Toitu te whenua
Land Information
New Zealand

Crown Pastoral Land Tenure Review

Lease name: KIRKLISTON

Lease number: PT 119

Public Submissions - Part 3

These submissions were received as a result of the public advertising of the Preliminary Proposal for Tenure Review.

February 06

Environment Canterbury
Te Rūnanga ā Rohe o Canterbury

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17 January 2005

18 JAN 2005

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The Commissioner of Crown Lands
C/- DTZ New Zealand Limited
P O Box 564
TIMARU

Attn. R A Ward-Smith

Dear Sir or Madam:

PT 119 KIRKLISTON PASTORAL LEASE
SUBMISSION ON PRELIMINARY PROPOSAL FOR TENURE REVIEW

Thank you for advising Environment Canterbury of the release of the Preliminary Proposal for tenure review of Kirkliston Pastoral Lease. We appreciate the opportunity to review the proposal and make a submission in relation to the future management of this land.

Environment Canterbury has statutory responsibilities under the Resource Management Act 1991 (RMA) for the sustainable management of natural and physical resources of the region, including soil conservation, water quality and quantity and ecosystems, and for maintenance of biodiversity. In addition, Environment Canterbury also has statutory responsibilities under the Biosecurity Act 1993 for the management or eradication of animal and plant pests in accordance with regional pest management strategies.

The Canterbury Regional Policy Statement 1998 (CRPS) provides an overview of the resource management issues of the region, and sets out how natural and physical resources are to be managed in an integrated way to promote sustainable management. Key to the management of soils is the maintenance or restoration of a vegetative cover over non-arable land that is sufficient to prevent land degradation or the onset of erosion (Ch7 Objective 1). Sustainable management of water resources requires safeguarding the life-supporting capacity of water, including associated aquatic ecosystems and significant habitats of indigenous fauna and vegetation (Ch9 Objective 3). Policy 11 in Chapter 9 promotes land use practices which maintain or enhance water quality

Environment Canterbury has recently notified its Proposed Natural Resources Regional Plan (NRRP) to address the resource management issues identified in the CRPS and to provide more specific standards and methods, including rules, to achieve the objectives. The NRRP promotes the integrated management of soil and water resources with provisions that emphasise the links between land use practices and the management of water quality.

The Soil Conservation chapter (Ch8), Objective SCN1 seeks to:

"...maintain soil quality and an intact and resilient vegetation cover sufficient to minimise the risk of induced erosion, safeguard the life-supporting capacity of the soil, and prevent, as far as practicable, the movement of soil into water bodies." The objective contains specific guidelines for intact and resilient vegetation cover. Policy SCN1 provides options to restore such a cover where it has become depleted.

Policy WQL5 of the Water Quality chapter includes a range of regulatory and non-regulatory methods to manage the riparian margins of rivers to maintain or improve water quality.

A copy of the objectives and policies referred to from the CRPS and the NRRP is attached.

Our Ref: PL5C-103; AG5T-60
Your Ref:
Contact: Cathie Brumley

The Canterbury Regional Pest Management Strategy (1998) and Canterbury Regional Pest Management Strategy Biodiversity Pests (2002) identify a number of species of plants and animals for control or management as pest species.

In line with these statutory responsibilities and documents, and Section 24 of the Crown Pastoral Lands Act (1998), technical and planning staff have reviewed the Preliminary Proposal for Kirkliston Pastoral Lease to assess the impacts, if any, of this proposal on pest management, indigenous biodiversity protection, soil conservation and the integrity of the water bodies. Our comments and recommendations are listed below.

General comments

As with most of the Preliminary Proposals released to date, the emphasis for this proposal has been primarily on management of the terrestrial ecosystems and landscape features of the land area in the pastoral lease. A consequence of this has been the almost total neglect of important issues for the long-term management and protection of soil conservation values and the water quality and instream aquatic environment of rivers flowing through the lease. This is fundamentally important to the "ecologically sustainable management" of the lease. Management of the headwaters will also have important consequences for the quality of water in streams downstream of this lease. In particular the Stony River is a significant river draining into Lake Benmore. This lake is currently valued for its very high water quality. Management of land in the upper Stony River catchment will affect the quality of water flowing into Lake Benmore.

Soil Conservation

Soil and vegetation information currently available (Waitaki Catchment Commission property map, NZLRI, and satellite imagery), as well as the DoC Conservation Resources Report, all suggest that vegetation cover over this pastoral lease is often rather limited with a significant proportion of the lease area having at least 20-40% bare ground. This is no doubt due to a combination of factors, particularly the semi-arid climate and shallow soils coupled with the cumulative effects of grazing, past rabbit invasions and the Haldon/Waitangi fire in the early 1980s. The area proposed to be freeholded is largely mapped as LUC classes VI and VII. The two main areas of Class VIII land are contained within the areas proposed to be restored or retained in full Crown ownership. The removal of these areas from production is supported.

The land proposed to be disposed of by freeholding in this proposal has a mixture of good and poor vegetation cover. Because of the difficult climate and shallow soils, it is unlikely that ground cover can be easily improved, particularly over the drier slopes. Conversely ground cover could be easily reduced with poor seasons or overgrazing. From a land sustainability standpoint, the semi-arid hills and steeplands, particularly in the Basin catchment, face the greatest risk of soil degradation without careful management, and have the least potential for sustained production. A large proportion of these slopes have less than 60% vegetation cover which does not meet the thresholds for an intact vegetation cover in the NRRP. Therefore the proposed freehold land will continue to require judicious management to retain or develop an intact and resilient ground cover to protect the shallow soils. On this basis it is recommended that these areas of land are either restored to full Crown control, or that specific conditions are placed over the future management of this land, consistent with policies in the NRRP. This would include the need for destocking or a reduction in grazing pressure to levels that allow for a cumulative improvement in cover (see NRRP Ch8 Policy SCN1(b)).

Environment Canterbury has a legal interest in the Preliminary Proposal through two Land Improvement Agreements (LIAs) registered on the Pastoral Lease title pursuant to Section 30A of the Soil Conservation and Rivers Control Act 1941.

The first is a Soil and Water Conservation Plan (S&WCP) extending across the entire pastoral lease area. The second is a Rabbit and Land Management Property Plan (R&LMP) agreement applying to the Hay, Pringle and Stony Rivers catchments. These LIAs required a range of management conditions to be applied to the lease to improve the vegetation cover and condition and to reduce the risk of erosion. Where these conditions continue to contribute to the long-term sustainable management of the pastoral lease land, Environment Canterbury will be advocating for their inclusion in the terms of the tenure review Substantive Proposal.

Soil and Water Conservation Plan

The S&WCP included retirement and surrender from the lease of Class VIIe12 and VIIIe3 land in the Upper Basin Stream block. Extensive erosion control fencing has also been established throughout the pastoral lease (with significant subsidies under the S&WCP) to facilitate the management of land according to its land use capability and within the climatic and soil limitations of the lease. Most of the land below 1000m has either been oversown and topdressed, or direct drilled according to topography.

A series of extremely dry seasons in this semi-arid area may have contributed to a rapid increase in Hieracium and scrub, particularly briar, making it very difficult to maintain good vegetation cover on all but the deeper soils, back faces and swales where there is better soil moisture retention. This highlights the severe limitations for long-term sustainable management of land within this lease.

The area in the upper Basin Stream catchment defoliated in the Haldon/Waitangi fire (1982) has recovered to a variable extent following an emergency programme under the S&WCP to repair fencing and oversow and topdress selected areas. The oversown and topdressed areas have maintained a reasonable pasture cover and serve to keep stock away from grazing the higher altitude and more fragile aspects. On the unimproved parts of the burn area, Hieracium is dominant, with scattered tall tussock, including some very limited tall tussock regeneration. It would be very useful to continue to monitor the recovery of these areas following the fire, particularly the regeneration of tall tussock in the unimproved areas. Some of this land is contained within the conservation area CA1.

Rabbit and Land Management Plan (R&LMP)

Under the R&LMP programme, a large area of the lower Stony and Pringle catchments was direct drilled to restore a vegetation cover over land depleted by rabbits. As required under this programme, the vegetation cover is being maintained, however the grazing of cattle is a concern for maintenance of stream margins and more fragile wetland soils present in the lower part of the catchments. This is discussed in more detail in the following sections on vegetation and water quality. Depleted areas in the headwaters of the Pringle and Hay streams, had grazing restrictions applied under the R&LMP. These areas will be included within the proposed conservation area CA2. Therefore the Preliminary Proposal supports the objectives of the R&LMP in this locality.

The areas of most concern for their ability to sustain production, outside the areas marked CA1 and CA2, have been marked in hatching on the accompanying Map 1. Environment Canterbury recommends that these areas should not be disposed of for freeholding without terms and conditions to achieve the restoration of an intact vegetation cover consistent with Objective SCN1 of the NRRP.

Map 2 shows satellite imagery of the vegetation cover. Areas shown as red or orange have the most depleted cover.

The terms of the S&WCP and the R&LMP agreements continue to contribute towards the conservation of these low-productive soils and the achievement of NRRP Objective SCN1.

Recommendations:

- That the terms of the S&WCP agreement for the Kirkliston lease that contribute to the ongoing restoration of the vegetation cover should be retained through any proposal for the freeholding of land through Tenure review.
- That any decision to freehold land shown as hatched on the accompanying map should be based on further examination of the condition of soils and vegetation cover, and the potential for sustained production consistent with the NRRP Chapter 8.
- That land burnt in the Haldon/Waitangi fire continues to be monitored for vegetation recovery, and management adjusted to achieve the restoration of an intact cover.

Terrestrial vegetation and wetlands values

Tenure review provides one of the best opportunities to help achieve two key objectives of the Reserves Act 1977 and the New Zealand Biodiversity Strategy (2001). These are, respectively, "preservation of representative samples of all classes of natural ecosystems and landscapes" and to "maintain and restore a full range of remaining natural habitats and ecosystems to a healthy functioning state." This is consistent with the CRPS and the objectives of Tenure Review, namely:

- To enable the protection of the significant inherent values of the reviewable land -

The Conservation Resources Report for the Kirkliston lease was prepared in 1996, at the time of high rabbit numbers and soon after the major Haldon/Waitangi fire which defoliated most native vegetation cover in the upper catchment of the Basin Stream due to extremely high combustion temperatures. Major changes to the management and the vegetation since then mean that the CRR is of very limited usefulness as a summary of important conservation values for this land. As the major resources report for the Tenure Review of the Kirkliston lease this is very disappointing, and in fact it may prove quite misleading for members of the public trying to ascertain the merits of the Preliminary Proposal recommendations.

To evaluate the Preliminary Proposal recommendations, the comments provided by Environment Canterbury on the indigenous vegetation and wetland values have been based on recent visits by ECan staff to the Kirkliston lease, together with LRI information, current satellite imagery and the Land Environments of New Zealand Classification System.

The Land Environments of New Zealand landscape classification system (Leathwick et al. 2003) provides a framework for securing protection and/or restoration of examples of the full range of terrestrial vegetation and habitats. Land environments, and potential natural vegetation cover (in the absence of human modification) are classified at four different national scales: Level I (20 land environments nationally), Level II (100 land environments nationally), Level III (200 nationally) and Level IV (500 nationally). Each is nested within higher levels. The 500 Level IV environments provide the most detailed information on the diversity of New Zealand's terrestrial environments and is the best nationally comprehensive estimate of the 'full range' of ecosystems, habitats and biodiversity.

Analysis of Land Environments in conjunction with spatial data depicting indigenous vegetation cover (from Land Cover Data Base) and current legal protection has recently been carried out by Landcare Research (Walker et al. in prep.), for the Department of Conservation. This analysis offers a useful method of identifying the most threatened environments, and therefore determining what should be priorities for protection of indigenous biodiversity, as part of tenure review. In reporting this work, the authors recommended that threat classification analysis be carried out using Level IV Land Environments, as these provide a more accurate, efficient and plausible assessment at regional and local scales.

Examples of nine Level IV Land Environments are present on the Kirkliston pastoral lease:

- Q1.1a, Q1.1d, Q1.2a, Q2.1a, Q2.1b – South-eastern Hill Country and Mountains
- E4.1b – Central Dry Foothills (central South Island east of the Southern Alps)
- K3.1a, K3.1b – Central Upland Recent Soils (South Canterbury)
- L1.2a – Southern Lowlands (South Canterbury)

These nine Land Environments are listed, in altitudinal sequence (highest to lowest), in the table below. The table shows the percentage of indigenous vegetation remaining in each land environment nationally, and the proportion of each environment that is already protected in existing reserves or conservation covenants. Threat categories are assigned on the basis of these figures (from Walker et al. in prep.)

Level IV Land Environment	% Indigenous Cover Remaining	% Protected	Threat category
Q1.2a	98.99	37.20	No threat category
Q1.1a	98.37	24.81	No threat category
Q1.1d	84.66	34.76	No threat category
Q2.1a	38.00	9.27	Critically under protected
Q2.1b	66.39	4.27	Critically under protected
E4.1b	27.00	3.82	At risk

K3.1b	19.85	3.33	Chronically threatened
K3.1a	27.19	2.99	At risk
L1.2a	3.85	7.89	Acutely Threatened

It can be seen that the highest altitude land environments present on the Kirkliston lease, have, at a national level, retained most of their indigenous cover, are already well represented in the existing national network of protected areas, and are therefore not considered to be threatened. The mid-slope environments (Q2.1a & Q2.1b) have, throughout their overall range, lost more of their indigenous cover and are less well represented in protected areas. Their threat category was assessed as 'Critically Under protected'. Regional and national loss of indigenous cover has been greatest in the dry foothill, valley floor and lowland environments. These environments are also under protected in existing reserves and therefore have the highest threat categories – 'At Risk', 'Chronically Threatened' and 'Acutely Threatened'. On the Kirkliston Pastoral Lease, the most threatened categories of environments are therefore the valley floors and riparian zones around the confluence of the Stony River, Pringle Stream and Hay Stream.

The proposed conservation areas (CA1 and CA2) include the highest parts of the Kirkliston Pastoral Lease and contain examples of Level IV South-eastern Hill Country and Mountains Land Environments Q1.1a, Q1.1d, Q1.2a – cold high elevation mountain tops and range crests – and a relatively small area of Land Environment Q2.1a at somewhat lower elevation in the headwaters of Basin Stream. The Conservation Resources Report describes these areas as containing cushion and fellfield, tall and short tussock grassland, sedgeland in hillslope seeps and flushes, and cushion bog vegetation. The assessed naturalness of these vegetation types was variable due to burning and grazing, ranging from low to medium/high.

Restoring CA1 and CA2 areas to full Crown control will be beneficial for soil and water conservation and is supported for this reason. However, for the most part, the land environments within these areas are well protected elsewhere in New Zealand and are not rated as threatened. Considering the range of environments present within the Kirkliston pastoral lease, these areas cannot be considered the top *priorities* for the protection of indigenous biodiversity and the full range of natural habitats and ecosystems, particularly given that the Conservation Resource Report did not assess them as being highly natural overall. It was, therefore, somewhat confusing to see the vegetation of these areas described as having a 'high degree of naturalness' in Section 3.2 of the Preliminary Proposal.

What is a concern from a biodiversity point of view, is the total lack of protection of the range of lower altitude environments present within this lease, including lower mountain slopes, dry foothills, valley floor and lowland environments, that are nationally considered threatened and critically underprotected within the reserves system. This is inconsistent with the objectives of the CPLA. It is accepted that there has been considerable modification of the vegetation over much of the proposed freehold area. Nevertheless, the Conservation Resources Report (CRR) described a range of natural and semi-natural indigenous vegetation and habitats persisting within the proposed freehold area, often associated with riparian zones, including snow tussock grassland, red tussock grassland, short tussock grassland, shrubland and wetland communities. (Unhelpfully for submitters, the location and extent of these are not shown on the accompanying CRR map). These montane and lowland communities, although modified by a history of burning and grazing and the presence of exotic plant species, still retain a diverse range of indigenous species, and remain important habitats for indigenous fauna. They may also function as important riparian buffers for water quality, and as corridors connecting with higher altitude areas of indigenous habitat, or other significant habitats beyond the boundaries of this lease.

On the basis of the sketchy information contained in the CRR, it is difficult to accept the conclusion in Section 3.3 of the Preliminary Proposal that 'most of the inherent values on proposed freehold land are not considered "significant"'. Rather, in view of the extent of habitat loss and poor levels of protection in threatened montane and lowland land environments, most remaining natural or semi-natural vegetation/habitats on the proposed freehold land *should* be considered significant. A major limitation of the CRR is that it provides no assessment of the significance of these habitats at a local, regional or national level. Priority must be given to securing opportunities for the protection and restoration of these most threatened environments if the tenure review process is to deliver conservation outcomes consistent with its own objectives, and those of the New Zealand Biodiversity Strategy.

The process of identifying priorities for protection of representative habitats and species, and drawing boundaries for those areas, is frustrated by a lack of knowledge of the diversity and condition of habitats on the surrounding land, particularly where the adjacent land is contained within the same catchment. It would greatly assist the public to comment on the merits of these Preliminary Proposals if there was information on the surrounding land that placed the lease land into a wider context. Assessing each lease in isolation is likely to perpetuate a system of protecting fragmented islands of habitat that limits their usefulness for long-term, sustainable biodiversity management.

Recommendations

- Extend CA1 down valley of Basin Stream to include the area of red tussock grassland identified on page 7 of the CRR and gorge shrubland (the largest area of native shrubland on the property – page 6 of the CRR. (Land Environments Q2.1a and Q2.1b)
- Establish a new CA3 along Stony River in the NE corner of lease. This will contain an altitudinal sequence from Kirkliston Range to valley floor including the montane valley floor wetland in the central basin, described on page 7 of the CRR, as well as shrublands and tussock grasslands. (Examples of Land Environments Q2.1a, Q2.1b, E4.1b, K3.1a, K3.1b, L1.2a)
- Riparian fencing below 900 m contour– Hay Stream, Pringle Stream, Stony River tributaries. To protect riparian shrublands and tussocklands, aquatic habitats, water quality. (Examples of Land Environments Q2.1b, E4.1b, K3.1a, K3.1b)

Surface water and ground water resources

As mentioned in the General Comments, the Preliminary Proposal and the Conservation Resources Report only contain a description of the terrestrial ecosystems. They contain little information on the type of streams within the pastoral lease, or on the state of their riparian vegetation and aquatic ecosystems. Management of the land surrounding rivers and wetlands will play a key role in the long-term protection of water quality and instream values, as well as influencing the quality of water further downstream.

The Kirkliston lease covers the upper basin and headwaters of the Stony River, including the Basin, Hay, Pringle and Stony Stream tributaries. The "basin" comprises screes, glacial outwash fans and Tertiary marine sediments (pg4 of the Conservation Resources Report), characterised by shallow, drought-prone soils. Unless these areas are carefully managed, intensive land use activities will further exacerbate erosion and lead to increased sedimentation in the tributary streams.

The Stony River is a significant river draining into Lake Benmore. Water quality surveys by ECan staff have shown that in its lower reaches its habitat and water quality have become degraded by land use intensification around the lake margins. Higher up the catchment, near the boundary of the Kirkliston Block, the main stem of Stony River also supports excessive algal mats and appreciable silt armouring of the bed. It therefore appears that the upper reaches of Stony River are generating loads of sediment and nutrients. The grazing of cattle in these catchments is likely to be exacerbating this. In contrast, the main middle reach tributaries of Stony River, below the Kirkliston lease (Balloon and Moffat Streams) are relatively clear and clean. Continued grazing along the stream margins of the Stony, Pringle and Hay catchments will compromise any steps to improve the state of the river in the lower reaches, and may reduce the high water quality of Lake Benmore if allowed to continue. Change in land status of the upper basins could compromise this further if any intensification of land use occurs without putting in place steps to manage or reduce such loads. Appropriate riparian buffers in this upper basin are one such mechanism that appears warranted.

Chapter 4 of the Proposed Canterbury Natural Resources Regional Plan seeks to maintain water bodies, including the upper Waitaki catchment, in a natural state, where rivers and their tributaries are largely unaffected by human activities. The plan also promotes the retention, maintenance and planting of riparian vegetation to minimise bank erosion and to reduce the runoff of sediment, nutrients and animal faecal matter. (Policy WQL 5)

Section 24C of the Conservation Act 1987 provides for the management of riparian margins. It states that marginal strips can be established to protect water courses, maintain water quality and aquatic life, and to enable public access. Marginal strips and the establishment of a cover of riparian vegetation will contribute to the protection of the water quality and aquatic ecosystems as well as acting as a buffer for land use activities.

Environment Canterbury is devoting considerable resources through its "Living Streams" programme to restoring water ways, mostly groundwater fed streams, which have become degraded as a result of land use activities. It is generally more cost effective to protect a waterway and to prevent a decline in water quality and habitat values, rather than trying to restore a degraded water body.

The tenure review process provides a key opportunity to put in place measures to safeguard the health of aquatic ecosystems and to protect the water quality of the Stony River catchment and Lake Benmore. The exclusion of livestock and establishment of vegetated buffer strips along stream margins offers the only effective long-term sustainable method of protecting the water way and its instream values.

Recommendation:

Environment Canterbury strongly supports the establishment of marginal strips and fencing adjacent to rivers, especially in the areas identified in the Conservation Resources report as "River Flats" and Central Lowland" (Stony, Pringle and Hay catchments) where cultivation or intensive stocking could occur on land that is flat to gently rolling. (see pg 2).

Geological features

There appear to be no geological sites of scientific or education value in the Kirkliston pastoral lease area that would require special protection.

Management of Pest species

971ha was direct drilled in the Stony and Pringle stream catchments to restore land depleted by rabbits and Hieracium. As required under the plan this area is being maintained. Rabbit numbers are very low and have been since the introduction of RHD in August 1997. Rabbits are not likely to be an issue in the short to medium term.

One negative impact of the RHD virus has been an increase in the growth of woody weeds such as sweet briar.

The current occupiers have a good management regime for woody weeds with infestations well contained. This will require vigilant ongoing management.

Scattered wilding conifers were also present within the retirement area and need urgent control to prevent further spread. The Farm Manager operates a rigorous wilding tree control programme and their location was passed onto him.

Public Access

The proposed access easement a-b is a much easier and more sensible route for a legal road than the current placement. Transferring the legal road to this alignment should be investigated.

Recommendations

Environment Canterbury acknowledges and supports the areas proposed to be restored to full Crown ownership and control as contributing to soil and water conservation management. However these areas do not, on their own, enable the achievement of the objectives of the NRRP or the CPLA to provide for the ecologically sustainable management of the land in the long-term. The following recommendations for alterations and additions to the areas for protection have been identified to provide for the ecologically sustainable management of the soil and water resources and the range of associated habitats of the Kirkliston lease:

1. Extend CA1 down valley of Basin Stream to include the area of red tussock grassland identified on page 7 of the CRR and gorge shrubland (the largest area of native shrubland on the property). (Land Environments Q2.1a and Q2.1b)
2. Establish a new CA3 along Stony River in the NE corner of lease. This will contain an altitudinal sequence from Kirkliston Range to valley floor including the montane valley floor

wetland in the central basin, described on page 7 of the CRR, as well as shrublands and tussock grasslands. (Examples of Land Environments Q2.1a, Q2.1b, E4.1b, K3.1a, K3.1b, L1.2a)

3. Establish riparian fencing below 900 m contour for the Hay Stream, Pringle Stream, and Stony River tributaries to protect riparian shrublands and tussocklands, aquatic values, and reduce the impacts of land use on water quality. (Examples of Land Environments Q2.1b, E4.1b, K3.1a, K3.1b)
4. That the terms of the S&WCP agreement for the Kirkliston lease that contribute to the ongoing restoration of the vegetation cover should be retained through any proposal for the freeholding of land through Tenure review.
5. That any decision to freehold land shown as hatched on the accompanying map should be based on further examination of the condition of soils and vegetation cover, and the potential for sustained production consistent with the NRRP Chapter 8 objectives for the restoration of an intact and resilient vegetation cover.
6. That land burnt in the Haldon/Waitangi fire continues to be monitored for vegetation recovery, and management adjusted to achieve the restoration of an intact vegetation cover.

See attached maps showing recommended changes to areas to be restored to full Crown control, and areas where depleted vegetation cover indicates limited potential for sustained production.

Thank you for the opportunity to comment on this Preliminary Proposal.

Yours sincerely

John Talbot
DIRECTOR OF POLICY AND PLANNING

Attachments:

- Map 1 – recommended changes to land to be returned to full Crown control
- Map 2 – satellite imagery showing % living vegetation cover
- CRPS Chapter 7 Objective 1
- NRRP Chapter 8 Objective SCN1 and Policy SCN1

mahinga kai, landscape and significant indigenous vegetation or habitats of indigenous fauna may be affected.

(f) Soil contamination

In Canterbury, low concentrations of contaminants are dispersed over extensive areas, and often more problematically, there are high concentrations over small areas. Discharges, accidental or otherwise, of substances that contaminate land are actually or potentially harmful to the environment. Land affected in this way may require expensive and difficult remediation of adverse effects on water and air quality and/or people's health and welfare. For example, in parts of Canterbury past applications of DDT still limit the use of some land, and dangerous residues remain from waste disposal sites and the use of timber treatment chemicals. Where they occur, these effects limit the availability of land.

(g) Loss of soil availability

Because of the basic requirements of communities for land on which to build and extend the infrastructure that supplies shelter and conveniently facilitates the supply of most social needs, the reduced availability of the benefits of the soil resource is easily overlooked. Urban development has removed the potential for primary productive use of some of the region's most versatile land. This applies to many Canterbury towns, and particularly on the periphery of Christchurch.

Intensified residential development on rural land can have adverse effects that tend to increase incrementally. They can include loss of the availability of land for primary production (both directly, and due to higher land values), harm to groundwater quality, increased demand for potable water, exposure to natural hazards, limitation of adjacent land uses, impact on landscape or heritage values, and additional demand for services, transport or energy.

(h) Water yield

Changes in land use, and particularly those involving vegetation change, such as trees to grass or vice versa, or vegetation to impermeable surfaces (roads, car parks, house roofs), are recognised as being a critical factor in water yields. Such changes in land use have occurred extensively in the past and continue to occur. These changes, especially in small catchments, affect water yield, including the magnitude and timing of flood flows, and can affect water quality.

7.2 Issue Resolution

Issue 1

Existing and potential land degradation, particularly degradation in the quality and life-supporting capacity of soils which arise from land use practices, or activities that reduce their: versatility for a wide range of primary productive uses; productivity; and ability to support a robust or regenerating vegetation cover. Examples of practices include:

(i) burning and over-grazing in parts of the high country causing land degradation including reduced plant stature and biomass, loss of nutrients

Issue SCN1: Loss of soil quality and soil depth

Land use practices that reduce soil quality, or that result in a reduction in the health, extent or protective capacity of the vegetation cover, can lead to induced erosion and a long-term loss of the life-supporting capacity of the soil resource.

In Canterbury the major concerns are:

(a) a long-term, cumulative decline in soil quality in some parts of the non-arable hill and high country used for pastoral farming for the last 150 years. This has resulted in a reduction in the extent and resilience of the vegetation that, in turn, exposes soils to an increased risk of erosion;

(b) an increased risk of slope destabilisation and soil erosion resulting from vegetation clearance and earthworks activities on erosion-prone soils of the hill and high country; and

(c) a reduction in soil quality and the creation of small aggregate size in arable soils under cultivation and intensive grazing activities. This increases the risk of soil erosion by wind and water.

The consequences of induced erosion include:

(i) degradation of water quality and aquatic habitat through increased sedimentation and inputs of phosphates that promote aquatic weed growth;

(ii) impacts on natural values including a loss of indigenous biodiversity and loss of indigenous habitat;

(iii) a loss of cultural values for the land including its mauri and mahinga kai;

(iv) adverse effects on sites of significance to Ngāi Tahu;

(v) a loss of important landscape and amenity values;

(vi) impacts on the social and economic wellbeing of the community through the loss of soil productivity and reduced ability to meet the reasonably foreseeable needs of future generations; and

(vii) the creation of situations where property and built assets, including network utility facilities, may be damaged by land instability.

Objective SCN1: Hill and high country non-arable land

On all hill and high country non-arable land, maintain soil quality and an intact and resilient vegetation cover sufficient to minimise the risk of induced erosion, safeguard the life-supporting capacity of the soil, and prevent, as far as practicable, the movement of soil into water bodies. For the purposes of this objective:

(a) An intact vegetation cover means:

(i) at least 80 percent ground cover, where species greater than 30cm tall occupy more than 50 percent of the canopy cover. This will include the tall tussock grassland, shrubland and forest ecosystems; and

(ii) at least 90 percent ground cover where:

1. the species greater than 30cm tall occupy less than 50 percent of the canopy; or

2. the canopy species are less than 30cm tall, such as introduced

and soil organic matter, increased introduced plant and animal pests, increased bare ground and induced erosion

(ii) cultivation of soil to a fine tilth, particularly the free draining light to medium soils of the Canterbury Plains, which predisposes them to wind erosion.

Objective 1

Ch 8 Landscape. Obj.2
Ch 6 Tangata Whenua. Obj 1

(a) **Safeguard the life-supporting capacity of soil by maintaining or restoring where appropriate, soil quality factors including: soil depth, soil structure, water holding capacity, organic matter, soil fertility and soil fauna.**

(b) **Prevent, as far as practicable, induced soil erosion in Canterbury.**

Principal Reasons

Objectives 1 (a) and (b) are intended to protect the life-supporting capacity of soils. In doing this, and particularly by reducing induced soil erosion, they also reduce siltation in water bodies. This benefits the life-supporting capacity of aquatic ecosystems, including mahinga kai areas.

To ensure retention and improvement of the life-supporting capacity of soils, and thereby safeguard their ecological functioning and potential to meet the reasonably foreseeable needs of future generations. Reduction of soil quality is a major factor contributing to land degradation.

To safeguard overall soil productivity (life supporting capacity) to meet the reasonably foreseeable needs of future generations, protect terrestrial and aquatic habitats, water quality, and other values of water bodies. The loss of soil through induced erosion reduces the life-supporting quality of soils. Loss of the mineral component of soil is effectively irreversible given its very slow rate of formation (generally several thousand years for Canterbury).

Policy 1

Land use activities that actually or potentially have significant adverse effects on the following soil quality factors: soil structure, organic content, soil fauna, water holding capacity, and soil fertility, should be avoided, or those effects remedied or mitigated.

Significant adverse effects on any of these factors include:

(a) **any deleterious change in a soil quality factor which would persist for 25 years or more, or would be impracticable to remedy;**

(b) **a change in a soil quality factor that increases the rate of runoff and/or nutrient contribution to waterbodies.**

Explanation

The use of land should not be allowed to irreversibly reduce soil quality factors because it is the combined operation of these factors that

Policy SCN1: Intact and resilient vegetation cover

On hill and high country non-arable land:

(a) Where vegetation cover meets the thresholds specified in Objective SCN1, encourage landholders to maintain the intactness and resilience of the vegetation cover by:

  (i) ensuring that any changes to vegetation cover or composition do not result in a loss of resilience or intactness; and

  (ii) managing the combined grazing pressure of domestic and feral animals to:

    1. maintain an intact and resilient vegetation cover; and

    2. avoid creating conditions that could initiate or exacerbate soil erosion.

(b) Where the vegetation cover has been depleted below the thresholds for intactness and resilience identified in Objective SCN1, encourage landholders to take measures to restore an intact and resilient vegetation cover by:

  (i) reducing the combined grazing pressure of domestic and feral animals to levels that allow for a cumulative improvement in the vegetation cover. This may require the temporary or long-term destocking of the depleted area;

  (ii) restoring existing indigenous vegetation communities, or enhancing the indigenous components of the vegetation communities, particularly in the undeveloped areas, where this will improve the resilience of the vegetation and contribute to soil conservation and the protection of indigenous biodiversity and habitat; and

  (iii) replacing indigenous species with exotic species only in circumstances where this will improve vegetation resilience in the long-term.

(c) Priority for restoration of depleted vegetation cover should be directed to those areas where:

  (i) a high proportion of topsoil remains in exposed areas; or

  (ii) the extent of bare ground is less than 40 percent; or

  (iii) the current condition is causing, or is likely to cause, adverse effects on important natural, landscape or amenity values, sites of significance to Ngāi Tahu or the loss of indigenous biodiversity; or

  (iv) there is an associated risk to water quality in water bodies and to mahinga kai values.

(d) The measures taken to achieve (a) or (b), should not result in:

  (i) the introduction or spread of any undesirable plant species, or encourage the spread of any plant pest species identified in a regional pest management strategy for the region;

  (ii) significant adverse effects on important natural, landscape or amenity values, sites of significance to Ngāi Tahu, mahinga kai values, or the loss of regional indigenous biodiversity; or

  (iii) significant adverse effects on stream flows, in particular activities will have to comply with the permitted activity requirements for flow-sensitive catchments identified in Chapter 5 Schedule WQN15.

pasture and short tussock grassland communities.

(b) A resilient vegetation cover will require:

(i) plant species able to retain their stature, vigour and biomass under prevailing land use and environmental conditions;

(ii) species able to retain soils in situ under the prevailing geological and environmental conditions;

(iii) inclusion of the indigenous species components of any undeveloped areas, particularly the tall tussock component of the undeveloped tussock grasslands;

(iv) soil nutrient levels sufficient to maintain plant vigour; and

(v) soil organic matter levels sufficient to maintain soil structure, water-holding capacity and soil fauna.

Explanation and principal reasons

This objective addresses all hill and high country non-arable land that would naturally have had a vegetative cover over the soil. It is not intended that an intact vegetation cover should be achieved over areas that naturally would have a predominance of exposed regolith, such as screes or rock outcrops. Hill and high country land includes all land above 600 metres in altitude and all land with a slope greater than 20 degrees (regardless of altitude). Non-arable land refers to land that is unsuitable for cultivation or cropping, regardless of how it is being managed. The undeveloped areas of the hill and high country, include all land where there have been no regular inputs of fertiliser or addition of seed to establish and sustain a pasture component in the vegetation. Indigenous species will dominate the vegetation cover, together with any naturally established exotic species such as browntop and *Hieracium*.

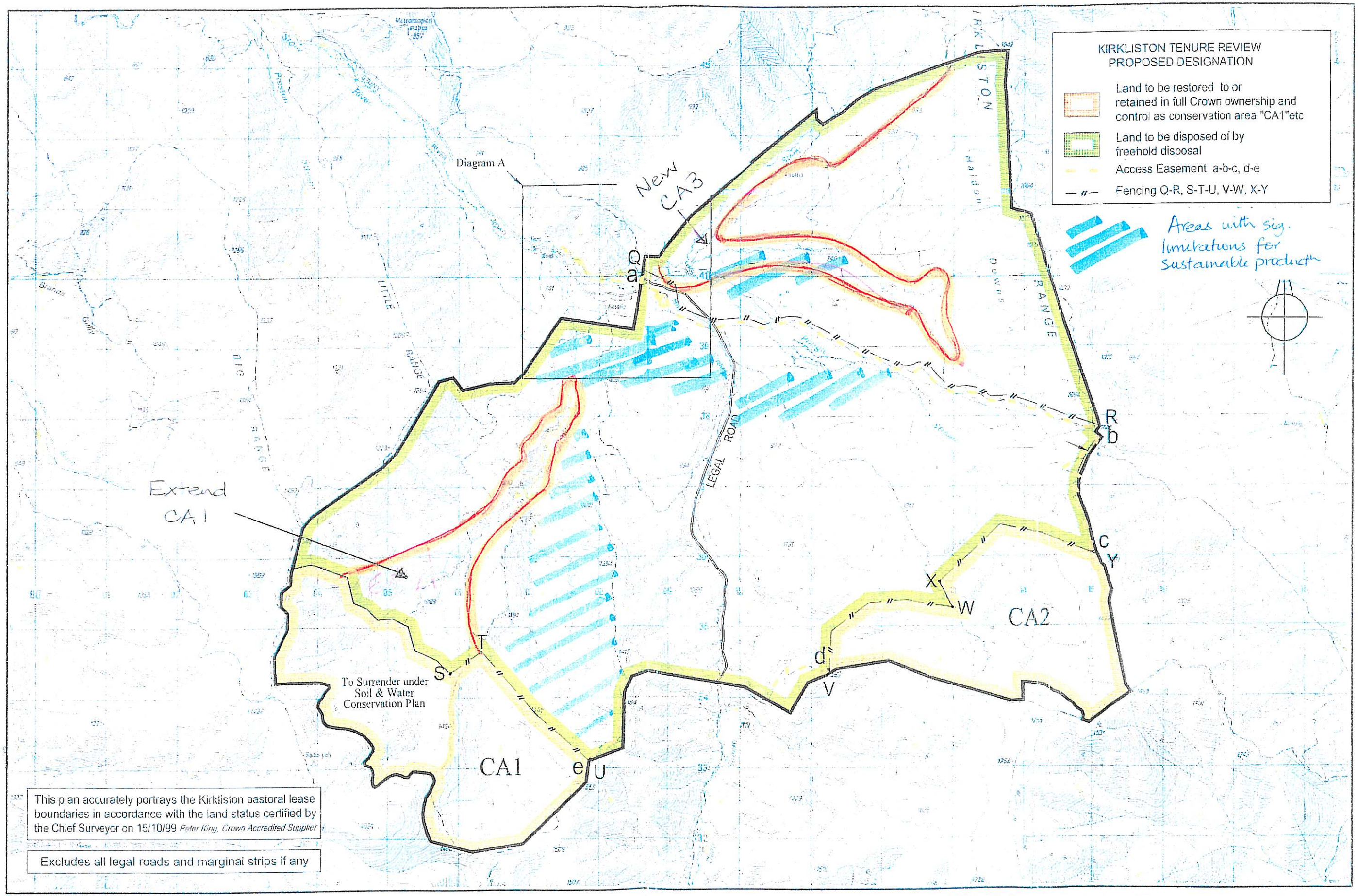
The single most important factor in safeguarding the life-supporting capacity of the soil is a healthy vegetation cover that is resilient to environmental stresses and that provides an intact soil cover. This is particularly critical in harsh environments, such as the high country, where vegetation growth or establishment is severely limited, and soil development rates are extremely slow. (See Appendix SCN1(a) and (b) for a description of the high country soil environment groups.)

Loss of the vegetation cover will leave soils exposed to erosion agents such as wind, water and frost. Tall vegetation provides greater shelter from these climatic elements than low-lying vegetation and provides greater root depth to stabilise the soil. This can compensate for some reduction in ground cover intactness under tall vegetation.

A resilient vegetation cover will be composed of species able to maintain plant growth and soil processes under the climatic and geological limitations of the environment and to recover from any land management disturbances. Plant vigour and biomass production must be sufficient to maintain soil fauna and microbial populations and to provide nutrients for continued plant growth in addition to any grazing or harvesting of the vegetation, such as the harvesting of production forests. The more resilient the vegetation, the less input in terms of management and nutrients will be required to maintain a healthy cover. This will be important for non-arable lands where management inputs are often dictated more by prevailing economic conditions than by the current condition of the vegetation.

Indigenous vegetation communities have evolved in these environments and are adapted to the conditions. Undisturbed indigenous vegetation will provide the highest, ongoing level of protection for soil conservation. Introduced pasture species may be dependent, even for their short-term stability, on continued inputs of fertilisers and frequent replenishment by oversowing. Management regimes that retain indigenous components of the vegetation, particularly the tall tussock component of the undeveloped high country grasslands, will help to sustain the long-term resilience of the vegetation cover.

Map 1



This plan accurately portrays the Kirkliston pastoral lease boundaries in accordance with the land status certified by the Chief Surveyor on 15/10/99 *Peter King, Crown Accredited Supplier*

Excludes all legal roads and marginal strips if any

New Zealand
International Property Advisers

GLASSON POTTS FOWLER

The boundaries shown on this plan are indicative and are for illustrative and discussion purposes only. Precise boundary positions will be determined by survey during implementation

Land being disposed of as freehold will be subject to Part IV A of the Conservation Act 1987, and Part IV A applies to the entire length of the river or stream within the boundaries of the land to be disposed of

KIRKLISTON PASTORAL LEASE

0 1 2 3 4 5

1:50,000 SCALE (Kilometres)

Version	1	2	3	4	5

Canterbury Land District
Topographic Map 260 - I39

Sheet 1 of 1
Date: September 2004