Land Information New Zealand
Toitū te whenua

Crown Pastoral Land Tenure Review

Lease name : GLENLEE RUN

Lease number : OM 025

Conservation Resources Report

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.

August 16

GLENLEE

PASTORAL OCCUPATION LICENCE

UPDATED CONSERVATION RESOURCES REPORT

DEPARTMENT OF CONSERVATION

August 2016

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Cover Photo: Teme Basin with Mt Hall to the right and Mt Alexander on the left. The flanks of Glenlee South are dominate the left hand side of the picture.

PART 1 INTRODUCTION

Glenlee is a 5787 ha property located on the northwest side of the mid-Awatere River valley in South Marlborough (Map 1). It covers moderately-steep to steep broken hill country south of Ferny Gair, and including the summits of Barometer (1780 m), Glenlee North (1720 m) and Mt Alexander (1596 m). The property ranges in altitude from 500-700 m in the main valleys to over 1700 m on the central summits of Glenlee North and Barometer.

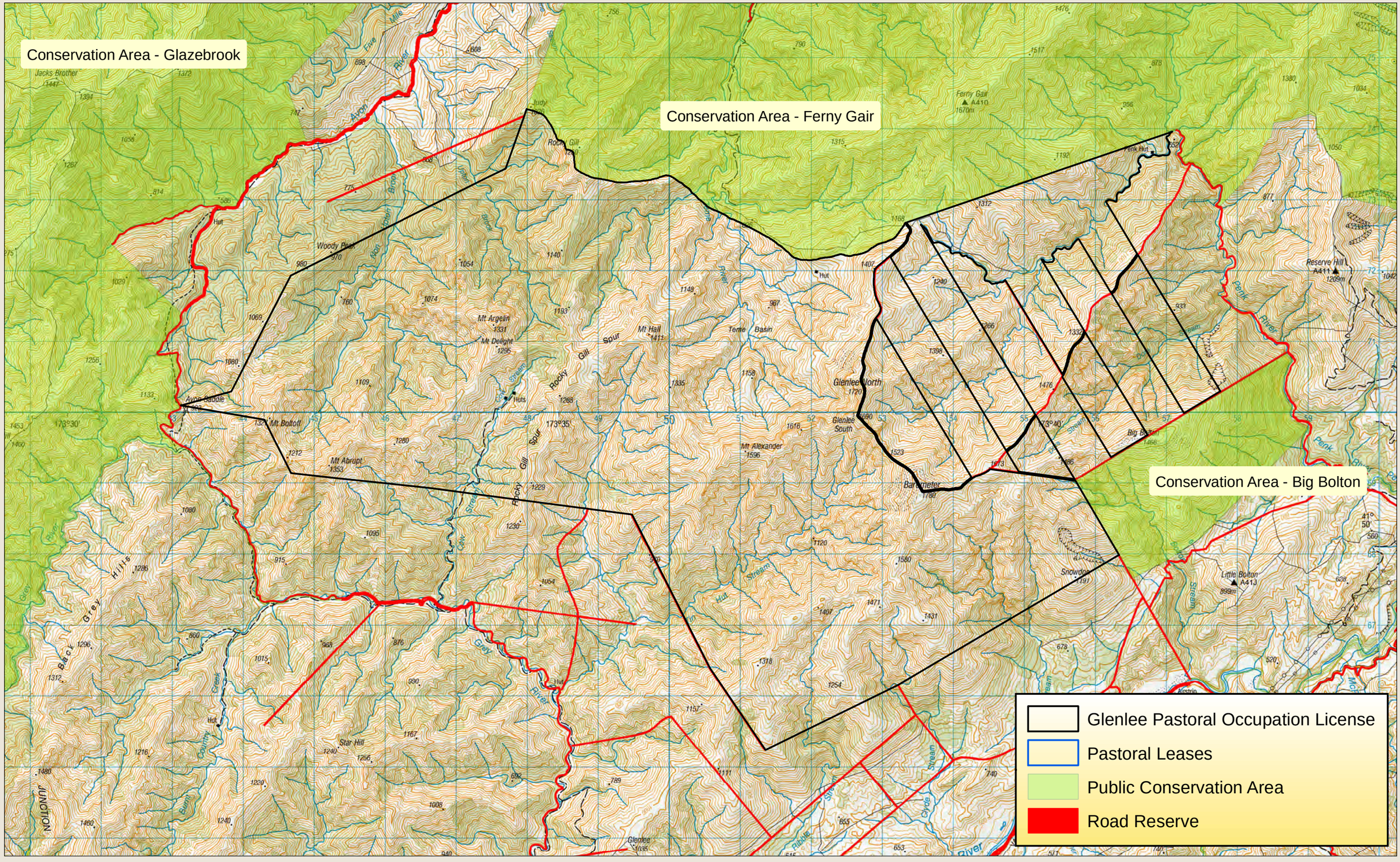
The northwest parts of the property are drained by Non-Upton Brook, Upton Brook and the Teme River; southwest parts by Cow Stream and the two main tributaries of Tin Hut Stream; northeast parts by the Penk River and its tributary Dore Stream; and southeast parts are drained by the upper reaches of Ribble, Clyde, Burr and Bolton streams. Non Upton Brook, Upton Brook and the Teme River flow north to the Avon River, in the Wairau River catchment. All other streams on the property drain south into the Awatere River. The main access to the property is from the Awatere Valley via freehold parts of the Glenlee property.

Glenlee Pastoral Occupation Licence (hereafter referred to as Glenlee or Glenlee POL) lies in the Waihopai Ecological District, within Inland Marlborough Ecological Region. The inland Marlborough ecological districts were investigated as a collation exercise for the Protected Natural Areas Programme in 1990. Areas on the property, in the Non Upton Brook and Upton Brook valleys, were identified for protection (Clare, 1990). More recently, Clerke (1994) investigated the conservation values on Glenlee. Clerke recommended that all northwest and eastern parts of the property be protected and administered by the Department of Conservation. He proposed that grazing of the Teme Basin be permitted under a special licence, and that sustainable farming use could be achieved for the catchments of Cow Stream and the northern tributary of Tin Hut Stream.

The property adjoins Ferny Gair Conservation Area to the north, a gridiron pattern of Glenlee freehold land and The Jordan Pastoral Lease in the Penk valley to the east, Big Bolton Conservation Area to the southeast, freehold parts of Glenlee in the Awatere and Grey valleys to the south and west, and the Glazebrook Conservation Area and freehold land of the Malvern Hills property in the Avon valley to the northwest.

The first tenure review inspection of the property, that formed the basis of the first Conservation Resources Report, was undertaken during April 2006 and December 2006 by a range of specialists. These specialists' reports are listed below.

- Vegetation Report for parts of Glenlee Pastoral Occupation Licence, Jan Clayton-Greene, August 2006, 10p + map.
- Assessment of the Fauna Values of Glenlee Pastoral Occupation Licence, Simon Elkington, *undated*, 11p + maps.
- Glenlee Pastoral Occupation Licence, A Report on the Freshwater Fish Survey, Scott Bowie, August 2006, 13p including photos + maps.
- Glenlee Pastoral Occupation Licence, Invertebrates, Ian Millar, March 2006, 8p + appendix + map.
- Glenlee Pastoral Occupation Licence, Landscape Assessment, Alan Petrie, December 2006, 8p + map.



Glenlee Pastoral Occupational License - Topo Cadastral

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Geospatial Services

The second tenure review inspection of the property was undertaken during December 2014 and February 2015. This purpose of this work was to confirm the information from the first assessment as well as contribute any new information regarding the property. This work was undertaken by a range of specialists, some who had previously visited the property and some who were new to the property; these reports augmented the work done during the first inspection, with both sets of reports contributing to this report. These specialists' reports are listed below.

- Vegetation Report for SW and NE ridges leading to Barometer, Penk, Dore and Tin Hut Streams and the Teme Basin – Glenlee POL Tenure Review, Jan Clayton-Greene and Simon Moore, July 2015, 25 pages + maps.
- Invertebrate Fauna - Glenlee POL, Eric Edwards, September 2015, 17 pages + map.
- Historic Assessment for Glenlee Pastoral Occupation Licence, Steve Bagley, July 2015, 21 pages.

Additionally, information from the first inspection reports is updated to match the current species threat classifications and the current Significant Inherent Values Criteria.

Significant Inherent Values

This Conservation Resource Report identifies the Significant Inherent values for Glenlee.

Significant inherent value is a term that is used in the Crown Pastoral Land Act 1998. It is defined as:

"in relation to any land, means inherent value of such importance, nature, quality, or rarity that the land deserves the protection of management under the Reserves Act 1977 or the Conservation Act 1987"

Neither the Reserves Act 1977 nor the Conservation Act 1987 is specific about which values deserve the protection of management under them. Guidance on significant inherent values and related matters under the tenure review programme, Crown Pastoral Land Act 1998 has been prepared by the Department of Conservation. This guideline was developed in 2004 and replaced by a revision developed in 2012.

The 2012 revision sets out guidelines for the different value classes. These guidelines have been used to identify the significant inherent values of Glenlee.

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

2.1 LANDSCAPE

2.1.1 Landscape Context

Glenlee is located within inland Marlborough and found within the mid section of a large block of broken rangelands that separate the Awatere River valley in the south from the Wairau River valley in the north.

The block of high country that the property encompasses is described as being tectonically active, formed by the dramatic uplifting of the earth's crust, resulting in a crumpled-like landscape that features such natural elements as sharp crested ridgelines, deep dissected gullies and displaced watercourses. Generally, the surrounding rangelands convey an overall appearance of being bare, windswept and scarred by long scree slides.

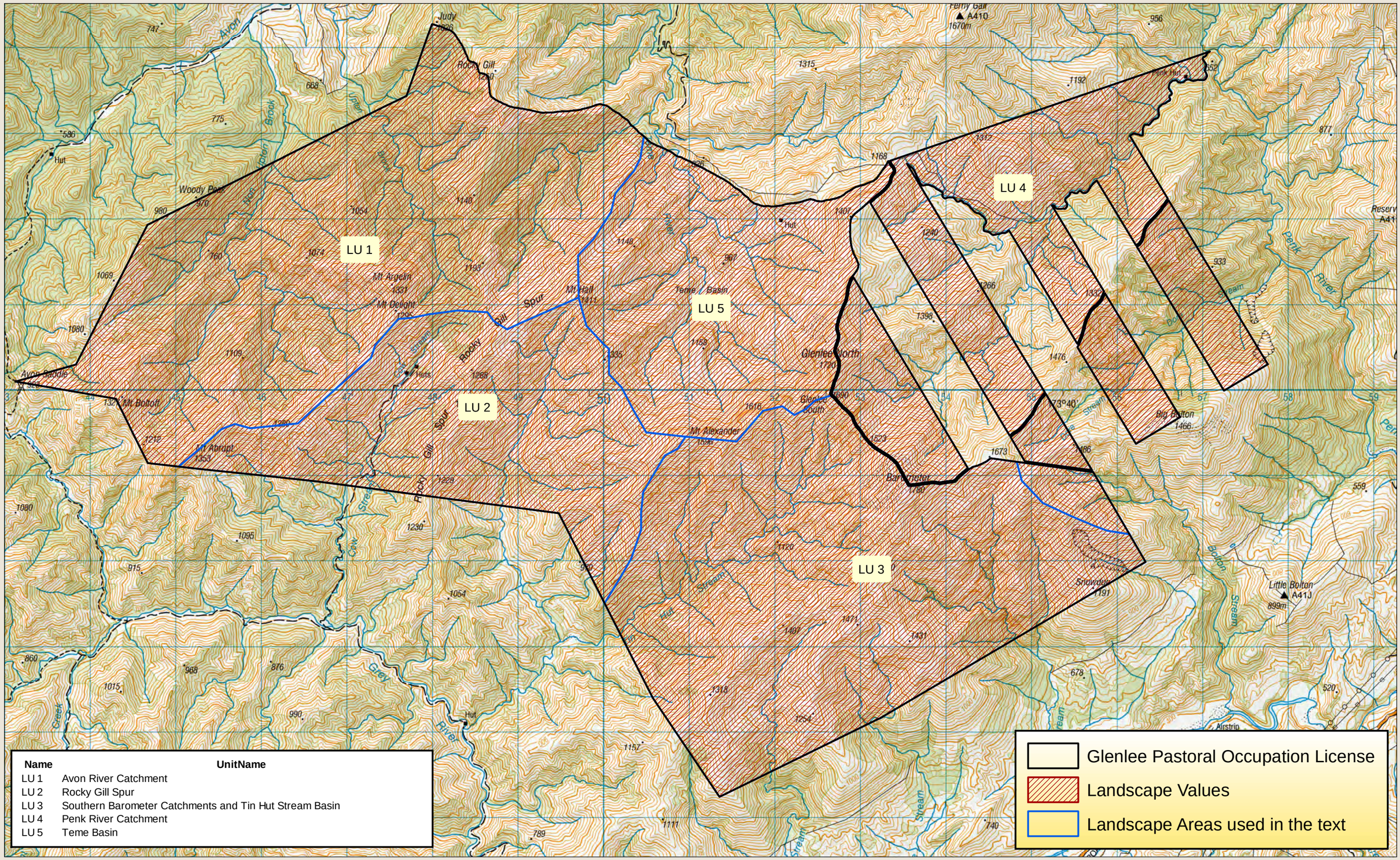
The main structural components of the property include a cluster of northeast to southwest trending high peaks including Barometer, Glenlee North, and Glenlee South. Separating these high peaks there is an intricate pattern of valleys and gullies through which watercourses wind out to meet the surrounding rivers.

A large percentage of the property's boundary follows rigid survey lines that, in a landscape context, are arbitrary and from a land management perspective in many places are difficult to define and manage.

2.1.2 Landscape Description

For the purposes of this landscape assessment Glenlee is divided into five landscape units with the boundaries being principally defined by catchment areas (Map 2). The criteria used to assess and evaluate each unit's landscape values were based on the following attributes:

- Naturalness: an expression of the degree of indigenous content of the vegetative cover, and the extent of human intervention.
- Legibility: an expression of the clarity of the formative processes and how striking these physical processes are.
- Aesthetic values: the concepts of memorability and naturalness, including factors which can make a particular landscape vivid, such as simplicity in landform, muted colours and fine-textured ground cover.
- Visual values: a subset of landscape values which relate to the visibility of a particular landscape or natural feature seen from public vantage points.



Name	UnitName
LU 1	Avon River Catchment
LU 2	Rocky Gill Spur
LU 3	Southern Barometer Catchments and Tin Hut Stream Basin
LU 4	Penk River Catchment
LU 5	Teme Basin

Glenlee POL - Landscape Values

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Unit 1, Avon River Catchment

This landscape unit covers the majority of the property that generally faces towards the north. The unit possesses a series of discrete catchment areas that contain tributaries of the Avon River including Non Upton Brook, Upton Brook and the northwest tributary of the Teme River. The upper limits to the unit follow a craggy and weathered ridgeline that extends from Mt Abrupt to Mt Hall then descends towards the Teme River valley directly north. The northern property boundaries are defined by a series of rigid survey lines that frequently cut across high relief physical features.

Internally the unit contains a number of spot heights that are located along a series of knobbly spur lines possessing straight runnels and eroding chutes. Separating the spur lines are deep dissected gullies, many of which contain small watercourses that link up with the main tributaries.

The vegetation reflects the fractured nature of the topography with a mixture of beech forest and kanuka shrublands that dominate the lower and mid altitudinal slopes. Above the natural timberline the vegetation becomes sparse with patches of mixed short shrublands and tussock. The balance of the ground cover for the higher altitude land is bare ground, outcropping of bedrock and extensive scree slides.

Landscape Values

This unit has significant inherent landscape values due to the high natural qualities and integrity of the indigenous component of the unit. In places the unit possesses an uninterrupted sequence of vegetation types that spans from sparse tussocklands along the ridgelines down to diverse beech forests within the gully floors. The intactness of the native vegetation and lack of "built" elements combine to create a semi wilderness backcountry landscape.

Potential Vulnerability to Change

Land uses that have the potential to adversely affect this unit are:

- The adoption of legal boundaries that frequently follows straight and rigid surveyed lines.
- Earth disturbances across slopes and ridgelines.
- Intervention in the natural regeneration of seral shrublands back to primary forest.
- Wilding pine spread.
- Unsustainable grazing, particularly over fragile slopes and ridgelines.
- Burn-offs.
- Feral animal damage.

Unit 2, Rocky Gill Spur

This unit covers Rocky Gill Spur, the upper catchment of Cow Stream and the west branch of Tin Hut Stream. The upper ridgeline of the unit connects Mt Abrupt, Mt Hall and the flat-topped summit of Mt Alexander. The southern property boundary follows a straight surveyed line that bisects high relief topographical features. Both catchments comprise v-shaped valleys that penetrate into the main ranges on the property. Stemming out from the valleys' ridgelines knobbly spur lines drop to the valley floors.

Covering the main ridgelines and Rocky Gill Spur is bare ground, bedrock outcropping and scree slides with patches of tussockland and stunted shrublands. The vegetation, particularly in Cow Stream catchment, is dictated by slope and aspect with the steeper graded west facing slopes being widely covered in beech forest and kanuka shrublands while the corresponding more moderate slopes are clad in occassional patches of kanuka, rock fields and mixed grasslands. Introduced grasses have become established in clearings in the beech forest along the track by Cow Stream.

Landscape Values

This unit conveys moderately high inherent landscape values with natural patterns and processes still dominating over small modified areas of human intervention. This unit should be seen as part of a broader landscape type that reinforces the natural characteristics of the district's rangelands that feature broken terrain, parched and bare ground and a patchwork of vegetation types.

Potential Vulnerability to Change

Land uses that have the potential to adversely affect this unit are:

- The adoption of legal boundaries that follow straight and rigid survey lines.
- Intervention in the natural regeneration of seral shrublands back to primary beech forest.
- Erection of structures at prominent sites visible from the Awatere Valley Road.
- Earth disturbances across slopes and ridgelines.
- Unsustainable grazing over fragile slopes and ridgelines.
- Potential wilding pine spread.
- Burn-offs.
- Feral animal damage.

Unit 3, Southern Barometer Catchments and Tin Hut Stream Basin

This unit faces towards the southeast and over looks the Awatere River valley. The unit comprises the mid and upper sections of Tin Hut Stream basin and the series of discrete catchments south of Barometer. Tin Hut Stream basin is enclosed by a series of prominent peaks including the summits of Barometer, Glenlee South and Mt Alexander. The southwest, southeast and northeast boundaries to the unit follow rigid survey lines bisecting the topographical features.

Tin Hut Stream basin features complex and fractured topography with angulated outcropping of bedrock, scree slides and eroding chutes and displaced watercourses often resulting in tumbling waterfalls. The catchments south of Barometer contain a series of high-shouldered spur lines that descend rapidly towards the property's southeast front country with deeply dissected gullies dividing the spur lines.

The barren slopes within Tin Hut Stream basin reflect eroding and parched-like traits commonly being covered in a wide scattering of kanuka and tauhina. Along the ridgelines strips of tussock cling onto the more stable ground. Cladding the smaller catchments is regenerating kanuka shrublands.

Landscape Values

Tin Hut Stream basin possesses significant inherent landscape values owing to the diverse array of natural features and elements within the unit. The legibility of the underlying formative processes, especially in relation to natural weathering, is clearly demonstrated in the angulated bedrock formations, scree slides, eroding gravel chutes and the large expanses of wind swept bare ground. The unit is also significant because it contains some of Marlborough's highest peaks outside the Inland Kaikoura Range with Barometer being a standout landmark within the Awatere Valley. The series of smaller catchments south of Barometer have relevance providing the foreground and setting to the high peaks.

Potential Vulnerability to Change

Land uses that have the potential to adversely affect this unit are:

- Earth disturbances across upper slopes and ridgelines.
- Intervention in the natural regeneration of seral shrublands back to primary beech forest.
- The adoption of existing legal boundaries that follow straight rigid surveyed lines.
- Wilding pine spread.
- Unsustainable grazing over fragile areas.
- Erection of structures at prominent sites visable from the Awatere Valley Road.

Unit 4, Penk River Catchment

This unit covers the catchment area of the main tributary to the Penk River along with parallel strips of the property that straddle the catchment of Dore Stream. The top of the catchment includes the peaks of Glenlee North, Glenlee South and Barometer. A short length of the unit's boundary follows along the Penk River with the remaining boundaries to the unit following rigid survey lines that cut across features with a high physical relief. The geometric outline of the property boundaries creates a distinct grid-like pattern over this section of the property.

The two head basins of the Penk River's upper catchment are characterized by an alternating pattern of steep craggy spur lines and crooked dissected gullies with the side slopes of the spur lines being deeply dissected and featuring extensive outcropping of parent rock. The Dore Stream catchment conveys similar traits with the topography being fractured and possessing knobbly spur lines, deep dissected gullies and expansive areas of barren ground.

The vegetative cover is varied with the upper sections of both the Penk River catchment and the smaller Dore Stream catchment covered primarily in depleted tussock. The mid slopes of the Penk River catchment comprise a mixture of kanuka shrublands and remnants of beech forest. Beech forest is also present in the mid and lower slopes of the Dore Stream catchment, especially on the darker slopes, while the opposite drier and sunnier faces are covered extensively in kanuka.

Landscape Values

This unit conveys high significant inherent landscape values owing to the high natural qualities and integrity of the indigenous component of the unit. An important feature is the high natural character of the upper Penk River and its tributaries. This unit forms a link between Ferny Gair Conservation Area in the north and the Big Bolton Conservation Area in the south. Both of these protected areas express the same inherent traits as the property.

Potential Vulnerability to Change
Land uses that have the potential to adversely affect this unit are:

- Earth disturbances across upper slopes and ridgelines.
- Intervention in the natural regeneration of seral shrublands back to primary beech forest, especially through burn-offs and unsustainable grazing.
- The adoption of the existing legal boundaries that follow straight survey lines.

Unit 5, Teme Basin

This unit encompasses all of Teme Basin located in the central northern section of the property adjoining Ferny Gair Conservation Area. Teme Basin is enclosed by an alpine ridgeline encircled by a string of high peaks on the property. Directly below the alpine ridgeline the terrain abruptly descends to form a rocky scarp. Projecting out from this bluff-like scarp is a complex of crooked spur lines that fall towards the main valley, which contains the main stem of the Teme River. The side slopes of the spur lines are regularly broken by depressions that contain straight runnels. Intervening the spur lines are narrow concave gullies.

Modification to the original ground cover is evident by a wide scattering of standing burnt beech trunks. Natural reversion is taking place with extensive tracts of kanuka shrublands and bracken fernland now occupying the basin. Ground cover within the high altitude section is sparse with the occasional area being occupied by fescue tussock supplemented by tauhinu. At a mid and lower altitude there are signs of reversion with taller tiered shrubs over topping both exotic grasses and lower tiered native species. Adjacent to the northern boundary exotic grasslands are a common feature.

Landscape Values
A large proportion of this unit possesses moderately high inherent landscape values attributable to the fact that natural landscape patterns and ecological processes are progressively replacing signs of human intervention. These dynamic processes are strikingly apparent with the reestablishment of beech seedlings over previously modified areas. This unit links the other key basins and valleys that radiate out from the core rangelands on the property.

Potential Vulnerability to Change
Land uses that have the potential to adversely affect this unit are:

- Intervention in the natural regeneration of seral shrublands back to primary beech forest.
- Burn-offs.
- Unsustainable grazing over fragile areas.
- Wilding pine spread.
- Adoption of legal boundaries that follow straight survey lines.

2.1.3 Visual Values

The focus of attention for Glenlee is the series of high peaks that are visible along stretches of the Awatere Valley Road. Barometer is a prominent focal point, being one of the highest named peaks outside the Inland Kaikoura Range. The side slopes that overlook the Awatere valley also have a high visual resource value and augment similar landforms that follow the

Awatere fault rift. The deep dissected valleys and gullies that typify much of the property have a limited visual resource value. However this obscurity helps to reinforce the property's sense of remoteness whilst the lack of formed access into the property strengthens its semi wilderness qualities and its importance as a backcountry recreational destination.

Significance of Landscape Values

Glenlee makes a significant contribution to the recognizable and distinctive landscape character of the rangelands within inland Marlborough. The notable traits of this property include the diverse range of geomorphic features that visually express the uplifting of the earth's crust in the form of fractured and contorted landforms. Glenlee's landscape can be summed up as austere, rugged, jumbled, sun parched and isolated. Glenlee adjoins other parcels of land that convey similar inherent characteristics that makes the property significant when considering the protection of uninterrupted ecological sequences of plant communities and full landscape continuum encompassing a full range of elements.

Significance Guidelines (DOC 2012):

46. Areas that can be restored or managed to contribute landscape linkages between generally recognised or iconic natural landforms and features (including vegetation) deserve protection.

- Protection of this area will enhance the natural character of the area over a period of time and create an integration and connectivity with the adjoining landscapes.

47. Generally recognised or iconic striking or unique discrete landforms or natural features in the high country, and their context, deserve protection.

- The high peaks within this area augment the rugged and mountainous character of inland Marlborough and form recognisable and striking prominent landforms in the district.

2.2 GEOLOGY, LANDFORMS AND SOILS

2.2.1 Geology

2.2.2 Landforms

Glenlee covers steep broken country spanning the headwaters of several tributaries of the Awatere and Wairau river systems. The property is dominated by the bare summits of the Glenlee peaks (Glenlee North and Glenlee South), Barometer, Mt Alexander, Mt Hall, Mt Argelin, Mt Abrupt and Mt Boltoff, all lying between altitudes of 1300 and 1800 m. The higher altitude ridges have broad crests; other ridges and spurs are narrower and more dissected. Between these high summits and ridges are steep and broken upper catchments of the small headwater streams. There is very little gentle lower altitude country on the property, other than some valley floors and small areas in the Teme Basin. Extensive areas of bare rock are present at higher altitudes.

2.2.3 Soils

Soils of the property are predominantly weakly developed Hurunui, Kaikoura and Tekoa steepland soils. Substantial areas of alpine soils and bare rock are present at higher altitudes. Soil depth and development varies considerably across the property.

Significance of Geology, Landforms and Soils

The bare broken country of the property is typical of the dry mountains of inland Marlborough. The effects of tectonic activity along the Awatere Fault, recent erosion and deposition are well illustrated by landforms on the property, notably the bare rocky upper slopes and ridges, steep mid-slopes and the narrow deeply-incised stream gullies. The igneous rock on the property is the largest exposure of this rock type in the ecological district. No geopreservation sites are listed for the property.

2.3 CLIMATE

Glenlee lies in an area characterized by warm to hot summer temperatures with frequent strong northwest winds, and cold winter temperatures with less frequent southerly storms (Tomlinson, 1976). Annual rainfall is between 750 and 1500 mm, with occasional heavy falls. Snow can occur at higher-altitude sites in winter. The area experiences high annual and moderate winter solar radiation and slight rainfall deficits (Leathwick *et al*, 2003).

2.4 LAND ENVIRONMENTS OF NEW ZEALAND (LENZ)

LENZ is, as described by Leathwick *et al.* (2003), "a classification of New Zealand's landscapes using a comprehensive set of climate, landform and soil variables chosen for their role in driving geographic variation in biological patterns." The classification units of LENZ, termed land environments by Leathwick *et al.* (2003), aim to "identify areas of land having similar environmental conditions regardless of where they occur in New Zealand." The consequences of this are that "LENZ provides a framework that allows prediction of a range of biological and environmental attributes. These include the character of natural ecosystems, the vulnerability of environments to human activity, and the potential spread or productivity of new organisms (Leathwick *et al.* 2003)." Leathwick *et al.,* (2003) present the LENZ information at four levels of detail, with level I containing 20 environments, level II containing 100 environments, level III containing 200 environments and level IV containing

500 environments. These LENZ classes are presented nationally to assist use at a range of scales; however, this data should be interpreted with caution, as the predicted extent and suggested vegetation types for each Land Environment (Leathwick *et al.*, 2003) have been extrapolated from limited field data.

In an analysis of the LENZ level IV data, with consideration of the remaining indigenous vegetation cover and the legal protection of these environments, Walker *et al.* (2005) proposed a threat classification for the remaining indigenous biodiversity in New Zealand's environments based on the two components of vulnerability (likelihood of loss): poor legal protection and risk of loss. This threat classification (Table 1) has become the recognised benchmark for the promotion of threatened LENZ conservation.

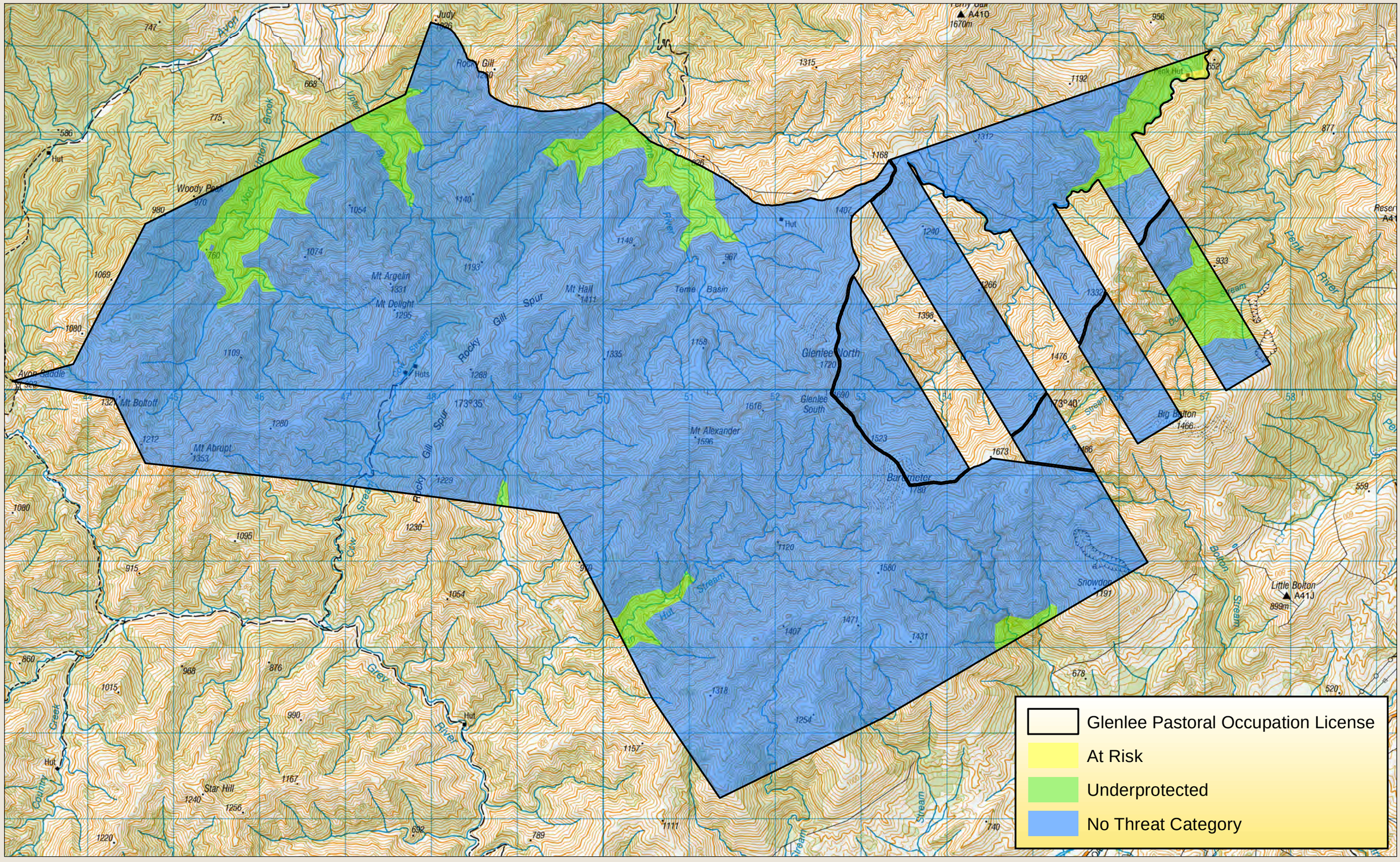
Table 1 LENZ threat categories and definitions (Walker *et al.,* 2005)

Category	**Criterion**
Acutely Threatened	<10% indigenous cover remaining
Chronically Threatened	10-20% indigenous cover remaining
At Risk	20-30% indigenous cover remaining
Critically Under-protected	>30% indigenous cover remaining <10% legally protected
Under-protected	>30% indigenous cover remaining 10-20% legally protected
No Threat Category	>30% indigenous cover remaining >20% legally protected

All higher-altitude parts of Glenlee have no LENZ threat category (Map3). A very small area beside the Penk River at the northeast corner of the property is classified as an “at risk” land environment. Other lower-altitude areas in the main valleys are classified as “under-protected” land environments.

Significance of Land Environments

Lower-altitude areas, comprising c.6% of the property, are classified as “at risk” or “under-protected”.



Glenlee POL - LENZ Threat Category

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2.5 VEGETATION

2.5.1 Ecological Context

The entire area lies within the eastern boundary of the Waihopai Ecological District (E.D.), part of the Inland Marlborough Ecological Region (P. Clerke, 1994). G. Walls *et al* (2005) described the original vegetation cover of the ecological district as being considerably modified since human arrival. This is true for Glenlee. Originally much of the property would have supported red, black and mountain beech forest grading to alpine vegetation at the bushline (P. Clerke, 1994). Podocarp-Broadleaved species-Beech forest would have occupied areas such as the Teme Basin where the occasional remnant still survives. Above the bushline, a mosaic of upland communities would have been present, including tussocklands, shrublands, alpine cushionfields, screes and rocklands. The steep faulted areas dominated by bluffs would have supported many Marlborough endemics such as rock daises, pink broom (*Carmichaelia carmichaeliae*) and New Zealand lilac (*Heliohebe hulkeana subsp. hulkeana*). Of these original patterns the bluff communities and the higher altitude rocklands and scree are probably the most intact with only remnants of the woody vegetation and the other communities remaining. However it is important to note that, given the degree of modification over the Inland Marlborough Ecological Region and Waihopai Ecological District, secondary and induced indigenous vegetation potentially retain considerable biodiversity value.

Glenlee spans the range that separates the Wairau and Awatere Valleys. The Department currently administers adjoining tracts of land as described in the introduction above. All these areas have had a history of burning and grazing. Forest persists in some of the upper catchments but much has also been replaced by grassland, kanuka forest and scrub (Walls et al, 2005). In areas such as Ferny Gair the repeated burning and grazing has resulted in induced fellfield vegetation composed of fescue tussock (*Festuca novae-zelandiae*) and mountain daisy (*Celmisia* species.). Although the conservation areas contain many of the values represented within Glenlee it is worth noting that the communities on igneous parent material are not represented elsewhere, also the remnant forest communities are ecologically important due to their disappearance over much of South Marlborough.

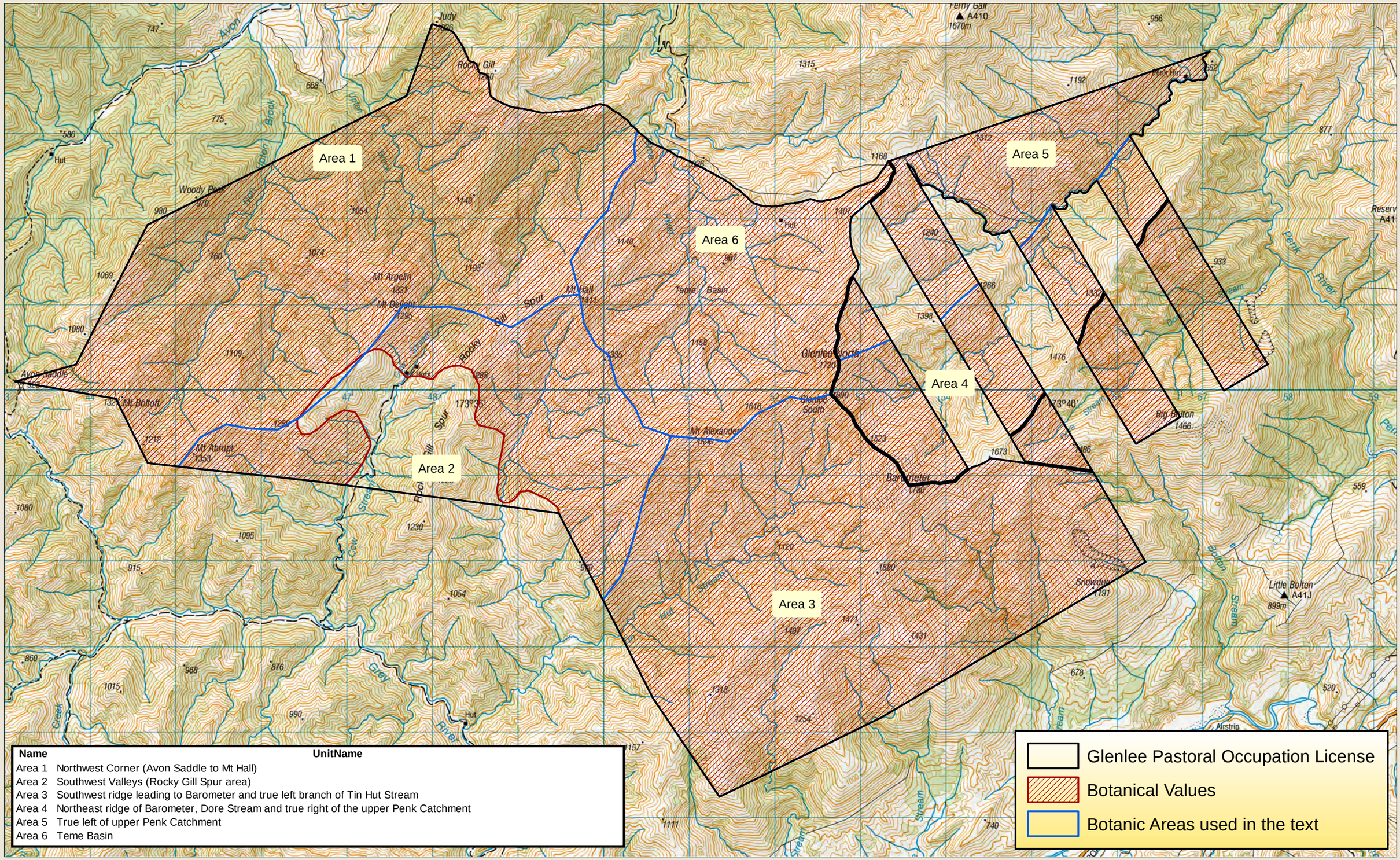
See Map 4 for vegetation units as discussed below.

2.5.2 Vegetation and Flora - *Plant Communities by Geographic Area*

* denotes exotic species
Where relevant, the scientific names can be found in Appendix 1.

Area 1 - Northwest Corner (Avon Saddle to Mt Hall)

The northwest parts of the property, encompassing the upper catchments of Non Upton Brook, Upton Brook and a western tributary of the Teme River, support extensive areas of indigenous woody vegetation. Beech forest is dominant in Upton Brook and the Teme River tributary, and low kanuka forest is dominant in Non Upton Brook. The higher-altitude summits and ridges between Mt Boltoff and Mt Hall support grassland, tussockland, shrubland and rockland plant communities.



Name	UnitName
Area 1	Northwest Corner (Avon Saddle to Mt Hall)
Area 2	Southwest Valleys (Rocky Gill Spur area)
Area 3	Southwest ridge leading to Barometer and true left branch of Tin Hut Stream
Area 4	Northeast ridge of Barometer, Dore Stream and true right of the upper Penk Catchment
Area 5	True left of upper Penk Catchment
Area 6	Teme Basin

Glenlee POL - Botanical Values

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A beech forest community was visited in Upton Brook. The forest canopy is dominated by mountain beech, with scattered patches of broadleaf, especially on rocky sites. Important understorey species are *Clematis* species, *Coprosma rhamnoides*, bush lawyer, leather-leaf fern, marbleleaf, prickly mingimingi, weeping mapou and yellowwood. Ground-cover species present are *Acaena* species, *Asplenium richardii*, *A. appendiculatum*, *Blechnum penna-marina*, *Hypolepis ambigua*, *Histiopteris incisa*, king devil hawkweed*, necklace fern, prickly shield fern, *Polystichum* species, and wall lettuce*. Other species present at open sites and on the forest margin are *Coprosma propinqua*, *C. dumosa, Hebe decumbens*, *Helichrysum lanceolatum*, kanuka, mountain wineberry, *Olearia paniculata*, *O. cymbifolia*, tauhinu, and white fuzzweed. Red beech has previously been recorded in parts of the Upton Brook and Non Upton Brook valleys (Clerke, 1994). The headwaters of Upton Brook contain a mosaic of broadleaved species forest and kanuka forest and scrub above the beech forest. It is dominated by broadleaf, with kohuhu, marbleleaf and akiraho also common. The occasional lancewood is also present.

Recent riverbed surfaces in Upton Brook support strongly regenerating mountain beech and kanuka, with seedlings of most of the species recorded in the forest communities. Open bluffs and other rocky sites in the valley support *Asplenium appendiculatum*, *Blechnum penna-marina*, blue tussock, *Brachyglottis monroi*, broadleaf, cotton daisy, flax, *Hebe decumbens*, *Helichrysum parvifolium*, *H. coralloides*, prickly mingimingi, *Ranunculus* species, *Heliohebe pentasepala*, and occasional wilding pines*. Areas of colluvium and scree associated with forest communities support *Acaena* species, *Craspedia* species, creeping pohuehue, *Epilobium pycnostachyum*, *Galium perpusillum*, *Geranium brevicaule*, *Gingidia montana*, *Myosotis* species, *Poa lindsayii*, *Raoulia glabra*, sheep's sorrel*, thousand-leaved fern, white fuzzweed and male fern*.

Low kanuka forest and scrub on this part of the property ranges from an open-canopied scrub community dominated by kanuka and with few understorey species on dry sites, to a denser and more diverse low-forest community at damper sites. Many species present in and around beech forest, as described above, are present in kanuka forest and scrub. Common species are *Blechnum penna-marina*, *Coprosma propinqua*, creeping pohuehue, broadleaf, mingimingi, akiraho, *Polystichum* species and tauhinu. Kanuka forest is present on alluvial sites in this area; this is one of only two locations in the ecological district where kanuka occurs on such sites (Clerke, 1994).

Ridge crest plant communities on this part of the property are a mosaic of bare rock (20-60% cover), short tussockland and shrubland (40-80%), and bare ground (5-10%), with localised patches of herbfield and grassland. Shrublands are dominated by tauhinu or low kanuka. Other woody species present are *Coprosma dumosa*, *Hebe decumbens*, matagouri and weeping mapou. Tussockland-herbfield-pasture communities are dominated by blue tussock, bristle tussock, browntop*, *Festuca matthewsii*, mouse-ear hawkweed*, patotara, silver tussock, and sweet vernal*. Other species present are *Acaena caesiiglauca*, *Acrothamnus colensoi*, *Anisotome aromatica*, catsear*, cotton daisy, *Gnaphalium* species, *Helichrysum filicaule*, king devil hawkweed*, *Lycopodium fastigiatum*, native violet, red woodrush, *Parahebe decora*, *Polytrichum juniperinum, Raoulia subsericea*, sheep's sorrel* and white clover*. Rockland communities support *Asplenium appendiculatum*, *A. trichomanes*, *Brachyglottis monroi*, *Celmisia discolor*, cotton daisy, *Epilobium pycnostachyum* species, *Geranium brevicaule*, *Gingidia montana*, harebell, golden speargrass, *Helichrysum parvifolium*, prickly mingimingi, *Myosotis* species, necklace fern,

Pimelea oreophila, porcupine shrub, *Ranunculus insignis*, *Raoulia australis*, *R. hookeri*, *R. glabra*, snowberry, *Heliohebe pentasepala* and white fuzzweed.

Area 2 - Southwest Valleys (Rocky Gill Spur area)

This area covers Cow Stream, Rocky Gill Spur and the west branch of Tin Hut Stream. These upper catchments support open rockland, grassland, short tussockland and shrubland plant communities, with areas of scrub and forest in the valleys, scattered amongst these communities are wetland seeps and flushes.

Forest patches are dominated by mountain beech with occasional broadleaf and mountain ribbonwood. Understorey species present are *Acaena* species, *Blechnum penna-marina*, bush lawyer, *Chaerophyllum colensoi* var *colensoi, Coprosma dumosa*, *C. cheesemanii*, *C. propinqua, C. rhamnoides,* soft mingimingi*, Lagenophora strangulata,* prickly mingimingi, *Poa breviculmis,* prickly shield fern, thousand-leaved fern, wall lettuce*, weeping mapou and yellow wood. Clearings in the beech forest in Cow Stream have an abundance of exotic grasses.

The beech forest is frequently flanked by low kanuka forest and scrub which ranges from an open-canopied scrub community dominated by kanuka and with few understorey species on dry sites, to a denser and more diverse low-forest community at damper sites. Many species present in and around beech forest, as described above, are present in kanuka forest and scrub.

The ridge crests and upper slopes are a mosaic of herbfield, tussockland, shrubland and rockland communities. The herbfields are frequently dominated by cotton daisy and moss (*Racomitrium* species), with patotara*,* blue tussock, bristle tussock, silver tussock, mouse ear hawkweed* and *Lycopodium* species common. Occasional *Geranium brevicaule,* golden speargrass, *Pimelea oreophila* subspecies *hetera,* and *Raoulia parkii* are also present.

The tussockland-herbfield-pasture communities are dominated by blue tussock, bristle tussock, browntop*, *Festuca matthewsii*, mouse-ear hawkweed*, patotara, silver tussock, and sweet vernal*. Other species present are *Acaena caesiiglauca*, *Anisotome aromatica*, catsear*, cotton daisy, *Euchiton audax,* king devil hawkweed*, *Lycopodium fastigiatum, Parahebe decora*, red woodrush, *Raoulia parkii*, and sheep's sorrel*. These herbfields grade into shrublands dominated by tauhinu. Other shrubs such as *Dracophyllum rosmarinifolium,* matagouri, *Pimelea oreophila* subspecies *hetera,* are frequently present. The ground covers identified in the tussocklands continue to be scattered amongst the shrublands.

Rocky outcrops support sparse but diverse vegetation, typically a mix of grasses, herbs and shrubs such as *Asplenium trichomanes,* blue tussock, bristle tussocks, *Blechnum penna-marina, Carex breviculmis, Celmisia insignis* (Naturally Uncommon)*,* mouse-eared chickweed**, Colobanthus acicularis,* cotton daisy*, Gaultheria crassa, G. nubicola, Gingidia montana, Hebe decumbens, H. rakaiensis, Helichrysum filicaule, H. parvifolium,* mouse ear hawkweed*, *Myosostis australis* "white", New Zealand lilac, *Pimelea mesoa* subspecies *mesoa*, porcupine shrub*, Raoulia glabra,* sheep's sorrel*, *Stellaria gracilenta, Heliohebe pentasepela,* and *Wahlenbergia albomarginata*. Occasionally *Gentianella bellidifolia,* flax

and *Ranunculus insignis* also occur. Near Mt Hall a population of *Ewartiothamnus sinclairii* (Naturally Uncommon) occurs on the bluffs on the ridge crest.

Igneous bluffs and rocklands on the ridgeline south-south east of Mt Hall support a herb field in which *Raoulia australis* is abundant with scattered chickweed*, clover*, bristle tussock, *Epilobium porphyrium, Geranium brevicaule, Myosotis australis* "yellow", *Wahlenbergia albomarginata* and white fuzzweed.

Wetland turfs and seeps in the head of the true right branch of Tin Hut Stream, are a mixture of low turfs and taller stature communities depending on slope and drainage. The lower stature areas contain *Cardamine corymbosa,* clover*, *Epilobium minutiflorum, Euchiton paludosus* (Naturally Uncommon), *E. ensifer* (Nationally Endangered), *Helichrysum filicaule, Hydrocotyle "montana", Isolepis subtilissima, Lagenophora barkerii* (Naturally Uncommon), *Luzula* species, moss, *Ranunculus foliosus and Viola cunninghamii,*. The taller stature vegetation includes *Carex comans, C. ovalis*, Juncus articulatus, J. edgariae* and *Schoenus pauciflorus*.

Area 3 - Southwest ridge leading to Barometer and true left branch of Tin Hut Stream

There are two distinct geologies on this ridge, greywacke and igneous. The igneous rocks stem from a swarm of basic dykes which are exposed on the surface on the upper part of the ridge. This area of dykes represents the largest area of igneous outcrop within the Waihopai E.D. Vegetation communities were quite distinct on each of the geologies. Both geologies had a pattern of bluff communities, scree, gravelfields and tussock shrublands.

The vegetation on all the igneous rock was very patchy and sparse. On the more stable portions of scree, tussock-herbfield communities established in patches consisting of bristle tussock, patotara and cotton daisy. Also present within this community were *Celmisia gracilenta*, creeping pohuehue*, Gingidia decipiens*, *Raoulia australis,* red woodrush*, Viola cunninghamii, Wahlenbergia albomarginata,* with occasional woody species such as *Pimelea oreophila* subspecies *hetera* and tauhinu.

On the igneous bluffs and outcrops there was a sparse community consisting of *Aciphylla monroi,* blue tussock*,* bristle tussock*, Cardamine bilobata* (Naturally Uncommon), *Colobanthus acicularis, C. brevisepalus* (Naturally Uncommon)*, Gaultheria crassa*, golden speargrass*, Helichrysum parvifolium, Melicytus* aff. *alpinus* "Kaikoura", patotara*, Wahlenbergia albomarginata* and white fuzzweed*,*

Greywacke substrates support denser vegetation coverage of tussock-tauhinu shrubland. In this community the dominant tussocks are bristle tussock and *Festuca matthewsii* with the occasional mid-ribbed snow tussock *(Chionochloa pallens*). Emergent tauhinu are common. Also within this community are *Anisotome aromatica, Brachyscome sinclarii, Cardamine corymbosa*, *Celmisia gracilenta, Colobanthus brevisepalus* (Naturally Uncommon)*, Coprosma petriei,* cotton daisy*, Epilobium porphyrium, Galium perpusillum, Geranium brevicaule,* golden speargrass*,* mouse-ear hawkweed**, Pimelea oreophila* subspecies *hetera, Raoulia subsericea, Scleranthus* species, and *Wahlenbergia albomarginata.* With reducing altitude down the ridge, the occasional *Dracophyllum filifolium*, matagouri and *Olearia cymbifolia* appear.

On the exposed and stable talus/scree there is a sparse tussock-herbfield consisting of *Aciphylla monroi, Anisotome filifolia,* bristle tussock*,* cotton daisy*, Epilobium glabellum* and *Festuca matthewsii.* Damper areas of scree support *Parahebe decora.*

Greywacke bluffs support a sparse herbfield-shrubland of bristle tussock*,* cotton daisy*, Festuca matthewsii, Helichrysum parvifolium, H. coralloides, Leonohebe cheesemanii, Raoulia bryoides,* red woodrush and tauhinu*.* Several of the bluffs in the headwaters of Burr and Clyde stream support populations of *Pachycladon fastigiata,* and at least one population of *Celmisia cockayneana* (Naturally Uncommon).

On the more mobile screes of both geologies there is a distinctive scree community of bristle tussock*, Epilobium pycnostachyum, Myosotis traversii,* penwiper, *Poa buchananii*, *Stellaria roughii,* and *Wahlenbergia cartilaginea* (Naturally Uncommon). Large populations of *Epilobium forbesii* (Naturally Uncommon) also occur on these screes.

The east (true left) branch of Tin Hut Stream is generally rocky and bare. Mountain beech treeland extends almost to the ridge at lower altitudes; otherwise the sparse vegetation comprises regenerating kanuka-tauhinu shrubland, fescue tussockland and cotton daisy herbfield. Along the stream is a large population of pink broom (Nationally Critical), extending from adjoining freehold land onto the property. The steep bluffs of the stream gorge in this area support *Brachyglottis monroi,* broadleaf, *Coprosma crassifolia*, *Helichrysum lanceolatum*, kanuka, koromiko, lancewood, bush lawyer, Marlborough rock daisy*,* mountain ribbonwood, native broom (*Carmichaelia australis*), native jasmine, New Zealand lilac, akiraho, pink broom (Nationally Critical), weeping mapou and white fuzzweed.

Many of the faces south east of Barometer are steep with numerous bluffs and a large proportion of exposed rock and bare ground, particularly in the head of Burr Stream. At lower altitudes, kanuka scrub and small areas of regenerating beech forest are present. The headwaters of Clyde and Ribble Streams are a mosaic of rock, exposed ground and tussock faces. The tussock faces are dominated by mid-ribbed snow tussock with bristle and silver tussock also common. Also present are *Anisotome filifolia, Epilobium hectorii,* cotton daisy*, Microseris scapigera,* mouse-ear hawkweed**, Myosotis australis* "white", *Ophioglossum coriaceum, Raoulia subsericea*, tauhinu*, Heliohebe pentasepala* and white fuzzweed. *Cardamine bilobata* (Naturally Uncommon) is frequently found in the more open rocky areas between the tussocks.

The riparian bluffs in the head of Clyde Stream support a sparse herbfield of *Anisotome filifolia, Cardamine bilobata* (Naturally Uncommon)*, Carex* species*, Celmisia insignis* (Naturally Uncommon), *Epilobium macropus, E. crassa, E. hectorii*, *Geum cockayneanum,* moss*, Notogrammitis crassior* and *Ranunculus insignis.*

This area supports a mosaic of tussockland, shrubland and bluff communities. There is an increasing proportion of woody vegetation at lower altitudes, mostly comprising kanuka-manuka shrubland. On the south side of the ridge pockets of mountain beech forest extend to the ridge crest. The slopes of Big Bolton (across Dore Stream) support a mosaic of

regenerating kanuka and remnant mountain beech forest. The vegetation pattern in the upper Penk is similar, with tussockland and shrubland at higher altitudes and woody species increasing at lower altitudes. Lower down the catchment, kanuka shrubland occupies the north-facing slopes and ridge tops, and mountain beech remnants are present on the south-facing slopes, in gullies and on steep bluffs.

Mixed herbfield-shrubland is present on greywacke bluffs. Prominent plants in this sparse community are bristle tussock, *Celmisia cockayneana* (Naturally Uncommon), *C. insignis* (Naturally Uncommon), *Dracophyllum filifolium*, *Epilobium glabellum*, *Exocarpos bidwillii, Helichrysum intermedium*, *H. parvifolium*, Marlborough rock daisy, *Pimelea oreophila* subspecies *hetera*, tauhinu, *Heliohebe pentasepala* and *Wahlenbergis albomarginata*. Also present at dry sites are white fuzzweed and, on talus, *Epilobium forbesii* (Naturally Uncommon). At lower altitudes, *Brachyglottis monroi, Coprosma cheesemanii* and *Gingidia montana* occur.

The mixed herbfield-tussockland-shrubland on greywacke hill slopes is dominated by blue tussock, bristle tussock and cotton daisy. Also present are low-stature woody species such as *Acrothamnus colensoi*, *Dracophyllum filifolium*, *Gaultheria crassa*, *Helichrysum parvifolium*, tauhinu, and herbfield dominated by *Anisotome aromatica, Blechnum penna-marina, Colobanthus brevisepalus* (Naturally Uncommon), patotara and *Viola cunninghamii.*

Mountain beech forest on the south side of the ridge has a bare understorey, which in 2006 had been overturned by pig-rooting. In places on the margins of the forest and beside bluffs plant diversity increases with *Aciphylla monroi*, blue tussock, *Brachyglottis lagopus, Celmisia insignis* (Naturally Uncommon)*, Coprosma* species, five-finger, flax, *Gaultheria crassa, Hebe brachysiphon*, *Hebe decumbens*, mid-ribbed snow tussock, porcupine shrub, prickly shield fern, red woodrush and *Heliohebe pentasepala*.

Shrublands lower down the ridge are dominated by kanuka and manuka. Manuka dominates on the igneous substrates and kanuka on greywacke substrates. Other species present are *Acrothamnus colensoi,* bristle tussock, *Clematis* species, *Coprosma propinqua*, cotton daisy, *Dracophyllum filifolium,* flax, *Gaultheria crassa,* golden speargrass, *Hebe brachysiphon, H. rakaiensis*, soft mingimingi*,* mid-ribbed snow tussock, prickly mingimingi*,* mountain wineberry, porcupine shrub, and occasional wilding pines*.

Vegetation in the Penk River valley near Penk Hut is dominated by low kanuka forest. The hut sits in a grassy clearing with the occasional *Botrychium australe* (Naturally Uncommon), *Coprosma* species, *Olearia odorata* and *Rytidosperma merum* (Nationally Vulnerable) amongst the grass just outside the hut. Low forest along the river is dominated by kanuka. The relatively diverse understorey supports *Clematis* species, *Coprosma propinqua, C. rhamnoides, C. crassifolia, C. rigida, C. dumosa, Hebe brachysiphon*, *H. traversii,* lancewood, soft mingimingi, mountain wineberry, native jasmine, *Olearia odorata*, prickly mingimingi*,* tauhinu, tree tutu, weeping mapou and occasional mountain beech. River flats support matagouri, toetoe and tree tutu.

Beech forest is present on hill slopes in Dore Stream. The forest canopy is predominantly mountain beech with occasional broadleaf and kanuka. Within the forest and in light gaps are *Coprosma rhamnoides*, *C. crassifolia*, *Helichrysum lanceolatum*, lancewood, *Leucopogon fasciculatus, Rubus schmideliodes* and hook sedge. Alluvial gravels in Dore

Stream support a mixture of herbs and shrubs including blue tussock, *Coprosma propinqua*, cotton daisy, *Festuca matthewsii*, *Geranium microphyllum*, *Helichrysum depressum,* prickly mingimingi, mouse-ear hawkweed*, patotara*, Raoulia tenuicaulis,* red woodrush, and white fuzzweed

The ridge at knob 1673 east of Barometer, at the head of Dore Stream is predominately a gravel and rockfield with a sparse vegetation component. Bristle tussock, cotton daisy and *Raoulia bryoides* are the most common species present. Also present are *Anisotome imbricata* var. *prostrata, Brachyglottis lagopus, Gentianella bellidifolia*, *Kelleria villosa,* patotara*,* red woodrush*,* and *Scleranthus* species Occasionally *Aciphylla monroi, Celmisia gracilenta, C.allanii, Coprosma cheesemanii, Haastia pulvinaris,* mouse-ear hawkweed**,* *Pentachondra pumila* and sheep's sorrel* are present. A small population of *Pimelea sericeovillosa* subspecies *sericeovillosa* (Declining) is present.

On the screes to the side of the knob *Stellaria roughii* and *Poa buchananii* are common.

Area 5 - True left of the upper Penk Catchment

Plant communities in the upper Penk catchment within the lease are in varying stages of recovery from burning events. Despite evidence of some oversowing through the presence of exotic pasture species, the character of the vegetation is overwhelmingly indigenous. The ecological processes that are leading to the reinstatement of indigenous shrublands, scrub and forest in the landscape are largely unimpeded. There are good connectivity and sequences of indigenous ecosystems throughout the variation of landforms, altitude, hydrology and disturbance history.

Shoulder slopes and ridge crests (e.g. south of Ferny Gair) are relatively unmodified and the vegetation communities are dominated by indigenous species. Shrub-herbfields dominated by cotton daisy, *Gaultheria depressa* and tauhinu are common. Associate species typically include blue tussock*, Brachyglottis bellidioides,* bristle tussock*, Dracophyllum rosmarinifolium, Gaultheria nubicola, G. crassa,* golden speargrass*,* fescue tussock*, Helichrysum parvifolium,* field hawkweed* (*Hieracium caespitosum*), mouse-ear hawkweed**,* patotara*, Pimelea concinna,* red woodrush*,* and sheep's sorrel*.

Bluff communities below ridgelines are typically sparsely vegetated, primarily by blue tussock*,* bristle tussock and *Helichrysum coralloides*. Associate species include *Aciphylla monroi, Anthosachne solandri, Asplenium richardii* (where shaded), *Blechnum penna-marina, Colobanthus acicularis, Helichrysum parvifolium, H. intermedium,* field hawkweed* tussock hawkweed*, mountain wineberry*, Heliohebe pentasepala* and red woodrush. These bluff communities provide habitat for *Cardamine bilobata* (Naturally Uncommon), *Celmisia insignis* (Naturally Uncommon) and *Melicytus* aff. *crassifolius* 'cliff' (Nationally Critical[1]).

Indigenous short tussock grasslands on hill slopes are fire-induced. They are typically dominated by fescue and silver tussock*,* cotton daisy and mouse-ear hawkweed* with scattered emergent flax, matagouri and tauhinu. Associate species include *Geranium brevicaule,* golden speargrass*,* field hawkweed**, Pimelea concinna,* and sweet vernal*.

[1] See note regarding taxonomy in the 'Notable Species' section

Higher up in the catchment beneath Glenlee North there is a mosaic of bare screes and pockets of mixed tussock. The tussocks are a mixture of bristle tussock, *Festuca matthewsii* and mid-ribbed snow tussock. Frequently cotton daisy, *Helichrysum parvifolium* and *Myosotis australis* "white" are also present.

There are a number of small seeps and flushes associated with watercourses. These herbfields are commonly dominated by *Anaphaloides bellidioides* and *Coriaria plumosa*. Associate species include *Acaena juvenca, Epilobium macropus, E. microphyllum, Geum cockayneanum,* field hawkweed* and tussock hawkweed*, *Isolepis aucklandica,* moss species, *Ranunculus insignis,* sweet vernal*, *Carex horizontalis, Viola cunninghamii,* white clover*, Yorkshire fog*.

There are remnant small stands of forest and scrub in refugia on hill slopes. Mountain ribbonwood and broadleaf appear dominant. Associate species include *Coprosma decurva,* wall lettuce*, prickly shield fern and weeping mapou. Associate species on the margins or within the stand include tussock hawkweed*, *Melicytus alpinus*, silver tussock and tauhinu.

Other remnant forest stands are dominated by mountain beech. The most common associate species in a sparse understorey with numerous canopy gaps include *Coprosma decurva, Hypolepis millefolium* (locally common), prickly mingimingi, wall lettuce*, prickly shield fern and weeping mapou. Other species which are present but uncommon include *Clematis forsteri* agg., *Coprosma propinqua, Blechnum penna-marina, Notogrammitis crassior,* and tussock hawkweed*.

Riparian communities associated with the northwestern-most headwater tributary of the Penk River, on the true left, contains a mosaic of riparian communities. Turfs are dominated by creeping pohuehue with *Acaena inermis, Blechnum penna-marina, Hydrocotyle microphylla,* mouse-ear hawkweed* and silver tussock. Toetoe is locally common, as are pukio and *Schoenus pauciflorus*. Elevated banks can contain riparian shrublands comprising *Coprosma propinqua*, mountain ribbonwood and weeping mapou. Associate species include broadleaf, *Olearia cymbifolia,* wall lettuce*, prickly shield fern, *Traversia baccharoides* (Declining) and Yorkshire fog*.

More advanced recovery from burning on hill slopes is expressed by the presence of diverse mixed shrublands dominated by *Hebe decumbens*, matagouri and tauhinu. Associate species include *Coprosma decurva, Dracophyllum filiformis, Hebe brachysiphon, Kunzea serotina,* mountain ribbonwood, wall lettuce* porcupine shrub, *Raukaua anomalus,* weeping mapou and Yorkshire fog*.

Area 6 - Teme Basin

Although it appears heavily modified by fire, the Teme Basin still supports a relatively diverse range of indigenous plant communities, including forest, shrubland, tussockland, herbfield, rockland, scree and seepage vegetation.

Riparian Zones and Wetlands:
The riparian zones are a mix of older terrace, active channel, and bluff/rockland. The older higher terraces are frequently dominated by a herbfield of mouse-ear hawkweed*.

Occasionaly present are *Carex breviculmis*, *Microtis* species, *Ophioglossum coriaceum Thelymitra* species, remnant mats of *Raoulia australis* and exotic grasses*. Scattered amongst these herbfields are pockets of kanuka, silver tussock and bracken.

A range of trees, shrubs and herbs occur on the riparian bluffs depending on their accessibility to browsing animals. These include *Blechnum chambersii, B. montanum, Coprosma rhamnoides,* cotton daisy*, Deyeuxia avenoides, Epilobium chlorifolium, Gaultheria* species, *Hebe canterburiensis, Helichrysum lanceolatum,* koromiko*, Lagenophora pumila, Luzula leptophylla,* marbleleaf*, Olearia avicenniifolia,* porcupine shrub and prickly shield fern. The diversity increases downstream and at these lower altitudes regenerating *Astelia fragrans,* broadleaf, lancewood, mountain totara (*Podocarpus laetus*), akiraho and bush lawyer species, occur. In one location, on an inaccessible bluff, a large white mistletoe *(Tupeia antarctica)* (Declining) occurs on a marbleleaf tree.

The more active channels of the stream are generally gravel beds with scattered silver tussock and tauhinu. In the less mobile areas *Acaena anserinifolia, Blechnum penna-marina,* creeping pohuehue*, Epilobium microphyllum, E. cinereum,* medic*, *Geranium brevicaule,* mouse-ear hawkweed**, Parahebe decora, Raoulia tenuicaulis, R. glabra, Sagina procumbens** and sheep's sorrel* are also present.

There are wetland turfs associated with watercourses and seeps, and these are characterised by mixed herbfields containing *Anaphaloides bellidioides, Anisotome aromatica, Blechnum penna-marina, Hypochaeris radicata**, *Juncus articulatus**, *Lagenophora barkeri* (Naturally Uncommon), *Schoenus pauciflora, Trifolium dubium**, white clover**,* and Yorkshire fog*. *Chaerophyllum colensoi* var. *delicatulum* (Nationally Critical) was found in a turf high on a ridge in Teme Basin running north from Glenlee North.

A wetland containing pukio sedgeland is associated with the drainage from an old debris flow close to the Teme Hut. Other tall or emergent species include *Carex buchananii,* silver tussock*,* sweet vernal*, toetoe and Yorkshire fog*. Smaller-statured intertussock species include *Epilobium chlorifolium*, *Euchiton limosus, Hydrocotyle moschata* var. *moschata, Juncus articulatus**, selfheal**, Ranunculus foliosus, Trifolium dubium** and white clover.

Carex wetlands are scattered on toe slopes and within the valley floors. These wetlands typically contain *Carex dipsacea, C, flagellifera, Juncus australis*, pukio*,* and toetoe. Under this canopy and in the wetter areas such as the margins of the flowing water there are turfs of *Eleocharis acuta, Epilobium minutiflorum, E. atriplicifolium, Euchiton traversii, E. audax, E. paludosus* (Naturally Uncommon), exotic grasses*, *Hydrocotyle microphylla, Lagenophora barkerii* (Naturally Uncommon), *Montia fontanum, Plantago udicola, Ranunculus multiscapus* and *Viola cunninghamii*. Many of these wetlands were pugged and appeared to be used as animal wallows.

Another herbfield in a seepage area is dominated by *Lagenophora pumila*. Also present are *Anaphalioides bellidioides, Carex* species, *Celmisia alpina*, *Corybas* species, *Epilobium komarovianum*, *Euchiton* species, *Hydrocotyle* species, monkey musk*, *Ranunculus foliosus*, selfheal*, white clover*, and the occasional *Astelia* species and toetoe. Several pukio wetlands drain into the main stream. Also present in these pukio wetlands are *Epilobium chionanthum*, *Euchiton* species, grasses*, Ranunculus foliosus, Rumex flexuosus,* rushes (*Juncus* species) and occasionally toetoe. All seepages were grazed and some heavily trampled.

The wetland turf adjacent to (and partly occurring within) the Teme Basin yards near the saddle contains a diverse mix of indigenous wetland species. The turf is dominated by *Epilobium minutiflorum,* mouse-ear hawkweed*, *Juncus novae-zelandiae,* sweet vernal* and several species of *Euchiton* including *E. audax, E. ensifer* (Nationally Endangered), *E. limosus* and *E. traversii*. Other species include *Acaena inermis, Helichrysum filicaule, Isolepis caligenis, Juncus articulatus*, Trifolium dubium** and Yorkshire fog*. Taller statured tussocks and grasses form a mosaic with the turfs and these are dominated by *Carex buchananii, Juncus conglomeratus*,* fescue and silver tussock and Yorkshire fog*. *Chaerophyllum colensoi* var. *delicatulum* (Nationally Critical) occurs in the turf community.

Lower altitudes:
Hill slopes in this area support kanuka and occasional red beech trees, including pockets of sapling red beech. A diverse range of shrub species are present, including broadleaf, *Coprosma dumosa*, *C. propinqua*, *C. rhamnoides,* five-finger, *Helichrysum lanceolatum*, lancewood, marbleleaf, prickly mingimingi, *Olearia odorata, O. avicenniifolia*, akiraho, porcupine shrub, tauhinu, weeping mapou, yellow wood and occasional wilding pine*. Marlborough rock daisy is present on bluffs beside the stream bed.

Herbaceous species present in this area are *Acaena anserinifolia, A. caesiiglauca, A. glabra, Anaphalioides bellidioides, Asplenium appendiculatum, Astelia* species, *Blechnum penna-marina*, *Epilobium* species, *Geranium microphyllum,* hawkweed species*, *Raoulia glabra,* silver tussock, white fuzzweed and a variety of exotic grasses including browntop*and Yorkshire fog*.

Short tussockland at lower altitudes is dominated by fescue tussock, silver tussock, hawkweed species* and exotic grasses such as browntop* and sweet vernal*. Also present are *Coprosma propinqua, C. rhamnoides*, scrub pohuehue (*Muehlenbeckia complexa var. complexa*), tauhinu, and scattered kanuka and marbleleaf. Occasional *Olearia odorata* shrubs are present on a river terrace in the mid-basin, and kowhai is present on streamside bluffs. A relatively dense patch of large matagouri and occasional kohuhu is present in the mid-section of the valley.

Bluffs, rocklands and screes:
Both igneous and greywacke bluffs and rocklands are common throughout the basin, Vegetation on these outcrops is scattered and includes: *Acaena fissistipula,* mouse-eared chickweed*, *Epilobium microphyllum, E. atriplicifolium, Geranium brevicaule*, *Helichrysum filicaule, Linum catharticum*, Myosotis australis* "white" (on greywacke substrates), *Myosotis australis* "yellow" (on igneous substrates), porcupine shrub*, Raoulia glabra, R. australis,* sheep's sorrel*, *Viola cunninghamii* and white fuzzweed.

The bluffs and rocklands on the Glenlee ridge north of Glenlee North support a sparse mix of herbs and shrubs which increases in diversity as altitude decreases. This community frequently includes *Aciphylla monroi, Blechnum penna-marina, Celmisia insignis* (Naturally Uncommon), *Colobanthus acicularis,* golden speargrass, *Helichrysum coralloides, Leonohebe cheesemanii,* and *Raoulia bryoides.* Occasionally *Helichrysum parvifolium, Melicytus* aff. *alpinus* "Kaikoura", porcupine shrub*, Ranunculus insignis* and *Raoulia australis* occur. Within the Basin the vegetation continues to diversify with *Colobanthus strictus*, bristle tussock, *Hebe decumbens, Myosotis australis* "white", *Raoulia grandiflora,* toetoe*, Heliohebe pentasepela* and white fuzzweed*,* also occurring on the bluffs

below Glenlee North. Marlborough rock daisy occurs on the inaccessible bluffs at lower altitude.

A sparse herbfield occurs on screes on or near the Glenlee north ridge supporting *Epilobium pycnostachyum, E. forbeseii* (Naturally Uncommon), *Hebe epacridea, Myosotis traversii,* and *Poa buchananii.* At lower altitude along the ridge (approximately 1300 m.a.s.l.) there are a number of low gradient igneous gravel fields. These areas are predominately bare rock and cobble but are characterised by large *Raoulia australis* mats, frequently with small plants of bristle tussock and *Festuca matthewsii.* Scattered over the areas are herbs such as *Geranium brevicaule, Scleranthus* species, and sheep's sorrel*. Occasionally *Helichrysum parvifolium, Myosotis traversii, Pimelea mesoa* subspecies *mesoa, Raoulia parkii,* and *R. subsericea,* are also present.

An area of greywacke scree beneath Glenlee North in the head of the Basin supports a community of *Epilobium pycnostachyum, E. melanocaulon, Lignocarpa diversifolia* (Naturally Uncommon), *Myosotis traversii,* penwiper, and *Poa buchananii*. A number of large igneous boulders/outcrops protrude from the western end of these screes. In the vicinity of these boulders *Cardamine bilobata* (Naturally Uncommon), mouse-eared chickweed*, creeping pohuehue, *Geranium* species, *Melicytus* aff. *alpinus* "Kaikoura", *Oxalis* "scree" (Naturally Uncommon) and sheep's sorrel* occur.

Rocklands and bluffs above the Teme Basin Hut contain, in varying densities, *Anthosachne solandri, Blenchnum penna-marina,* bristle tussock, *Gingidia montana, Helichrysum parvifolium,* field hawkweed*, mouse-ear hawkweed*, silver tussock, blue tussock and sweet vernal*.

Midslopes:
Mid altitude parts of the basin support relatively extensive areas of grassland, with scattered fescue tussock, silver tussock and tauhinu. Stream sides, rocky areas and seepages within the grassland-short tussockland support a greater diversity of indigenous species, e.g *Anaphalioides bellidioides*, *Corybas* species, *Euchiton* species, *Lagenophora pumila*, and *Ranunculus foliosus*. The occasional *Astelia* species and toetoe were also present.

The eastern slopes at elevations between 1000m and 1300m are a mosaic of natural and semi-natural vegetation communities. Convex slopes and slopes of low gradient are generally more modified by historic burning and oversowing. These slopes tend to be dominated by browntop*, field hawkweed*, mouse-ear hawkweed*, silver and fescue tussock and sweet vernal*. Associate species include *Blechnum penna-marina,* mouse-eared hawkweed*, cotton daisy, *Geranium brevicaule,* sheep's sorrel* and white clover* with scattered tauhinu.

The mid-slopes in the western part of the basin below point 1335 are characterised by a mosaic of tussock grasslands, hawkweed herbfields and rocklands with regenerating shrublands and remnant treeland. The tussock grasslands occupy the gentler slopes, saddles, swales and terraces. They are a mix of silver and bristle tussocks over exotic pasture grasses, (commonly sweet vernal* and browntop*). Occasionally tauhinu and bracken are present. Herbs such as *Acaena inermis,* tussock hawkweed*, medic*, mouse-ear hawkweed*, *Myosotis discolor**, sheep's sorrel*, *Taraxacum officinale** and white clover* are common within this grassland and dominate within the herbfield areas.

The gentler areas of the ridge (such as the tops of knobs) north of Glenlee North support short tussock grassland dominated by silver, blue and bristle tussock with cotton daisy a common component. Under this canopy of tussocks is a herbfield of *Acaena inermis*, *Anisotome imbricata* var. *prostrata, Carex* species, field hawkweed*, tussock hawkweed*, moss, mouse-ear hawkweed* and sheep's sorrel* There are pockets of bristle tussock, *Geranium brevicaule* and patotara within these communities.

A mosaic of shrublands occurs over the sideslopes and ridgelines, in particular on the north facing slopes. These are usually dominated by either tauhinu, or regenerating kanuka, with matagouri also a common component. Frequently *Coprosma rhamnoides*, *C. dumosa*, marbleleaf, mingimingi, mountain wineberry and *Polystichum neozelandicum* subsp. *zerophyllum* are also present, particularly at lower altitude.

Boulderfields on Bench:
A mixed tussock and shrubland is scattered over a boulderfield that extends along the bottom of the screes where the angle of slope changes to form a "bench". Shrubs such as *Melicytus* aff. *alpinus* "Kaikoura" and tauhinu are common along with *Acaena caesiiglauca,* mouse-eared chickweed*, clover*, *Coprosma dumosa,* creeping pohuehue, *Blechnum penna-marina*, mountain wineberry, silver tussock and various exotic pasture grasses. Porcupine shrub, *Viola cunninghamii*, prickly shield fern, *Taraxacum officinale** and hook sedge species occupy the gaps between the boulders. In one area, above a seepage zone, *Epilobium pictum* (Nationally Critical) is creeping through the herbs around the base of a boulder and large tussocks. Dead standing trunks of old burnt trees (presumably beech trees) are present.

Away from the boulderfield the vegetation cover becomes denser with tauhinu and silver tussock becoming dominant canopy species. Browsed pasture grasses*, bristle tussock, cotton daisy and mouse-ear hawkweed* are also present. Occasionally *Myrsine nummularia* and *Pittosporum anomalum* are present.

A series of seeps occur on this "bench" feeding the streams draining through the basin. These seeps are generally a mix of turfs consisting of species such as clover*, *Epilobium minutiflorum, Euchiton traversii, Hydrocotyle* "montana", *Isolepis subtilissima*, *Lagenophora barkeri* (Naturally Uncommon), *Leptinella dioica, Oxalis magellanica, Ranunculus foliosus, Veronica* species* and *Viola cunninghamii,* and taller riparian vegetation such as *Carex petriei and Juncus edgariae.* The herb *Chaerophyllum colensoi* var. *delicatulum* (Nationally Critical) is locally common throughout these seeps.

Higher Altitudes:
Higher altitude parts of the Teme Basin are dominated by rockland, scree, tall tussockland and shrubland. Tall tussockland supports blue tussock, bristle tussock, cotton daisy, fescue tussock, mid-ribbed snow tussock, silver tussock, and scattered tauhinu. Mid-ribbed snow tussocks are heavily browsed. Other species commonly present are browntop*, *Euchiton* species, golden speargrass, *Helichrysum filicaule*, mouse-ear hawkweed*, *Raoulia hookeri*, *R. subsericea*, red woodrush, and sweet vernal*.

Scree slopes on the northwest slopes of Glenlee North support *Epilobium pycnostachyum*, *Lignocarpa carnosula* and *Myosotis traversii*. Stable rock in this area supports *Aciphylla monroi*, *Blechnum penna-marina*, blue tussock, bristle tussock, *Caltha* species, *Celmisia*

angustifolia, cotton daisy, fescue tussock, golden speargrass, *Hebe epacridea*, *Helichrysum coralloides*, *H. parvifolium*, patotara, *Pimelea oreophila* subspecies *hetera*, porcupine shrub, *Ranunculus* species, and vegetable sheep (*Raoulia eximia*).

The ridge crest between Mt Hall and Mt Alexander supports an open rockland-tussockland plant community similar to that described for the northeast part of the property. Additional species recorded here were *Anisotome flexuosa* and creeping pohuehue. In places on the ridge the rocklands give way to boulderfields of very large greywacke boulders. These support a very sparse herbfield usually in the gaps between the boulders. *Celmisia allanii, Colobanthus acicularis,* bristle tussock, *Leptinella atrata* subspecies *luteola* (Naturally Uncommon) and *Raoulia bryoides,* all occur within these boulderfields. Elsewhere on the ridge there are gravel filled swales (possibly where there are fault lines) where the vegetation cover and diversity of the herbfield increases. This community includes *Aciphylla monroi, Acrothamnus colensoi, Anisotome imbricata* var. *prostrata, Blechnum penna-marina,* bristle tussock, *Carex wakatipu,* cotton daisy*, Epilobium porphyrium, Geranium brevicaule,* mid-ribbed snow tussock*, Raoulia bryoides,* red woodrush*, Scleranthus* species*,* and sheep's sorrel*.

Notable Flora

Although modified by burning and grazing the property supported a surprising diversity including many threatened and endemic species (Table 2). The following table summarises these (Threat rankings follow de Lange *et. al*., 2013). The symbol # denotes a Threatened or At Risk species which is also a South Marlborough endemic

Table 2: Threaened, At Risk and significant plant species (# indicates Marlborough endemic species)

Threat Division	**Threat Category**	**Species**	**Location on Property**
Threatened	Nationally Critical	*Carmichaelia carmichaeliae* (pink broom)#	Riparian vegetation and bluffs, observed in Tin Hut Gorge, may be elsewhere on the property in stream gorges
		Chaerophyllum colensoi var. delicatulum	Wetland turfs and seeps in the Teme Basin
		Epilobium pictum	Damp area around the base of large boulders and tussocks Teme Basin
		Melicytus aff. *crassifolius* 'cliff' # NB: this could comprise more than one species & new populations have been found since the 2012 ranking (including the Glenlee one) resulting in a threat status that isn't clear, but will be at least Nationally Vulnerable or higher for all taxa within this name as none of the taxa are common & all are palatable (Shannel Courtney, pers.com.)	Subalpine bluffs in the upper Penk catchment

	Nationally Endangered	*Euchiton ensifer*	Wetland turfs near yards in Teme Basin, and true right branch of Tin Hut Stream
	Nationally Vulnerable	*Rytidosperma merum*	Grassy flat outside Penk Hut
At Risk	Declining	*Pimelea sericeovillosa* subspecies *sericeovillosa*	Sparse herbfield at higher altitude (1600-1700m) east of Barometer
		Traversia baccharoides	Riparian shrubland in the upper reaches of the Penk catchment
		Tupeia antarctica	Riparian in the lower Teme Basin
	Naturally Uncommon	*Botrychium australe*	River terrace outside Penk Hut
		Cardamine bilobata	Rocky ledges and overhangs on Barometer , bare sites between tussocks on the SE faces of Barometer, lee of boulders in scree in Teme Basin and bluffs in the Penk catchment
		Celmisia cockayneana#	Rock outcrops and bluffs on Barometer ridges, probably elsewhere on the property on rocky outcrops
		Celmisia insignis#	Rock outcrops and bluffs on Barometer ridges, Glenlee ridges, upper Penk catchment, probably elsewhere on the property on rocky outcrops
		Colobanthus brevisepalus	Rock outcrops and bluffs on Barometer ridges, probably elsewhere on the property on rocky outcrops
		Epilobium forbesii	Screes on Barometer, Glenlee and likely to be elsewhere on the property on screes
		Euchiton paludosus	Wetland turfs in true right branch of Tin Hut Stream and Teme Basin
		Ewartiothamnus sinclairii#	Ridgeline bluffs near Mt Hall
		Lagenophora barkeri	Wetland turfs in the Teme Basin, and in the true right branch of Tin Hut Stream
		Leptinella atrata subsp. *luteola#*	Boulderfields on ridge above Teme Basin
		Lignocarpa diversifolia#	Scree in the head of Teme Basin
		Oxalis "scree"	In screes around igneous boulders in Teme Basin
		Wahlenbergia cartilaginea#	Screes on Barometer, likely to be elsewhere on the property on screes

South Marlborough endemic	*Hebe decumbens*#	Northeast ridge of Barometer, Upper Penk, Teme Basin, Upton Brook
	Helichrysum coralloides#	Higher altitude bluffs , particularly near Glenlee North and the Upper Penk
	Heliohebe hulkeana subsp. hulkeana#	Riparian vegetation and bluffs, observed in Tin Hut Gorge may be elsewhere on the property in stream gorges
	Heliohebe pentasepala#	Rocky outcrops on Barometer ridges, upper Penk catchment
	Pachystegia insignis (Marlborough rock daisy)#	

Significance of Botanical Values

The botanic significant inherent values of Glenlee Pastoral Lease relate to the remnant and regenerating indigenous vegetation that indicate pre-European patterns, and the presence of Threatened and At Risk plants. Although the primary vegetation patterns have been much modified by human activity, in places it is still possible to observe the original patterns, especially where there is beech forest, subalpine shrubland, wetlands and alpine vegetation. Continuous altitudinal sequences of indigenous vegetation are present in at several localities. Secondary and induced indigenous habitats also often retain considerable ecological value, particularly in a landscape which has been modified to the extent that South Marlborough has.

It is important to examine values within a national, regional, and local (Ecological District) context. All are valid and equally important.

National Framework
In 2007 the government produced four priorities for protecting biodiversity on private land (*Protecting our Places: Information about the national priorities statement for protecting rare and threatened biodiversity on private land* – MfE/DOC 2007).

National Priority 1 is related to the protection of Acutely and Chronically Threatened Land Environments of New Zealand (LENZ). LENZ is a classification system which combines patterns of climate, soils and landform to indicate surrogate ecosystems. It then looks at how much of each surrogate ecosystem category remains nationally. Less than 10% remaining indigenous vegetation triggers Acutely Threatened, and 10-20% remaining triggers Chronically Threatened. The classification system also looks at the amount of land which is under formal protection. While there are no Acutely or Chronically Threatened LENZ categories on Glenlee there are areas on valley floors and lower hill slopes which are classified as 'Underprotected' because less than 20% of the remaining vegetation is formally protected.

National Priority 2 is to protect indigenous vegetation associated with sand dunes and wetland. The property contains a large number of wetlands (particularly upper Tin Hut stream, Teme Basin and upper Penk) that support indigenous vegetation including threatened species.

National Priority 3 is to protect indigenous vegetation associated with "originally rare" terrestrial ecosystems. Several of these ecosystems occur on the property including: mafic bluffs and scarps (ridgelines of Mt Hall, Barometer, Glenlee, upper Penk, upper Teme) and boulderfields of silicic intermediate rocks, non-volcanic (Glenlee North ridgeline and upper Teme basin).

National Priority 4 relates to the habitats of Threatened and At Risk species. The property supports six of threatened species, including three Nationally Critical species, one Nationally Endangered, one Nationally Vulnerable and one taxon that is yet to be ranked (but will likely rank highly). In addition it supports 16 At Risk species (three Declining and thirteen Naturally Uncommon). There are a number of South Marlborough endemic species on the property including many of the Threatened and At Risk species.

Regional and Local Context

The property occupies high country between the Wairau and Awatere Faults generally ranging between 700 and 1780 m.a.s.l. Most of the areas visited displayed altitudinal sequences of indigenous vegetation within this range which are characteristic of the remaining vegetation of Inland Marlborough Ecological Region and Waihopai Ecological District.

The areas of forest at lower and mid altitudes, notably in Upton Brook, Penk River and Teme River, and in parts of Cow, Tin Hut and Dore Streams are representative of the original vegetation of Inland Marlborough Ecological Region and Waihopai Ecological District. The areas of forest and high-altitude rockland are connected by strongly regenerating low kanuka or scrub.

The upper slopes of Barometer have distinctive bluff-rockland, scree and gravel field communities associated with both greywacke and igneous rocks. The igneous dykes and their associated communities are distinctive within the Waihopai Ecological District. These communities have minimal introduced species and are originally rare ecosystems. The bluff and scree communities contain Marlborough endemics and many of the threatened species recorded on the survey. They are also some of the most intact communities remaining on the property.

Below the alpine zone historic burning events have led to a pattern of remnant vegetation interspersed with secondary and induced vegetation types, either woody (e.g. kanuka shrublands) or non-forest (e.g. short tussock grassland). Where burning events have been infrequent and there has not been an emphasis on topdressing and oversowing, natural regeneration has generally functioned and progressed well, and the mosaic of indigenous communities form good representative sequences over the range of altitude, substrate, aspect and landform.

An examination of the assessment criteria used in Protected Natural Areas Programme surveys shows that in many of the sites described, one or more are triggered within the context of Waihopai Ecological District and Inland Marlborough Ecological Region.

There is impressive diversity of indigenous ecosystems over the landscape as well as diversity within these ecosystems. This is shown by the high number of "Nationally Threatened" and "At Risk" plant species which occupy specific habitats.

The true right branch of the Penk River has diverse riparian vegetation. Of note was the presence of *Rytidosperma merum* (Nationally Vulnerable) on the terrace at the confluence with the true left branch and the *Melicytus* taxon on the subalpine bluffs in the catchment. The headwaters show a pattern reflecting past history including burning though the natural regeneration pattern and trajectory are working well so that woody indigenous ecosystems are in recovery and indigenous species dominate the majority of the plant communities. Several At Risk species were recorded from the range of ecosystems in this catchment.

The community in the true left branch of Tin Hut Stream gorge at the base of Glenlee is a distinctive bluff community containing a population of the Nationally Critical pink broom as well as a number of South Marlborough endemics. The upper section of this stream is a mosaic of bluffs and screes on a mix of geologies which support a number of At Risk species. The middle sections support regenerating kanuka and shrublands providing an altitudinal sequence. The wetlands and seeps in the head of the true right branch of Tin Hut Stream are distinctive with a number of At Risk species and a population of *Euchiton ensifer* (Nationally Vulnerable).

At the head of Burr and Clyde Streams, the terrain is very steep and dominated by rock and scree, much of which appears inaccessible. Remnant beech forest is retained in several gullies, and the side slopes support mid-ribbed snow tussock grasslands. A site visit to one of the headwater tributaries confirmed that the bluff and screes support distinctive communities including several At Risk species and South Marlborough endemics, which are intact and relatively weed free.

Although being severely modified, the Teme Basin shows a reasonably high diversity and contained a large number of the Threatened and At Risk species, albeit in a mosaic of communities which ranged in their level of historic modification. In general those communities which are less susceptible to burning remain the most significant elements within the landscape, most notably wetlands (including watercourses), screes, rocklands and boulderfields on concave south-facing slopes.

Remnant totara and regenerating red beech with the other species present in the base of the basin show the area is capable of recovering. The shrublands are diverse with pockets of old matagouri and remnant *Olearia* species, kowhai and kohuhu.

The wetlands in the Teme are diverse ranging from *Carex* wetlands to turfs, and support a number of Threatened and At Risk species. The wetland turf communities at the saddle adjoining the yards and on the bench below Glenlee North, and their associated watercourses are a feature of the basin and provide for a diverse range of indigenous wetland turf species including *Chaerophyllum colensoi* var. *delicatulum* (Nationally Critical) and *Euchiton ensifer* (Nationally Endangered) as well as several At Risk species. The screes and boulderfields below Glenlee North are of note for their communities and Threatened and At Risk species including *Epilobium pictum* (Nationally Critical).

The significant inherent values area is depicted on the botanical values map (Map 4).

Significance Guidelines (DOC 2012):

Area 1 - Northwest Corner (Avon Saddle to Mt Hall)

Ecosystems, habitats and communities

20. Diverse woody indigenous vegetation communities in the high country deserve protection.
The area is full of diverse forest and shrublands that support good examples of the original woody vegetation of the respective EDs and LENZ.

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22. Continuous altitudinal sequences of indigenous vegetation deserve protection.

- Continuous altitudinal sequence from subalpine ridgelines and bluff systems (1300-1400m elevation) to valley floor forest (500-600m). These sequences may include a diverse range of natural and semi-natural ecosystems associated with watercourses, and hill slopes.

Area 2 - Southwest Valleys (Rocky Gill Spur area)

Species and their habitats

12. Species listed as National Priority 4 in "Protecting Our Places", or in any revision of those tables, deserve protection, along with their habitat. Plainly, the more threatened a species is, the more it deserves protection. Species listed in DOC's (new in 2007) "Threatened" categories (nationally critical, nationally endangered and nationally vulnerable) and their associated habitats, must have protection.

- Wetland turfs that contain *Euchiton ensifer* (Nationally Endangered).

17. Species listed in DOC's (new in 2007) "At Risk" categories (declining, recovering, relictual and naturally uncommon) deserve protection.

- Wetland turfs that contain *Lagenophora barkerii* (Naturally Uncommon) and *Euchiton paludosus* (Naturally Uncommon).
- Bluff and rockland communities which contain *Celmisia insignis* (Naturally Uncommon) and *Ewartiothamnus sinclairii* (Naturally Uncommon).

Ecosystems, habitats and communities

20. Diverse woody indigenous vegetation communities in the high country deserve protection.

21. The originally rare ecosystems listed as national priority 3 in "Protecting our Places" must have protection.

- The presence of extensive bluffs and scarps with their associated indigenous vegetation.

22. Continuous altitudinal sequences of indigenous vegetation deserve protection.

- Continuous altitudinal sequence from subalpine ridgelines and bluff systems (1300m elevation) to valley floor forest (970m). These sequences may include a diverse range of natural and semi-natural ecosystems associated with watercourses, and hill slopes.

23. Wetlands and sand dunes (as set out in "Protecting our Places") must have protection where it is practical and realistic to manage and sustain their values.

- Wetland communities such as wetland turfs associated with seeps and flushes and riparian wetland communities.

25. Indigenous vegetation associated with wetlands, waterways and the margins of lakes deserves protection.

- Wetland communities such as wetland turfs associated with seeps and flushes and riparian wetland communities.

Area 3 - S.W. Ridge Leading to Barometer and True Left Branch Tin Hut Stream

Species and their habitats

12. Species listed as National Priority 4 in "Protecting Our Places", or in any revision of those tables, deserve protection, along with their habitat. Plainly, the more threatened a species is, the more it deserves protection. Species listed in DOC's (new in 2007) "Threatened" categories (nationally critical, nationally endangered and nationally vulnerable) and their associated habitats, must have protection.

- Riparian shrublands in Tin Hut Stream which contain pink broom (*Carmichaelia carmichaeliae*) (Nationally Critical).

17. Species listed in DOC's (new in 2007) "At Risk" categories (declining, recovering, relictual and naturally uncommon) deserve protection.

- Bluff and rockland communities which contain *Colobanthus brevisepalus* (Naturally Uncommon), *Cardamine bilobata* (Naturally Uncommon) and *Celmisia cockayneana* (Naturally Uncommon).
- Scree communities which contain *Wahlenbergia cartilaginea* (Naturally Uncommon) and *Epilobium forbseii* (Naturally Uncommon).
- Tussock herbfields which contain *Cardamine bilobata* (Naturally Uncommon).

Ecosystems, habitats and communities

20. Diverse woody indigenous vegetation communities in the high country deserve protection.

- The area contains many significant diverse forest and shrublands that support good examples of the original woody vegetation of the respective EDs and LENZ.

21. The originally rare ecosystems listed as national priority 3 in "Protecting our Places" must have protection.

- The presence of originally rare ecosystems - mafic bluffs and scarps with their associated indigenous vegetation.

22. Continuous altitudinal sequences of indigenous vegetation deserve protection.

- Continuous altitudinal sequence from subalpine ridgelines and bluff systems (1780m elevation) to stream side forest (800m). These sequences may include a diverse range of natural and semi-natural ecosystems associated with watercourses, and hill slopes.

27. Extensive intact tall tussocklands (Chionochloa species) must have protection.

- The headwaters of Clyde and Ribble Streams contain tussock faces dominated by mid-ribbed snow tussock.

Area 4 - Northeast Ridge of Barometer, Dore Stream and true right of the Upper Penk Catchment

Species and their habitats

12. Species listed as National Priority 4 in "Protecting Our Places", or in any revision of those tables, deserve protection, along with their habitat. Plainly, the more threatened a species is, the more it deserves protection. Species listed in DOC's (new in 2007) "Threatened" categories (nationally critical, nationally endangered and nationally vulnerable) and their associated habitats, must have protection.

- Grasslands on the Penk Hut alluvial terrace which contain *Rytidosperma merum* (Nationally Vulnerable).

17. Species listed in DOC's (new in 2007) "At Risk" categories (declining, recovering, relictual and naturally uncommon) deserve protection.

- Grasslands on the Penk Hut alluvial terrace which contain *Botrychium australe* (Naturally Uncommon).
- Sparse herbfields at altitude which contain *Pimelea sericeovillosa* subspecies. *sericeovillosa (*Declining).
- Bluff and rockland communities which contain *Cardamine bilobata* (Naturally Uncommon) and *Celmisia cockayneana* (Naturally Uncommon).
- Scree communities which contain *Epilobium forbesii* (Naturally Uncommon).
- Tussock herbfields which contain *Colobanthus brevisepalus* (Naturally Uncommon).

Ecosystems, habitats and communities

20. Diverse woody indigenous vegetation communities in the high country deserve protection.

- The area contains many stands of diverse forest and shrublands that support good examples of the original woody vegetation of the respective EDs and LENZ.

21. The originally rare ecosystems listed as national priority 3 in "Protecting our Places" must have protection.

- The presence of originally rare ecosystems - mafic bluffs and scarps with their associated indigenous vegetation.

22. Continuous altitudinal sequences of indigenous vegetation deserve protection.

- Continuous altitudinal sequence from subalpine ridgelines and bluff systems (1780m elevation) to stream side forest (800m). These sequences include a diverse range of natural and semi-natural ecosystems associated with watercourses, and hill slopes.

Area 5 - True left of the upper Penk Catchment

Species and their habitats

17. Species listed in DOC's (new in 2007) "At Risk" categories (declining, recovering, relictual and naturally uncommon) deserve protection.

- Bluff and rockland communities which contain *Celmisia insignis* (Naturally Uncommon) and *Cardamine bilobata* (Naturally Uncommon).
- Riparian shrublands which contain *Traversia baccharoides* (Declining).

Ecosystems, habitats and communities

20. Diverse woody indigenous vegetation communities in the high country deserve protection.

- The area contains several significant patches of diverse forest and shrublands that support good examples of the original woody vegetation of the respective EDs and LENZ.

22. Continuous altitudinal sequences of indigenous vegetation deserve protection.

- Continuous altitudinal sequence from subalpine ridgelines and bluff systems (1300m elevation) to valley floor forest (970m). These sequences include a diverse range of natural and semi-natural ecosystems associated with watercourses, hill slopes and debris flows.

24. Wetlands and waterways that make a significant contribution to the ecosystems of lakes deserve protection where it is practical and realistic to manage and sustain those values.

- Wetland communities such as wetland turfs associated with seeps and flushes and riparian wetland communities.

- Wetland communities such as wetland turfs associated with seeps and flushes and riparian wetland communities.

Area 6 - Teme Basin

Species and their habitats

12. Species listed as National Priority 4 in "Protecting Our Places", or in any revision of those tables, deserve protection, along with their habitat. Plainly, the more threatened a species is, the more it deserves protection. Species listed in DOC's (new in 2007) "Threatened" categories (nationally critical, nationally endangered and nationally vulnerable) and their associated habitats, must have protection.

- Boulderfield at the base of the scree below Glenlee North which contains *Epilobium pictum* (Nationally Critical).
- Wetland turf communities containing *Chaerophyllum colensoi* var. *delicatulum* (Nationally Critical) and *Euchiton ensifer* (Nationally Endangered)**.**

- Riparian bluffs in the Teme basin which contain *Tupeia antarctica* (Declining).
- Wetlands on the toeslopes and valley floors which contain *Euchiton paludosus* and *Lagenophora barkerii* (both Naturally Uncommon).
- Wetlands on the bench below Glenlee North which contain *Lagenophora barkerii* (Naturally Uncommon).
- Bluff and rockland communities on the Glenlee ridge which contain *Celmisia insignis (*Naturally Uncommon).
- Boulderfields on the Glenlee ridge which contain *Leptinella atrata* subsp. *luteola* (Naturally Uncommon).
- Argillite scree communities on the Glenlee ridges which contain *Epilobium forbseii* (Naturally Uncommon).
- Screes in Teme Basin which contain *Lignocarpa diversifolia, Oxalis* "scree" and *Cardamine bilobata* (all Naturally Uncommon).

Ecosystems, habitats and communities

20. Diverse woody indigenous vegetation communities in the high country deserve protection.

- The area contains numerous significant patches of diverse forest and shrublands that support good examples of the original woody vegetation of the respective EDs and LENZ.

21. The originally rare ecosystems listed as national priority 3 in "Protecting our Places" must have protection.

- The presence of originally rare ecosystems - mafic bluffs and scarps and boulderfields of silicic intermediate rocks (non volcanic) with their associated indigenous vegetation.

22. Continuous altitudinal sequences of indigenous vegetation deserve protection.

- Continuous altitudinal sequence from subalpine ridgelines and bluff systems (1720m elevation) to stream side forest (650m). These sequences include a diverse range of natural and semi-natural ecosystems associated with watercourses, and hill slopes.

23. Wetlands and sand dunes (as set out in "Protecting our Places") must have protection where it is practical and realistic to manage and sustain their values.

- The numerous and diverse wetlands communities including pukio sedgeland, turfs, seeps and flushes of Teme Basin .

25. Indigenous vegetation associated with wetlands, waterways and the margins of lakes deserves protection.

- The numerous and diverse wetlands communities including pukio sedgeland, turfs, seeps and flushes of Teme Basin.

2.6 FAUNA

2.6.1 Birds

The bird fauna of Glenlee is typical of the dry mountains of South Marlborough. Areas of forest and shrubland in this area support common indigenous species such as bellbird, brown creeper, grey warbler, silvereye, South Island rifleman, South Island fantail and South Island tomtit. Open country habitats support Australasian harrier, New Zealand pipit (Declining), southern black-backed gull and New Zealand falcon (eastern falcon; Recovering). Other bird species are found in the more extensive forest and alpine habitats to the west, including kea (Nationally Endangered), long tailed cuckoo (Naturally Uncommon), New Zealand pigeon, rock wren (Nationally Vulnerable), South Island kaka (Nationally Endangered) and yellow-crowned parakeet. Blue duck (Nationally Vulnerable) and grey duck (Nationally Critical) have been recorded from the Avon River. New Zealand falcon and South Island rifleman have been recorded recently from across the Awatere valley on Mt Gladstone Pastoral Occupation Licence.

Birds observed on Glenlee are described below for the three main parts of the property (See Map 5 also).

Forests of Upton Brook

Bird species recorded in the mountain beech-broadleaf forests in this area were South Island rifleman, New Zealand falcon, bellbird, brown creeper, grey warbler, silvereye, South Island fantail, South Island robin, South Island tomtit and five naturalised bird species.

Mt Hall

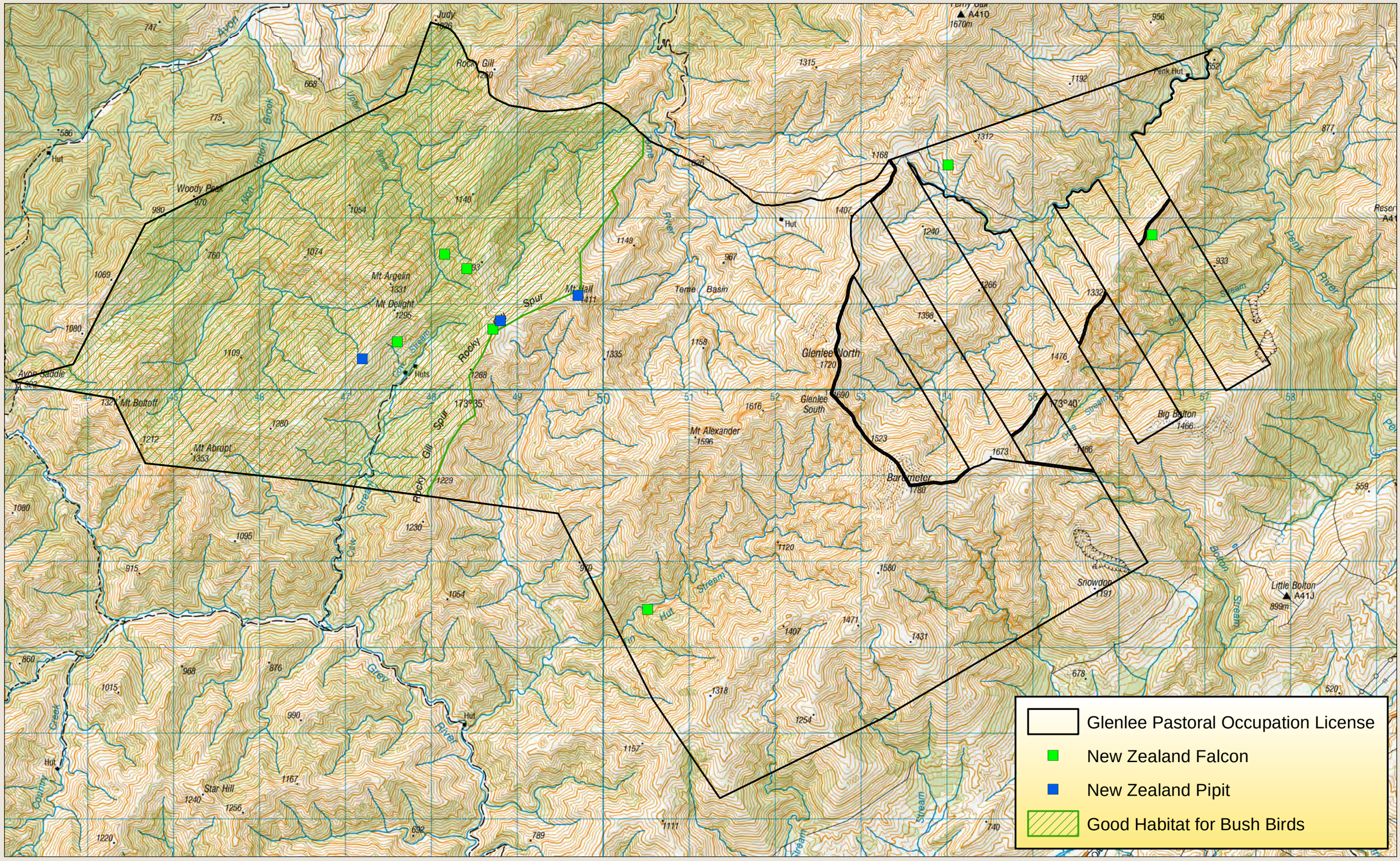
The ridge crest and summit of Mt Hall support tussockland, shrubland and rockland habitats. Birds observed here were New Zealand falcon, New Zealand pipit, silvereye, grey warbler and four naturalised bird species.

Teme Basin

The upper reaches of Teme River and Teme Basin support forest, shrubland, tussockland, rockland and scree habitats. Indigenous birds recorded from forest and scrub habitats were bellbird, grey warbler, South Island tomtit, silvereye and South Island fantail. Birds recorded in other habitat in the area were Australasian harrier, New Zealand pipit, welcome swallow, paradise shelduck and seven naturalised species.

Barometer

The summit and southern ridges of Barometer provide extensive open rockland, scree and sparse tussockland habitats. The only bird species observed in this zone was New Zealand pipit.



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Dore Stream and Penk River

Dore Stream has relatively extensive areas of mountain beech forest, kanuka forest and scrub. Birds recorded here were New Zealand falcon, bellbird, grey warbler, New Zealand falcon, silvereye, South Island fantail, South Island tomtit, South Island robin and five naturalised bird species.

Glenlee Peaks

The high peaks northeast of Barometer (Mt Alexander, Glenlee South and Glenlee North) provide extensive areas of open rock, scree and sparse tussockland-herbfield. Bird species recorded here were New Zealand pipit and four naturalised bird species.

Tin Hut Stream

Tin Hut Steam valley supports small patches of mountain beech forest, more extensive areas of low kanuka forest and scrub, and open tussockland habitats. Bird species recorded here were New Zealand falcon, bellbird, grey warbler, silvereye, South Island fantail, New Zealand pipit, welcome swallow, South Island tomtit and six naturalised bird species.

Cow Stream

Beech forest is present in the headwaters of Cow Stream. Birds recorded from this forest habitat were bellbird, New Zealand falcon, South Island tomtit, silvereye and South Island robin.

Bird Species Recorded

Twenty-two bird species were recorded on Glenlee: 12 indigenous species and 10 naturalised species. Two threatened species (Hitchmough 2012) were recorded.

Table 3 Indigenous bird species recorded from Glenlee.

Bird species	Threat status	Distribution on property
Australasian harrier		Teme Basin.
bellbird		Forest and scrub throughout.
brown creeper		Upton Brook forest.
grey warbler		Forest and scrub throughout.
New Zealand falcon	(Recovering)	Tin Hut Stream; Dore Stream; Upton Brook; Cow Stream; Penk River.
New Zealand pipit	(Declining)	High altitude areas throughout.
silvereye		Forest and scrub throughout.
South Island fantail		Forest and scrub throughout.
South Island rifleman		Upton Brook forest.
South Island robin		Upton Brook, Cow and Dore stream forests.
South Island tomtit		Forest and scrub throughout.
welcome swallow		Teme Basin and Tin Hut Stream.

Naturalised bird species observed on the property were blackbird, chaffinch, chukor, dunnock, goldfinch, greenfinch, redpoll, skylark, song thrush and yellowhammer.

Significance of the Bird Fauna

Forest on Glenlee provides important nesting and feeding habitats for South Island rifleman and other forest birds, notably South Island robin. The mosaic of forest, shrubland, tussockland and rockland on the property provide favourable habitats, including good breeding habitat, for New Zealand falcon (Recovering). Open country provides habitat for the New Zealand pipit (Declining). The significance of bird habitats on the property is enhanced by their proximity to contiguous areas of forest and open country habitats on adjoining properties, including Ferny Gair Conservation Area.

Significance Guidelines (DOC 2012):

Species and their habitats

27. Indigenous species not listed in "Protecting our Places", and their associated habitats at the extremities of the species' range deserve protection.

- The area supports a species that is relatively uncommon in this area and probably at the edge of its regional distribution: South Island robin.

28. Species listed in DOC's (new in 2007) "At Risk" categories (declining, recovering, relictual and naturally uncommon) deserve protection.

New Zealand pipit (Declining).

2.6.2 Lizards

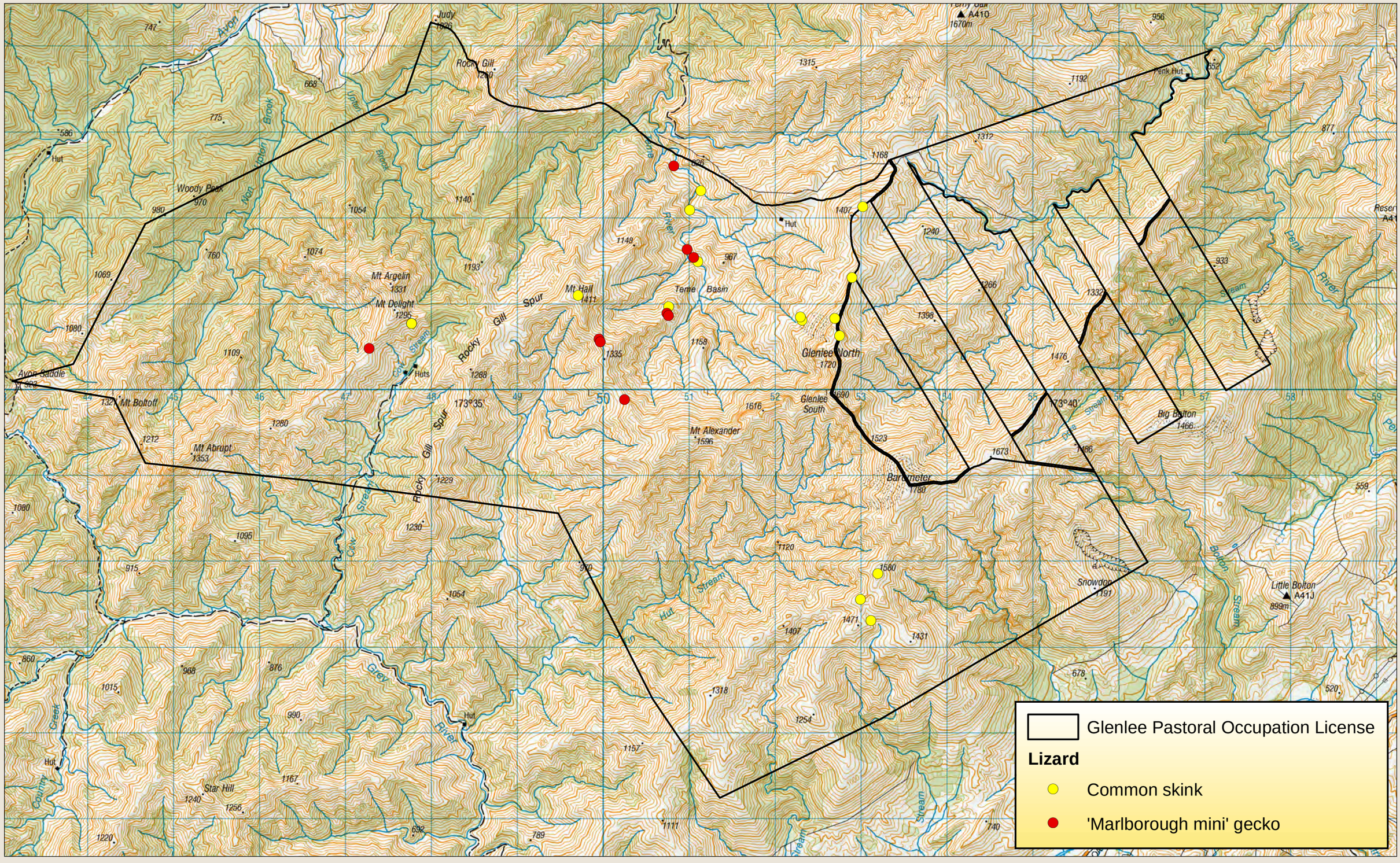
The lizard fauna of South Marlborough is diverse. Five species of the *Hoplodactylus maculatus* complex are known from the general area. Common gecko and Canterbury gecko (Declining) are found in shrubland and forest, and Southern Alps gecko, Marlborough mini gecko and the threatened Kaikouras gecko (Naturally Uncommon) are found in open rocky areas. The threatened black-eyed gecko (Nationally Vulnerable) and rough gecko (Nationally Vulnerable) have also been recorded. Four skink species are present in the general area: common skink, scree skink (Nationally Vulnerable), Spotted skink "South Marlborough" (Nationally Vulnerable) and long-toed skink (Nationally Vulnerable). Threatened species are from Hitchmough et.al.(2012).

Four lizard species: Southern Alps gecko, common skink, Marlborough mini gecko and the threatened black-eyed gecko have been recorded across the Awatere valley on the Inland Kaikoura Range (Department of Conservation Herpetofauna Database). Marlborough mini gecko has been previously recorded close to Glenlee (Clerke, 1994).

The property supports substantial areas of apparently suitable lizard habitat. Two lizard species were recorded during this survey: common skink and Marlborough mini gecko (Map 6). Individuals of these species were found under stones on terraces alongside the Teme River and on Rocky Gill Spur near Mt Hall. The apparent paucity of lizards may be due to the failure of lizards to colonise areas following burning, or may be a consequence of the unfavourable survey conditions, (i.e weather and the time of year).

Significance of lizard fauna

Glenlee provides relatively extensive areas of apparently suitable habitat for lizards, including habitat that is potentially suitable for threatened species. Two common species of lizard were recorded from many parts of the property.



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2.6.3 Freshwater Fauna

The northwest part of Glenlee is drained by the headwaters of Non Upton Brook, Upton Brook and Teme River, which are tributaries of the Avon River in the Wairau River catchment. South and east parts of the property are drained by tributaries of the Penk River, including Dore Stream, and the headwaters of Cow, Tin Hut, Ribble, Clyde, Burr and Bolton streams, in the Awatere River catchment.

One of the distinguishing features of the Wairau and Awatere rivers is that they are not affected by dams. This has two effects on the fish communities. The first is that diadromous species (those species with a sea-going phase in their lifecycle) are more likely to be present. The second effect is that fish are able to move between catchment tributaries, allowing re-colonisation of streams.

The New Zealand Freshwater Fish Database (NZFFD) has 129 records from the Awatere River catchment and 460 records from the Wairau River catchment (at 29th of May 2016). Fish species recorded from rivers and streams near the property are shortfin eel, longfin eel, Canterbury galaxias (Northern), koaro, torrentfish, upland bully and brown trout. The freshwater crayfish/koura, are also recorded in the NZFFD near the Glenlee boundary. Four of the species are considered threatened by Hitchmough (2010): longfin eel (Declining), Canterbury galaxias (Northern) (Declining), torrent fish (Declining) and koura (Declining).

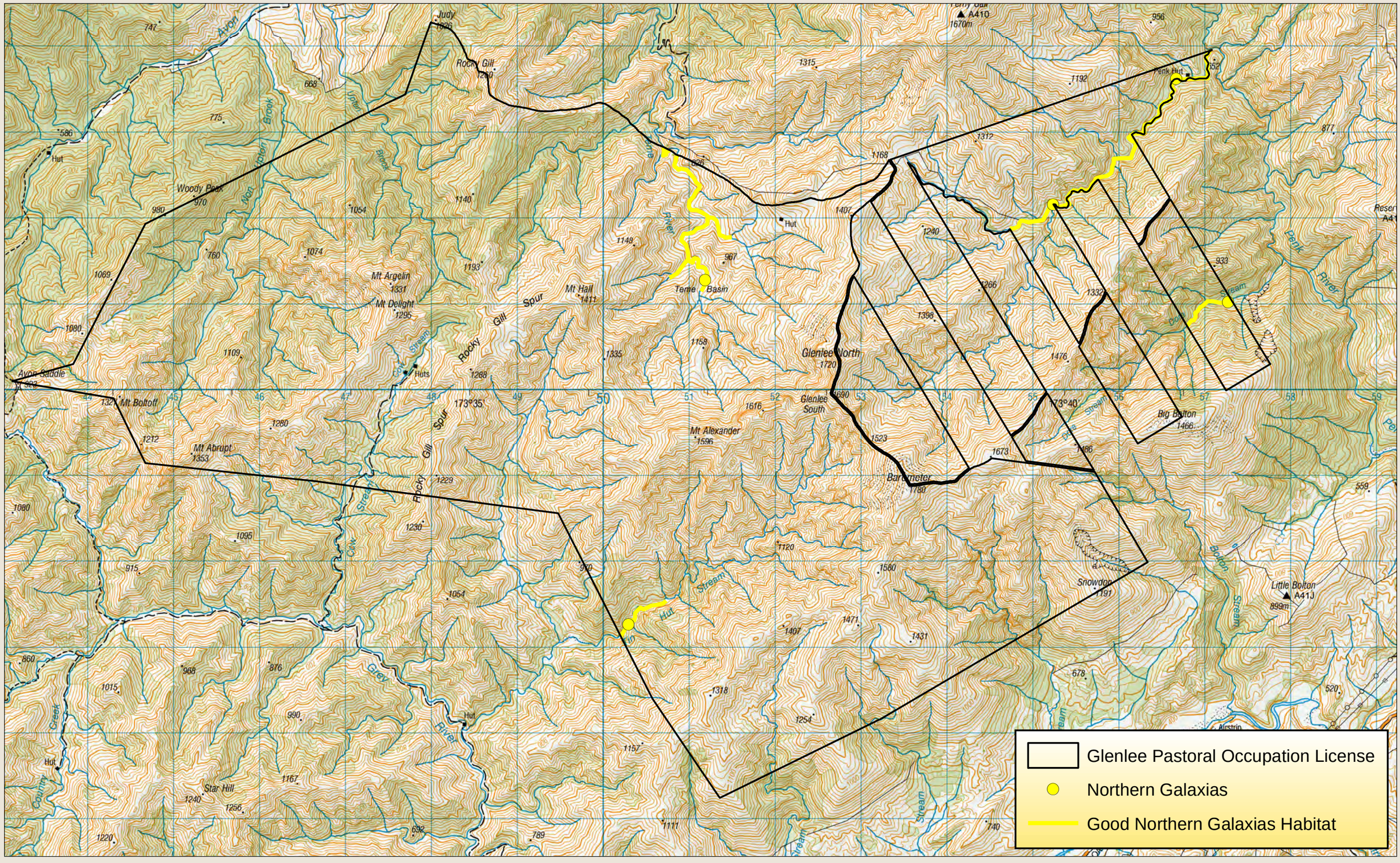
Glenlee comprises two main geographic areas of freshwater habitat, classified by river catchment. Freshwater habitats and the fish species recorded are described below for each of these areas. See Map 7.

Avon River Catchment

This area incorporates the north-facing slopes on the property which drain to the Avon River via Non Upton Brook, Upton Brook and Teme River. These three valleys have similar characteristics: large-stream habitats near the northern boundary of the property, small-stream habitats in the middle reaches and ephemeral stream habitats in the upper reaches. Non Upton Brook flows through extensive low kanuka forest, Upton Brook flows through mountain beech forest and Teme River flows through forest, treeland and tussockland. Small seepages are present in the Teme River catchment. Farm animals appear to be grazed only in the Teme Basin, though wild animal access is unrestricted throughout.

The ephemeral streams appear to be generally more than a metre wide after high rainfall. The small streams are up to two metres wide, and the large streams generally up to four and occasionally six metres wide. Ephemeral stream substrates are generally soil or bedrock. Small and large stream substrates are boulders, cobbles and gravels. The small seepages in the Teme Basin are generally spongy areas with small springs. These wetlands are no larger than 50 m^2, commonly less than 20 m^2 and are mud and silt based.

One site was electro-fished in the Teme River. Canterbury galaxias (Northern) was the only species recorded. Additional species found in the Avon River catchment near Glenlee and recorded in the NZFFD are brown trout, longfin eel and upland bully.



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Awatere River Catchment

This area incorporates the south and east-facing slopes on the property which drain to the Awatere River via Penk River (including Dore Stream), Grey River (Cow and Tin Hut streams) or directly to the Awatere River (Ribble, Clyde, Burr and Bolton streams). These streams are similar in character to those described for the Avon River catchment. The streams flow through open tussockland and rockland vegetation in their upper reaches, and shrubland, scrub and forest in their lower reaches. Some parts of the streams flow through small rocky gorges, notably Tin Hut Stream. All these streams are accessible to stock and wild animals, except that topography restricts access in some places.

The ephemeral streams appear to be generally more than a metre wide after high rainfall. The small streams are up to two metres wide, and the large streams generally up to four and occasionally eight metres wide. Ephemeral stream substrates are generally soil. Small and large stream substrates are bedrock, boulders, cobbles and gravels.

Four sites were electro-fished in this area: two in the Penk River, one in Dore Stream and one in the eastern branch of Tin Hut Stream. Canterbury galaxias (Northern) were recorded at all four sites. Additional species found in the Awatere River catchment near Glenlee and recorded in the NZFFD are brown trout, koaro, longfin eel, shortfin eel and torrentfish.

Significance of the Freshwater Fauna

Canterbury galaxias (Northern) is present in steams at several locations on the property, in both the Avon (Wairau) and Awatere river catchments. Other native and introduced fish species have been recorded in streams near the property. Canterbury galaxias (Northern) are a threatened species (Declining). The Wairau River catchment is listed as a "Type I" Waters of National Importance (Chadderton *et al*., 2004), indicating that the majority of the river and its tributaries are nationally significant.

Significance Guidelines (DOC 2012):

Species and their habitats

16. Species listed in DOC's (new in 2007) "At Risk" categories (declining, recovering, relictual and naturally uncommon) deserve protection.

- Canterbury galaxias (Northern) are a threatened species (Declining)

28. Resources (including ecological processes) that help to sustain other values that are deserving of protection, will themselves deserve protection.

- The Wairau River catchment is listed as a "Type I" Waters of National Importance (Chadderton *et al*., 2004), indicating that the majority of the river and its tributaries are nationally significant.

2.6.4 Terrestrial Invertebrates

Glenlee is part of an extensive system of tectonically active mountainous steeplands in the north-eastern South Island rain shadow. Similar to other regions of New Zealand, inland Marlborough and the Kaikoura mountains are known for regional endemism among many plants (Rogers & Walker 2005, Walls et al. 2005). Such endemism is less well documented for invertebrates though there are examples among weta (Gibbs 2001), beetles (eg. Watt 1992), moths (eg. Hoare 2005) and landsnails (eg. Efford 1998). Many other invertebrate groups would include Marlborough -Kaikoura endemics if better studied and reported (see Millar 2006).

Complex terrain, soil classes and remoteness mean that ecosystems retain many original elements but are also severely depleted (particularly woody vegetation) by fire and by grazing from feral and farm animals. This is typical for the region. However, some non-forest ecosystems may have persisted well and the station includes significant uplands, well above bushline where a mosaic of natural ecosystems are retained in 'close association' with depleted montane forests, successional shrublands, grasslands, wetlands, screes and bluff systems.

The Waihopai Ecological District (of the Inland Marlborough Ecological Region) has not been previously surveyed and reported on for invertebrates.

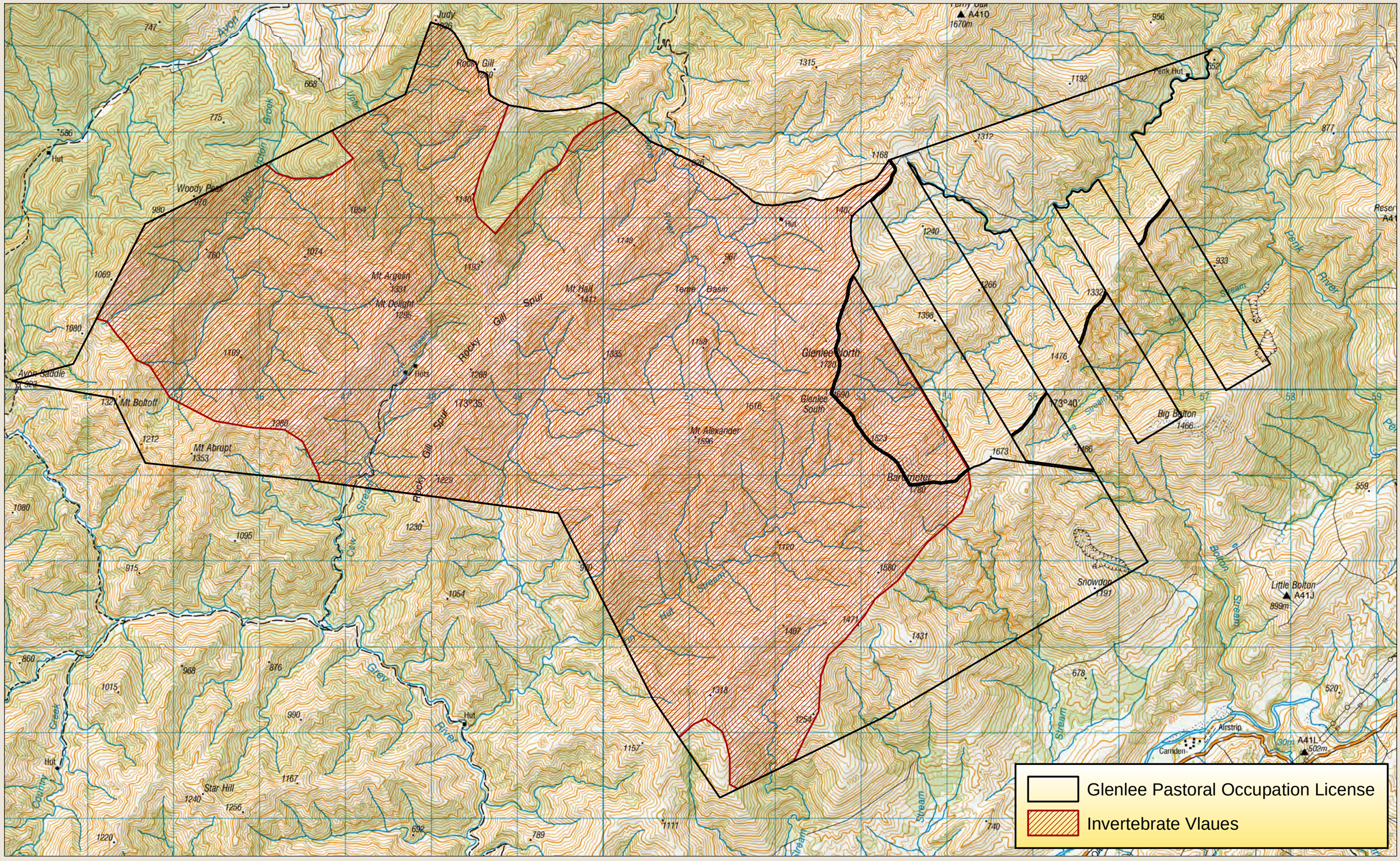
Invertebrate fauna description
Tenure review surveys yielded 165 species of invertebrates including 11 beetles, 115 moths & butterflies, 15 micro-snails and a few examples (24 spp.) of other invertebrate groups.

Collectively the invertebrates sampled reveal a complex terrain of large landscape scale (Map 8). Indigenous insects and snails were typical of the upper eastern South Island montane areas and uplands. A particular richness of moths and other insects was associated with exposed rocky slopes, bluffs and stream beds.

Surveys revealed four moths with a national threat ranking (Table 4.(a)). The moth *Asaphodes obarata* has the threat status 'Nationally vulnerable' (Stringer et al 2012).

Also recorded was the moth genus *Gingidiobora* which includes *G. subobscurata* (Declining). An Olearia owlet moth *Meterana exquisita* (Relict) and a looper moth *Austrocidaria lithurga* (Naturally uncommon) both inhabit specific shrubs and are not as widely distributed as their shrub hosts are. Another endemic moth not recorded but likely present is *Hieroderis pachystegiae* which has larvae associated with Marlborough rock daisy species in the region.

Teme Basin and Glenlee North
Some of the most active screes in the region are under Glenlee North and Mt Alexander in the Teme Basin. The vivid orange hindwing moth *Paranotoreas brephosata* was common as were grasshoppers *Paprides nitidus*. On less active scree one early season example of black mountain ringlet butterfly *Percnodaimon pluto* was recorded. On stable rock talus here and elsewhere is habitat for grasshopper *Brachaspis nivalis*. The crevices of rock bluffs also above bushline here and elsewhere shelter an un-named cave weta species. A specialist alpine moth *Asterivora tillyardi* has larvae on vegetable sheep. Also only noted at 1700 m was the moth *Dichromodes* cf. *cynica* whose larvae inhabit lichens.



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In the Teme Basin at the toe of the Glenlee North screes (1400 -1300 m asl.) a complex of shrubland, stable rock talus, springing streams and deeper soils have examples of insects to match including chirping cicada *Amphipsalta strepitans*. Boulder butterflies *Lycaena* sp. cf. *tama* (Canterbury alpine boulder) bask on the talus while larvae eat creeping pohuehue. \

Below 1300 m in the basin, rocky spurs, bluffs and river bed are a matrix of grassland and scattered shrublands. Over 70 species of moths were noted here occupying a good range of habitats. Moths from wet areas include *Glaucocharis lepidella, Orocrambus apicellus, O. ramosellus* and *Elachista gerasmia*. On bluffs and rocky sites below natural bushline, six moths were noted, their larvae eating mosses or lichens. This includes the cryptic and delicate *Dichromodes sphaeriata* on rockfaces. The moth *Aletia* s.l. *virescens* has caterpillars feeding at night on river bed and slip scar willow-herbs.

Many moths and other insects of open or sparse vegetation were noted below natural bushline. 17 (out of 24 total species) of moth in the Crambidae family of day active moths were recorded. The recorded species richness signals a diversity of natural non-forest habitats together with seral disturbed non-forest ecosystems.

A mixed shrubland fauna is also present including the endangered and rarely recorded moth *Asaphodes obarata*. In a rocky shrubland site with kanuka, fern, hardwood trees, 14 species of micro-snail were collected from leaf litter which have persisted from the formerly more extensive shrub and forest cover.

In contrast with Teme Basin, the Cow Stream catchment is south facing and more wooded. It includes a beech forest remnant at the head of the valley and extensive regenerating kanuka dominated shrubland with intervening grassy areas, sedge/grass flushes, riparian mixed shrublands among side gullies, spurs and bluffs joining the central stream. Light trapping moths and hand collecting/beating from trees provided a sample of moths and other insects that reflected contrasting grassland and forest –tall shrubland associations. Two forest litter feeding moths *Tingena* spp. and case moth *Grypotheca* sp. indet., were collected. Ground beetle *Mecodema rugiceps* was also noted in forest. The moth *Meterana diatmeta* has caterpillars on understory shrub *Pennantia corymbosa.* Moths in open shrubland included *Graphania phricas* on matagouri and *Meterana exquisita* (relict) on *Olearia odorata.*

Sampling recorded many grassland inhabiting including the widespread owlet moths *Graphania omoplaca, Persectania aversa, Tmetolophota unica* and others. Moths from open habitats remain a high proportion of the sample from Cow Stream catchment and include examples associated with sedges, mosses, roots, litter, flowers and herbs in open areas.

Glenlee Station upland and alpine fauna 1150 m asl. and above

A large proportion of Glenlee consists of alpine steeplands. There appears to have been significant soil loss with associated vegetation particularly along spurs south of Barometer. This has led to a predominance of communities suited to rocky exposures, skeletal soils and mobile alluvium. Deeper soils retain representative invertebrate communities on tussock, shrubland and wet flush areas.

Many insects noted at Glenlee North are also present along the ridges spanning Mt Delight – Mt Hall and Rocky Gill Spur. Although vegetation is sparser along the ridges and in the catchments surrounding Barometer it still retains a richness of upland and alpine invertebrates. Time was spent searching for the Kaikoura giant weta *Deinacrida parva* and giant scree weta *D. connectans* among the talus of bluff systems. Only the scree weta was recorded at Glenlee North but it did not appear common. The presence of high altitude tiger beetles, ground weta, mountain ringlet butterfly, and rock lichen moths *Dichromodes niger* and *D*. c.f. *simulans* demonstrated the natural qualities of these alpine habitats.

General comment on regional representation

Little general invertebrate survey is reported among the nearby Ecological Regions. Within the Waihopai Ecological District. Existing protected areas include Ferney Gair/Black Birch Conservation Area adjacent to the north and the Glazebrook Conservation to west and south. Big Bolton is a smaller public conservation area set within the east of the POL. Inspection, satellite imagery and the New Zealand Landcover database shows upland rock dominated expanses are better represented on the Glenlee station than on Ferney Gair although Glazebrook has a good proportion protected on the nearby range between old Pudding Hill and Pudding Hill. Broadly within the region, many of the insect faunal assemblages present on Glenlee are likely to be represented within public conservation lands of the Ecological District and to the south in the Kaikoura Ranges. This includes Ka Whata Tu o Rakihouia Conservation Park. However, the threat to montane areas of loss to woody weed cover (particularly *Cytisus scoparius* –exotic broom) is presently less than in many parts of those regions.

Table 4. (b) includes beetles not determined to species level but which may well include species of regional significance. Appendix 1. includes many annotations of species associations that reflect local landform and vegetation.

Table 4. (a) Invertebrates recorded from Glenlee POL that are ranked according to the New Zealand threat classification system (Townsend et al. 2008).

Species	Threat rank	Notes
Moth *Asaphodes obarata*	*Nationally vulnerable*	Larval host plant unknown but likely caterpillars feed on understory herbs. Threat status qualifiers are 'designated', 'Data Poor' and 'Sparse'. A re-assessed threat status in 2014 is presently unpublished but it suggests a higher threat ranking.
Moth *Gingidiobora* sp. cf. *subobscurata*	At Risk, Declining	Caterpillars eat herb *Gingidia montana* which is highly palatable to grazing animals. All other species in this genus have a higher threat rank and if this entity proved not to be *subobscurata* then it would likely also be ranked with a threat status.
Moth *Meterana exquisita*	Relict	Caterpillars eat shrub *Olearia odorata* & other small leaved *Olearia*
Moth *Austrocidaria lithurga*	Naturally uncommon	Caterpillars likely eat divaricating small-leaved *Coprosma* spp. Inhabits open shrubland community

Table 4. (b) Beetles of note recorded from Glenlee POL

Species	Notes
Megadromus sp. indet.	A moderately large predatory ground beetle/carabid beetle. Tentatively this may be *M. compressus* which has the threat classification 'Relict' (qualifiers; 'Range Restricted' and 'Sparse') (Leschen et al 2012).
Neocicindela sp. indet.	A tiger beetle species. Collected above 1500 as a larva too early in the season for adult stages. Millar (2006) notes high altitude tiger beetle *Neocicindella hamiltoni* as likely present. This beetle is endemic to the northeastern 'rainshadow' mountains of the South Island.
Rhicnobelus aenescens	A belid weevil beetle. Commonly associated with celery pine *Phyllocladus alpinus*. I Millar pers comm. "-according to Kuschel (Fauna of NZ 45) it is found from Gisborne and Wanganui to Central Otago & Dunedin, but he found it was quite rare in collections. I have noted it from Molesworth & a few other South Marlborough sites."
Mimopeus sp. indet 1,2 &3	Three undetermined darkling beetle species. Larvae eat dead wood. Many species are confined to small regions of New Zealand. While three *Mimopeus* species are recognised among the Glenlee samples, it is possible one of these is the threat listed *Mimopeus parallelus* which has the threat classification 'Relict' (qualifier; 'Range Restricted'.) (Leschen et al 2012) and is known from nearby Clarence Valley (Watt 1992). Alternatively Millar (2006) lists two local endemic spp. then regarded as likely to be present. These include *M. clarkei* and *M. vallis*. Both have the threat status of 'Naturally Uncommon' and qualifier 'Range Restricted'.

Significance Guidelines (DOC 2012):

Criteria that apply:

12. Species listed as National Priority 4 in "Protecting Our Places", or in any revision of those tables, deserve protection, along with their habitat. Plainly, the more threatened a species is, the more it deserves protection. Species listed in DOC's (new in 2007) "Threatened" categories (nationally critical, nationally endangered and nationally vulnerable) and their associated habitats, must have protection.

- Moth *Asaphodes obarata* 'Nationally Vulnerable' (Stringer et al. 2012) (& tentatively a higher category in the next published revision). Noted in light trapping. Likely occurs in patches of montane damp shrubland on Glenlee.

13. Habitat that is available for those threatened species to move into of their own accord deserves protection likewise.

- With respect to *A. obarata* (and associated shrubland inhabiting invertebrates), gully shrubland patches are widely occurring on the station.

14. Where it is practical and realistic to restore habitats for those threatened species, those habitats deserve protection also.

- With respect to *A. obarata* (and associated shrubland inhabiting invertebrates), gully shrubland patches are widely occurring on the station. In the absence of 'some' disturbance processes these are evidently regenerating and increasing in extent.

17. Species listed in DOC's (new in 2007) "At Risk" categories (declining, recovering, relictual and naturally uncommon) deserve protection.

- One steepland and two shrubland inhabiting moths recorded are also listed 'At Risk' Stringer et al. (2012). These are moth *Gingidiobora* sp. cf. *subobscurata,* moth *Meterana exquisita* and moth *Austrocidaria lithurga.*
- Steeplands harbouring the food plants *Gingidia montana* and *G. decipiens* are widely scattered within the station. Shrublands including food plant *Olearia odorata* are occasional in many station valleys and the precise host shrub/habitat association is not known for *A. lithurga.*

18. Migration or dispersal paths for indigenous species deserve protection because of their strategic importance to the species' life cycle, genetic diversity and survival.

- Many litter and soil dwelling invertebrates are dependent on forest and shrubland cover. In many sites the strategic importance of the advanced seral regeneration of tall shrubland and forest patches so that they link together may benefit such invertebrates otherwise slow to disperse by other means.

Biodiversity protected area design and function

28. Resources (including ecological processes) that help to sustain other values that are deserving of protection, will themselves deserve protection.

- Invertebrate survey shows complexity and richness of invertebrate associations with open rocky areas of sparse vegetation cover found in most alpine and many montane parts of the station. Regionally, Glenlee is a stronghold of such habitats –'resources' and the processes and complex soil mineralogy that sustains them.

2.6.5 Problem Animals

Introduced animal species that may have an important effect on indigenous plant or animal communities on the property, and that can be controlled or contained, are listed and discussed below. Other ubiquitous naturalised species for which containment or control are probably impractical (such as rodents) are not discussed here.

Feral goat, feral deer and feral pig

Feral goats and sign of feral pigs (rooting) were observed throughout the property, with relatively high numbers in at least the Upton Brook and Teme Basin. Populations of these wild animals pose a significant threat to indigenous plant communities, invertebrates and fauna habitat.

Brushtail possum

Possum sign was observed throughout the property. Possums are browsers of palatable indigenous plants and predators of birds, lizards and invertebrates.

2.7 HISTORIC

2.7.1 European Heritage Values

Background History

A depasturage licence for what was to become the Glenlee Run was first taken up by Edward Bolton in 1851. The run comprised 18000 acres. Bolton was a member of a tightly knit and intermarried grouping of catholic families who had come to Nelson on the 'George Fyffe' in 1842. This group included the Redwoods, Wards, Cliffords and Vavasours. All became prominent Marlborough runholders. Bolton married Elizabeth Redwood 1845 and initially farmed in Waimea West, Nelson. His brother in law JosephWard is said to have named Bolton Stream after him while carrying out a survey of the Awatere for the New Zealand Company. Edward Bolton did not hold the run for long although he established a remote homestead 'on the lower end of the run'[2]. This may be the house between the branches of Burr Stream shown in SO 2704.[3] He seems to have quickly got into financial difficulties and sold Glenlee to JC Whitehead in 1853.[4]

Joseph C Whitehead is a shadowy figure who has been suggested as the first European to explore the Clarence River from the Acheron to the sea[5]. His manager on Glenlee was William Henry Bursill who remained on the run until his death in 1868. Bursill first as manager then, part owner and finally as sole owner was responsible for the early development and consolidation of Glenlee. Whitehead sold to Bursill and Thomas Charles Howard of Motueka in 1860.

Howard and Bursill began a programme of freeholding and by 1866 had private title to almost 10,000 acres. It seems likely that they instigated the gridironing across the Penk catchment to protect the eastern end of the run from freeholding by others. Using their Glenlee freehold as security they also purchased William Adams' Redwood Run in the Avon. This adjoined Glenlee Run's northern boundary and gave the partners 40,000 acres. This included land within the current Glenlee ex POL and probably shows the date it was first farmed. Bursill lived on the Redwood Run and married in 1865. Howard sold his share to Bursill in 1866. In 1868 Bursill died and his young widow sold the runs to George Bennett and John Symons. In 1871 Symons became sole owner and also purchased the Avondale Run in the Waihopai and the Awatere Shearing Reserve. This brought Symon's total holdings (freehold and leasehold) in the Awatere through to the Waihopai to about 63,000 acres.

The Redwood run in the Avon River, a branch of the Waihopai, and in the Wairau catchment was first taken up by William Adams in 1852. Adams was later the first superintendant of Marlborough Province and a leader of the 'ungentle shepherds' who promoted the separation from Nelson. He and his family moved to Langley Dale in 1857 and Redwood was leased to Charles Elliot, editor and owner of the Nelson Examiner newspaper[6]. Elliott has numerous advertisements in the Examiner between 1857 and 1859 offering the services of his stallion 'Augean' which was standing at the Redwood Run.

[2] Kennington 1982 p.78
[3] LINZ SO 2704 Glenlee Run J Beauchamp 1861.
[4] Kennington 1982. P9 77-79
[5] Sherrard 1966. P 52
[6] Denton. 1983 p 26

Dr Allison is shown as the first lessee of the Avondale Run. Teschemaker has described it as in a very run down state prior to his tenure.

Bennett and Symons established the first boiling down plant on the run in 1869.
Symons sold Glenlee, Redwood, and Avondale to to Charles de Vere Teschemaker[7] in 1877 for 23,000 pounds. Teschemaker, born in Devon, had come to Otago in 1854 and took up the Waipahi and Spylaw runs in West Otago. In 1866 he was forced to sell Spylaw because of debts. Teschemaker, along with other Otago squatters was a member of the Otago Club and enjoyed a high social life but was not considered a good businessman and manager of his finances[8]. He subsequently managed his brother's Taipo run near Oamaru[9]. Following his purchase of Avondale/Glenlee the Marlborough Express noted that "Mr Teschemaker is an extensive sheepfarmer and agriculturalist from the vicinity of Oamaru where he ploughs up land by the thousand acres. He will thus be an important accession to the population of this district."[10] As in Bursill's time the aggregated runs were managed from the Waihopai side.

The Teschemakers lived at Avondale while a shepherd James Fletcher lived on the Glenlee block. Fletcher built a cob house near the mouth of the Grey River where the present Glenlee homestead stands.[11]

Throughout the tenures of Bursill and Teschemaker the horse track over the Avon Saddle must have been the primary line of communication between Avondale and Glenlee. The track had been developed early on as a mid way connection between the Wairau and Awatere. It was maintained by the Wairau and the Awatere Roads Boards, each managing their respective side as far as the saddle. The track runs up the Avon River from the Waihopai before sidling up and across the western side of the head of the river to the saddle. From the saddle it drops down into the Grey and follows it to its junction with the Awatere. There are newspaper reports of work being done on the 'road' from 1873.[12]

In 1907 Teschemaker sold the run, (but retained Avondale), to William Shipley of Greendale Canterbury. The property was described as comprising 13,600 acres freehold and 15,500 acres leasehold with 8500 sheep.[13] This included 10,000 acres of leasehold from the Redwood. Presumably much of this is land now within the current Glenlee Pastoral Occupation License (POL).

The property changed hands regularly over the next 18 years. Shipley sold to Donald McDonald in 1912. McDonald sold to James Lyon in 1919 who sold a year later to F G Warring. Warring sold to Sidney Shale in 1924. Shale sold the following year to James Martin Samson a well known auctioneer and businessman from Dunedin. The sale was an exchange of properties, Samson providing two farms (in Norwood and Awarua) for Glenlee Run. The deal went sour with Shale claiming in court that that the Awarua property was worth only a fraction of the value claimed by Samson while Samson claimed he had been

[7] Charles de Vere Teschemaker appears to have later gone by the surname Teschemaker-Shute
[8] Rodger Dickson 2011
[9] Taipo belonged to William Teschemaker who built a 28 bedroom homestead of oamaru stone. This building was acquired by the Catholic Church in 1911 and became Teschemakers Girls School
[10] Marlborough Express 1 August 1877 p.5
[11] Kennington 1982, p79
[12] Marlborough Express 18 October 1873
[13] Ibid 9 October 1907.

short changed in the number of sheep coming with the Glenlee Run. [14] It is presumed settlement was reached because the Samson family retained the Glenlee Run until it was sold to Ian G Hamilton in 1966.[15] The property has remained in the Hamilton family.

A number of sections of the Glenlee POL boundaries are defined as legal road. Most of these bear no relationship to the topography and have never been intended as practical roads or routes and therefore have no formations or even evidence of informal use. The only formed road is the Avon Saddle bridle track from the upper Avon River to the Awatere River via the Grey River. The Glenlee POL just touches this at the saddle. Another legally defined pack track ran from the lower branch of the Penk River over a saddle to the Bolton stream and then to the Burr Stream but this is south of the POL on Glenlee freehold.[16]

19th century trigs and survey points on the peaks and ridges are shown as generally being marked with cairns.[17]

Historic Sites

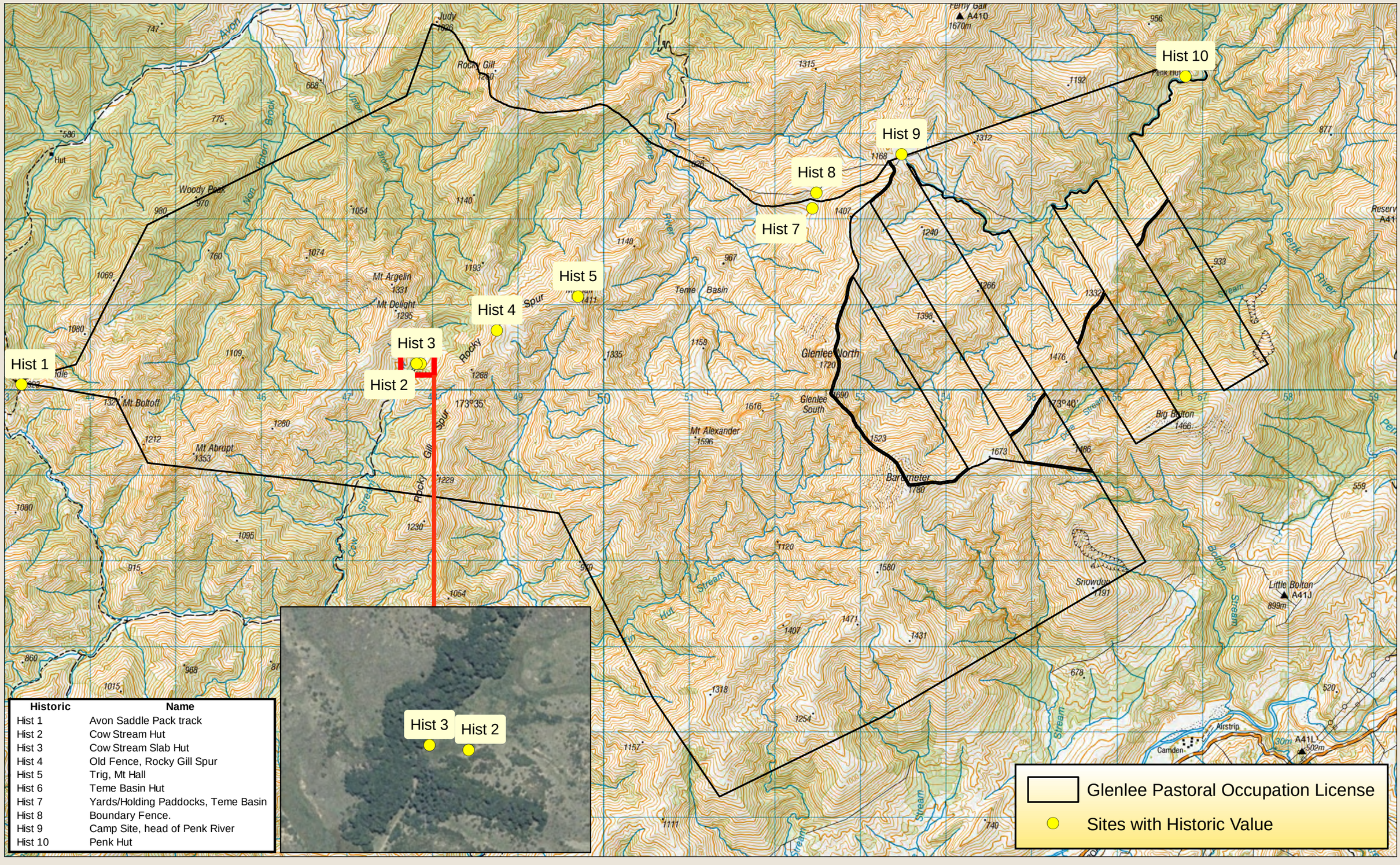
Table 5. Historic places and sites found during tenure review survey of Glenlee POL (See also Map 9).

Site name	Easting (NZTM)	Northing
Avon Saddle Pack track	1643191	5370066
Cow Stream Slab Hut	1647810	5370312
Old Fence, Rocky Gill Spur	1648749	5370697
Trig, Mt Hall	1649698	5371094
Yards/Holding Paddocks, Teme Basin	1652438	5372128
Boundary Fence.	1652487	5372310

Avon Saddle Pack Track

This track which is the primary natural midpoint route between the Wairau and the Awatere was used as a stock, horse and foot route during the second half of the 19th and the early years of the 20th centuries. Both the Awatere and Wairau Roads Boards voted funds and carried out formation work and repairs to their respective sides of the route from at least the 1870s[18]. It also appears that the lessee carried out maintenance on the 'road' from time to time. In 1889 Teschemaker was instructed by the Awatere Board to carry out any any 'inexpensive repairs'.[19]

[14] Press 8July 1927.
[15] Kennington 1982 p.79
[16] LINZ SO 39
[17] ibid
[18] Marlborough Express 18 October 1873
[19] Ibid November 9 1889



Historic	Name
Hist 1	Avon Saddle Pack track
Hist 2	Cow Stream Hut
Hist 3	Cow Stream Slab Hut
Hist 4	Old Fence, Rocky Gill Spur
Hist 5	Trig, Mt Hall
Hist 6	Teme Basin Hut
Hist 7	Yards/Holding Paddocks, Teme Basin
Hist 8	Boundary Fence.
Hist 9	Camp Site, head of Penk River
Hist 10	Penk Hut

Glenlee POL - Historic Values

N

0 1 2
Kilometres

Department of Conservation
Te Papa Atawhai

New Zealand Government

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Geospatial Services

The Glenlee POL's western extremity just touches on the saddle, otherwise the pack track is outside this survey. A benched track formation was visible on the on the saddle and its approaches.

Cow Stream Slab Hut.

This old hut preceded the current hut as the top mustering hut in Cow Stream and is at the terminus of the vehicle track up the stream from its junction with the Grey River. It is situated on the valley floor on the true right of Cow Stream more or less opposite the 'new' hut. The hut is framed in pole beech and is clad with axe-dressed beech slabs set vertically over tar paper. The roof is also clad with butted slabs which have been covered with tar paper and corrugated iron[20]. The hut has been competently built with diagonal bracing in the wall framing and had five bunks also completely fabricated from pole beech. The hut is now in a derelict state and partially collapsed. Half of the front (east) wall and two thirds of the back wall is missing. It has a fireplace in the south end and two small windows; one in the north end and another in the east side next to the door. The door is of tongue and groove with three ledges and diagonal braces on the inside. Although no reference to the hut has been found it has been built in the first half of the 20th century possibly the 1930s or 40s. It is not shown on the February 1943 edition of NZMS1 S35 but is shown on the 1968 edition.

Old Fence, Rocky Gill Spur

This fence appears to come from the saddle at the head of Cow Stream and sidles around point 1288 on Rocky Gill Spur to the flat on the spur which is effectively the saddle between Upton Brook and the west branch of Tin Hut Stream. It is a six wire fence primarily on flat standards although there are several small T-iron posts where the fence deviates into the head of Tin Hut Stream. One of the T-irons has the maker's mark DL & Co, M BRO[21] embossed on it. Information on this manufacturer has not been found however the fence appears to date from the early 20th century based on the thinner type of standard used. It is not shown on any of the NZMS1 editions.

Trig, Mt Hall

There is a rock cairn on the western side of the top of Mt Hall. This is presumed to mark a trig. The cairn is approximately1 metre diameter at the base and 50 centimetres high. The cairn is partly collapsed on one side.

Yards/Holding Paddocks, Teme Basin

There is a large holding paddock in the saddle up hill from the Teme Basin Hut. This paddock is rectangular and measures approximately 180 by 110 metres and encloses almost 2 hectares. There is a smaller paddock at its centre. The outer paddock appears to be earlier and is fenced with a T-iron and standard 6 wire fence. At the northern end it butts on to the boundary fence (see below). There is a gate in the south east corner.

The T-irons are from various manufacturers including: Lanarkshire Steel Co, Scotland; Frodingham, England; Dorman Long and Co, Middlesborough; and MISCO. All these companies date back into the 19th century and continued into the 20th. The dates of these posts is not known but they are steel and likely to be either late 19th or early 20th century.

[21] Dorman Long and Co Middlesborough. This iron and steel company was founded in 1875 and went on to become builders of large bridges including the Sydney Harbour Bridge in 1932.

The internal paddock is enclosed with a four wire with barb fence supported on timber post and standards. It is also old. The original timber posts are rotted and supported by later steel posts. These paddocks clearly pre-date the present Teme Basin Hut.

Boundary Fence

This fence is shown on the 1968 edition of NZMS1 S35 running along ridgelines from the Avon, over Rocky Gill, crossing the upper Teme, along the ridge behind Teme Basin Hut across the saddle behind the hut and down into the head of the Penk River. It is assumed that this fence dates from the separation of Glenlee from Avondale in 1907. It remains the back boundary to the Glenlee ex POL and has been maintained and renewed.

2.7.2 Maori Archaeological Sites

It is very likely that Maori using the Awatere and Wairau valleys knew of the Avon Saddle route and had explored the valleys of the Penk, Teme and Grey Rivers and their tributaries. However there are currently no Maori (or other) archaeological sites recorded on or the general vicinity of the Glenlee POL. No Maori archaeological sites were found during the tenure review survey.

Significance of Historic Resources

The Glenlee POL, particularly the Teme Basin area appears to have always been an area that has been an outlier to existing leasehold runs. It is a reasonably remote area lacking easy horse or vehicle access. It has always been peripheral to the main development of Glenlee and Avondale Runs and as a consequence has little early farming infrastructure or evidence. Apart from the Avon Saddle pack track, some of the old fences, possibly the holding paddock and the Mt Hall Trig the evidence recorded above all clearly relates to the 20th century and the Samson and Hamilton tenures.

The Avon Saddle pack track, which is defined as legal road, only just touches the POL at the saddle. It is one of several key 19th century horse routes between the Wairau and the Awatere. It may not have played as significant a role in the movement of stock between Nelson, Marlborough and Canterbury as those tracks further west, notably the Upper Wairau/Tarndale, the Saxton Saddle between the Leatham and the Saxton rivers and the Acheron Saddle between the head of the Waihopai and the Acheron rivers, nevertheless it is an important Marlborough horse track. Almost all of this track's formations appear to be legal road adjacent to Glenlee and Upcot freehold. Because the surveyed road is presumed to be accurate there is a high possibility that none of the track on the saddle lies within the Glenlee POL and may be outside the scope of this assessment.

Wire fencing began to be used on New Zealand farms from the mid 1860s and was in common use by the mid 1870s. The use of iron posts (standards and T-irons), particularly in timber poor areas like the South Marlborough drylands, began also at this time and persisted right through to the introduction of the 'Waratah' star picket in the late 1920s. The remnant old fences recorded have T-irons of various manufacture. None appear really early but are assumed to date from the late 19th and early 20th centuries. This also applies to the holding paddock behind the Teme Basin Hut. This paddock is the oldest feature found relating to the farming of the Teme Basin. There are still many of these old fences in existence in South Marlborough and other dry areas in the South Island. The iron posts will last a very long time and so will remain a feature of the farming landscape unless

deliberately removed[22]. The old fencing on Glenlee POL is interesting in terms of the farming history of this land but has little wider significance.

The Cow Stream Slab Hut is of a style and type once common throughout remote parts of New Zealand. It is an example of the use of readily available materials (beech timber) which combined with simple tools and bush carpentry skills could be made to provide moderately comfortable shelter. In this case the hut appears to have been roofed with packed in re-cycled corrugated iron[23]. Indications are that this hut is a fairly late (1940s) example. It was superseded several decades ago by the present Cow Stream Hut and with no viable use maintenance has ceased and it is now in a ruinous state. It is unlikely to remain standing for much longer.

None of the above recorded sites is seen as being of high SIV apart from the Avon Saddle Pack Track. However this is either all or almost all outside the Glenlee POL. It is subject to the archaeological provisions of the HNZPT Act 2014.

Significance Guidelines (DOC 2012):

Criteria that apply:

2. Sites which, while they are of a type known from elsewhere, have attributes of intactness, rarity and a strong association with particular historical events, deserve protection.

- Any parts of the Avon Saddle Pack Track at the head of the Acheron valley that all within the POL bopundary are important as it is a very good example of part of a historically-important early route between the Wairau and Awatere valleys.
- The old Cow Stream Slab Hut in upper Cow Stream are a good example of a backcountry stock-working hut, but in a current state of disrepair.

4. Sites that complete the representativeness of the protected areas network in relation to particular historic or cultural heritage themes deserve protection.

- Any parts of the Avon Saddle Pack Track at the head of the Acheron valley that all within the POL bopundary are important as it is a very good example of part of a historically-important early route between the Wairau and Awatere valleys.

6. Sites of a type known from elsewhere some of which are already protected, even if there is no particular association with historical events and the fabric is not particularly intact, deserve protection if they are particularly good examples or have special attributes such as providing a particularly memorable visitor experience.

- The area contains sites with remains of old fences, stockmen's camps, yards, fireplaces and huts, all of which are representative of early pastoral activity, some of which are in good condition and which provide value and interest to visitors.

[22] Note that those fences predating 1900 are archaeological sites within the definitions of the Heritage NZ Pouhere Taonga Act 2014 and therefore should not be disturbed without HNZPT authorisation.
[23] Lysaght Bristol Crown. This brand of corrugated iron is likely to have been of English manufacture prior to Lysaghts setting up their Australian factories from 1921.

2.8 PUBLIC RECREATION

2.8.1 Physical Characteristics

Glenlee is predominantly one recreation unit. It is characterised by the chain of mountains from Barometer through Glenlee North, Glenlee South, Mt Alexander, Mt Hall, Mt Delight, Mt Argelin and Mt Abrupt to Mt Boltoff near the Avon Saddle. An intricate pattern of valleys and gullies run off the mountainous chain on the property forming the headwaters of catchments draining into the Avon, Gray, Awatere and Penk rivers.

The land is principally bare windswept mountains containing pockets of forested areas in the stream valleys. Three huts are located in the Penk River, Cow Stream and in the Teme Basin. The only tracking on the property is a single farm track following Cow Stream in to the huts.

The property provides a high natural setting for recreation due to the property's isolation and limited development.

2.8.2 Legal Access

Roads

There are no formed legal roads to the property. An unformed legal road exists along the ridge that runs south from Ferny Gair starting at point 1168 and connects with Glenlee North, through to Glenlee South, across to Barometer then northeast down a major ridge line running into the Penk catchment. An unformed legal road heads south east from this ridge at point 1673 into the head of Bolton Stream. Various legal roads (unformed) exist over adjoining freehold lands with several connecting to the property boundary though none provide practical access to the property. Current practical access to the property is achieved over farm tracks on adjoining freehold land with permission of the freehold owner.

Legal access that is sometimes used for access to the hut in the headwaters of Penk River is along the Penk River by use of the adjoining unformed legal road. The legal road that approximately follows an existing track across the Avon Saddle to the west of the property also connects to the property boundary.

Marginal Strips

No marginal strips appear to be present along streams within the property boundaries.

Adjoining Public Conservation Land

The property adjoins the Ferny Gair Conservation Area along a large portion of the northern property boundary, Big Bolton Conservation Area to the southeast and connects with the Glazebrook Conservation Area at the Avon Saddle to the northwest.

2.8.3 Activities

Limited practical access exists to the property for recreational activities. The area is known to be used for hunting (pigs, goats, deer and chamois) primarily in the Non Upton Brook, Upton Brook, Teme Basin and the Penk River catchments. The peaks of Glenlee North, Glenlee South, Barometer, Mt Alexander and Big Bolton are a focus for tramping parties. There is some use of the Avon River and Avon Saddle by tramping parties. There is little other information available about the existing recreational use of the property.

Significance of Recreation

The highly natural setting throughout the property offers significant recreational values. There is however, limited practical access to the property and recreation opportunities will need to be developed in conjunction with adjoining freehold land. Hunting and tramping access to the mountain range and catchment headwaters within the property are the key recreation values.

Significance Guidelines (DOC 2012):

Criteria that apply:

30. Recreational opportunities identified in CMS, and securing the ability to deliver public enjoyment of them, deserves protection.

- The CMS identifies improved tussockland tramping in Inland Marlborough as a key objective.
- The CMS seeks to maintain facilities and seek opportunities to improve access for recreational hunting in South Marlborough; of which this property contributes in part to.

PART 3 OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

Information gathering meetings were held with representatives of non-governmental organisations (NGOs) at Blenheim on the 6th September 2004 and at Geraldine on the 9th of September 2004. Comments made at those meetings are summarised below.

- Area is really good for tramping, Penk Hut (ex NZFS) is used by trampers.
- California quail, chukor, grey duck and paradise shelduck are present; no Canada geese; no fisheries values; good hunting for goats, deer, chamois, pigs (especially in the Teme Basin); NZDA/hunters definitely interested in hunting opportunities on the property; limited access can be gained from Avon Saddle.
- Main areas of interest for tramping are Rocky Gill (access from Malvern Hills), Bolton and Barometer (access from Awapiri via Little Bolton) and Avon Saddle (access from Avon River); these are all good day trips.
- There is a very good track up the Avon Valley, across Avon Saddle and down the Grey Valley; it is an old musterers' track that is now overgrown.
- There used to be a good track up the Teme Valley (an old walkway) to the property boundary at Teme Basin, though it was mostly used to gain access to Ferny Gair (north of the property).
- The Penk River, on the eastern boundary of the property, is popular for hunting; it also supports a small trout fishery. Historically the area around Ferny Gair has been difficult for access. The Grey River also supports a small trout fishery.
- It looks like access up the Grey Valley would be desirable.

3.2 REGIONAL STATEMENTS AND PLANS

Glenlee lies within Marlborough District. The relevant district plan forms part of the Wairau Awatere Resource Management (RM) plan. The Wairau Awatere RM plan is a combined district, regional coastal, and regional plan prepared by a unitary council. This plan applies to that part of the district located south of the Wairau River catchment, including the Awatere Valley where the property is located.

a) Marlborough Regional Policy Statement

The Marlborough Regional Policy Statement (Marlborough RPS) provides an overview of resource management issues within the Marlborough region and how those issues are to be managed. The Marlborough RPS identifies methods to be adopted into resource management plans to address and manage these issues. The relevant issues to Glenlee Pastoral Lease will be discussed below.

The focus of *Chapter 5: Protection of Water Ecosystems* of the Marlborough RPS is to sustain the life supporting capacity of Marlborough's water ecosystems. To achieve this focus the chapter includes provisions to manage water quality, flows and levels; to maintain

and enhance freshwater habitats and biodiversity; and to preserve natural character and amenity values.

Chapter 6: Land Ecosystems addresses the issue of land modification and the indigenous biodiversity loss associated with this change. However it also recognises the importance of land ecosystem change to assist the community to provide for the cultural, social and economic needs. This chapter (and *Chapter 7: Community Wellbeing*) provides for development and change provided that the integrity and diversity of indigenous land ecosystems is maintained and the activities do not adversely affect the environment.

The Marlborough RPS requires that the visual character of indigenous and working landscapes of Marlborough are maintained and enhanced. *Chapter 8: Protection of Visual Features* recognises that there are different landscape types which have a character of their own, and it is important to recognise this to ensure the overall landscape value of Marlborough is protected. This chapter requires that activities that have the potential to adversely affect landscape values are managed.

The Anticipated Environmental Results for the region include:

- Enhanced conditions within the freshwater ecosystems.
- Enhanced integrity and diversity within land environments.
- Landscape types are differentiated shown by the protection of outstanding landscape features, and the maintenance of those criteria which define the nature and character of indigenous, working, and built landscapes.

b) Wairau Awatere Resource Management Plan

The Marlborough District Council is a unitary authority and therefore fulfils the responsibilities of both a regional and district council. The Wairau Awatere Resource Management Plan (Wairau Awatere Plan) manages activities and values that would be found in both district and regional plans.

Glenlee Station lies completely within the Marlborough District and within the Wairau Awatere Plan area. The Wairau Awatere Plan was made operative in 2011 and has since been subject to a number of plan changes. The majority of these plan changes are now operative and those that are not operative do not have any effect on Glenlee Station.

Glenlee Station is wholly located within the Rural Four Zone. The majority of rural land with the Wairau Awatere Plan area is either zoned Conservation Zone or Rural Four Zone. The rural areas are dominated by Marlborough's landscape of moderately steep to very steep hill country and mountainous land bisected by major river systems. Extensive pastoralism, currently and historically, is the predominant land use activity.

The objectives and policies of the Rural Chapter of the Wairau Awatere Plan address sustaining this rural environment by encouraging land uses and land management practices that are appropriate for the high country, including the voluntary retirement of pastoral leases having high conservation or landscape values. A prominent consideration of the objectives and policies in the Wairau Awatere Plan is the recognition and protection of ecological values of the sensitive upland environment (i.e. land above 1000m).

Within the Rural Four Zone there are overlays that provide additional management of identified values. Glenlee Station is not subject to an Outstanding Natural Features and Landscape overlay and no areas have been identified as being Areas of Significant Conservation Value. Glenlee Station is subject to an ecology/riparian overlay. This overlay applies to two tributaries of the Avon River which are located within Glenlee Station.

The rules within the Wairau Awatere Plan manage residential activities, farm airstrips and helipads, application of agrichemicals, commercial activities, farming, earthworks, water abstraction and vegetation clearance, for example. The Wairau Awatere Plan includes standards which set thresholds of effects not to be exceeded and if they are exceeded resource consents are required. Activities are considered within a framework of permitted, controlled, limited discretionary, non-complying or prohibited activities.

The Wairau Awatere Plan has identified a series of Anticipated Environmental Results. These include, but not limited to:

- Maintenance or enhancement of the integrity and natural species diversity of land and water communities, habitats and ecosystems;
- Development located in a manner, style and character which is sympathetic and complementary to the landscape;
- Maintenance of the outstanding landscapes and natural features of the District.
- Protection of in-stream habitat and ecology;
- Maintenance of natural character of high and very high value fresh water resources;
- Social, economic and cultural well-being of the communities;
- Environmentally sound farming practices based on:
    - Strategies enhancing, maintaining and restoring soil structure and fertility, and minimising soil erosion;
    - Strategies enhancing efficiency in the use of energy, water fertiliser and pesticide inputs; and
    - The use of systems for the sustainable management of weeds, pests and diseases.
    - Strategies avoiding, remedying, and mitigating adverse effects of land use activities on water quality;

A register of significant heritage resources is also included in the proposed plan as Appendix A. There do not appear to be any heritage trees or buildings identified within the property.

3.3 CONSERVATION MANAGEMENT STRATEGIES

Glenlee lies within the South Marlborough Management Unit of the Nelson/Marlborough Conservancy. Relevant priorities for this unit are listed in the CMS (Department of Conservation, 1996) as:

- Identify and protect traditional falcon nesting sites in western Molesworth and Inland Marlborough.
- Control goats to protect endemic plant communities at the Richmond Range, Inland Marlborough and Inland Kaikoura Range.
- Control the spread of wilding pines in Red Hills ultramafic areas, on Ferny Gair and on Molesworth.

- Resolve the status of conservation areas and reserves in Inland Marlborough and Inland Kaikoura Range.
- Provide for remote recreation in the Inland Kaikoura Range and western Molesworth.
- Negotiate access and provide for remote tussockland tramping in Inland Marlborough, western Molesworth and Inland Kaikoura Range.
- Maintain facilities and seek opportunities to improve access for recreational hunting, particularly in the Branch and Leatham catchments but also elsewhere in South Marlborough.
- Seek controls on land clearance and prevent fire in lowland areas and in Inland Marlborough.
- Seek control of those effects of pastoral farming that are detrimental to natural values.
- Protect freshwater fish habitat through statutory advocacy.

3.4 NEW ZEALAND BIODIVERSITY STRATEGY

The New Zealand Government is a signatory to the Convention on Biological Diversity. In February 2000, Government released the New Zealand Biodiversity Strategy. This strategy is a blueprint for managing the country's diversity of species and habitats. It sets a number of goals to achieve this aim. Of particular relevance to tenure review is Goal 3, which states:

- Maintain and restore a full range of remaining natural habitats and ecosystems to a healthy functioning state, enhance critically scarce habitats, and sustain the more modified systems in production and urban environments, and do what is necessary to:
- Maintain and restore viable populations of all indigenous species across their natural range and maintain their genetic diversity.

PART 4 ATTACHMENTS

4.1 ADDITIONAL INFORMATION

4.1.1 Scientific Names of Species

Plant Species referred to in text

Species names follow those in the published volumes of New Zealand Flora and the name changes listed in A Checklist of Indigenous Vascular Plants of New Zealand, 10th Revision (*Unpublished Document*, S. Courtney, Department of Conservation, Nelson). Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998 (indicated with +). Naturalised species are indicated by an asterisk (*).

Common name	Scientific name
akiraho	*Oleria paniculata*
beech/tawhai	*Fuscospora* spp.
black beech	*Fuscospora solandri*
blinks	*Montia fontana*
blue tussock	*Poa colensoi*
bracken	*Pteridium esculentum*
bristle tussock	*Rytidosperma setifolium*
broadleaf/kapuka+	*Griselinia littoralis*
browntop*	*Agrostis capillaris*
bush lawyer	*Rubus cissoides*
catsear*	*Hypochoeris radicata*
cotton daisy/tikumu+	*Celmisia spectabilis* subsp. *spectabilis*
creeping pohuehue	*Muehlenbeckia axillaris*
fescue tussock	*Festuca* sp.
field hawkweed*	*Pilosella caespitosa*
fierce lancewood+	*Pseudopanax ferox*
five-finger	*Pseudopanax arboreus*
flax/harakeke+	*see also mountain flax*
golden speargrass/taramea+	*Aciphylla aurea*
harebell	*Wahlenbergia albomarginata*
hook sedge	*Uncinia* sp.
inaka	*Dracophyllum longifolium*
kanuka+	*Kunzea ericoides*
king devil hawkweed*	*Pilosella piloselloides* subsp. *praealta*
kohuhu+	*Pittosporum tenuifolium*
koromiko+	*Hebe salicifolia*
kowhai+	*Sophora microphylla*
lancewood/horoeka+	*Pseudopanax crassifolius*
leather-leaf fern	*Pyrrosia eleagnifolia*
male fern*	*Dryopteris filix-mas*
manuka+	*Leptospermum scoparium* var. *scoparium*
marbleleaf	*Carpodetus serratus*
Marlborough rock daisy	*Pachystegia insignis*
marsh thistle*	*Cirsium palustre*
medic* (sometimes referred to as medick)	*Medicago* sp.
midribbed snow-tussock	*Chionochloa pallens*

mingimingi ..... *Leptecophylla juniperina* ssp. *juniperina*
monkey musk* ..... *Mimulus guttatus*
mountain beech+ ..... *Fuscospora cliffortioides*
mountain flax/whararikiki+ ..... *Phormium cookianum*
mountain ribbonwood/houhi+ ..... *Hoheria lyallii*
mountain totara+ ..... *Podocarpus hallii*
mountain wineberry ..... *Aristotelia fruticosa*
mouse-eared chickweed* ..... *Cerastium* sp.
mouse-ear hawkweed* ..... *Pilosella officinarum*
native broom ..... *Carmichaelia australis*
native jasmine ..... *Parsonsia* sp.
native violet ..... *Viola lyallii*
necklace fern ..... *Asplenium flabellifolium*
New Zealand lilac ..... *Heliohebe hulkeana* subsp. *hulkeana*
patotara+ ..... *Leucopogon fraseri*
penwiper ..... *Notothlaspi rosulatum*
pink broom ..... *Carmichaelia carmichaeliae*
porcupine shrub ..... *Melicytus alpinus*
prickly mingimingi ..... see mingimingi
prickly shield fern ..... *Polystichum vestitum*
pukio+ ..... *Carex secta*
red beech+ ..... *Fuscospora fusca*
red woodrush ..... *Luzula rufa*
scabweed ..... *Raoulia australis*
scrub pohuehue ..... *Muehlenbeckia complexa*
selfheal* ..... *Prunella vulgaris*
sheep's sorrel* ..... *Rumex acetosella*
silver tussock/wi+ ..... *Poa cita*
snowberry ..... *Gaultheria depressa*
soft mingimingi ..... *Leucopogon fasciculatus*
sweet vernal* ..... *Anthoxanthum odoratum*
tauhinu ..... *Ozothamnus vauvillersii*
thousand-leaved fern ..... *Hypolepis millefolium*
toetoe+ ..... *Austroderia richardii*
tree tutu+ ..... *Coriaria arborea*
tussock hawkweed* ..... *Hieracium lepidulum*
tutu+ ..... *Coriaria* sp.
vegetable sheep ..... *Raoulia eximia*
wall lettuce* ..... *Mycelis muralis*
weeping mapou ..... *Myrsine divaricata*
white clover* ..... *Trifolium repens*
white fuzzweed ..... *Vittadinia australis*
white sun orchid ..... *Thelymitra longifolia*
yellowwood ..... *Coprosma linariifolia*
Yorkshire fog* ..... *Holcus lanatus*

Animal Species referred to in text

Species names follow King (1990) for mammals, the June 2003 version of the New Zealand Recognized Bird Names list (compiled by C.J.R. Robertson and D.G. Medway for the Ornithological Society of New Zealand Inc.) for birds, Whitaker (1998) for lizards and McDowall (2000) for fish. Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998 (indicated by +). Naturalised species are indicated by an asterisk (*).

Common name	Scientific name
Australasian harrier/kahu[+]	*Circus approximans*
bat	*see* South Island long-tailed bat
bellbird/korimako[+]	*Anthornis melanura melanura*
blackbird*	*Turdus merula*
black-eyed gecko	*Hoplodactylus kahutarae*
blue damselfly	*Austrolestes colensonis*
blue duck/kowhiowhio[+]	*Hymenolaimus malacorhynchos*
bluff weta	*Deinacrida elegans*
brown trout*	*Salmo trutta*
brushtail possum*	*Trichosurus vulpecula*
Canterbury galaxias (northern)	*Galaxias vulgaris*
Canterbury gecko	*Hoplodactylus* aff. *maculatus*
chaffinch*	*Fringilla coelebs*
chukor*	*Alectoris chukar*
common gecko	*Hoplodactylus maculatus*
common skink	*Oligosoma nigriplantare polychroma*
dunnock*	*Prunella modularis*
feral goat*	*Capra hircus*
feral pig*	*Sus scrofa*
giant scree weta	*Deinacrida connectens*
goldfinch*	*Carduelis carduelis*
greenfinch*	*Carduelis chloris*
grey warbler/rironiro[+]	*Gerygone igata*
Hutton's speargrass weevil	*Lyperobius huttoni*
Kaikouras gecko	*Hoplodactylus* aff. *maculatus* "Kaikouras"
kea[+]	*Nestor notabilis*
koaro	*Galaxias brevipinnis*
koura/freshwater crayfish	*Paranephrops planifrons*
longfin eel/tuna[+]	*Anguilla dieffenbachii*
long-tailed cuckoo/koekoea[+]	*Eudynamys taitensis*
long-toed skink	*Oligosoma longipes*
Marlborough mini gecko	*Hoplodactylus* aff. *maculatus* "Marlborough mini"
New Zealand falcon/karearea[+]	*Falco novaeseelandiae*
New Zealand pigeon/kereru[+]	*Hemiphaga novaeseelandiae novaeseelandiae*
New Zealand pipit/pihoihoi[+]	*Anthus novaeseelandiae novaeseelandiae*
paradise shelduck[+]	*Tadorna variegata*
possum*	*see* brushtail possum
redpoll*	*Carduelis flammea*
rock wren	*Xenicus gilviventris*
rough gecko	*Heteropholis rudis*
shortfin eel/tuna[+]	*Anguilla australis*
short-tailed bat	*Mystacina tuberculata*
silvereye	*Zosterops lateralis lateralis*
skylark*	*Alauda arvensis*
song thrush*	*Turdus philomelos*
Southern Alps gecko	*Hoplodactylus* aff. *maculatus* "Southern Alps"
southern black-backed gull/karoro[+]	*Larus dominicanus dominicanus*
South Island fantail/piwakawaka[+]	*Rhipidura fuliginosa fuliginosa*
South Island kaka[+]	*Nestor meridionalis meridionalis*
South Island long-tailed bat	*Chalinolobus tuberculatus*
South Island rifleman/titipounamu[+]	*Acanthisitta chloris chloris*
South Island robin/kakaruai[+]	*Petroica australis australis*

South Island tomtit/miromiro[+] ..... *Petroica macrocephala macrocephala*
spotted skink ..... *Oligosoma lineoocellatum*
torrentfish/piripiripohatu ..... *Cheimarrichthys fosteri*
upland bully ..... *Gobiomorphus breviceps*
upland longjaw galaxias ..... *Galaxias prognathus*
welcome swallow ..... *Hirundo tahitica neoxena*
yellow-crowned parakeet/kakariki[+] ..... *Cyanoramphus auriceps auriceps*
yellowhammer* ..... *Emberiza cintrenella*

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