora microphylla</i> *	South Island kōwhai	Locally uncommon
<i>Sophora prostrata</i>	Prostrate Kōwhai	Locally uncommon
<i>Thelymitra longifolia</i>	White Sun Orchid	Locally uncommon
<i>Zoysia minima</i>	Prickly couch	At Risk - Declining
Native mosses and lichens**		
<i>Breutelia affinis</i>	Moss	Not threatened
<i>Cladia aggregate</i>	Lichen	Not threatened
<i>Cladonia species</i>	Cup lichen	Not threatened
<i>Hypnum cupressiforme</i>	Hypnum moss	Not threatened
<i>Polytrichum juniperinum</i>	Juniper haircap moss	Not threatened
<i>Racomitrium pruinosum</i>	Woolly moss	Not threatened
<i>Triquetrella papillata</i>	Moss	Not threatened
<i>Xanthoparmelia species</i>	Crust lichen	Not threatened

Henderson Lease – Lot 17A	
Species	Conservation Status
<i>Carex breviculmis</i>	Locally uncommon
<i>Carex resectans</i>	Locally uncommon
<i>Carmichaelia australis</i>	Locally uncommon
<i>Carmichaelia corrugata</i>	At Risk - Declining
<i>Cheilanthes sieberi</i>	Locally uncommon
<i>Cordyline australis</i>	Not Threatened
<i>Crassula sieberiana</i>	Not Threatened
<i>Dichondra breviflora</i>	Locally uncommon
<i>Dichondra repens</i>	Not Threatened
<i>Discaria toumatou</i>	Locally uncommon
<i>Geranium brevicaule</i>	Locally uncommon
<i>Geranium retrorsum</i>	Threatened - Nationally Vulnerable
<i>Hypericum involutum</i>	Locally uncommon
<i>Leptinella serrulata</i>	At Risk - Naturally Uncommon
<i>Leucopogon fraseri</i>	Locally uncommon
<i>Microtis unifolia</i>	Locally uncommon
<i>Muehlenbeckia axillaris</i>	Locally uncommon
<i>Myosotis brevis</i>	Threatened - Nationally Vulnerable
<i>Olearia adenocarpa</i>	Threatened - Nationally Critical

<i>Ophioglossum coriaceum</i>	Locally uncommon
<i>Oxalis exilis</i>	Not Threatened
<i>Poa cita</i>	Locally uncommon
<i>Poa maniototo</i>	Locally uncommon
<i>Prasophyllum colensoi</i>	Locally uncommon
<i>Raoulia australis</i>	Locally uncommon
<i>Raoulia monroi</i>	At Risk - Declining
<i>Rytidosperma clavatum</i>	Locally uncommon?
<i>Rytidosperma exiguum</i>	At Risk - Declining
<i>Rytidosperma maculatum</i>	Locally uncommon
<i>Scleranthus uniflora</i>	Locally uncommon
<i>Sophora microphylla</i>	Locally uncommon
<i>Sophora prostrata</i>	Locally uncommon
<i>Thelymitra longifolia</i>	Locally uncommon
<i>Zoysia minima</i>	At Risk - Declining

Henderson Water Race Area ³	
Species	Conservation Status
<i>Acaena novae-zelandiae</i>	Not Threatened
<i>Blechnum minus</i>	Not Threatened
<i>Blechnum penna-marina</i>	Not Threatened
<i>Carex breviculmis</i>	Not Threatened
<i>Carex buchananii</i>	At Risk - Declining
<i>Carex flagellifera</i>	Not Threatened
<i>Carex geminata</i>	Not Threatened
<i>Carex secta</i>	Not Threatened
<i>Carex virgata</i>	Not Threatened
<i>Carmichaelia australis</i>	Not Threatened
<i>Centella uniflora</i>	Not Threatened
<i>Dichondra repens</i>	Not Threatened
<i>Discaria toumatou</i>	Not Threatened
<i>Eleocharis acuta</i>	Not Threatened
<i>Geranium brevicaule</i>	Not Threatened
<i>Gonocarpus</i> sp.	Not Threatened
<i>Gunnera dentata</i>	Not Threatened
<i>Hydrocotyle</i> sp.	Not Threatened
<i>Isolepis basilaris</i>	At Risk - Declining
<i>Isolepis reticularis</i>	Not Threatened
<i>Juncus antarcticus</i>	Not Threatened
<i>Juncus planifolius</i>	Not Threatened
<i>Juncus sarophorus</i>	Not Threatened
<i>Leptostigma setulosa</i>	Not Threatened
<i>Leucopogon fraseri</i>	Not Threatened

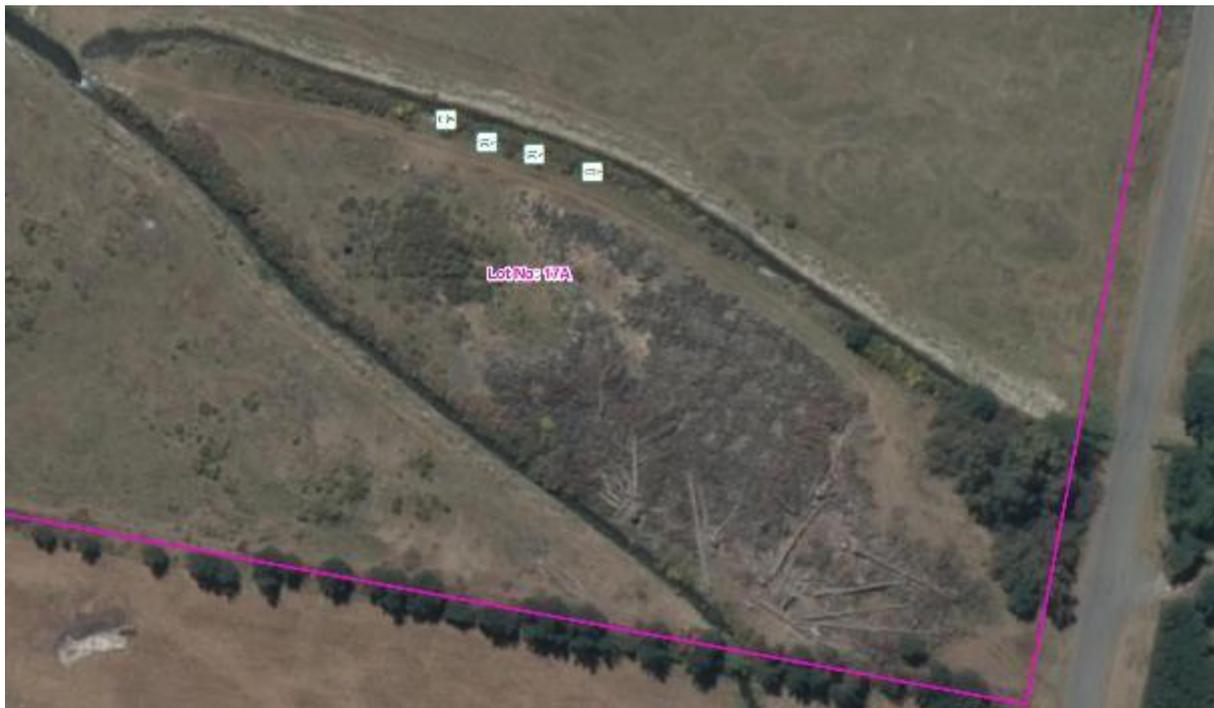
³ List specific to the area outlined within the figure below. Provided by Jason Butt.

<i>Lobelia angulata</i>	Not Threatened
<i>Luzula picta</i> var. <i>limosa</i>	Not Threatened
<i>Mentha cunninghamii</i>	At Risk - Declining
<i>Microtis uniflora</i>	Not Threatened
<i>Muehlenbeckia axilaris</i>	Not Threatened
<i>Plantago triandra</i>	Not Threatened
<i>Poa cita</i>	Not Threatened
<i>Ranunculus foliosus</i>	Not Threatened
<i>Rytidosperma exiguum</i>	At Risk - Declining
<i>Rytidosperma merum</i>	At Risk - Declining
<i>Schoenus pauciflorus</i>	Not Threatened
<i>Triglochin striata</i>	Not Threatened



Above: Henderson Water Race Area relating to plant list above.

Attachment 3: Locations of lizard observations



Above: Location of observations of Southern grass skink (*Oligosoma* aff. *polychroma* Clade 4; Conservation status: At Risk - Declining) and McCanns skink (*Oligosoma maccanni*⁴; Conservaiton status: Not Threatened) in 2006 at the southern end of Lot 17A. Thompsons road at right of image. Observations of skink sign were made within this area during a site visit in February 2019.

⁴ Although confirmation of *O. maccanni* is required.

Attachment 4: Invertebrate records from Thompsons road area (both lots). Received from Brian Patrick, January 2019. Reference location point for records: E: 1545400 N: 5185880 (NZTM).

ORDER/FAMILY/SPECIES	Threat Status (Hoare et al. 2017)	Ecology - Notes_Larval hostplant
<i>Agrotis ipsilon</i>		herbs
<i>Aletia moderata</i>		herbs incl. Raoulia
<i>Arctesthes catapyrrha</i>		diurnal species with larvae on various herbs and cushions
<i>Argyrophenga antipodum</i>		tussock grasses
<i>Capua semiferana</i>		leaf litter
<i>Eudonia cataxesta</i>		Raoulia cushions
<i>Eudonia diphtheralis</i>		mosses
<i>Eudonia leptalea</i>		grasses
<i>Eudonia manganeutis</i>		mosses
<i>Eudonia sabulosella</i>		grasses
<i>Eurythecta robusta</i>	Naturally Uncommon	flightless female; larvae on Scleranthus
<i>Graphania mutans</i>		herbs
<i>Graphania plena</i>		herbs
<i>Helastia corcularia</i>		mosses
<i>Lepidoscia heliochares</i>		introduced species
<i>Lycaena new species - boulder copper group</i>		<i>Muehlenbeckia axillaris</i> and <i>M. ephedroides</i>
<i>Nysius huttoni</i>		tiny bug
<i>Orocrambus corruptus</i>		grasses
<i>Orocrambus flexuosellus</i>		grasses
<i>Orocrambus vittellus</i>		grasses
<i>Prepalla austrina</i>		Leucopogon fraseri
<i>Scoparia chalicodes</i>		moss?
<i>Scopula rubraria</i>		diurnal species with larvae on plantain
<i>Tingena melanamma</i>		leaf litter
<i>Tmetolophota atristriga</i>		grasses
<i>Zizina oxleyi</i>		blue butterfly on Carmichaelia corrugata & clovers

Additional Notes: Extract from notes on the fauna of ECAN Perpetual Lease block (Part Res. 947) Received from P. M. Johns (2016).

A short survey was done in 2016 during which a few of the common introduced species of grassland and urban habitats were found. Some important native species also were taken:

1. The tiger beetle *Neocicindela dunedensis*.

A rare species found in isolated pockets in the eastern South Island. Last mid-Canterbury record known to me was in McLeans Island 20 years ago. Now also in a nearby private reserve.

2. The ground beetle *Metaglymma minor*.

In Mid-Canterbury *Metaglymma moniliferum* is common in relatively undisturbed shrublands of the Selwyn District and Banks Peninsula. Three specimens were caught within the regenerating area on the Nicol's farm and it is known elsewhere in West Melton. It is relatively uniform in length. However, in 1905 a much smaller form, described as *Metaglymma minor* was caught in North Canterbury at an unknown site and now one, 100 years later, has been taken on the flats of the ECAN reserve adjacent to the Nicol's farm, about 100 m from regenerating shrubbery. This site will be covered by the formation of the new river control bank. Two more specimens are known from an area close to the river.

There are small differences between the two forms but the question as to whether it represents another species cannot be answered as yet. It requires further specimens to see the variation within the population and a determination of its genetic differences, if any. If it is different this may prove to be an important site for a relict population.

3. Butterflies and moths.

There is good population of the undescribed Waimakariri boulder butterfly in the area. It lives on the prostrate *Muelenbeckia* shrub. Other native plants also support many moth species and the further conversion to exotic grassland or shrubbery (gorse and lupin) would hasten their decline.

4. The crane-fly *Zelandotipula* ? new species.

One larva was found in the fine mud in shallow water along the edge of the water race. Adults are known from one other site in West Melton, also near a water race.

Attachment 5: Plant, insect and fungi records across Lot 16A recovered from iNaturalist, 13.02.2019.

id	observed_on	user_login	quality_grade	scientific_name	common_name
949644	16/01/2013	jasonbutt	needs_id	Poa cita	Silver Tussock
949646	16/01/2013	jasonbutt	research	Schoenus pauciflorus	Bog Rush
952640	17/02/2013	meurkc	research	Dichondra brevifolia	
952642	17/02/2013	meurkc	research	Scleranthus uniflorus	
952644	17/02/2013	meurkc	needs_id	Geranium	geraniums and cranesbills
952645	17/02/2013	meurkc	research	Carex breviculmis	Grassland Sedge
952663	17/02/2013	meurkc	needs_id	Carex comans	
973698	10/08/2013	timlogan	needs_id	Clematis	Clematis
980219	20/12/2013	timlogan	needs_id	Poa cita	Silver Tussock
980220	20/12/2013	timlogan	needs_id	Festuca novae-zelandiae	Hard Tussock
980254	20/12/2013	timlogan	research	Carex breviculmis	Grassland Sedge
980255	20/12/2013	timlogan	research	Kunzea serotina	Kanuka
980260	20/12/2013	timlogan	research	Carmichaelia australis	NZ common broom
981597	1/01/2014	timlogan	needs_id	Rytidosperma	Wallaby grasses
981598	1/01/2014	timlogan	needs_id	Anthoxanthum odoratum	sweet vernal grass
981599	1/01/2014	timlogan	research	Triquetrella papillata	
981602	1/01/2014	timlogan	research	Hypochaeris radicata	Catsear
981604	1/01/2014	timlogan	research	Erodium cicutarium	Stork's bill
984405	24/01/2014	timlogan	needs_id	Acaena agnipila	Australian Sheep's Bur
984407	24/01/2014	timlogan	needs_id	Trifolium repens	white clover
984507	25/01/2014	timlogan	needs_id	Rytidosperma	Wallaby grasses
984508	25/01/2014	timlogan	needs_id	Austrostipa	
984509	25/01/2014	timlogan	research	Trifolium arvense	Hare's foot trefoil
984789	27/01/2014	timlogan	research	Cerastium semidecandrum	Little Mouse-ear
985148	1/02/2014	timlogan	needs_id	Muehlenbeckia axillaris \checkmark — ephedroides	
985174	1/02/2014	timlogan	needs_id	Rytidosperma	Wallaby grasses
985182	1/02/2014	timlogan	research	Festuca rubra	red fescue
985186	1/02/2014	timlogan	research	Microtis unifolia	Maikaika
985190	1/02/2014	timlogan	research	Geranium sessiliflorum	
985192	1/02/2014	timlogan	research	Carmichaelia australis	NZ common broom
985193	1/02/2014	timlogan	research	Rytidosperma racemosum	
985194	1/02/2014	timlogan	needs_id	Rytidosperma	Wallaby grasses
985196	1/02/2014	timlogan	research	Hypochaeris radicata	Catsear
985382	2/02/2014	timlogan	research	Leucopogon fraseri	Patotara
985562	2/02/2014	timlogan	research	Raoulia australis	Golden scabweed
985694	6/02/2014	timlogan	research	Poa cita	Silver Tussock
992135	30/03/2014	timlogan	needs_id	Dichondra	
992142	30/03/2014	timlogan	research	Hypoxis hookeri	
992530	30/03/2014	timlogan	research	Breutelia affinis	
992531	30/03/2014	timlogan	research	Breutelia affinis	
1066604	8/11/2014	melissa_h	research	Senecio dunedinensis	
2739079	29/02/2016	edwilson	needs_id	Isolepis	
2739153	29/02/2016	edwilson	needs_id	Acaena	Bidibid
2739159	29/02/2016	edwilson	needs_id	Euchiton	Cudweed
2741297	29/02/2016	edwilson	research	Senecio glomeratus	Cutleaf burnweed
id	observed_on	user_login		scientific_name	common_name
Insect records					
952639	17/02/2013	meurkc		Lepidoptera	Butterflies and Moths
952676	17/02/2013	meurkc		Orocrampus	
980253	20/12/2013	timlogan		Megadromus antarcticus	Alexander Beetle
980261	20/12/2013	timlogan		Lycaena	Copper Butterflies
984504	25/01/2014	timlogan		Phaulacridium marginale	New Zealand Grasshopper
984788	27/01/2014	timlogan		Lepidoptera	Butterflies and Moths
985153	1/02/2014	timlogan		Lycaena	Copper Butterflies
2970763	10/04/2016	alice_shanks		Lycaena boldenarum	Boulder Copper
Fungi records					
984411	24/01/2014	timlogan		Cladia aggregata	
984774	27/01/2014	timlogan		Xanthoparmelia	rock shields
984777	27/01/2014	timlogan		Ustilago agropyri	
984790	27/01/2014	timlogan		Cladia aggregata	

Attachment 6: Photographs

Lot 17A



Above: *Leucopogon fraseri* (left) and *Microtis unifolia* (right); commonly observed within grassland-herbfield mosaic of Lot 17A.



Above: Boulderfield shrubland of SE corner of Lot 17A. Grass skink records are from the edges of this area.



Above: Dwarf broom *Carmichaelia corrugata*



Above: Scattered *Discaria toumatou* alongside knobby club rush (*Finicia nodosa*) and marram grass (*Ammophila arenaria*) at the SW corner of Lot 17A.



Above: Fenced *Sophora prostrata* at NE corner of Lot 17A. Note regrowth of vegetation from base of shrubs since fencing occurred in 2010 (lower image from Godley et al. (2011)).



Above: Isolated *Sophora microphylla* within the grassland of the upper part of the lot. Note no regrowth at base of tree compared to those trees which are fenced (see image below).



Above: Example of regrowth at stem of fenced *S. microphylla* within a fenced area.



Above: Example of need for weed management/surveillance within any fenced off areas.
Below: Silver poplar coming away in an area fenced off to protect a kowhai.



Below: The Henderson Water Race Area



Images from Lot 16A



Above: *Muelenbeckia axillaris* (left) is often found along the presumably less disturbed fence lines, here observed at the eastern boundary between Lot 16A & the neighbouring Lot 16B. *Dichondra brevifolia* (right) observed within the gorse-shrubland in the SE corner of Lot 16A.



Above: *Microtis unifolia* (Onion-leaved orchid) (Left) is common through Lot 16A and scattered *Discaria toumatou* (right) occurs along the edges of old braid contours.



Above: Isolated kowhai tree (left) and relatively common *M. axillaris* (right).



Above: Exotic grassland with areas of gorse shrubland at the northern edge of Lot 16A. Native plants such as *Microtis unifolia* (observed at E1545959 N5186000) and *Muelenbeckia axillaris* occur sporadically beneath this cover (lower images).