Toitu te whenua
Land Information
New Zealand

Crown Pastoral Land Tenure Review

Lease name : THE LARCHES

Lease number : PO 254

Conservation Resources Report - Part 1

As part of the process of Tenure Review, advice on significant inherent values within the pastoral lease is provided by Department of Conservation officials in the form of a Conservation Resources Report. This report is the result of outdoor survey and inspection. It is a key piece of information for the development of a preliminary consultation document.

Note: Plans which form part of the Conservation Resources Report are published separately.

These documents are all released under the Official information Act 1982.

October 02

DOC CONSERVATION RESOURCES REPORT ON TENURE REVIEW OF THE LARCHES PASTORAL LEASE

PART 1

INTRODUCTION

1.1

The lessee of The Larches pastoral lease has applied to the Commissioner of Crown Lands for a review of the property's pastoral lease tenure.

The 1825 hectare property is situated in the Cardrona Valley on the western flanks of the Criffel Range which is separated from the main Pisa Range massif by the Luggate Creek catchment. The property is within the Luggate Creek and Cardrona River catchments which both feed into the Clutha River. The homestead lies on the eastern side of the Cardrona Valley adjacent to SH 89.

Altitude ranges between 400 metres on the Cardrona Valley floor to 1370 metres on the crest of the Criffel Range.

The pastoral lease is made up of developed river flats, moderately steep faces which have been historically AOSTD up to 1000m and rolling dissected country on either side of Luggate Creek.

Seven hectares of land adjoining unallocated Crown Land adjoining the lease is recommended for inclusion in the review (see Other Matters).

Ecological Setting

The Larches Pastoral Lease is found in the north-west of the Pisa Ecological District (ED). The Pisa ED is an 84,750 ha land area, bounded in the north and east by the Clutha River, in the west by Lake Wanaka and the Cardrona River and in the south by the Kawarau River.

The property contains no areas identified as Recommended Areas for Protection (RAP's) identified in the Lindis, Pisa, Dunstan Ecological District Protected Natural Areas Programme survey report (Grove, 1995).

No parts of the lease are currently subject to protection for conservation purposes.

The Tenure Review inspection of The Larches Pastoral Lease was undertaken on 29-30th January 2002. This inspection was undertaken by a multi-disciplinary team of eight people.

PART 2
INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE

2.1 Landscape

Methodology

The pastoral lease is divided into landscape units (LUs). For each unit a landscape character description is provided along with a description of the key visual and scenic attributes present. An evaluation summary is then presented using a range of criteria to assess each unit and assist with determining each unit's high inherent values. The criteria include:

1. Intactness: - refers to the condition of the natural vegetation, patterns and processes and the degree of modification present.
2. Legibility: - refers to its expressiveness - how obviously the landscape demonstrates the formative processes leading to it.
3. Aesthetic Factors: - include criteria such as *distinctiveness* - the quality that makes a particular landscape visually striking. Frequently this occurs when contrasting natural elements combine to form a distinctive and memorable visual pattern. A further criteria assessed under aesthetic factors is *coherence*. This is based on characteristics including intactness, unity, continuity, and compatibility. Intrusions, alterations, disruptions tend to detract from coherence.
4. Historic Factors - refers to historically valued attributes in the context of a high country landscape.
5. Visibility - refers to the visibility from public places such as highways, waterways or local vantage points.
6. Significance - is the significance of the characteristics and features, or combination of characteristics and features within individual units. If they are locally, regionally or nationally significant.
7. Vulnerability - is a measure of each landscape unit's susceptibility to further ecological deterioration, which would impact on landscape values.

Landscape Units

The Larches is broken into three landscape units (refer Appendix 1 and Appendix 2). These are:

LU 1 Cardrona Flats and Terraces

LU 2 Criffel Front Faces

LU 3 Summit Plateau

(a) Criffel

(b) Luggate Creek and Eastern Summit Plateau

Landscape Unit 1 (Lu1) – Cardrona Flats And Terraces

Character Description

This small unit includes the river flats and low terraces (including the area within the lease west of the Cardrona Valley Road.)

The flats adjacent to the river are cultivated and subdivided into paddocks. Vegetation includes willow, poplar, broom, briar and exotic grasses. A pine plantation is located near the homestead.

The area west of the Cardrona Valley is outwash terrace and consists of a low flat-topped terrace with pasture (predominantly browntop). The terrace face is eroded and modified in places from early gold workings. Overall the unit is highly modified.

Visual & Scenic Values

The unit is typical of the Cardrona Valley floor low outwash terraces and river flats. There are no significant or outstanding visual features contained within the unit.

Evaluation Summary

Table 1

Criteria	Value	Comment
Intactness	Low	Highly modified
Legibility	High	Terraces and river flats expressive of formative processes
Aesthetic Factors	Medium	Typical to Cardrona valley and other valley floor landscapes
Historic Factors	Low	Some gold workings on terraces
Visibility	Medium	Partly visible from Cardrona Valley Road
Significance	Low	
Vulnerability	Low	

Landscape Unit 2 (Lu2) – Criffel Front Faces

Character Description

The front faces are grouped as one unit. The faces represent typical Central Otago fault mountain slopes of ripply slump topography with dissected ridge and gully landform on the lower range slopes. Upper slopes are steep slump topography with a minor collapsed scarp below the ridge.

Vegetation patterns are variable from top to bottom. Lower areas are a mix of depleted short tussock, pasture, briar, browntop, scattered pine and significant patches of kanuka/manuka

and matagouri shrubland. The shrubland has been subject to patch burning. The shrubby woodland contrasts in colour and texture with grassland consisting of oversown and top dressed (OSTD) pasture and depleted short tussock.

Above the kanuka/manuka belt is an extensive area of induced bracken within basins and gully systems. Bracken is mixed with briar, short tussock and patchy grey shrubland (predominantly matagouri). Seepages and wet areas occur within the gullies.

Beyond the gully bracken is extensive OSTD short tussock. This occurs on the ridges and in a broad band across the upper ripply slopes. Rock outcrops usually associated with matagouri shrubland are also a distinctive feature within the short tussock (mainly silver tussock) grassland.

The top fence roughly forms the boundary between the short tussock dominant grassland and another distinctive belt consisting of *Hieracium lepidulum.* This extends up onto the summit plateau.

Visual & Scenic Values

There are no highly distinctive visual features within the front face unit. The remnant patches of manuka/kanuka/matagouri woodland are however a notable visual feature and contributes to local character and identity.
The primary visual and scenic values are associated with the range as a whole forming part of the eastern visual enclosure to the Cardrona Valley and also the backdrop to the Wanaka Township and environs.
The mid bracken belt combined with woody weeds and pine is visually scruffy and reflects its transition phase from shrubland to pasture.

Evaluation Summary

Table 2

Criteria	**Value**	**Comment**
Intactness	Low to medium	Retains main characteristics but modified
Legibility	Medium	Slump topography expresses formative processes
Aesthetic Factors	Medium	Not distinctive. Visually scruffy in places
Historic Factors	-	Some gold sluicing activity on low terraces
Visibility	Medium	Visible from Cardrona Valley Road and from parts of Wanaka
Significance	Low	
Vulnerability	Low	

Landscape Unit 3 (Lu3) – Summit Plateau

Character description

The summit plateau visually forms one relatively homogenous unit. This reflects the fairly uniform landform over the whole unit consisting of undulating to rolling landform with the entrenched Luggate Creek carved into the underlying schist.

For descriptive purposes and to reflect the different vegetation characteristics east of Luggate Creek compared to west of the creek, the unit is divided into two sub-units.

LU 3a – Criffel (West of Luggate Creek)

This large area consists of smooth, undulating / rolling landform with *Hieracium lepidulum* the dominant cover. In flower the plateau assumes a bright yellow hue. While *H.lepidulum* is dominant there is a native component consisting of short tussock (blue and hard tussock) and a depleted inter-tussock component. *Aciphylla* is also visually significant. Within the western tributaries of Luggate Creek reddish/ brown *Dracophyllum* is a notable feature on south faces with some low *Ozothamnus* (tauhinu) shrubland.

LU3b- Luggate Creek and eastern Summit Plateau

Luggate Creek is a very distinctive landscape feature within the summit plateau. It is entrenched within the plateau forming an incised basin with eroded edges and an infilled floor. Near the southern boundary the creek follows a meandering pattern. Green seepages occur on the valley sides. The floor and the valley sides are mostly modified by grazing and support a significant exotic vegetation component.

Further north, Luggate Creek enters a tighter gorge, gradient steepens and rock outcrops dominate the valley sides. This is especially so towards the bend below the Criffel Diggings.

A further significant feature is the historic and parallel water races on the west sides of Luggate Creek leading to the Diggings.

Generally the native component and naturalness is greater east of Luggate Creek. While snow tussock is almost entirely absent and *Hieracium* is a significant component, short tussock and inter-tussock alpine plant communities are dominant. *Dracophyllum* occupies large patches on south faces and is a strong visual feature. Bare areas occur on exposed west and north facing ridges reflecting the fragility of the land at this altitude. Seepage's and wet areas occur within shallow entrenched tributaries of Luggate Creek.

Criffel Diggings

Part of the Criffel Diggings occur within the lease. They appear as pink and white scars visible over a wide area. The pits, dams, tailings, sluicings and water races represent a significant and important cultural overlay on the summit plateau. Time has softened the scars to create a strange badlands feel.

Visual & Scenic Values

Visually the summit plateau appears as a vast upland plateau of smooth, rolling landform with spectacular panoramic views in all directions. Visual values over the whole unit are high despite the modified state of natural values.

The extent of *Hieracium* infestation and ecological deterioration within LU3 (a) Criffel (West of Luggate Creek) impacts on the perception of visual values associated with this high country natural landscape. Not withstanding this, however the rolling and folding plateau

landscape is very distinctive and memorable and does contain high visual values. It also forms an integral part of the much larger Criffel/ Pisa Range summit plateau landscape.

Luggate Creek is unquestionably of high visual and scenic values. The combination of characteristics which contribute to high values include; the gentle entrenched basin at the southern end contrasting with the deep gorge to the north; the naturalness and quality of the watercourse (water and stream bank); the vegetation patterns (contrasting *Dracophyllum* and tussock/alpine herbfield; impressive rock bluffs and outcrops; and the water-race/Criffel Diggings complex.

East of Luggate Creek the key characteristics include contrasting and varied vegetation patterns (ie short tussock and inter tussock species intermingling with extensive *Dracophyllum pronum*.) These characteristics combined with impressive landform patterns and spectacular views represent high visual and scenic values.

Evaluation Summary

Table 3

Criteria	Value	Comment
Intactness	Medium	Snow tussock absent over whole unit. High infestation of *Hieracium lepidulum* especially west of Luggate Creek
Legibility	High	Landform formative processes highly legible
Aesthetic Factors	High	Derived from combination of characteristics (landform and vegetation patterns and spectacular views)
Historic Factors	High	Criffel Diggings and water- race complex significant human dimension
Visibility	Low	
Significance	High	Forms part of the vast and important upland Criffel/Pisa Range Summit
Vulnerability	High	Very fragile and vulnerable to landuse changes

2.2 Landforms & Geology

The Criffel Range forms part of the the Pisa Range massif which is the highest of the fault-block ranges characteristic of Central Otago. Along with other South Island mountain ranges the Pisa Range was formed as part of the Kaikoura Orogeny during the Pliocene (5–2million years ago). Movements of the Kaikoura Orogeny formed the characteristic basin and range topography of Central Otago as some blocks of the country were pushed up faster than others. The Criffel Range is sharply fault bounded by the Cardrona Valley.

The underlying bedrock is comprised of Haast schists while there is a thick alluvial mantle on the Cardrona Valley floor and a thin alluvial mantle in the headwaters of Luggate Creek.

An unusual feature of the property is the presence of ancient alluvial gravels on ridge tops which pre date the Kaikoura Orogeny. It is in these gravels from which gold was historically mined (refer historical section).

2.3 Climate

The climate of the Pisa ED is generally typical of Central Otago. Annual rainfall is at its minimum (c. 400 mm) in the south-east of the district, rising to c. 650 mm on valley floors with the maximum of c. 1400 mm on the summit. Much of the summit precipitation is as snow in winter. Some snowbanks on shady aspects may persist throughout the summer. Annual rainfall at the Larches homestead is in the vicinity of 500mm. Snow cover on the Criffel Range summit is shallower and less persistent than on the adjoining higher Pisa Range.

2.4 Vegetation

Property Overview

For the purpose of describing botanical values the property has been split into three parts: (a) the valley floor and terraces, (b) the relatively steep faces of the Criffel Range and (c) the gentle summit area which is the north-eastern extent of the Pisa Range summit plateau.

(a) Valley floor and lower terraces: This area is highly modified, with most of the flat ground being in pasture. Along the Cardrona River crack willow (*Salix fragilis*) is abundant. The terrace faces contain scattered shrubs and silver tussock (*Poa cita*).

(b) Slopes of the Criffel Range: Most of the slopes have been oversown and topressed, leading to a dominance of pasture species with a low to moderate density of fescue tussock (*Festuca novae-zelandiae*) and or silver tussock. The lower to mid slopes also contain scattered shrubs and fragmented shrublands, while the mid slopes have much bracken fern. Other minor communities are found on rock outcrops and wetlands/seepages. The upper most area above the oversowing and topdressing level is dominated by tussock hawkweed (*Hieracium lepidulum*).

(c) Summit area: The summit area generally has an abundance of tussock hawkweed. There is a naturalness gradient from tussock hawkweed dominance in the north-east to high naturalness in the south-west. Other communities include *Dracophyllum pronum* on shady aspects, wetlands in some gullies floors and along the Luggate Creek. The summit area also contains rock outcropping, along the Luggate Creek, especially in the gorge.

Description of Vegetation Communities Which Retain a Significant Natural Component

A Tussocklands

Tussockland would formerly have been the dominant vegetation type on the property. Short tussockland communities are now the most extensive. This community has been induced

from a formerly more widespread snow tussockland which once extended down to a treeline/shrubland zone. As a consequence of fires and pastoral use, the lower portion of the former snow tussockland has become dominated by fescue tussock across Otago.

Fescue tussocklands: Fescue tussock remains widespread on the mid and upper slopes, although introduced species dominate in this zone. The cover of the fescue tussock and other associated species is highly variable.

Alpine short tussockland: Is the major community across much of the gentle rolling summit plateaux. The community has been induced from a formerly more extensive snow tussockland as a consequence of burning and pastoral use. The composition of the community is highly variable in its naturalness. There is a gradient of decreasing naturalness from the south-west to the north-east of the summit. Tussock hawkweed is the most common and widespread exotic species. The cover of alpine fescue is somewhat variable reaching 25+% in the most dense sites. Golden speargrass (*Aciphylla aurea*) is locally common.

Four representative sites were sampled. The first site was on a gentle slope near the southern boundary (Grid Ref. NZMS 260 F40 025 926). At this site the cover consisted of bare ground (30% cover), lichen (12%), alpine fescue (10%), *Raoulia subsericea* (3-10%, average 8%), *Chionohebe densiflora* (2-15%, average 4%), *Rytidosperma pumila* (4%), *Leucopogon fraseri* (3-5%), harebell (*Wahlenbergia albomarginata*, 3%), tussock hawkweed (3%), *Craspedia lanata* (<1-3%), *Oreomyrrhis colensoi* (2%), *Celmisia gracilenta* (1%), *Scleranthus uniflorus* (1%), *Colobanthus strictus* (1%), *Pimelea oreophila* (1%), *Acaena saccaticupula, Lagenifera cuneata*, sweet vernal (*Anthoxanthum odoratum*) and other plant species.

The second site was on a shady aspect on the east side of Luggate Creek (Grid Ref. NZMS 260 F40 045 923). At this site the cover consisted of leaf litter (30%), bare ground (20% cover), alpine fescue (15%), *Leucopogon fraseri* (8%), *Rytidosperma pumila* (8%), blue tussock (3%), *Raoulia subsericea* (3%), *Chionohebe densiflora* (1-3%), *Epilobium elegans* (2%), sheeps sorrel (2%), harebell (*Wahlenbergia albomarginata,* 1%), *Dracophyllum muscoides, Raoulia grandiflora, Lycopodium fastigiatum, Pimelea oreophila,* tussock hawkweed and other species.

The third site was on a broad ridge crest on the east side of Luggate Creek near to site two. At this site the cover consisted of bare ground (30% cover), alpine fescue (10%), leaf litter (10%), lichen (8%), *Chionohebe densiflora* (6%), *Rytidosperma pumila* (6%), *Leucopogon fraseri* (5%), sheeps sorrel (4%), blue tussock (*Poa colensoi*, 3%), tussock hawkweed (2%), bryophytes (2%), *Pimelea oreophila* (1%), *Dracphyllum muscoides, Brachyscome* sp. and other plant species.

The fourth site contained highly modified modified vegetation in which tussock hawkweed is dominant, with only patchy alpine fescue. The cover includes mainly bare soil (50-80%), with much tussock hawkweed (8-15%) and some *Leucopogon fraseri, Raoulia subsericea, Rytidosperma pumila*, sheeps sorrel (*Rumex acetosella*) and occasional snowberry (*Gaultheria depressa* var. *novae-zelandiae*), *Pimelea oreophila* and other plant species.

Figure One. Upper Luggate Creek. The Valley Floor Comprises Alpine Wetlands. Hill Slopes Support a Native Short Tussock Association Interspersed with Tussock Hawkweed.

Snow tussockland: This community has become very localised, with only a few patches remaining. At a sample site the cover consisted of narrow-leaved snow tussockland (*Chionochloa rigida*, 50%), leaf litter (25%), bare ground (10%), *Dracophyllum pronum* (8%), alpine fescue (2%), snowberry (1%), *Rytidosperma pumila* (1%), *Lycopodium fastigiatum* and other plant species.

On the south faces of the Luggate Gorge (Grid Ref. NZMS 260 F40 058 944) is a low density snow tussockland. The major cover consists of narrow-leaved snow tussock (5%), tussock hawkweed (20%), leaf litter (18%) and bare/rock (15%). Also present are *Dracophyllum pronum*, blue tussock, *Celmisia angustifolia*, prickly shield fern (*Polystichum vestitum*), *Anisotome aromatica* and *Anaphalioides bellidioides*, with *Schoenus pauciflorus*, *Dolychoglottis lyallii* common in seepages and along creeks.

B Shrublands

A variety of shrublands are present on the property. These are most common at lower altitudes, where they provide some residual element of natural character to this generally developed zone. The composition is dependent upon altitude, disturbance, and physical characteristics of the site.

Matagouri-mingimingi-briar shrubland: This shrubland is the most extensive shrubland on the property, being common in low to mid altitude gullies and slopes. It has been modified by fires, grazing and other disturbance. The shrublands contain mingimingi (*Coprosma propinqua*), matagouri (*Discaria toumatou*), kanuka (*Kunzea ericoides*), and briar (*Rosa*

rubiginosa) with occasional *Olearia lineata*, *O. odorata* and porcupine shrub (*Melicytus* aff. *alpinus*). Manuka is scattered in some areas.

Kanuka shrubland: Kanuka becomes dominant locally, forming a dense tall shrubland. This community would be much more widespread if not for repeated burning in the past.

Dracophyllum pronum shrubland: Areas of *Dracophyllum pronum* are common on shady aspects at higher altitude. These are characteristically of very low diversity, but typical of their type in the Pisa ED. One site sampled consisted of *Dracophyllum pronum* (40%), bare (40%), leaf litter (10%), alpine fescue (5%), snowberry (2%), *Raoulia subsericea* (1%), *Agrostis muelleriana*, *Pimelea oreophila* and few other species.

Figure Two. *Dracophyllum pronum* Shrublands Covering Shady Aspects in Luggate Creek.

C Wetlands

Alpine wetlands: There are several large alpine wetlands present in gullies on the summit plateau. The wetland sampled is very diverse, containing several distinct associations (Grid Ref. NZMS 260 F40 051 924).

The wetland edge is dominated by comb sedge (*Oreobolus pectinatus*, 80%), with sphagnum moss (*Sphagnum cristatum*, 4%), *Carex gaudichaudiana* (4%), *Gaultheria parvula* (3%), *Celmisia* sp. "gracilenta rhizomatous" (1%), *Euphrasia dyeri* (1%), *Euphrasia* sp. (1%), *Kelleria paludosa* (1%), *Plantago uniflora* and other plant species.

The upper (south) end edge of the wetland consists of *Polytrichum juniperinum* (80%), *Carex gaudichaudiana* (10%), sphagnum moss (3%), other bryophyte species (2%) and browntop (*Agrostis capillaris*, 1%).

The top end of the wetland consists of much sog (water and bare mud, 30%), *Carex gaudichaudiana* (15%), *Polytrichum juniperinum* (15%), comb sedge (8%), *Deschampsia chapmanii*? (5%), *Isolepis aucklandica* (3%), *Abrotanella caespitosa* (3%), *Agrostis pallescens* (3%), *Euchiton laterale* (2%), *Luzula leptophylla* (2%), *Rytidosperma australe* (2%), *Oreomyrrhis* sp. "bog" (2%), brown top (2%), *Euphrasia dyeri* (1%), bladderwort (*Utricularia monanthos*), *Plantago obconica*, *Epilobium* sp. and other plant species.

Much of the interior of the wetland consists of sphagnum moss (50-80%, average 60%), *Carex gaudichaudiana* (15%), *Oreomyrrhis* sp. "bog" (5%), *Epilobium komarovianum* (3%), *Euphrasia dyeri* (3%), *Euchiton laterale* (2%), *Coprosma perpusilla* (2%), *Luzula leptophylla* (2%), other bryophyte species (2%), comb sedge (1%), *Gentiana amabilis* (1%) and other plant species.

A cushionfield area consists of comb sedge (75%), sphagnum moss (6%), *Carex gaudichaudiana* (5%), *Abrotanella caespitosa* (3%), *Luzula leptophylla* (3%), *Gaultheria parvula* (2%), other bryophyte species (2%), *Euphrasia dyeri* (1%), *Euchiton laterale* (1%), *Celmisia* sp. "gracilenta rhizomatous", *Isolepis aucklandica*, *Centrolepis pallida*, *Coprosma perpusilla*, *Gentiana amabilis* and other species.

Ponds and wet depressions contain bladderwort, *Isolepis aucklandica*, *Deschampsia chapmanii*?, *Rytidosperma australe*, *Epilobium komarovianum* and *Centrolepis pallida.*

Hillslope wetland and pond: This wetland system centred on Grid Ref NZMS 260 F40 042 974) and an associated artificially created pond sits on the hill slope in an area formed from past slumping.

The wet centre of the wetland consists of bryophytes (35%), white clover (*Trifolium repens*, 10%), spike rush (*Eleocharis acuta*, 8%), jointed rush (*Juncus articulatus*, 8%), *Carex secta* (5%), *Carex gaudichaudiana* (5%), *Juncus effusus*? (5%), *Epilobium chiononanthum*? (4%), *Stellaria graminea* (2%), cutty grass (*Carex coriacea*, 1%), *Potamogeton suboblongus* (1%), *Hydrocotyle microphylla* (1%), *Montia fontana* (1%), *Ranunculus glabrifolius* (1%), *Myosotis arvensis* (1%) and other plant species.

Around the margin of the wetland is a turf community containing *Hydrocotyle microphylla*, *Carex gaudichaudiana*, white clover, pasture grasses, *Ranunculus foliosus*, *Lagenifera petiolata* and other plant species.

The wet pond edge supports a dense thicket of raupo (*Typha orientalis*), *Carex secta*, *Carex maorica* and *Myriophyllum* sp. In the gully below the pond and dam is a seepage wetland area.

Figure Three. Mid Altitude Wetland in Centre with Kanuka Dominated Shrubland Remnants Below.

D Other communities

There are number of generally minor communities present, most of these are in alpine areas.

Rock Outcrops: These form a distinctive part of the landscape and are characterised by a selection of plant species. Distinctive species include *Luzula banksiana, Leptinella pectinata* var. *villosa, Cystopteris tasmanica, Hymenophyllum villosum, Celmisia viscosa, C. laricifolia, Ourisia caespitosa, O. glandulosa* and other plant species.

Flood Plain along Luggate Stream: This fertile flood plain is largely clothed in exotic grasses. There are also some old channels and back washes containing wetlands and seepage/turf communities. An area of seepage/turf examined contained bryophytes, *Hydrocotyle microphylla, Carex gaudichaudiana, Leptinella squalida* var *mediana, Plantago uniflora, Euchiton laterale, Euphrasia dyeri, Oreomyrrhis* sp. "bog", *Isolepis aucklandica, Nertera balfouriana, Ranunculus maculatus, Gaultheria parvula,* white clover and red fescue (*Festuca rubra*) and other plant species.

Problem Plants

Tussock hawkweed is abundant on the upper Criffel Faces and summit plateau. It achieves dominance in the north-east of the summit and decreases to a minor cover in the south-east.
Briar is common on the lower and mid slopes of the Criffel Faces.
Gorse is localised along parts of the track and is being controlled by the lessee.
Elderberry and hawthorn are scattered through shrublands in gullies on the lower slopes.

SIGNIFICANCE OF VEGETATION

The entire property has suffered from some level of modification as a consequence of its long fire history and pastoral use (as is the case for most of coastal and Central Otago). The intactness of the remaining natural values on the hill slopes of the Criffel Range is limited. The upper slopes and summit area contains fields of tussock hawkweed, however this grades into short tussockland. The extensive short tussocklands have been induced from formerly widespread narrow-leaved snow tussockland. The short tussockland communities remain important in maintaining natural vegetation character. The condition, composition and intactness of the values of the area are similar to those identified on adjacent properties.

A partial plant list of 200 taxa, including 182 native taxa was recorded during the inspection (see Appendix 3). This flora includes several notable species. The species recorded with a national listing from Molloy et.al 2001, include:
Oreomyrrhis colensoi var. *delicatula* (status – Nationally Endangered). This herb was recorded from a turf area on the flood plain of Luggate Stream.
Epilobium chionanthum: (status – gradual decline) This willowherb was recorded from the hillslope wetland.
Olearia lineata (status – sparse) This tree daisy was scattered through shrublands on the lower and mid slopes of the property.
Plantago obconica (status – sparse) This dwarf native plantain was recorded in an alpine wetland. It is one of only a few records from Otago.
Ranunculus maculatus: (status – sparse) This buttercup was recorded from seepage/turfs along Luggate Stream.

Other plant species of interest recorded include those that are considered regionally uncommon. These include:
Carex maorica: This sedge was found around the margin of the pond associated with the hill slope wetland.
Cabbage tree (*Cordyline australis*): A single cabbage tree was observed above the hill slope wetland, within bracken.
Hebe hectorii: A few plants of this whipcord hebe were found in the alpine fescue tussockland.
Manuka (*Leptospermum scoparium*): Manuka was scattered through open shrub areas on the lower slopes of the property.
Native mint (*Mentha cunninghamii*): Native mint was observed in the turf communities around the hill slope wetland.

2.5 Fauna

2.5.1 Aquatic Fauna

No fish were caught during electric fishing surveys on the Larches Pastoral lease.

The western area of the property contains wetlands, seepages and small streams which drain into the Cardrona River. The small streams are on steep faces, and are probably prone to high flows during storm events and may become dry during summer or drought conditions. It is unlikely that fish inhabit these waterbodies.

The upper section of Luggate Creek is located within the Larches Pastoral Lease property. The feeder tributaries to Luggate Creek are small, with most being wetland areas rather than lotic waters. The creek streambed consists of mainly coarse gravels with smaller areas of sand and bedrock substrate. No fish species were found during electric fishing surveys. Anecdotal evidence suggests that a gorge outside the pastoral lease prevents the upstream movement of introduced sports fish. Approximately 10 years ago rainbow trout were caught, within the pastoral lease, however, these were probably introduced above the gorge and did not breed. Invertebrate taxa present in Luggate Creek are generally those associated with good water quality. Species composition is dominated by the mayflies *Nesameletus* and *Deletidium* (Ephemeroptera). *Hydrobiosis* and *Olinga feredayi* (Trichoptera) are also present, but in lower abundance.

SIGNIFICANCE OF AQUATIC FAUNA

Although no fish species were found during the inspection, the Luggate Stream environment has the potential to provide excellent fish habitat. The upper part of Luggate Creek within the Larches Pastoral Lease, may provide suitable translocation sites for threatened non-migratory galaxiids.

2.5.2 Herpetofauna

"Site locations of rare and endangered herpetofauna are recorded in the original report. Herpetofauna of this nature is at risk of illegal activities including damage and removal through unlawful interference and disturbance. Accordingly, information regarding the locations of any such herpetofauna has been deleted from this version of the report. The Department of Conservation has put in place mechanisms to ensure that such information can be released for genuine scientific and research purposes. Please contact the Department of Conservation directly to determine whether the information can be released."

The Larches offers little good habitat for lizards apart from McCanns (*Oligosoma maccanni*) and common skinks (*O. nigriplantare polychroma*) which are both widespread on the property. Although Whittaker (1987) suggests that the lower reaches of Luggate Creek may represent suitable habitat for Otago (*O. otagense*) and grand (*O. grande*) skinks, habitat modification and the presence of introduced mammalian predators makes their presence unlikely. Black backed gulls which have breeding colonies on several tors are also likely to prey on diurnal lizards.

The apparent lack of the Cromwell Gorge gecko (Hitchmough 1997) in particular at GR NZMS 260 F40 2204500 5596600, suggests that the habitat is somehow unsuitable. This gecko is widespread in the Cardrona catchment (Jewell and McFarlane 1997). See Appendix 4 for full lizard survey report.

SIGNIFICANCE OF HERPETOFAUNA.

Both McCanns and common skinks are widespread throughout the Otago highcountry.

2.5.3 Avifauna

Native birds seen were harrier hawk, pipit, black backed gull (colony), New Zealand (Eastern) falcon (*Falco novaeseelandiae*) (juvenile).

SIGNIFICANCE OF AVIFAUNA

New Zealand Falcon is a category B threatened species (second priority threatened species) 0(Molloy & Davis 1994). The species is considered to be in in gradual decline).

2.5.4 Invertebrate Fauna

The property was surveyed for invertebrates in January 2002. Pitfall traps were left until 21 February 2002 (about 3 weeks) and emptied at the end of that period.

Nine sites were sampled using a variety of methods (see Appendix 5. for site location, description and collection technique). In total, 147 species of invertebrates were identified from the survey and these are listed in Appendix 6,7 & 8) . This is a conservative estimate of the material collected because some groups such as Hemiptera and Diptera were not fully identified to species. Almost 80% of species records were from sites 1, 2 and 3 (average of 56 spp. per site) which reflects the pitfall (Sites 1 and 2) and Blower-Vac sampling (Sites 1, 2 and 3) that was carried out only at these sites. The average number of species records from sites 4-9, where only hand-collecting methods were used, was 8 spp. per site. This emphasises the inadequacy of a relatively short period of hand collecting for invertebrates in essentially grassland environments.

All invertebrates were identified as far as possible to species depending upon the author's systematic knowledge of the groups, and some were sent to specialists for species identification. (see Appendix 7).

Fauna Of Collecting Sites

Criffel Range Plateau and Rock Outcrops (Sites 1, 3, 5 and 7)

These sites were located on the summit plateau areas of the Criffel Range characterised by tussock, large patches of prostrate *Dracophyllum* shrubs, dominance of *Hieracium lepidulum* in places and a mix of native and exotic inter-tussock grasses, herbs and sub-shrubs. Eighty eight species were identified from these sites, but as mentioned above, sampling methods were not consistent at all sites.

Some of the larger Carabidae were found mainly at these sites, for example *Megadromus sandageri*, *Mecodema lucidum* (Fig. 4) and *Holcaspis ovatella*.

Figure. 4: ***Megadromus sandageri*** **(25mm long)*, Mecodema lucidum, Holcaspis egregialis, H. sternalis***

Similarly the broad-nosed weevils in the genera *Irenimus, Nicaeana* and *Nonnotus,* and 'flower weevil' *Peristoreus veronicae* (associated with *Hebe* and *Cassinia*) (Fig. 5), were found at these sites, but not exclusively. *Cicindela* sp. cf. *dunedinis* (Fig. 6) was present in large numbers on the bare areas of the gold diggings at site 7, a typical habitat for tiger beetles.

Figure 5: ***Peristoreus veronicae*** **(3mm long)**

Fig. 6: ***Cicindela*** **sp.cf.** ***dunedinis*** **(8mm long)**

Figure. 7: *Asaphodes clarata* (wingspan 27mm)

The geometrid Lepidoptera, *Aponotoreas anthacias Asaphodes clarata* (Fig. 8), and *Notoreas* n. sp. were found only at sites 1 and 3, although they are specific to plants found at other sites also.

Luggate Creek and Tributaries (Sites 2 and 6)

These sites were essentially riparian with more lush vegetation including wetland species. The number of species recorded from these sites was 73, mostly from Site 2 where pitfall and Blower-Vac sampling was carried out.

The remains of a single specimen of the carabid, ?*Taenarthrus capito* (Fig.9) was found at Site 6, but this could possibly be more widespread along the margins of Luggate Creek and its tributaries which form quite a significant feature of the upper parts of the property. Two of the *Holcaspis* species (Fig. 4) were found only at Site 2, possibly suggesting a preference for more moist habitats, or a greater abundance of suitable prey items.

Upper Wetland (Site 4)

Site 4 was a wetland area representing the upper reaches of a catchment of a tributary stream running into Luggate Creek. The alpine sundew, *Drosera arcturi* , an insectivorous plant, was present in quite large patches at the sides of the bog. This is native to Australia and NZ, and is thought to be particularly successful in trapping small Diptera (Tassara, 2000).

Only 3 insect species were collected from the bog, and all were found at other sites as well. They were the small carabid *Scopodes edwardsi* and a lygaeid bug (all immature stages), both of which were very active and abundant on the surface of the bog vegetation, and the crambid moth, *Orocrambus thymiastes*, also particularly concentrated in numbers on and in the vicinity of the wetland.

NW-facing slope of Cardrona Valley and Lower Wetland (Sites 8 and 9)

Site 8 at 800m on the NW slopes of the Criffel Range was dominated by *Hieracium lepidulum*. Only the tussock butterfly, *Argyrophenga antipodum* was collected in the short time spent at the site.

Site 9 was a wetland area at 580m, collecting from the NW faces of the Criffel Range and draining into the Cardrona River. The wetland was surrounded by introduced grasses and shrubland and the main collecting method used at this site was beating matagouri and other shrub species. Consequently, most of the 21 species collected were not represented at other sites. The anobiid beetle, *Leanobium flavomaculatum* (native wood borer) was collected, and the anthribid *Eucoides suturalis*, an Australian species which develop in flower stalks of browntop and cocksfoot (Poaceae). The adults are thought to feed on fungal spores (Holloway 1982). A grasshopper species characteristic of lower altitude grasslands, *Phaulacridium marginale*, was present, and the blue butterfly *Zizinia labradus oxleyi* was abundant. A preying mantis *Orthodera novaezealandiae* was also beaten from shrubs. Dragonflies and damselflies were observed but not collected.

SIGNIFICANCE OF INVERTEBRATE FAUNA

Given current limited knowledge of invertebrate taxa and their distributions, the most significant species identified in this survey were:

Diptera: Tachinidae: new genus new species

This small tachinid species (Fig. 8) was found at sites 1 and 2, and apparently has not been recorded previously (John Dugdale pers. comm.). Tachinid larvae are parasitic on other invertebrates and until rearing studies are undertaken, the host group for this species cannot be ascertained. Several specimens were collected, all by pitfall trapping.

Figure. 8: Tachinidae new genus new species (4mm long)

Coleoptera: Carabidae: Migadopinae: *?Taenarthrus capito* (Jeannel)

The specimen (Fig. 9) was found dead under a rock at the edge of a steep part of a tributary stream flowing from the NW side in to Luggate Creek at Site 6. The specimen is more or less complete, although disintegrated, and the male aedeagus is present, so the identity can be confirmed in the future (P.M. Johns pers. comm.). The type locality of this species is Lake Wakatipu, and according to Larochelle and Lariviere (2001), it has only been recorded from the OL (Otago Lakes) region using the area codes of Crosby *et al.* (1976). However, Johns (1980) has recorded this species, then in the genus *Loxomerus*, from Arthurs Pass National

Park. He notes that it is a rare, generally subalpine species of western Otago, Westland and Southland. It is a very hygrophilous species and is always found beside rocky streams (Larochelle and Lariviere 2001).

The presence of this species on the Criffel Range is significant since it is not commonly found, and would seem to indicate that the riparian margins of the shady faces of Luggate Creek may be relatively undisturbed.

Figure. 9: *Taenarthrus capito* (approx. 11mm long)

Hymenoptera: Proctotrupidae: ?*Oxyserphus* sp.

Hymenoptera are so poorly known in NZ that the significance of new species discoveries on this property is difficult to determine. In this case, this small, brachypterous wasp is known from only very few specimens from Central Otago, and may in fact represent a new genus (J. Early pers. comm.). Specimens were collected in pitfall traps at Site 1.

Hymenoptera: Scelionidae: *Scelio* sp.

Again the significance of this species is uncertain, but John Early noted that he had not seen it before. He suspects that it might be a native parasitoid of grasshoppers. The specimens were collected in pitfall traps at Site 2.

2.5.5 Problem Animals

There is an itinerant goat population on the Criffel Range which appears to be largely comprised of farm escapees. These animals are very mobile and are not always observed in the area. Goats are subject to periodic control by DOC. A vigilance is maintained for pigs which are generally confined to the nearby Pisa Range. A high percentage of pigs on the Pisas have been found to be infected with bovine TB. A mob of Chamois have periodically been sited on the Criffel Range. Hares are present in low to moderate numbers and have a significant impact on ecological values. Possums are present throughout the property. Rabbits are found below 1000m and have historically reached very high numbers.

2.6 Historic

The northern end of the Criffel Range was the scene for the last alluvial gold field to be found in Otago. Gold was discovered here in 1885, nearly 25 years after the first rush to Gabriels Gully in 1861. In the first years of the diggings there were about 50 miners on the field and despite a shortage of water for sluicing as much as 2000 ounces of gold a year was taken out. Two water races bringing water from the upper Luggate Creek were completed in 1887. Mining continued through the 1890s with a smaller population of up to 27 miners but mining seems to have ceased in the early years of the 20th century (Hamel 1991: 4–7).

The gold bearing deposits are ancient gravels that were originally beaches before being uplifted during the formation of the Central Otago block mountains. The diggings are distributed in discrete patches over an area approximately 7 km long by 2 km wide. Unlike most alluvial workings these are not in the stream valleys but on the tops of ridges where the ancient beach gravels have not been eroded away. At 1300 metres above sea level these sites are some of the highest large scale alluvial mining sites in New Zealand.

Sites

Of these discrete areas of mining the western most diggings, the western end of the middle diggings, parts of the associated major water races and part of the miners pack track are on the Larches pastoral lease. For detailed descriptions of these sites refer to Hamel (1991:44-49).

Two large water races carried water from the headwaters of Luggate Creek along the western side of the creek valley to the three areas of diggings west and north of Luggate Creek. Another water race system ran along the eastern boundary of the lease to a set of diggings near the junction of Luggate Creek and the Princess Burn. These workings are just outside the Larches lease.

An unusual feature of this area is high visibility of the miners pack tracks. All supplies to the Criffel diggings had to be carried in on horse back and several pack tracks are visible at various locations. They probably all connected to create a system that serviced all the diggings on the range with main branches connecting the workings and with both Mt Barker and the Cardrona valley. Such systems are rarely found on the remaining gold fields sites elsewhere in Otago.

Figure Ten. Miners Pack Track On The Eastern Side Of Luggate Creek.

Of the 3 areas of gold working around Mt. Criffel only the westernmost area is entirely within the Larches lease. These diggings are the largest and highest of the workings (GR 054955). The main working site is a large U shaped sluice pit with both arms about 300 m long. The sluice faces are up to 15m high. Curiously the 3 areas of hut sites located were within the sluice pits – presumably other hut/tent sites existed outside of the sluicings but these were not found during the survey. These occupation areas were marked by the flattened

areas for huts or tents and were associated with discarded domestic rubbish items (shovels, alcohol bottles, tin cans, beef bones).

The western half of the middle Criffel diggings are also within the Larches lease (GR059 957). In comparison to the above site these workings are quite shallow, about 400 m long and situated on the top of a ridge line. Originally the tailings from the mining were discharged north into a tributary of Luggate Creek and then as the sluiced ground reached the crest of the ridge the tailings were discharged directly into Luggate Creek. There was a camp site located in the south east corner of the workings (ie within the Larches lease) again associated with domestic rubbish items.

Figure Eleven. The Criffel Diggings.

SIGNIFICANCE OF HISTORIC VALUES

The mining landscape on the Criffel Range is significant for a number of reasons. It was the last major alluvial gold field to be discovered in Otago, it was probably the highest area of major sluicing in Otago and the workings were based on remnant ancient beach gravels on ridge lines rather than the usual alluvial deposits along waterways. It is also well documented in the official mines department records of the day.

Perhaps most significantly the mining system of gold workings, water races and dams and the associated pack tracks is essentially intact. The area has not been subject to the activities which has destroyed or damaged other areas of gold mining elsewhere in Otago. Furthermore the high altitude of the workings has prevented them becoming lost under exotic pasture grass and trees which obscures other sites at lower altitudes. As a result that portion of the Criffel

diggings which is present on the Larches lease is remarkably well preserved and highly visible.

2.7 Public Recreation

2.7.1 Physical Characteristics

In 1992 DOC compiled a Recreation Opportunity Spectrum for the entire conservancy whereby all areas regardless of land tenure, were classified and mapped according to setting, activity and recreational experience characteristics.

The Criffel Range was zoned "Backcountry 4WD Drive In" which "is characterised by a feeling of relative remoteness from populated areas". "The highly natural setting is a valued part of the experience and may be associated with motivations of "escape from town", education and nature appreciation". "Four wheel drive vehicles are desirable to give access to high country tussock grasslands and block mountains and more rugged remote areas."

2.7.2 Legal Access

The western margin of the property is dissected by the Cardrona River, the margins and bed of which are excluded from the pastoral lease as Crown Land and marginal strip. There is legal access to the river from several points off the Cardrona Valley Road. The Cardrona Valley Road (SH89) separates the bulk of the pastoral lease from a smaller block on the western side of the road. There is no legal public access up the faces of the Cardrona Valley faces to the crest of the Criffel Range. A marginal strip is present on Luggate Creek as far as the lease boundary. The southern end of the Criffel block adjoins conservation land acquired through a completed tenure review on adjoining Avalon Station. A public access easement within Avalon Station leads to Little Criffel Peak on the south western boundary of the Criffel Block.

2.7.3 Activities

The Cardrona River is utilised for picnicking and fishing (supports rainbow and brown trout). The areas scenery is enjoyed by motorists travelling along the Cardrona Valley Road. The Criffel diggings and surrounds receive a level of use over summer months by walkers, four wheel drivers, mountain bikers and horse trekkers with permission of the run holders. A commercial 4 wheel motor bike operation regularly takes visitors to the part of Criffel diggings which lies on the freehold land on the northern boundary of the Criffel Block.

There may be some periodic use of the Criffel Range for ski touring although snow cover is less reliable than on the main massif of the Pisa Range.

PART 3

OTHER RELEVANT MATTERS & PLANS

3.1 Consultation

Conservation resources on The Larches were discussed at a meeting with "umbrella" recreation and conservation groups (NGO's) in Alexandra on Monday October 8th 2001.

Key points raised at the meeting were:

- Land on the summit of the Criffel Range should be added to the public conservation estate as it has been on adjoining Avalon Station.
- The skyline landscape visible from the Cardrona Valley should be protected.
- Public access should be attained onto the Criffel Range via a route which is less steep than the easement on neighbouring Avalon Station. This would also serve to make for a round trip via Little Criffel.

Federated Mountain Clubs have provided a preliminary report on recreation and related significant inherent values. This report is appended as Appendix 9.

Recommendations in this report are a follows:

(i) The plateau area of the Criffel Range and faces above 1000m should be restored to full Crown ownership as a conservation area.
(ii) An area of lowland shrubland in the NE corner of the property should be restored to full Crown ownership as a conservation area or protected under a conservation covenant.
(iii) Formal public access (foot, bicycle and possibly for horse trekkers) should be acquired along the farm track which links the Criffel tops to the Cardrona Valley.

3.2 Regional Policy Statements & Plans

Under the Otago Regional Plan: Water suction dredge mining of the waterways on the lower slopes of the property requires resource consent.

3.3 District Plans

The property is located within the General Rural zone of the Queenstown Lakes District Plan. In general, the proposed Queenstown Lakes District Plan (amended to incorporate Council decisions) does not act as a trigger for the protection of tussock grasslands and smaller wetlands and forest areas. Resource consent is required for subdivision and subsequent development, buildings, forestry and also ski area activities. No forestry shall be undertaken in an alpine area with an altitude greater than 1070m. The protected landscape provisions of the Plan are in the process of going through the Environment Court. However, it is likely that part of this property will be in an Area of Outstanding Landscape. There are no registered

historic sites, or areas of significant indigenous vegetation as set out in the schedules of the plan. Protection is limited to the controls set out above.

3.4 Conservation Management Strategies & Plans

The Otago Conservancy of DOC has prepared a Conservation Management Strategy (CMS) which was approved by the Minister of Conservation in August 1998.

The CMS identifies 41 special places of conservation interest in Otago Conservancy. The Larches lies within the Pisa Special Place.

The CMS objective for the Pisa Special Place is:

"*To protect representative low altitude low altitude lands and high altitude lands in the area for their landscape, nature conservation and historical values; the latter lands on an extensive basis providing enhanced public recreational opportunities complementary to those already being provided commercially*".

The key implementation methods relevant to The Larches are:

(a) seek opportunities arising out of pastoral lease tenure review negotiations to protect extensive high altitude areas of high landscape, nature conservation, historical, recreational and water and soil significance.

(b) As tenure reviews are concluded , keep under consideration the unifying concept of a high altitude Pisa Conservation Park. If the park proposal proceeds, a management plan for the park will be developed.

(c) Ensure appropriate public access, both vehicular or by horse where appropriate and on foot, to lands administered by the department.

(d) Continue to gather ecological and historical information that aid management and pastoral lease tenure review negotiations, including surveys for indigenous fish.

(e) Recreation and tourist concessionaire use of the range may be allowed where any potential adverse effects on the natural, historic and recreational resources and opportunities can be avoided, remedied or mitigated.

(f) *Aiming to protect at least one complete mining system.*

Priorities for the Pisa Special Place
Completion and continuation of protection negotiations at both high and low altitudes, including tenure reviews, will be a priority in this Special Place.

3.5 Freshwater Fisheries Plans

Under Preparation.

3.6. Crown Land Recommended for Inclusion in the Review.

7.1071 hectares described as Section 7 SO 300466 is fenced into the top block of the Larches. This land was originally part of Midrun pastoral lease although it has historically been fenced into the Larches. On survey, following completion of tenure review on Midrun the area was surveyed off as a separate parcel, with the objective of sorting its future status out at such time that the Larches undergoes tenure review. The area contains extensive gold workings which are an integral part of the Criffell Diggings described under the historic section. The area is of equal historic and recreational significance.

PART 4

MAPS ETC.

4.1 Additional information

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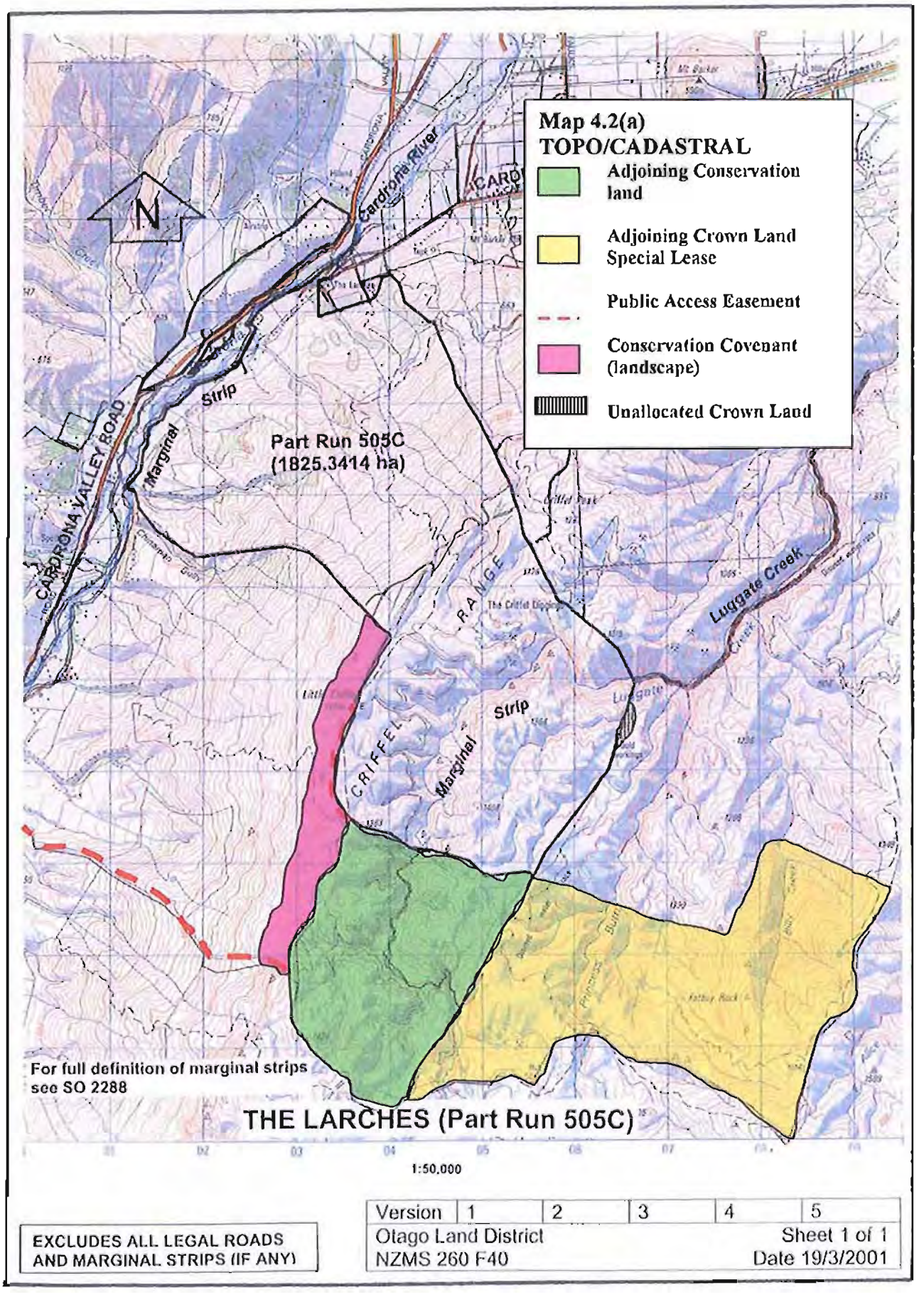
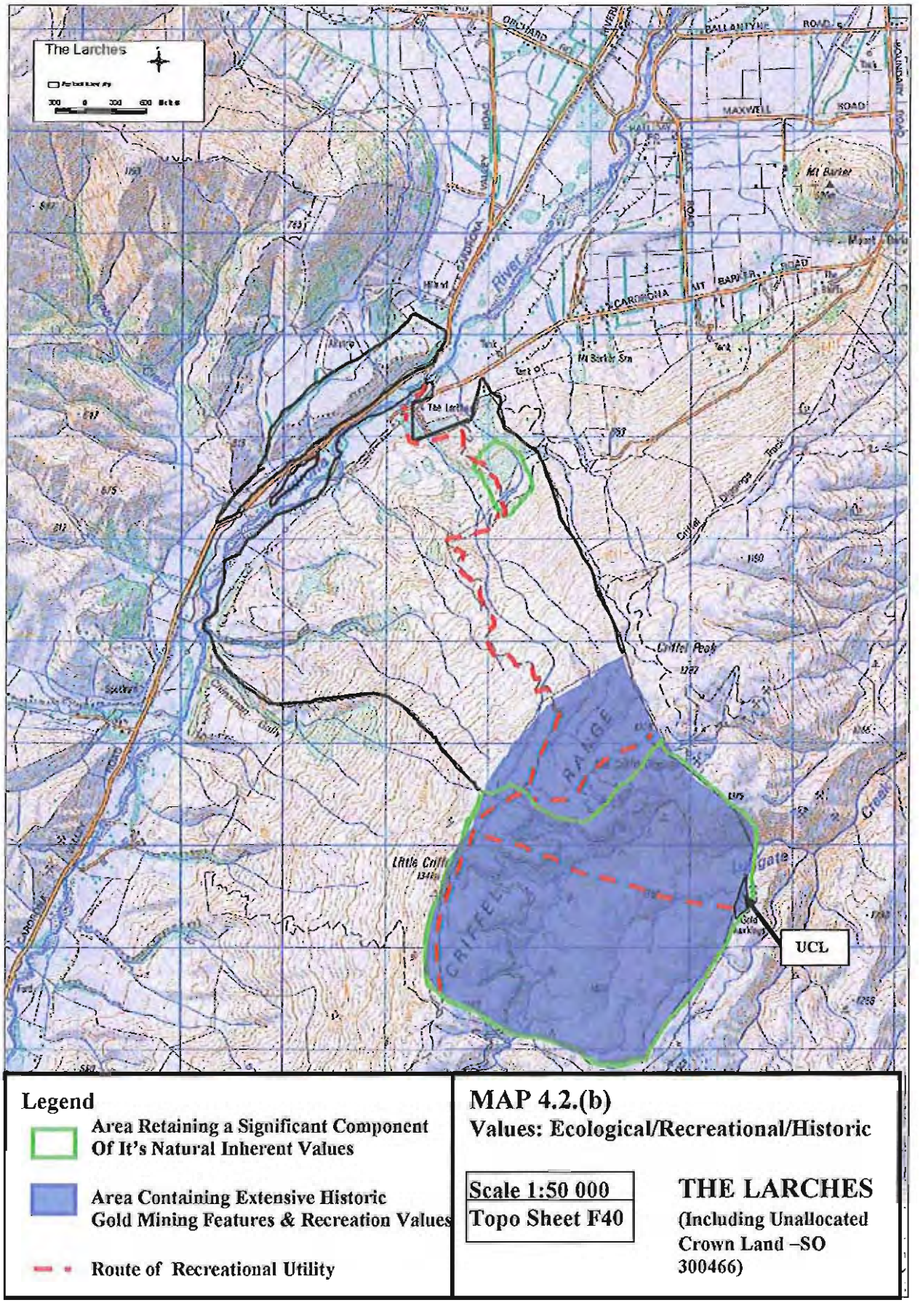
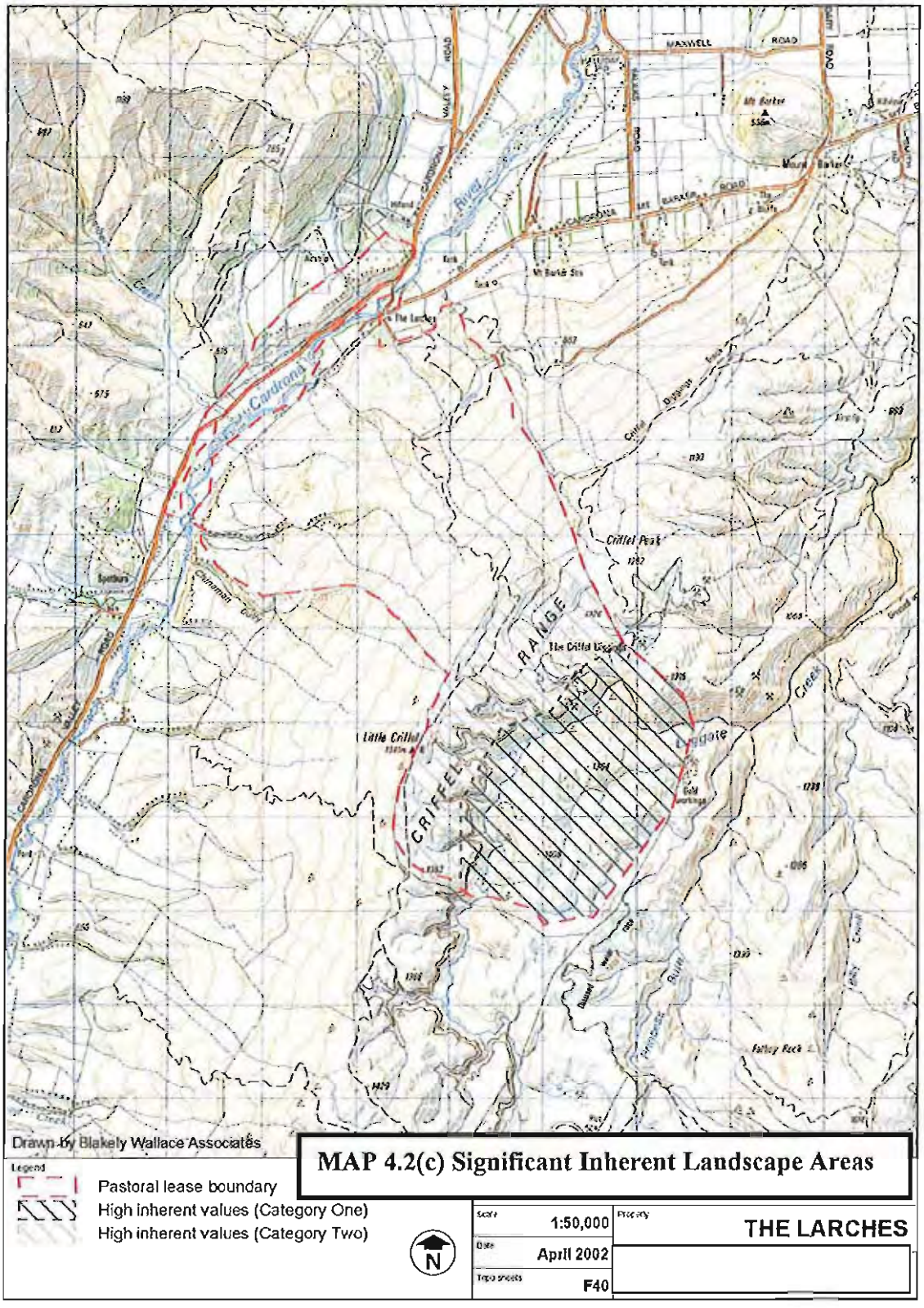
4.2 Illustrative Maps







Drawn by Blakely Wallace Associates

Appendix 2

Title	LANDSCAPE UNIT PHOTOGRAPHS
Scale	
Date	April 2002
Property	THE LARCHES
Drawing	PHOTOGRAPHS

Appendices