

## Crown Pastoral Land Tenure Review

Lease name : *MARYBURN*

Lease number : PT 041

### Public Submissions Part 10

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

These submissions are released under the Official Information Act 1982.

*August*

*12*

127 060

4-4-11



28 March 2011

Tony Sharpe  
Darroch Limited  
PO Box 142  
Christchurch 8140

Dear Tony

**Re: Preliminary Proposal for Tenure Review of the Maryburn Pastoral Lease Pt 041**

Thank you for providing an opportunity to comment on the preliminary proposal for this tenure review. As you will appreciate, this is the first opportunity that the New Zealand Walking Access Commission (the Commission) has had to comment on this proposal.

In its response, below, the Commission identifies the specific and significant public access and enjoyment opportunities it wishes to see protected for the New Zealand public.

**A] Introduction**

**Purpose and Objectives of the NZ Walking Access Commission**

The Walking Access Act 2008 (sections 3, 9 and 10) sets out the purpose and objectives of the NZ Walking Access Commission.

Central to its role is the Commission's leadership in negotiating the provision of free, certain, enduring and practical walking access to the outdoors for the New Zealand public and visitors.

The specific criteria that the Commission must take into account when considering walking access are set out in Section 11 of the Walking Access Act 2008. These criteria include vicinity of waterways, scenic or recreational value, and provision of continuous physical access.

**Focus of Submission is public access and protective mechanisms**

The Commission's submission to this Preliminary Proposal is designed, as envisaged by the Walking Access Act 2008, to achieve appropriate and enduring public access in this popular area of New Zealand which has very high scenic and recreational value.

The Commission's submission reinforces the objectives of the Crown Pastoral Land Act 1998, in particular section 24(c) which is to make easier the securing of public access to and enjoyment of reviewable land. Specifically, our submission addresses the public access and public enjoyment matters specified in subsection (2) (c) and (d) of section 40 of the Crown Pastoral Land Act 1998.

**B] Submission**

**Existing public access**

*Depiction of existing public access on designation plans*

There are areas where legal roads currently exist and which have not been clearly identified on the designation plans. The designation plans could be interpreted as showing these areas as currently being part of the pastoral lease, which they are not. The green border depicting the pastoral lease land needs to be extended along the legal road boundaries to address this.

The lease adjoins the Tekapo-Twizel Road in the south west, south east of Lake Pukaki, and

approximately 2km of legal road runs generally parallel with the Tekapo Twizel Road (see Plan 1).

On Plan 2, the Tekapo Twizel Road (SH8) intersects the pastoral lease in two locations in the central portion of the lease.

In the southern tip of the lease there is an unformed legal road running south west from the Tekapo River to the Mary Burn (and beyond, see Plan 2). The Conservation Resources Report identifies this road as approximating the historic Bullock Track from Dog Kennel Corner to the Pukaki River.

The Commission seeks to have:

1. *The boundary of proposed freehold and Conservation Area land shown as adjoining, not including, all parcels of legal road.*

### **Desirable public access**

#### *Marginal Strips*

The disposal of Crown land, through the implementation of this tenure review, will result in the creation of 'marginal strips' adjoining qualifying water bodies under Section 24 Conservation Act 1987. These strips, reserved from disposition, will generally provide for public access.

The Preliminary Proposal gives no indication of which water bodies qualify and what, if any, marginal strips will be created. This makes it difficult to assess the adequacy or otherwise of public access requirements. Opportunities, such as easements, to provide access contiguous to non-qualifying but appropriate waterways or to provide continuous access between existing legal roads cannot, therefore, be analysed with any confidence. For example, will marginal strips be created on the Mary Burn and, therefore, potentially provide for public access from the Tekapo Twizel Road, alongside the Mary Burn, to the proposed area CA1 – or will an access easement be required to achieve appropriate public access to this area?

The Commission seeks to have:

2. *An assessment of qualifying water bodies under Section 24 Conservation Act 1987 made publicly available and proposed marginal strips depicted on the plans, to clarify current gaps and enable desired public access requirements to be readily identified and addressed.*
  - *The New Zealand Walking Access Commission specifically requests a copy of this assessment for the Maryburn pastoral lease to enable the Commission to meet its statutory requirements as envisaged by the Walking Access Act 2008.*

#### *Access along the Mary Range*

The Mary Range is a prominent elevated landscape feature which provides excellent views over the Mackenzie basin. The Maryburn Conservation Resources Report identifies that trampers often traverse the Mary Range. There are also future significant opportunities to provide for additional public access and enjoyment opportunities by including mountain biking and horse trail access along such a route.

This tenure review presents a unique opportunity to negotiate highly desirable public access from the Tekapo Twizel Road to, and along, the southern section of the Mary Range. This would provide for day walks, at least, and needs to be integrated into wider walking, mountain biking and horse riding opportunities on the Mary Range.

Integrated access analysis needs also to be addressed as part of tenure reviews of neighbouring properties.

The Commission seeks to have:

3. *Provision for public walking, mountain biking and horse trail access from the Tekapo Twizel Road to, and along, the top of the Mary Range, and*

4. *Appropriate provision for car parking to facilitate public walking access.*

*Public access across selected farm tracks*

Before submitting this submission we would have liked to discuss with you the nature and location of tracks across the property. In particular the position of the track from the Tekapo – Twizel Road eastwards to the Tekapo River, through area CA1, about the extension of the line 'b-d' on Plan 2. If the track sits inside the area of pastoral lease to be disposed, rather than within CA1, the Commission requests a public access easement created over this track.

The Commission seeks to have:

5. *Provision for public access over existing formed tracks to provided access to CA1, should the current track, generally about the line "b-d" on Plan 2, be positioned within the proposed pastoral lease area designated to be disposed of.*

*Public access to "Pink Elephant Boulders"*

Approximately two kilometres south east along State Highway 8 (Tekapo-Twizel Road) from the junction with Hayman Road, is an area colloquially known as 'Elephant Land', or 'Pink Elephant Boulders'.

This area does not appear to have been considered in the original tenure review analysis.

The Commission strongly recommends that this area be designated for public access as it has significant scenic and recreational value.

Of special interest are the boulders which have been deposited by glaciers between 12,000 and 200,000 years ago. Local brochures confirm that the boulders are popular with rock climbers and also climbers seeking alternative activities around Aoraki/Mt Cook National Park during periods of inclement weather.

A number of the larger boulders have been equipped with top rope anchor points for climbing and the area, generally, provides a spectacular place for the public and tourists to New Zealand to just wander.

The Commission seeks to have:

6. *Provision for public access to and within this area of significant scenic and recreational value .*

Thank you for the opportunity to make a submission on the Preliminary Proposal for tenure review of Maryburn pastoral lease. We request advice in due course as to how the points we have raised have been progressed and what, if any, amendments are subsequently proposed to the Preliminary Proposal designations.

We draw your attention especially to the request for a copy of the assessment of qualifying water bodies, under Section 24 Conservation Act 1987, for the Maryburn pastoral lease.

Yours sincerely



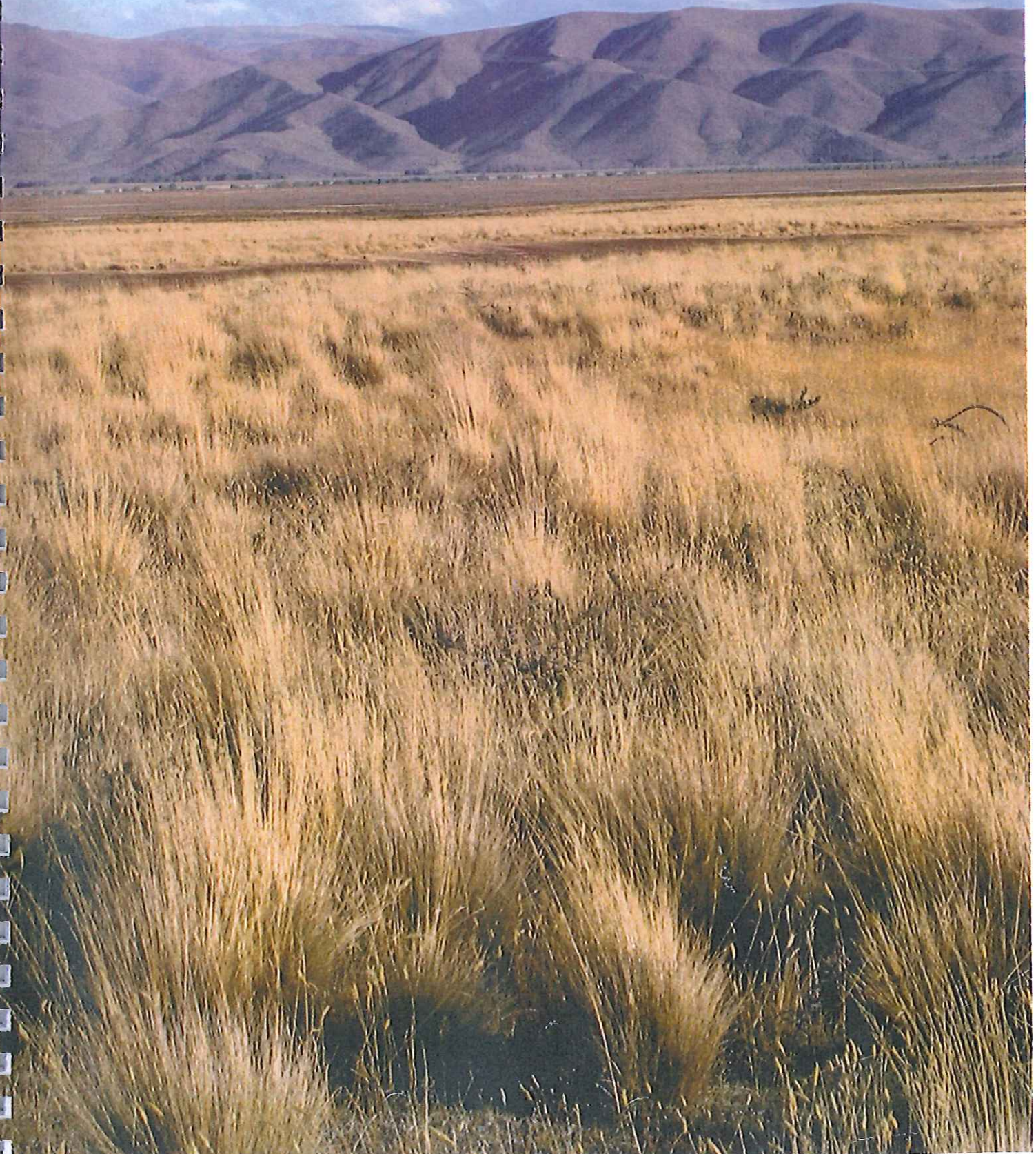
Mark Neeson  
Chief Executive

127 061

RECEIVED  
29 MAR 2011

# M a r y b u r n

Mackenzie Guardians



Mackenzie Guardians Incorporated  
213 Olliviers Rd  
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Christchurch

30 March 2011

THE COMMISSIONER OF CROWN LANDS  
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SUBMISSION ON PRELIMINARY TENURE REVIEW PROPOSAL FOR  
MARYBURN STATION PASTORAL LEASE

**Background**

Mackenzie Guardians Inc. is a group which was formed to present the views of its members concerned about the rapid rate of indigenous ecosystem loss and landscape transformation in the Mackenzie Basin. The group has membership spread across the country, demonstrating the national significance of the natural and naturalistic values of these landscapes.

The aims of Mackenzie Guardians are to promote the protection of the natural/naturalistic wildlife, water, vegetation, heritage and landscape values of the Mackenzie Country. Mackenzie Guardians believe that the values of this unique area need to be conserved for the enjoyment and well being of present and future generations.

The Mackenzie Guardians have undertaken considerable assessment and analysis in the Mackenzie Basin and have identified that the Maryburn Pastoral Lease encapsulates the very essence of the basin's natural and naturalistic values. The Lease includes core aspects of the iconic Mackenzie Country. The Mackenzie Guardians have previously met with the CCL and LINZ officials for clarification that the statutory processes will be adequately implemented in any tenure review and consent processes to address the character and scale of these Mackenzie landscapes. It is thus extremely alarming to receive a tenure review proposal that does not implement either the statute or the stated intent of this government (Crown pastoral land - 2009 and beyond). The government's policy provides an assurance that inherent landscape values will be maintained and protected. The Maryburn proposal does not achieve this.

**Mackenzie Guardians understands the Tenure Review proposal for the Maryburn Pastoral Lease is to:**

1. designate 3,430 hectares as land to be restored to or retained in Crown control as conservation area (CA1).
2. designate 4,946 hectares as land to be disposed of by freehold to the Holder

**Mackenzie Guardians oppose** the preliminary Tenure Review proposal in its entirety because the proposal fails to protect significant inherent values on Maryburn. It fails to protect the natural values of the Maryburn outwash plain, the wetlands and much of the catchments of Mary Burn and Irishman Creek and the margins of Lake Pukaki. It fails to protect the Pukaki moraine (western block) and the eastern slopes of Mt Mary. That is, the proposal fails to protect the essence of this core of the Mackenzie landscape, and also fails to protect particular natural features within it.

The proposal does not meet the provisions of the Crown Pastoral Lands Act (CPLA). Under the CPLA Section 24 (b) (i) and (ii), significant inherent values must be protected by the creation of protective mechanisms with a preference to return to full Crown ownership and control.

The proposal does not promote the management of reviewable land with significant inherent values in a way that is ecologically sustainable, as required by the CPLA Section 24 (a) (i).

The proposal does not provide for future public access, recreational opportunities and enjoyment of the high country landscape as required by Section 24 (c) (1) of the CPLA "*make easier the securing of public access to and the enjoyment of reviewable land*".

Nor does the proposal meet Government Policy (2009 and beyond). Allowing for varying mechanisms, the Policy requires the protection of high landscape values be achieved, including for lakesides. The proposal does not meet this requirement. As reiterated by the Guardians in meeting with LINZ officials, administration should more closely match statutory requirements and government directions. The methods proposed in this tenure review do not ensure achievement of the stewardship that is directed by the government policy, particularly for the natural character of landscapes.

#### **Significant Inherent values**

DOC assessment criteria for determining SIV's for areas of highest significance is as follows:

106. *The highest significance will be accorded to the best remaining representative examples of landscapes that characterised New Zealand before humans arrived.*

The outwash plains and the Pukaki moraine are among the best remaining examples especially because of their scale and broadscale intactness. The proposal fails to protect their highly significant inherent landscape values.

107. *The highest significance will be accorded to the natural character of the margins of lakes and rivers. The margin includes those landforms that surround a water body and define its character and qualities.*

The Maryburn, and its associated landforms, is of the highest significance. The proposal fails to protect these highly significant inherent values.

108. *High significance will be accorded to other remaining examples of landscapes that characterised New Zealand before humans arrived.* Whilst not pristine, the vast outwash landscape is an important and rare remaining example of a characteristic original landscape. The proposal gives this no significance.

109. High significance will be accorded to generally recognised high country landscapes or scenery. *This can include natural and cultural landscapes.*

The Maryburn outwash lands are crucial aspects of the grand high country landscape of the Mackenzie, forming the naturalistic foreground to the views up to the source of the material at Aoraki Mount Cook. The ability for the public to drive through and experience this giant natural system is undoubtedly a nationally important inherent value. The proposal does nothing to protect this highly significant value.

110. High significance will be accorded to opportunities to restore or increase the natural character of recognised high country landscapes.

The proposal does nothing to provide opportunities to restore or increase the natural character of the outwash landscape that is core to this recognised high country landscape.

In addition, Government policy states that lakeside and landscape values are to be maintained and protected through tenure review. The proposal does not maintain or protect the Pukaki lakeside landscape or the Tekapo outwash landscape.

### **Maryburn Pastoral Lease**

The Maryburn Pastoral lease is located in the centre of the Mackenzie Basin. The lease extends west from the Tekapo River to the Maryburn stream. A second block includes the south western end of the Mary Range to Lake Pukaki. The three main types of landforms represented on Maryburn are outwash and alluvial surfaces, moraine, and, hard rock isolated mountain or *roche moutonnée*.

The alluvial fluvio-glacial outwash plains, till-covered glacial hummocks, stony terraces, kettleholes and ephemeral tarns, and lowland hill country shrubland, are all significant as distinctive geomorphological features, ecosystems, habitats and communities. Due to their naturalness, together they provide a 'textbook' of glacial processes. The sequence of habitats from the Pukaki terminal moraine, to the hummocky moraine deposits to the fluvio-glacial channels and outwash plain provide an important landscape sequence.

**The areas on Maryburn which deserve protection are:**

#### **1. Maryburn outwash plain (eastern block)**

This broad fluvio-glacial outwash plain between State Highway 8 and the Tekapo River comprises a series of terraces and flood plains built of deep gravels overlain to varying degrees with loess soils and bisected by Irishman's Creek.

The Maryburn outwash plain is one of the most distinctive natural landscapes in the Mackenzie Basin. From the major tourist State highway, the outwash plain of short tussock grassland can be viewed at close range across vast distances, making it one of the most iconic and memorable views in the Mackenzie. The sense of extreme openness and exposure to the elements is highly characteristic. It is a landscape treasured by many New Zealanders and overseas visitors.

Outwash plains in their undeveloped form make a fundamental contribution to outstanding natural landscape character. They are distinct and unique and are a key element to the Mackenzie Basin.

They are a naturally rare ecosystem. Outwash plains are listed in the proposed National Policy Statement on Indigenous Biodiversity 2011 as a naturally uncommon ecosystem type, which is to be regarded as supporting vegetation and/or habitat that is "significant". There is to be no "net loss" of biodiversity from such areas. The



outwash plains and its ecosystem is irreplaceable or irreplicable because of its high stress environment and highly specialised species.

Stronger mechanisms are required to protect the significant inherent values of outwash plains. The proposed unencumbered freeholding of moraine and outwash will not maintain or protect the values.

If freeholded as proposed the outwash plain landscape values could be cultivated and destroyed. The naturalness, the evident dry tussock grassland, the textures and colours of gold, brown and grey would likely be replaced by bright green exotic grass, pivot irrigators and other structures and shelter belts. Inadequate measures and poor enforcement of District Plan rules means the RMA would not prevent damage from earthworks, cultivation, irrigation or forestry.

The statute and Policy recognise the inadequacies of Council measures under the RMA. Whilst this Maryburn Pastoral Lease has been recognised as an important contribution to an outstanding natural landscape of national importance, there are as yet no land management measures in the Canterbury Region or Mackenzie District Policies or Plans to implement the landscape protection in terms of land management.

As some of these dry landforms and associated dryland plant communities are some of the least protected in New Zealand, Mackenzie Guardians seek protection for the entire triangle of land as conservation land to safeguard a full suite of fluvial-glacial outwash and younger alluvial terrace and floodplain features.

## **2. Land between Lake Pukaki and crest of Mary Range including Pukaki lateral moraine (western block)**

The moraine landscape between the Mary Range and Lake Pukaki is part of a wider area previously identified for its significant geomorphological values (Mansergh 1978).

It is a part of the Lake Pukaki Terminal Moraine site, a nationally significant geopreservation site classified as an extremely well defined landform of scientific and educational value.

It is part of "the most intact sequence of lateral moraine topography remaining in the Mackenzie Basin" (Head 2001).

The moraine landscape is visible from the main highway corridor, SH8 and the road adjacent to the Lake Pukaki shoreline. The area is distinctive and is as important as any other area contributing to the diversity of the Basin's natural landscapes. It evokes landscape qualities of openness and vast space. It is memorable because it is one of the most natural looking landscapes now remaining in the Basin.

The area should become conservation land to protect its significant inherent values and to help safeguard a continuous landscape sequence from the lake margin to the crest of the Mary Range. Protection would also secure public access to the lake and to the top of the Mary Range.

A trail along the crest of the range would provide one of the best views of the geopreservation site and spectacular views over Lake Pukaki to the Ben Ohau Range and Aoraki/Mt Cook. It would enable the public to appreciate the distinctive landscape character and natural heritage, and, due to its naturalness, provide for a

real appreciation of the vastness of the Basin and its formative processes and structure.

The Te Araroa trail passes through the area from Tekapo to Twizel, mainly within the Lake Pukaki moraine landscape and along the Pukaki shoreline for 7kms to SH8.

### **3. Eastern slopes Mary Range**

Mackenzie Guardians support a sustainable land management covenant as recommended by DoC under the Crown Pastoral Land Act over 306 ha. of the eastern slopes of the Mary Range from the crest of the range to around the 600 m. contour. This part of the range can be seen from SH8 and is an important part of the corridor highway experience through the basin. The skyline is intact with no major structures. The covenant was intended to protect these landscape values by prohibiting the erection of buildings or structures, forestry plantings and earthworks. Freeholding without a covenant leaves the skyline and eastern slopes vulnerable to modification.

### **4. Mary Burn Stream and wetlands**

In hill and high country areas water quality has generally remained relatively high but accelerating land use change and intensification are causing water quality degradation in some rivers, lakes and wetlands. More intensive land use change as a result of the proposed freeholding on Maryburn may compromise water quality in the Mary Burn and Irishman Creek, and associated springs and wetlands.

The Mary Burn has high visual values because of its clear water and its natural character. The stream corridor is distinctive in its dryland setting adds to the richness of the landscape through diversity and contrast. This valuable riparian habitat is part of the Tekapo River system.

All streams of this scale and associated wetlands are significant because of the extent of loss and degradation that has occurred nationally since European settlement, less than 10% remain in Canterbury. All deserve protection and proper management for clean water and protection of habitat and species that use the stream and wetland for parts of their lifecycle.

Mackenzie Guardians do not support the freeholding of streams and wetlands and riparian corridors with known and proven values. We seek that the Mary Burn and its associated landforms and wetlands be managed for its natural values, clear clean water, vegetation, birdlife and invertebrates, and as important contributor to the landscape unit, as conservation land. A standard marginal strip would not adequately protect and buffer the stream and wetland riparian shrubland and be inadequate to retain the natural character and landscape values. Instead mechanisms to ensure the values are maintained and protected need to be ensured.

### **5. Northern wetland**

All remaining wetlands are a priority habitat for conservation. The northern wetland is a good example of a spring fed wetland. It is permanently wet, connected to Mary Burn Stream and has been identified as a Site of Special Wildlife Interest for birds.

The wetland is a rare habitat type in a dry landscape. It is fairly substantial in size, contains representative wetland plant communities and provides a key habitat for indigenous birds, fish and invertebrates. The proposal to freehold the wetland would likely result in continued degradation.

Mackenzie Guardians seek protection of the wetland by way of conservation covenant, to restore the vegetation and ecological values.

**Summary**

Mackenzie Guardians understand the Key Priority (4.10.1) under the Canterbury Conservation Management Strategy is landscape protection – the Mackenzie Basin is described as a vast open landscape exhibiting a distinctive tussock grassland character. The property is a key landscape to be protected. The CMS states the Conservancy will seek to protect, maintain and enhance the [natural] heritage landscape.

Tenure Review should provide that protection and an opportunity to maintain, restore and enhance the natural heritage landscape.

Key priority (4.10.2) is to protect and enhance the viability of priority threatened species and their habitats.

Tenure Review should be the implementation method (#18) to protect indigenous biodiversity.

Tenure Review should ensure the survival of the best representative examples of geological features, landforms soil sites and active physical processes so that the geological history of NZ its landforms and the evolution of its biota can be understood.

Tenure review should protect a range of areas and values that best contribute to maintaining and restoring Canterbury's indigenous biodiversity.

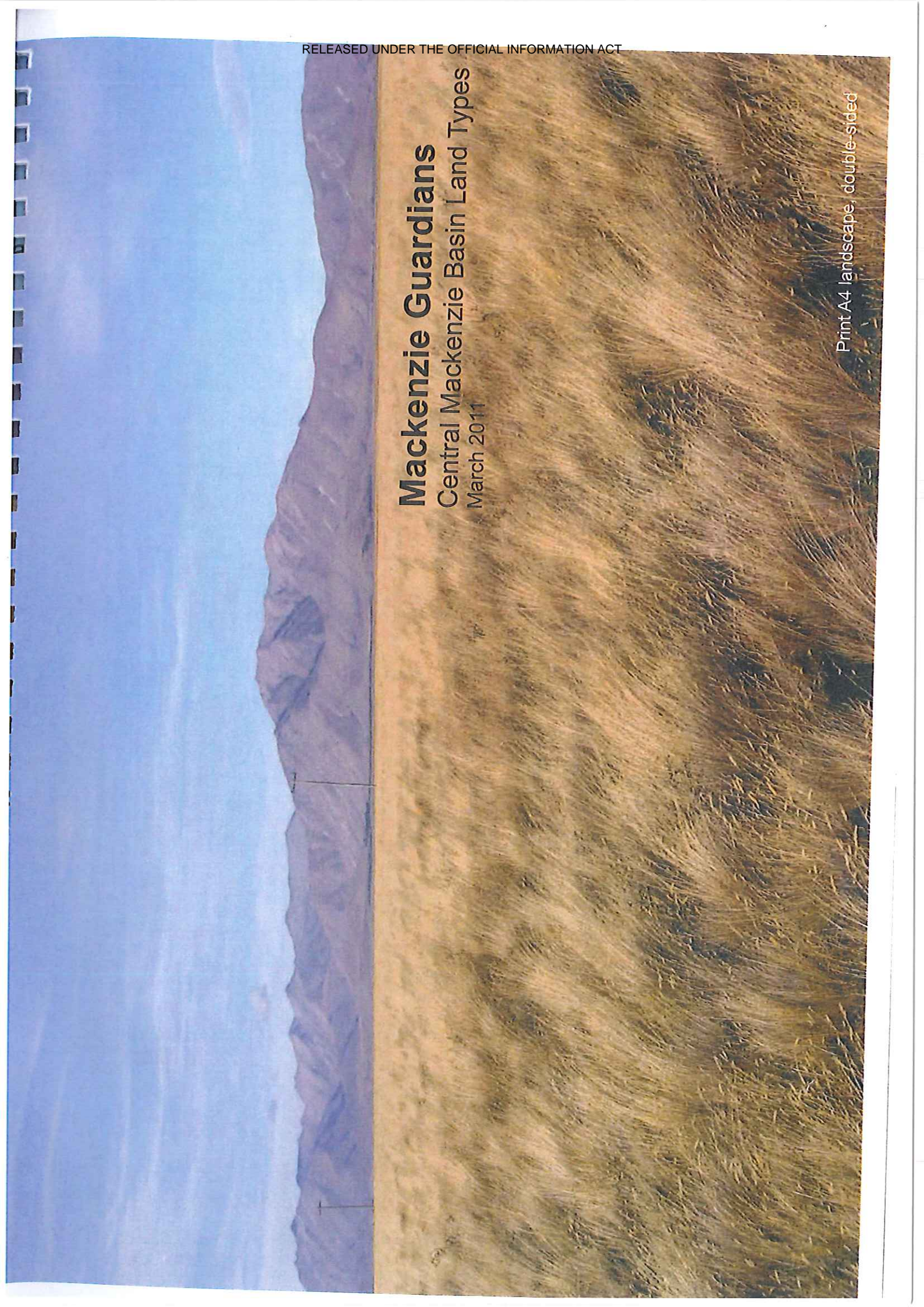
As the preliminary proposal does not substantially provide for landscape and ecological protection and recreational opportunities, tenure review should be halted and the property remain as a pastoral lease.

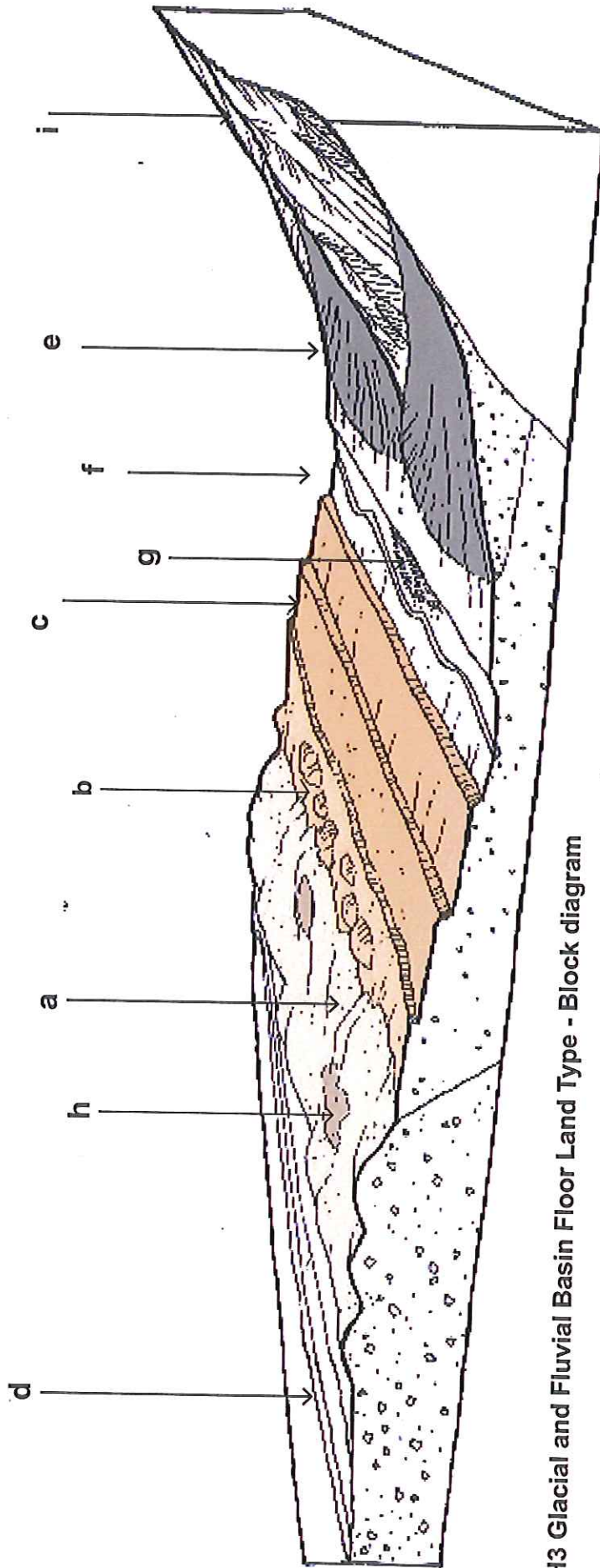
Jane Zusters  
Spokesperson  
Mackenzie Guardians

# Mackenzie Guardians

Central Mackenzie Basin Land Types  
March 2011

Print A4 landscape, double-sided



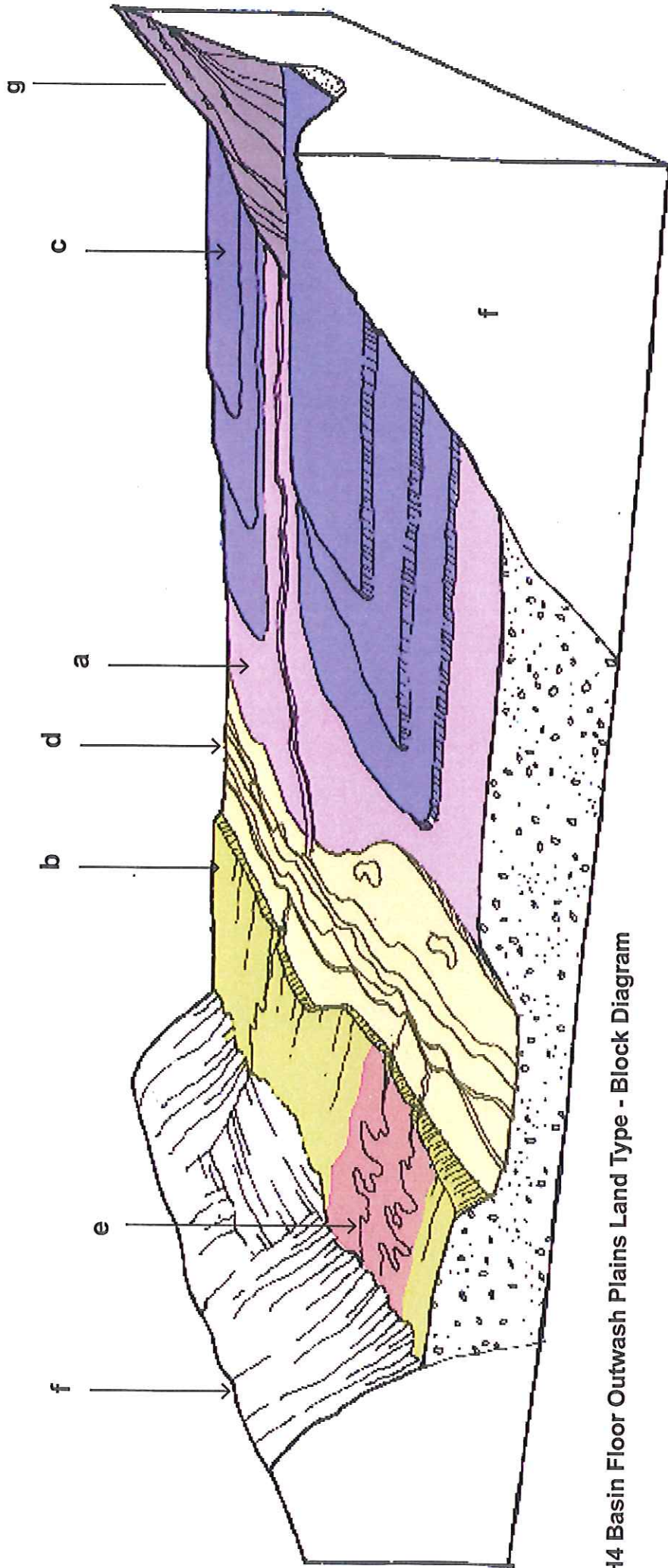


H3 Glacial and Fluvial Basin Floor Land Type - Block diagram

**H3 Glacial and Fluvial Basin Floor Land Type**

Glacial and fluvial basin floor landforms, extensive ablation and terminal moraine, and associated meltwater channels, outwash terraces, minor lakes, fans, meandering floodplains, backswamps etc, and glacial moulded hills and mountains under 1300 m. Elevation ranges from 400 to 1300 m, with the balance below 1000 m, and rainfalls between 850 and 4800 mm/A. The land type includes parts of the Waitaki.

landform component	geological formation	elevation m	remnant native vegetation	present land use	agronomic potential	potential land use	potential impacts
(a) extensive ablation & terminal moraine fields	late Pleistocene moraine deposits, with loess	500 - 1200	short, red and snow tussock, matagouri and manuka scrub	extensive grazing	medium	semi intensive grazing, exotic forestry	increase in exotic pasture, shelter trees, fencing, exotic forest
(b) glacial outwash terraces and minor moraine dumps	late Pleistocene outwash gravels and moraine deposits	460 - 900	short, red and snow tussock, matagouri and manuka scrub	extensive grazing, limited intensive grazing	high	intensive grazing, feed cropping, exotic forestry	increase in exotic pasture, cultivation, cropping, shelter trees, fencing, exotic forest
(c) fluvial valley terraces	late Pleistocene outwash gravels	400 - 1000	short and snow tussock, matagouri scrub	extensive grazing, limited intensive grazing and feed cropping	high	intensive grazing, feed cropping, exotic forestry	increase in exotic pasture, cultivation, cropping, shelter trees, fencing, exotic forest
(d) lake shore benches and beaches	late Pleistocene outwash deposits	400 - 760	short tussock and matagouri scrub, moss tussock gravel fields	extensive grazing	high	intensive grazing, feed cropping, exotic forestry	increase in exotic pasture, cultivation, cropping, shelter trees, fencing, exotic forest
(e) fans	late Pleistocene and Holocene fan deposits	400 - 1000	short tussock and matagouri scrub, some red tussock	intensive and extensive grazing, feed cropping, shelter trees	high	intensive grazing, feed cropping, exotic forestry	increase in exotic pasture, cropping, shelter trees, cultivation, fencing
(f) meander floodplains	Recent alluvium and swamp deposits	500 - 800	wetlands, sedge, reed, and rushlands, red tussock, raupo	extensive grazing	high	intensive grazing, feed cropping	increase in exotic pasture, drainage, cultivation, fencing, decrease in scrub
(g) valley fill swamps	Recent alluvial and swamp deposits	400 - 860	wetlands, sedge, reed, and rushlands, red tussock, raupo	extensive grazing	very high	intensive grazing, feed cropping	drainage, cultivation, increase in exotic pasture, fencing
(h) terrace and moraine backswamps	late Pleistocene outwash and Recent swamp deposits	400 - 860	tussock, raupo wetlands, sedge, reed, and rushlands, red tussock, raupo	extensive grazing	low	semi intensive grazing	decrease in wetland vegetation by grazing, drainage
(i) erosional 'hard' rock hill slopes	Foriesse Group sandstones and siltstones	610 - 1400	short tussock, matagouri scrub and fern, beech forest	extensive grazing	medium	semi intensive grazing, exotic forestry	increase in exotic pasture, fencing, tracking, , exotic forest, decreased tussock and scrub



H4 Basin Floor Outwash Plains Land Type - Block Diagram

**H4 BASIN FLOOR OUTWASH PLAINS LAND TYPE**

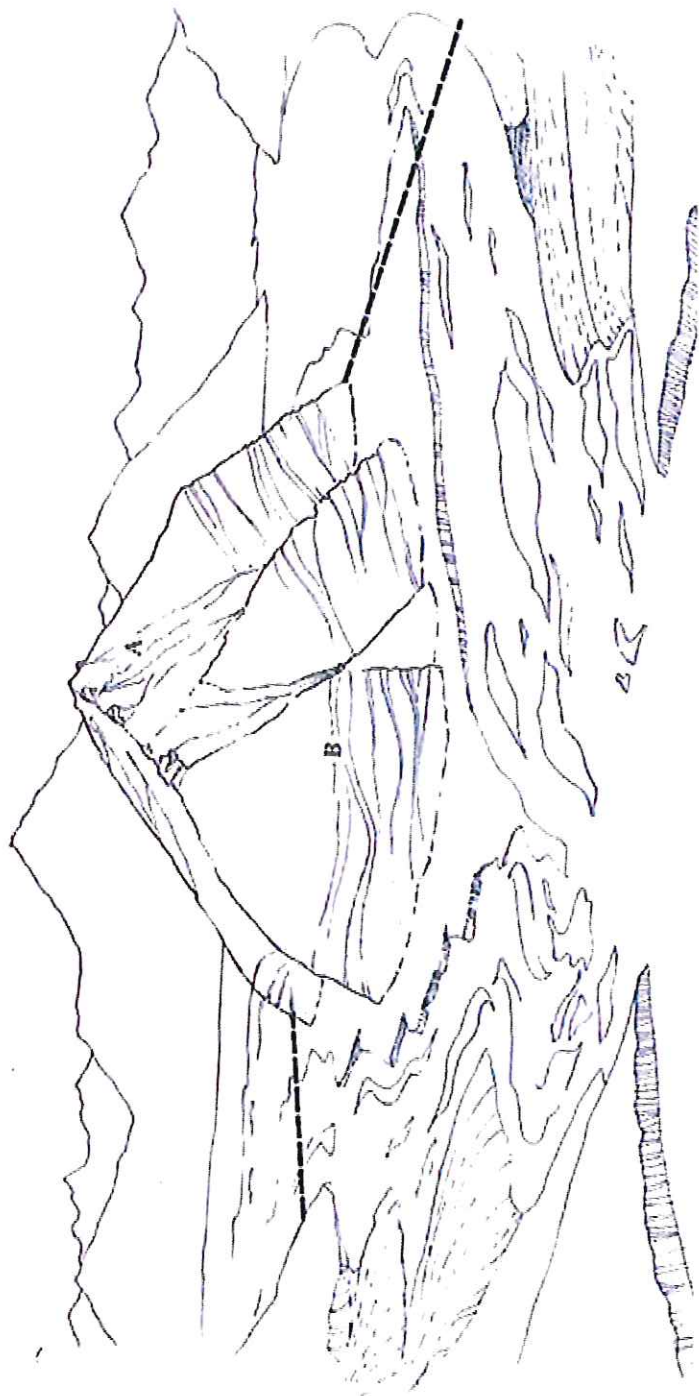
Basin floor fluvio-glacial outwash plains, terraces, piedmont fans, braided and meandering floodplains, and backswamps etc, and associated low hard rock ranges, and minor soft rock hills. Elevation ranges from 350 to 1400 m, with the balance below 600 m, and rainfalls between 430 and 850 mm/A. The land type includes parts of the Waitaki basin.

landform component	geological formation	elevation m	remnant native vegetation	present land use	agronomic potential	potential land use	potential impacts
(a) fluvio-glacial outwash plains	Pleistocene and late Pleistocene outwash gravels	360 - 700	short tussock and matagouri scrub	extensive grazing	low	extensive grazing, conservation forestry	management dependent, decrease tussock cover, increase in hieracium and exotic trees
(b) outwash terraces	late Pleistocene outwash gravels, some loess	350 - 900	short tussock and matagouri scrub	extensive grazing	low to medium	semi intensive grazing, exotic forestry	increase in exotic pasture, and trees, fencing
(c) piedmont fans	Pleistocene and late Pleistocene fan alluvium, some loess	360 - 900	short tussock and matagouri scrub	extensive grazing	low to medium	semi intensive grazing, exotic forestry	increase in exotic pasture, and trees, fencing
(d) braided floodplains	Holocene fluvial deposits	360 - 970	Raoulia cushion fields, moss tussock gravel fields	extensive opportunist grazing	low	extensive opportunist grazing	largely a 'natural' environment, exotic river control trees and 'weed' establishment
(e) meander floodplains and backswamps	Recent alluvium and swamp deposits	350 - 970	wetlands, sedge, reed, and rushlands, red tussock, raupo	extensive grazing	high	intensive grazing, feed cropping	increase in exotic pasture, drainage, cultivation, fencing, decrease in wetland vegetation
(f) low hard rock ranges	Torlesse Group sandstones and siltstones	610 - 1400	short tussock, matagouri scrub and fern	extensive grazing	medium to low	semi intensive grazing, exotic forestry	increase in exotic pasture, fencing, tracking, exotic forest, decreased tussock and scrub
(g) minor soft rock hill slopes	tertiary non marine gravels	500 - 900	short tussock, matagouri scrub and fern, broadleaved scrub	extensive grazing	medium	semi intensive grazing, exotic forestry	increase in exotic pasture, fencing, tracking, exotic forest, decreased tussock and scrub

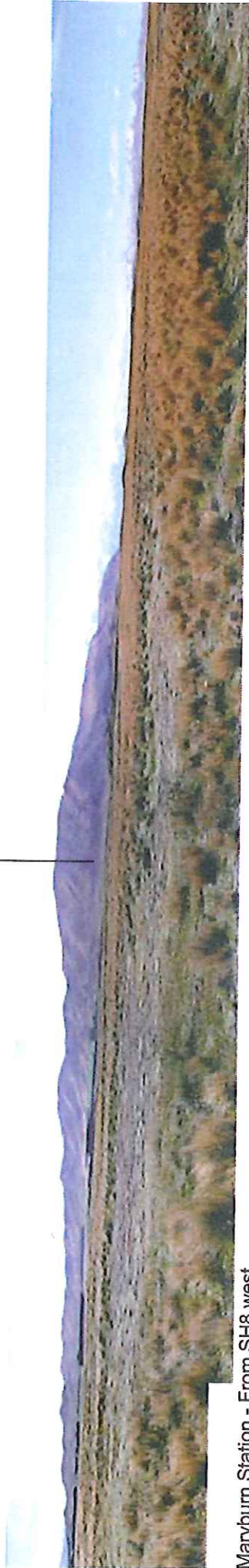


### 15. ISOLATED MOUNTAIN LAND TYPE

Steep to very steep, ice scoured, isolated mountain blocks, up to 1830 m, nested within the glacial and fluvial valley floor or basin land types; rock outcrop and scree are common at higher elevations, lower steep to very steep often rectilinear slopes have been scoured by past glacial activity, higher summits currently undergo moderate periglacial processes. Elevation ranges from 280 to 1830 m and rainfalls between 560 and 2600 mm pa. Vegetation ranges from short tussock with manuka - kanuka scrub, dense sweet brier, fernland, semi improved pasture on the drier more easterly examples, eg. Mt Iron, to beech forest and short tussock with dense fernland in the wetter west, giving way up slope to snow tussock grassland, alpine scrub, and fellfield vegetation on the higher summits. Example locations include Mt Alfred.



Mary Range



Maryburn Station - From SH8 west

Endform component	geological formation	elevation m	remnant native vegetation	present land use
<b>A</b> upper mountain slopes, and summits (> 1100 m)	Haast Schist Group schist of t.z. HA to t.z. IV	1100 - 1830	snow and alpine tussock grassland; subalpine scrub; fellfield and sere vegetation	extensive grazing, conservation land
<b>B</b> lower mountain slopes (< 1100 m)	Haast Schist Group schist of t.z. HA to t.z. IV, colluvium, and minor glacial till	280 - 1100	short tussock grassland with manakouri, manuka and broadleaved scrub and fern; beech and mixed hardwood forest	semi-intensive and extensive grazing, recreation, conservation land



Mary Range





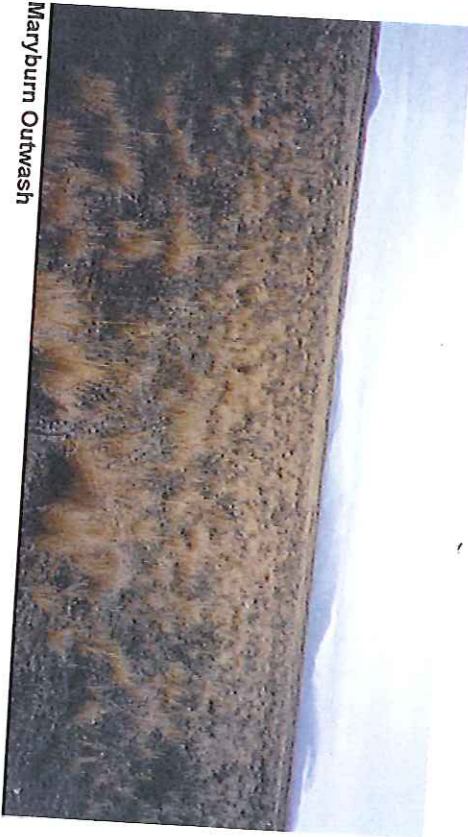
Pukaki Moraine



Maryburn moraine looking north into Wolds



Maryburn Flats



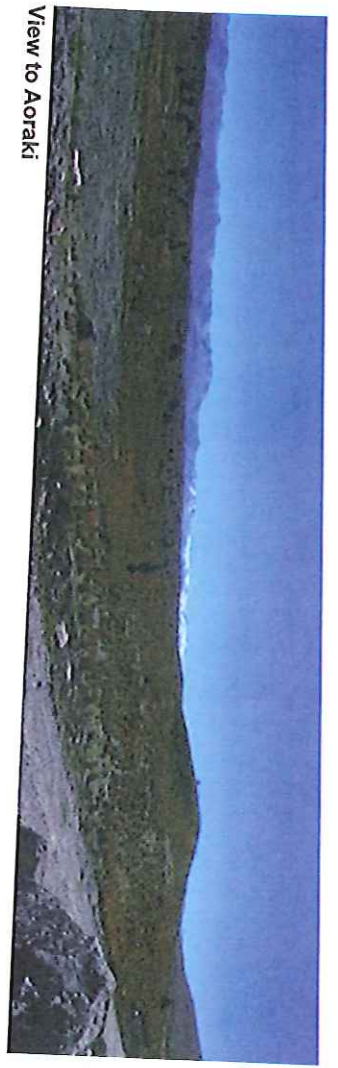
Maryburn Outwash



Maryburn Photos 4

RELEASED UNDER THE OFFICIAL INFORMATION ACT





View to Aoraki



View over moraine & of glaciers



Maryburn Photos 6



