Appendix 1 – Eastern Mackenzie Landscape Study

Boffa Miskell

Eastern Mackenzie Landscape Study

Landscape Characterisation and Evaluation Report
Prepared for Environment Canterbury / Mackenzie District Council

11 October 2023

Boffa Miskell is proudly a
Toitū carbonzero® consultancy

Document Quality Assurance

Bibliographic reference for citation: Boffa Miskell Limited 2023. *Eastern Mackenzie Landscape Study: Landscape Characterisation and Evaluation Report*. Report prepared by Boffa Miskell Limited for Mackenzie District Council.		
Prepared by:	Yvonne Pfluger Associate Partner Landscape Planner Boffa Miskell Limited Hannah Wilson Landscape Architect Boffa Miskell Limited	
Reviewed by:	Yvonne Pfluger Associate Partner Landscape Planner Boffa Miskell Limited	
Status: [FINAL]	Revision / version: 1	Issue date: 11 October 2023

CONTENTS

1.0 Introduction 3

1.1 Location of the Eastern Mackenzie 4
1.2 Landscape 5
1.3 Study Approach 5

2.0 Statutory Context 7

2.1 Resource Management Act 7
2.2 Canterbury Regional Policy Statement 7
2.3 Mackenzie District Plan 8

3.0 Landscape Characterisation Methodology 10

3.1 Landscape Description 10
3.2 Landscape Characterisation Process 11
3.3 Land Typing 11

4.0 The Landscape Character Areas of the Eastern Mackenzie 13

4.1 Landscape Character Area 1: Fairlie Basin 15
4.2 Landscape Character Area 2: Two Thumb Range 18
4.3 Landscape Character Area 3: Orari 21
4.4 Landscape Character Area 4: Albury/ Rollesby Ranges 24
4.5 Landscape Character Area 5: Dalgety/ Hunters Hills Ranges 27
4.6 Landscape Character Area 6: Tengawai 30

5.0 Landscape Evaluation Methodology 33

5.1 Landscape Evaluation Methodology 33
5.2 Defining Landscape Values 34
5.3 Evaluating Landscape Values 37

6.0 Outstanding Natural Landscapes and Features in the Eastern Mackenzie 40

6.1 Tarahaoa ONL 41
6.2 Two Thumb Range ONL 43
6.3 Hunter Hills, Dalgety, Rolleston Ranges ONL 45
6.4 Pareora Gorge ONF 46
6.5 Opihi Gorge ONF 47
6.6 Raincliff ONF 48
6.7 Upper Orari SNL 49
6.8 Albury Range SNL 50
6.9 Rollesby Valley SNL 52
6.10 Mount Smith SNL 53

Appendix 1: Bibliography and References 54

Appendix 2: Landscape Evaluation Attributes 55

Appendix 3: Geopreservation Site Index Table 59

Appendix 4: List of Figures 61

1.0 Introduction

Environment Canterbury, in collaboration with Mackenzie District Council, has engaged Boffa Miskell Ltd (BML) to assist in assessing the landscape values and identifying areas of Outstanding Natural Features and Landscapes (ONF/Ls) within the Eastern Mackenzie.

The **Eastern Mackenzie District Landscape Study** has been carried out in the following stages:

- Desktop Review of Information
- Ground-based Site Visits
- Landscape Characterisation
- Landscape Evaluation to identify Outstanding Natural Features and Landscapes (ONF/Ls), Significant Natural Features and Landscapes (SNF/Ls) and Scenic Viewing Areas.
- Mapping of Outstanding Natural Features and Landscapes, Significant Natural Features and Landscapes and Scenic Viewing Areas.

A key outcome of this Landscape Study is to ensure that Outstanding Natural Features and Landscapes, Significant Natural Features and Landscapes and Scenic Viewing Areas, are consistent with each other in terms of their value and boundary identification. A detailed methodology for the characterisation and evaluation stages, as well as the mapping, is provided at the start of the respective report sections.

The preparation of the Landscape Study is in response to the Councils' obligation under the Resource Management Act (RMA) and the Canterbury Regional Policy Statement (CRPS) to protect ONF/Ls.

Through a review of the CRPS in 2010, Environment Canterbury (ECAN) completed a statutory review of the management of its landscapes and natural features in accordance with the requirements of the RMA[1]. In 2006, an earlier assessment, the 'Eastern Mackenzie Natural Values and Landscape Study' was prepared for the Council which was reviewed in 2013 and 2016. Both the characterisation and evaluation stages of this study utilise information from the District's previous landscape assessment *Eastern Mackenzie Landscape Review* (Graham Densem Landscape Architects & Boffa Miskell Limited, 2016), as well as the Canterbury Regional Landscape Study prepared for Environment Canterbury, and other existing information in the public realm. Therefore, this Landscape Study contains a review of this existing information, while assessing all of the district's landscapes within a comprehensive, up-to-date study based on best practice methodology. Through site visits it was ensured that the information was current and correct.

Recent relevant case law is considered as well as advances in the understanding of the concept of 'landscape' since the introduction of the RMA 1991.

The draft version of this study has undergone land owner consultation and stakeholder engagement in the first half of 2023. Land owners had the opportunity to discuss ONF/Ls on their land with MDC and to request a review of boundaries on site. Site visits were undertaken by MDC and BML in early June 2023 to specific parts of the Eastern Mackenzie District, most of which involved meeting land owners and accessing their private land for more detailed on-site investigations. Where these site visits resulted in amendments to the ONF/L boundaries, detailed maps were provided to land owners to inform them of the small-scale changes to the boundary outlines. Maps included in this report reflect these amendments.

[1] Canterbury Regional Landscape Study Review (July 2010) Boffa Miskell.

1.1 Location of the Eastern Mackenzie

Refer **Map 1, Graphic Supplement.**

The boundary of the Eastern Mackenzie follows:

- The Tarahaoa Range, including Four Peaks, Mount Peel, and High Claytons
- The Two Thumb Range from the Ben McLeod Range to Te Kopi-o-Ōpihi/Burkes Pass
- The Rollesby Range, Dalgety Range, and Te Tari-a-Te-Kaumira/ Hunters Hills to Mount Nessing
- The true right of the Tengawai River near the township of Cave
- The Opihi and Opuha Rivers

Neighbouring Districts

The Eastern Mackenzie forms a significant part of the wider Mackenzie District. It is adjoined by the Timaru District to the north and east, the Waimate District to the south, and Mackenzie Basin to the west. The Dalgety, Rollesby and Two Thumbs Ranges to the west of Te Kopi-o-Ōpihi/Burkes Pass form the boundary between Eastern Mackenzie and the Mackenzie Basin (see Image 1 below).

On the southern side the Waimate District includes the southern Te Tari-a-Te-Kaumira/ Hunters Hills and lower Hakataramea Valley. The lower reaches of the Tengawai and Opihi Rivers, the Eastern Mackenzie's two largest rivers, extend into Timaru District, where they meander across the plains before reaching the Canterbury Bight. Timaru District also includes Peel Forest Park, which crosses over into the Eastern Mackenzie.

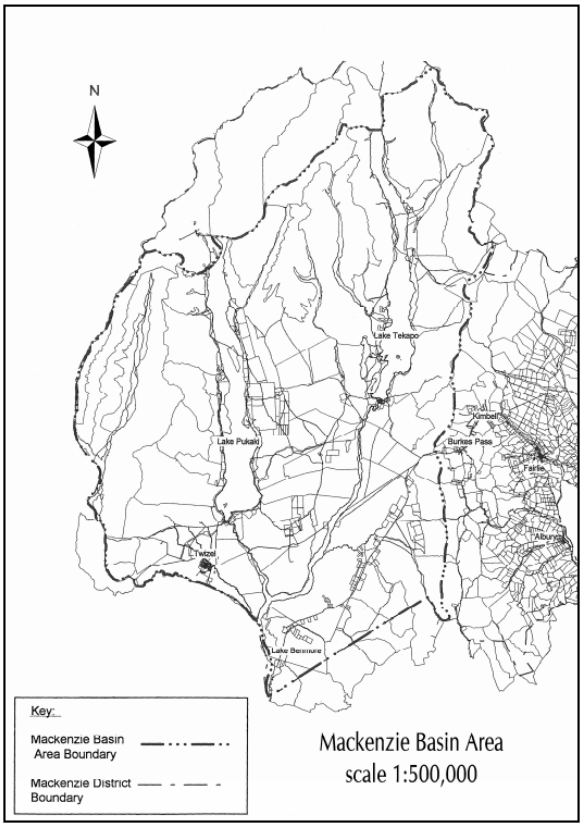


Image 1: Map of the Mackenzie Basin Area.

1.2 Landscape

Landscape, as defined by Tuia Pito Ora New Zealand Institute of Landscape Architects (NZILA), is the "relationship between people and place: It is the character of an area, how the area is experienced and perceived, and the meanings associated with it" (NZILA et al., 2021). While all landscapes are dynamic and continually change, the rate of change varies under different physical, social and economic conditions.

Defining landscape character relies on an analysis of topographic and various other mapping and spatial data (datasets), field survey and photography and aerial photography. For this particular study, much of the work has been based on a desk top analysis with field work to verify findings. The mapping of ONF/Ls, SNF/Ls and Scenic Viewing Areas has been undertaken at a broad, district-wide scale, based on a variety of information at different scales.

Within the Eastern Mackenzie District (refer to **Figure 1**), the landscape varies from expansive, rolling basins, to steep mountain ranges and high-country valleys. The description of landscape and subsequent landscape characterisation, undertaken as a first stage in the preparation of this Study, provides valuable information on the key attributes that contribute to landscape character. This involves the review of a range of existing information, including other research documents, field work and input from related technical experts.

However, description and characterisation alone gives little assistance to the identification of the importance of values attributed to the landscape and associated influences directing the management of landscape change. To inform a rational decision on what constitutes landscape values and associated management techniques, including areas requiring legal protection such as ONF/L, criteria and justification must also be made explicit.

Within landscape character areas there are often sites or features that are significant components of the wider landscape such as geological formations or mountain ranges, native vegetation, or important historic or cultural areas or features.

These areas and features add depth and meaning to the landscape and contribute to landscape character and its values. Communities identify with them and seek to recognise them in some way – through naming them and representing them in art and literature, for example. Once these characteristics have been identified, then values can be assigned and a special status or protection in terms of resource planning and management can be applied if necessary. This occurs through identifying the areas and features in regional policy statements and district plans and developing specific policies and rules around them.

Effective landscape management is underpinned by landscape assessment. If robustly and rigorously applied, landscape assessment should inform both the approach and decision-making process relating to how landscapes are or can be managed.

1.3 Study Approach

This Landscape Study comprises the following main assessment stages.

The first part of the Landscape Study includes a **Landscape Characterisation** of the Eastern Mackenzie. This first stage comprises a district-wide landscape characterisation, by which the district's landscapes are classified into broad land-types and character areas, drawing from land typing analysis conducted by Landcare Research on a regional scale[2]. This stage also includes a review of the current landscape study (Graham Densem Landscape Architects & Boffa Miskell Limited, 2016). Following the desktop analysis a two-day site visit was carried out by Boffa Miskell in March 2022 to provide up-to-date findings to be incorporated in the first and second stages. The site

[2] and contained within the Canterbury Regional Landscape Study Review (Boffa Miskell, 2010)

investigation included access along public roads to the parts of Eastern Mackenzie that can be viewed from roads.

The second stage comprises an **evaluation** of the district's different landscape values, including the identification of landscapes in accordance with Section 6b and Section 7c of the RMA. This stage has led to recommendations on which areas should be identified as ONF/L, SNF/L and a Scenic Viewing Area. A detailed assessment of landscape values present in each ONF/L and SNF/L is provided as part of this report.

As outlined, this Landscape Study was undertaken as an independent technical assessment by Boffa Miskell's landscape planners as well as limited ecological input. The brief for this landscape assessment did not involve the engagement of cultural specialist advice or mana whenua liaison. It includes input from Canterbury Regional Council and Mackenzie District Council staff through the review process. It is assumed that engagement with manawhenua is intended to take place through Mackenzie District Council. Once this engagement has taken place, the recognition of important values to manawhena can be integrated into this report.

2.0 Statutory Context

2.1 Resource Management Act

The Resource Management Act (RMA) is the principal statute governing the management of New Zealand's landscapes. The relevant directives within the Act regarding the protection and management of landscapes are set out in Part II, and include:

Section 6(b): The protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.

Natural features and landscapes that do not meet the criteria for being ranked as 'outstanding' can nonetheless qualify for protection under other clauses in section 6, or are required to be "maintained and enhanced" either as "amenity values" or part of the wider "quality of the environment" encompassed under RMA section 7(c) or section 7(f) respectively.

In addition, landscapes of the coastal environment, wetlands, rivers or lakes that are not "outstanding natural features and landscapes" are still required to have their "natural character" preserved under RMA section 6(a), or significant areas of indigenous vegetation or habitats of indigenous fauna protected under section 6(c).

Other related topics include Section 6(e) concerning the relationship of Māori and their culture and traditions with their ancestral lands, water, mahinga kai or settlement sites, waahi tapu, and other taonga. While publicly available information was used to inform the assessment in respect of mana whenua values, it should be noted that this landscape study is unlikely to include all mana whenua values.

As part of the wider environment to be managed under Part 5 of the RMA, adverse landscape effects resulting from inappropriate activities must be avoided, remedied or mitigated.

2.2 Canterbury Regional Policy Statement

The Canterbury Regional Policy Statement 2013 (CRPS) provides a regional level approach to objectives, policies and methods to resolve the resource management issues of the Region and to achieve the integrated management of the natural and physical resources of Canterbury. Chapter 12 sets out the issues, objectives, policies and methods in relation to Landscape. Of particular relevance to this study is the identification of an issue around the inconsistent identification and management of ONF/Ls around the region and thus variable levels of protection of values.

To address this issue, the CRPS includes objectives seeking the identification of ONF/L and their recognition and protection, and also the identification and management of other landscapes of importance for natural character, amenity or historic and cultural heritage reasons. The third objective seeks consistency of assessment of landscapes.

Policy 1 requires identification of ONF/L including recognition of the values set out in Appendix 4 to the Statement (which sets out the ONF/L at a regional scale from the 2010 Regional Landscape Study). To achieve this policy, territorial authorities are required to set out objectives, policies and methods, including maps, to identify ONF/Ls at the time of a relevant district plan review, or within 7 years of the CRPS becoming operative; whichever is sooner.

Policy 3 provides for identification of other important landscapes that are not outstanding natural landscapes, for natural character, historic cultural, historic heritage and amenity purposes. This is not a mandatory requirement for territorial authorities.

Consistency of identification is managed through policy 4 which states:

12.3.4 Consistency of identification and management of outstanding natural features and outstanding natural landscapes

Seek to achieve regional consistency in the identification of outstanding natural features and landscape areas and values by:

1. considering the following assessment matters which address biophysical, sensory and associative values when assessing landscapes in the Canterbury region:

(a) Natural science values

(b) Legibility values

(c) Aesthetic values

(d) Transient values

(e) Tāngata whenua values

(f) Shared and recognised values

(g) Historic values

The preparation of landscape assessments that take into account these values is a mandatory requirement for territorial authorities within the Canterbury Region.

2.3 Mackenzie District Plan

The Mackenzie Basin was the subject of Plan Change 13 to the Mackenzie District Plan and involved identification of the majority of the basin as an ONL with only small exclusions in the settlement and farm homestead areas. This finding in the Environment Court decision is consistent with the regional 2010 ONL study.

However, the ODP for Mackenzie District currently does not include any ONFLs outside the Mackenzie Basin, including the Eastern Mackenzie area (east of Te Kopi-o-Ōpihi/Burkes Pass). In 2013 a study was prepared for this part of the district by Densem and further refinements were made following the BML peer review in 2016.

Mackenzie District Council (MDC) is planning to undertake a staged District Plan Review (DPR), commencing in 2022. Since there are currently no ONLs identified for Eastern Mackenzie in the Operative District Plan, this report will inform the landscape related aspects of the DPR in relation to the Eastern Mackenzie area. As part of the DPR process the findings of this report were subject to community consultation and subsequently submissions where some further amendments may arise.

The key landscape related plan provisions relate to the higher-lying parts of the district, located above the 900m contour which restricts built development in the rural zone. Appendix K of the ODP includes Landscape Guidelines that provide guidance on siting, design, material and colours of buildings and structures; fences, power lines; tracks and roads; siting and design of tree planting and signs. These guidelines contain non-statutory recommendations, and their contents will require review in light of change in the district's landscape over the past three decades.

2.3.1 Section 4 - Takata Whenua

The landscapes of the Eastern Mackenzie are of cultural and spiritual importance to Kāti Huirapa (hapu), and Ngāi Tahu (Iwi). This is due to the natural and physical resources of the area, including traditional areas such as mahinga kai sites. Arowhenua Runaka, the principal Māori kainga of South Canterbury, still maintains kaitiaki over the health and survival of these resources, ensuring they are available for future generations. For Kāti Huirapa people, a way of life developed which was closely

related to the natural environment and gave them intimate knowledge of the land and resources through their movement through Te Wai Pounamu.

The stories of the ancestor's journeys of exploration and creation and the shaping of the land also acted as "oral maps", with place name meanings woven carefully into them. Within the Mackenzie District many of the hills and mountains bear the names of the waka (canoes) and members of their crews important to the hapu of Ngāi Tahu. Many of the rivers, lakes and plains are named to represent the movements and marks upon the land of these ancestral vessels and people (Dacker, 1990[3]). Natural resources were managed by strict tikaka (resource management protocols and practises) and observance to these tipuna. Today's knowledge of these traditional resource management techniques is maintained by Kaumatua (elders) of Kāti Huirapa.

Section 4 of the Mackenzie District Plan outlines the issues, objectives and policies directly relating to takata whenua. It includes areas of concern for takata whenua, including consultation, Arowhenua Runaka being recognised and Kaitiaki Runaka, the identification of waahi tapu, and the maintenance and enhancement of mahinga kai areas.

Kāti Huirapa prepared an iwi management plan for the area between the Rakaia and Waitaki Rivers in 1992[4], which includes the Eastern Mackenzie. While maps are included in the plan, there are no descriptions of the identified features.

[3] Bill Dacker- The People of the Place: Mahika Kai (1990)

[4] https://api.ecan.govt.nz/TrimPublicAPI/documents/download/2738399

3.0 Landscape Characterisation Methodology

As a starting point, this assessment recognises that all landscapes have values and form an integral part of the environment. Accordingly, an understanding of landscape character can provide an important tool which assists with managing landscape change. Whilst a primary focus of this assessment relates to identifying areas or features with notable landscape values, wider everyday rural landscapes can also be vulnerable to extensive landscape change.

To identify landscape values, the Eastern Mackenzie Landscape Study has relied upon professional judgement and drawn upon available information including GIS databases, but only a limited amount of field work with two days of site visits by a landscape architect. This application of professional judgment will subsequently sit within a process of community input and validation if the findings are adopted into the District Plan through a review process. Ultimately, landowners and the community, together with Council, will have input into the refinement of the landscape study and the implications for landuse through a notification process.

In summary, the outputs from the Landscape Study, seek to develop an understanding of landscape values and provide guidance on how best to manage landscape character and landscape values, be it for protection, productive land uses, development, enhancement or rehabilitation.

3.1 Landscape Description

'Landscape description' involves a process of data compilation during which the layers or components that make up the landscape are identified. The data gathered can also include available GIS datasets which include: landform, soil, geology, drainage patterns, vegetation cover, land uses, built development, infrastructure, heritage sites, cultural meaning and associations as well as associations with water bodies such as lakes, rivers and the sea.

Relevant GIS information that has been used to inform the extent of information, included:

- Topographical Maps (LINZ)
- Digital contour information at 20-meter intervals (LINZ)
- Land Cover Database v5.0 (LCDB Mainland New Zealand)
- Aerial Photography
- Geology (QMAP Geological Map of New Zealand Project - GNS Science)
- Soils (New Zealand Land Resources Inventory)
- Geopreservation Sites and Areas (GNS/qmap geology and New Zealand Geopreservation Inventory)
- Land Typing (Landcare Research – used for the Regional Landscape Study, 2010, Environment Canterbury)
- Heritage Sites (New Zealand Historic Places Trust)
- Ngāi Tahu Cultural Sites of Significance (various sources including Kā Huru Manu – Ngāi Tahu)
- Ecological Regions and Districts
- Elevation and Slopes
- Active Faults (GNS Science)

3.2 Landscape Characterisation Process

Landscape character can be defined as 'a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse'. It is an expression of the landscapes' collective attributes. Landscape character is each landscape's distinct combination of physical[5], associative[6] and perceptual[7] attributes. Put simply, landscape character is what makes an area unique

'Landscape characterisation' is the term used for the process of identifying, mapping and describing landscape character. Each area of landscape can be understood as having an identifiable character based on its individual or cumulative natural and cultural expression.

Characterisation provides a sound descriptive and analytical basis defining what makes an area of landscape distinct. Communities identify with 'their' landscapes and recognise them as having a particular combination of attributes and features that give them their distinctive 'character'. As defined in the latest NZILA guidance document[8] landscape character entails:

- Both tangible and intangible attributes; and
- The attributes in combination (as a whole); and
- Especially the combination that makes a place distinct or individual

Landscape characterisation typically involves identifying a series of landscape character areas or units. The process of landscape characterisation relies largely (although not entirely) on objective information and is intended to develop an understanding of 'sense of place'.

This element of the study is largely descriptive and objective. It draws on an understanding of the natural and cultural features, patterns and processes. Its focus is to identify distinguishing characteristics, which make one part of a district different from another. An understanding of the landscape characterisation of all landscapes at a district level provides a meaningful basis for the identification of significant and important landscapes within a subsequent landscape evaluation exercise.

For the Eastern Mackenzie Landscape Study the land typing work undertaken by Landcare Research as part of the Canterbury Regional Landscape Study Review (Boffa Miskell 2010) was of assistance. This parcel of work described and mapped 'Land types' to distinguish major physiographic land units on the basis of topography and lithology. In New Zealand, 'land typing' has proved a useful basis for landscape characterisation and subsequently identifying natural features and landscapes.

3.3 Land Typing

'Land types' are used to distinguish major physiographic land units on the basis of topography and lithology. In New Zealand, 'land typing' has proved a useful basis from which landscape characterisation has been based and forms a minimum requirement for identifying natural features and landscapes.

In the Eastern Mackenzie there are 9 Land Types, which have been determined by Landcare Research and are contained within the Canterbury Regional Landscape Study Review (Boffa Miskell

[5] The physical elements of the landscape, including its geomorphological, ecological and biological elements, and involving more objective and quantifiable data.

[6] Sometimes referred to as the 'meaning' of the landscape and including: cultural; historic values; shared and recognised values; and recreational and scenic values.

[7] involving consideration of aesthetic characteristics; the degree of naturalness of a landscape; its memorability, legibility and expressiveness; transient matters; and experiential aspects such as smells, sounds and a sense of remoteness

[8] Te Tangi a te Manu_Aotearoa New Zealand Landscape Assessment Guidelines [Final Draft, May 2021]

2010). These can be divided into 5 broad categories of which some are made up of accumulated land types:

- **Low Altitude Plains**, comprising: L2 Lower Plains Land Type; L24 – Inland Basins and Major Valleys.
- **Foothills and Downlands**, comprising: L14 – Southern Loess Mantled Soft Rock Hills and Downlands; L16 – Southern Structural Soft Rock Hills; L17 – Loess Mantled Hard Rock Hills and Downlands; L22 – Southern Hard Rock Hills and Mountain.
- **Front Ranges**, comprising: H10 Southern Eastern Front Range.
- **Intermontane Ranges and Basins**, comprising: H5 – Small Intermontane Basins and Valleys.
- **Semi-Arid Ranges,** comprising: H17 – Semi Arid to Humid Mountain Range

4.0 The Landscape Character Areas of the Eastern Mackenzie

The landscape of the Eastern Mackenzie is diverse and forms the picturesque gateway to the Mackenzie District. The landscape forms a transition between the more intensively farmed Canterbury Plains and the Mackenzie Basin surrounded by distinctive mountain ranges. The landscapes within this part of the Mackenzie District range from the expansive Fairlie Plains, back-country farms within the Rollesby and Upper Orari valleys, and the striking Two Thumb Mountain Range.

The Eastern Mackenzie is renowned for its pastoral and gently undulating landscape that extends along the routes to the wider Mackenzie country. The area was a key connection for local mana whenua from Arowhenua/Temuka to the Te Manahuna/Mackenzie Basin (Te Rūnanga o Ngāi Tahu, 2022). The Opuha and the Tengawai Rivers formed two major travel routes to the Te Manahuna/Mackenzie Basin and are of immense significance to mana whenua. On the banks of these rivers are also several limestone caves containing archaeological records of rock art.

The Orari, Opuha, Opihi and Tengawai Rivers are the largest rivers in the Eastern Mackenzie with catchments extending into the northern, and southern ranges. Many of the rivers in the Eastern Mackenzie are braided rivers, which are considered globally rare ecosystems (Braid New Zealand, 2022). The Orari, Opuha, Opihi, and Pareora Rivers each contain narrow incised gorges which are distinctive features within the Eastern Mackenzie, each clad in regenerating indigenous forest.

The predominant land use on the lower plains in the Eastern Mackenzie is pastoral farming. The northern part of the Eastern Mackenzie includes the rural township of Fairlie which is surrounded by flat and gently undulating rural pasture. To the south towards the settlement of Albury, the landscape becomes more enclosed and characterised by several streams and gullies in the upper Tengawai River catchment.

The Eastern Mackenzie not only contains extensive rural plains, but impressive mountain ranges and high-country valley. The Tarahaora Range and Two Thumb Ranges, frame the north and east of the Eastern Mackenzie and contain some of the area's most intact ecological hotspots. The Tarahaora Range and Tarahaora/Mount Peel take their names from one of the passengers who survived the capsize of the Ārai-te-uru waka off Matakaea (Shag Point). Little Mount Peel is also named after Tarahaora's wife, Huatekerekere, hence the area is of immense significance to local Ngāi Tahu hapu Kāti Huirapa (Te Rūnanga o Ngāi Tahu, 2022). The Tarahaora Range contains Peel Forest, an area with popular walking tracks and extensive areas of indigenous forest.

The Two Thumb Range is a popular recreation area for the Eastern Mackenzie and contains the area's highest peaks including Fox Peak (2330 masl), Mount Misery (2305), and Dobson Peak (2095). Rising steeply above the Fairlie Plains, the mountain range contains the Dobson and Fox Peak backcountry ski fields and extensive areas of tussockland on the mid to upper slopes. To the north-east, the remote upper Orari River catchment is confined by the Ben McLeod and High Claytons Ranges, with the Four Peaks Range to the south-east, where the Orari River cut its distinctive gorge through the foothills.

The Eastern Mackenzie is home to several back country stations within the Rollesby Valley, Dalgety Range, and upper Orari River catchment. These are some of the most remote areas of the Eastern Mackenzie, some of them only accessible by private roads, or gravel tracks. The Rollesby Valley is overlooked by the distinctive Albury Range and Single Hill to the east, and the Rollesby Range to the

west. The Rollesby Valley has a distinctive, enclosed rural high-country character which extends from Te Kopi-o-Ōpihi/Burkes Pass to Manahuna/ Mackenzie Pass. The southern area of the valley contains part of the upper Tengawai River catchment. The Dalgety Range and Te Tari-a-Te-Kaumira/ Hunters Hills confine the Eastern Mackenzie as distinctive mountain ranges to the south. The Te Tari-a-Te-Kaumira/ Hunters Hills include the northern section of the Te Tari a Te Kaumira/ Hunters Hills Conservation Area, which extends into Waimate District. The landscape is predominantly characterised by tussockland with areas of regenerating manuka and kanuka forest.

In total, the following six Landscape Character Areas have been identified for the Eastern Mackenzie area:

1. Fairlie Basin
2. Two Thumb Range
3. Orari
4. Albury/ Rollesby Ranges
5. Dalgety/ Hunters Hills Ranges
6. Tengawai

A description of each Character Area is provided in the following section and the character areas are shown on **Figure 12**.

Please note that a full analysis of cultural values, sites and areas has not been undertaken as part of this study, however existing and publicly available information on cultural sites and values has formed part of this assessment. It is intended that a more comprehensive analysis will be integrated via engagement with manawhenua, which may also allow incorporation of the work on Ngāi Tahu Cultural Sites of Significance.

4.1 Landscape Character Area 1: Fairlie Basin

Photograph 1: View of the upper Fairlie Plains looking towards the Two Thumb Range.

The Fairlie Basin Landscape Character Area forms the heart of the Eastern Mackenzie. The area is surrounded by neighbouring mountain ranges, the Two Thumb, Four Peaks, and Albury Range and contains the township of Fairlie. The character of this landscape is defined by gently undulating paddocks and rural foothills used for grazing, crops and forestry. The landscape character area contains local features such as Lake Opuha, to the north-east and the northern tributaries of the Opihi River.

4.1.1 Physical Characteristics

The Fairlie Basin Landscape Character Area is characterised by Neogene sedimentary rocks, primarily sandstone, gravels and siltstone to the south and Late Pleistocene gravels to the north (GNS Science, 2018). The area contains predominantly pallic and brown soils and contains several active faultlines. The largest faultlines present include the Albury Fault which extends the length of the Albury Range and the Fox Peak Fault which follows the base of the Two Thumb Range (GNS Science, 2020). Elevation in this character area ranges from approximately 300 to 600 masl.

The Fairlie Basin is substantially influenced by rivers and streams which traverse the landscape in a west to east direction. The underlying landform comprises historic riverbeds and alluvial plains dating back to the Late Pleistocene and Holocene (GNS Science, 2018). The character area forms the wider catchment for the Opihi River and includes a small, artificial, recreational lake and irrigation/ hydro-electricity reservoir, Lake Opuha.

Key landscape features within the Fairlie Basin Landscape Character Area include the Raincliff limestone escarpment and the Opihi Gorge. The Raincliff Reserve contains a distinctive Paleogene to Neogene limestone outcrop which overlooks the Opuha River (GNS Science, 2018). Upstream of the Opuha and Opihi River confluence is the Opihi Gorge. The gorge extends approximately five

kilometres upstream of Rockwood and is located on the District boundary to Timaru. The gorge is approximately 200 metres deep and has been identified as a site of natural significance in the Mackenzie District plan due to its breeding habitat for black fronted dotterel, and white winged black tern. Long tailed bats have also been recorded in the regenerating lowland bush which overlooks the gorge, which contains remnant totara (Mackenzie District Council, n.d.).

Historically, the Fairlie Basin was characterised by predominantly lowland short and tall tussockland, but also podocarp and hardwood forests, scrub and wetlands (McEwan, 1987). Given the development within the Fairlie Basin the landscape largely comprises expansive areas of pasture, including smaller areas of exotic forest near Pioneer Park and Ashwick Flat. Remnant forest tends to be present on the banks of streams and major rivers and includes species such as mahoe, broadleaf, fivefinger as well as lancewood, olearia spp. and large podocarps such as totara, matai and kahikatea.

Due to the intensification of the Fairlie Basin for farming there remains limited habitat for native birds and other species. Nevertheless, species such as bellbird, tomtit and kereru are present in the remnant forests (McEwan, 1987).

To the very north of this landscape character area is a site of natural significance near the head waters of the North Opuha River. The North Opuha/Clayton Station Wetland contains an intact stand of rush, sedge, and succulent herb swamp, as well as rare restiad peat bogs and tussockland (Mackenzie District Council, n.d.). Red tussock and alpine cushion log are both present which are rare plant communities.

4.1.2 Perceptual Characteristics

The Fairlie Basin Character Area is the gateway to the Eastern Mackenzie and wider Mackenzie country. It is the foreground to the larger mountain ranges including the Albury Range, Two Thumb Range, Ben McLeod Range, and Four Peaks Range, and is characterised by a patchwork of paddocks, forestry blocks, shelter belts, gravel roads, and rural settlements. Panoramic views of the basin and ranges are available throughout this character area, including seasonal changes such as snow-capped mountains during the winter months.

The Fairlie Basin Character Area extends to the foothills of the larger ranges which surround the basin and includes some of the Eastern Mackenzie's larger farms and high-country stations. The northern area of the Fairlie Basin contains several small, braided rivers which are highly expressive of their formative processes, connecting the mountain ranges to the plains below. Historic river channels of the larger rivers, including the North and South Opuha Rivers, are still legible features in this landscape today.

The Opihi River Gorge is a highly legible feature within this landscape character area. The deep, incised gorge section is highly expressive of its formative processes and known for its aesthetic vividness.

Transient characteristics within this landscape character area include the presence of snow on surrounding ranges in the winter months, a key attraction to the area. Lake Opuha also experiences significant fluctuations in water levels, storing water from the snow-melt and rainfall in the winter months, and acting as an irrigation reservoir in the summer. The lake is popular for fishing and boating, as well as camping and passive recreation and contributes to the aesthetic values in this part of the basin.

4.1.3 Associative Characteristics

The Fairlie Basin Character Area is the heart of the Eastern Mackenzie, and contains the largest settlement in the area, Fairlie township. The Fairlie Basin was a gateway for mana whenua travelling from Arowhenua/Temuka to Te Manahuna/Mackenzie Basin (Te Rūnanga o Ngāi Tahu, 2022). The

travel route Te Kopi-o-Ōpihi (Burkes Pass) followed the Opihi riverbed and is of immense significance to the local Ngāi Tahu hapu of Kāti Huirapa. The Opihi River was the principal travel route to the Mackenzie Basin, with areas in the upper catchment containing several archaeological records of rock art within the caves along the riverbed including near Raincliff. The river was also a known as having a rich food supply, with the lower reaches providing food for tuna, inaka, kokopu, and other native fish species.

The Raincliff Historic Reserve at the confluence of the Opuha and Opihi Rivers, is of immense cultural significance due to the several rock paintings found in the caves within the reserve. The area is now part of a forest restoration project and is collaboratively managed by Department of Conservation and the Ngāi Tahu Rock Art Trust (Department of Conservation, 2016).

The Fairlie Basin, along with much of the Eastern Mackenzie is strongly rooted in agricultural history and rural character. The township of Fairlie was settled during the late 1800's and is the main township within the Eastern Mackenzie. It is a service town for nearby farming settlements of Clayton, Ashwick Flat, and Sherwood Downs. More recently rural lifestyle developments have started to extend around Ashwick Flat in the vicinity of Lake Opuha which has somewhat changed the productive rural character in this area.

4.1.4 Key Characteristics

- Highly modified and gently undulating landform, largely used for farming purposes with distinctive patterns and vegetation relating to agricultural use
- Underlying topography of alluvial fans and historic riverbeds is expressive of its formatives processes in some places
- Several narrow, braided river corridors with key rivers including the Opihi and Opuha Rivers
- Largely characterised by Neogene to Late Pleistocene sedimentary gravels, sandstone and siltstone
- The two major faultlines within this landscape character area define the rolling plains of the Fairlie Basin from the Two Thumb and Albury Ranges
- Enclosed by the Albury Range, Two Thumb Range, Ben McLeod Range, and Four Peaks Range
- Panoramic views of the nearby mountain ranges are available throughout the flat and largely open landscape character area
- Transient presence of snow on the surrounding ranges during the winter months
- The Opihi River is of immense significance to local Ngāi Tahu hapu of Kāti Huirapa being a primary travel route from Arowhenua/Temuka to Te Manahuna/Mackenzie Basin
- The character area is highly influenced and characterised by its rural character and agricultural history.

4.2 Landscape Character Area 2: Two Thumb Range

Photograph 2: View of the Two Thumb Range forming the backdrop to the Fairlie Basin.

The Two Thumb Range Landscape Character Area forms the north-western boundary of the Eastern Mackenzie. A striking backdrop to the Fairlie Basin, the landscape character area extends from the Ben McLeod Range in the north-east to Te Kopi-o-Ōpihi/Burkes Pass in the south-west. The area largely comprises a steep mountain range extending beyond the study area which is popular with hunters, back country enthusiasts; the south-facing part of the range that falls within the landscape character area is largely inaccessible to the public, apart from access to the ski areas which provide highly valued recreation opportunities and are a major draw card of the Fairlie Basin. Due to its steep topography, the Two Thumb Range Landscape Character Area is characterised by bare and rocky scree slopes around its peaks and alpine tussocklands at mid-elevations. The snow-capped mountains of the high peaks are visible from the Fairlie Basin during the winter months.

4.2.1 Physical Characteristics

The Two Thumb Range Landscape Character Area is characterised by the steep mountain range formed from Late Permian to Early Triassic greywacke sandstone (GNS Science, 2018). The mountain range reaches an elevation which exceeds 2000 masl in areas with key features including Fox Peak (2330 masl), Mount Misery (2305), Dobson Peak (2095), and the Butler Saddle which extends into the Ben McLeod Range. Due to the topography within this landscape character area, catchment sizes are small and steep and form the upper reaches of the North and South Opuha Rivers which are tributaries to one of the Eastern Mackenzie's largest rivers, the Opihi River.

The Two Thumb Range is considerably influenced by the Fox Peak Fault, a regionally significant geopreservation site (*New Zealand Geopreservation Inventory*, n.d.). The faultline extends from Butler Saddle in the north and along the base of the Two Thumb Range until it terminates at Ross Stream near Rona in the Te Kopi-o-Ōpihi/Burkes Pass area (GNS Science, 2020). The faultline forms the distinctive boundary between the Two Thumb Range and the wider Fairlie Basin.

Due to the high altitude and steep topography of this landscape there are extensive areas of bare rock and scree slopes. Soils are shallow, alpine and unstable, making this a harsh environment for vegetation to establish. Nevertheless, historic vegetation in this area once included extensive tussocklands and alpine communities including Hall's totara and mountain beech forest on lower to mid slopes (McEwan, 1987).

Vegetation within this character area is limited to the mid to lower slopes of the Two Thumb Range, before transitioning into bare gravels and rocks. The majority of this landscape character area is covered in tussockland with species present including matagouri, coprosma scrub, *Festuca novae-zelandiae*, narrow-leaved snow tussock, and mountain daisy, on lower to mid slopes, with slim snow tussock present at higher altitudes (McEwan, 1987). Larger species found in the gullies and valleys includes mountain beech and podocarp-hardwoods including totara. At the base of the Two Thumb Range, low producing grassland and some small-scale forestry blocks are present as the landscape transitions into farmland. The ranges also contain several ecological communities such as high alpine boulderfield, and stonefield, and low alpine cushionfield, and herbfields, particularly near Mount Dobson (Wardle, 2021).

Due to its sparse and rugged character, birdlife found within the landscape character area is largely isolated to the forest remnants in the gullies and selected valleys. This includes species such as the brown creeper, tomtit, New Zealand falcon and, at higher elevations, the kea (McEwan, 1987). The Two Thumb Range Landscape Character Area is also the northern most limit for Dobson's speargrass, *Anisotome lanuginose*, and mountain lobelia.

To the north of this landscape character area at the headwaters of the North Opuha River is a site of natural significance (Mackenzie District Council, n.d.). A large stand of red tussock is located to the true left of the North Opuha River south-west of Walkers Spur and extends south towards the North Opuha Track. The site is of significance due to the rare occurrence of this species within the Eastern Mackenzie and wider Mackenzie District.

4.2.2 Perceptual Characteristics

The Two Thumb Range Landscape Character Area forms the western backdrop to the Eastern Mackenzie and contains some of the area's most striking and memorable mountain ranges. The landscape is highly expressive of its formative processes with the entire mountain range remaining coherent and largely unmodified with the exception of farm tracks, the Dobson and Fox Peak Ski Areas, and the areas of farmland on the lower slopes, particularly towards the south-west of this landscape character area.

At higher altitudes within areas such as the Two Thumb Range and North Opuha hunting blocks, the landscape becomes remote and exposed, with panoramic views of the Eastern Mackenzie and wider Mackenzie basin available. From the plains below, transient characteristics of this landscape include the snow-capped mountains present during the winter months which provide a striking backdrop to the Fairlie Basin.

The topography of this landscape and private landownership along the base of the slopes makes the landscape character area largely inaccessible to the public. Access to the hunting blocks is by gravel roads or walking tracks, with several huts scattered throughout. The Dobson Ski Field is accessible from State Highway 8 and follows the true left of the Firewood Stream.

4.2.3 Associative Characteristics

The Two Thumb Range is one of the most remote areas of the Eastern Mackenzie. The landscape character area provide the backdrop to the Fairlie Basin and is one of Canterbury's iconic mountain landscapes with its stark scree slopes and rocky peaks.

The Opuha/Ōpūaha River was recorded by Ngāi Tahu kaumatua in the late 1800s as being an important place for mahinga kai where tuna (eels), and taramea (speargrass) were gathered (Te Rūnanga o Ngāi Tahu, 2022).

There are two ski fields within this landscape character area including Dobson and Fox Peak. These are popular attractions to the area during the winter months for those wishing to experience a smaller ski field with fewer crowds. The ski fields users come to area from the wider mid and south Canterbury area to enjoy the recreation opportunities.

Opportunities for hunting in higher altitude areas and in the upper reaches of the North Opuha river are available throughout the year with several huts scatted throughout the Two Thumb Range. Hunters can expect to find chamois, red deer and tahr (Department of Conservation, 2022).

4.2.4 Key Characteristics

- Steep mountain range formed from Late Permian to Early Triassic greywacke sandstone.
- Key features include Fox Peak (2330 masl), Mount Misery (2305), Dobson Peak (2095), and the Butler Saddle which extends into the Ben McLeod Range.
- Small and steep catchment sizes which form the upper reaches of one of the Eastern Mackenzie's largest rivers
- Vegetation is largely dominated by tussockland on the lower to mid slopes, while in high altitude areas bare rock and gravels, including scree slopes, dominate
- Includes an area of red tussock within the headwaters of the North Opuha River which is considered to be a site of natural significance
- Forms a striking and highly coherent backdrop to the Fairlie Basin
- At higher altitudes, panoramic views of the Fairlie Basin and wider Mackenzie Basin are available
- Transient presence of snow during the winter months
- The Opuha/Ōpūaha River is an important place for mahinga kai where tuna (eels), and taramea (speargrass) were gathered
- The Dobson and Fox Peak Ski Fields are popular attractions during the winter months
- Opportunities for hunting throughout the year with huts spread throughout this landscape character area.

4.3 Landscape Character Area 3: Orari

Photograph 3: View of the upper Orari River catchment from the Meikleburn Saddle on Lochaber Road.

The Orari Landscape Character Area forms the north-eastern boundary of the Eastern Mackenzie and separates the Mackenzie District from Timaru District. The area is characterised by the upper Orari River catchment and has a remote and contains several rural high-country stations. The extent of this landscape character area includes the High Claytons and Hewson Range in the north-west, the Tarahaoa Range and the lower foothills to the east of the Mowbray catchment which overlook Lake Opuha and the Fairlie Basin below. Key features of this landscape character area include Mount Peel Conservation Area and the Orari River Gorge.

4.3.1 Physical Characteristics

The Orari Landscape Character Area is characterised by low mountain ranges formed from Late Permian to Early Triassic greywacke sandstone (GNS Science, 2018). Surrounding the Upper Orari River valley, the landscape contains several key peaks including Tripps Peak (1653 masl), Mount Catherine (1264 masl), Little Mount Peel (1311 masl), and Mount Peel (1743 masl). The western slopes of Mount Edith (1089 masl) are considered a nationally significant geopreservation site due to its easily discernible patterned ground covered in tussock (*New Zealand Geopreservation Inventory*, n.d.).

The Orari Landscape Character Area forms the upper catchment for the Orari River. The headwaters of the river extend as far inland as the Meikleburn Saddle and as far north as the Hewson Range. The topography of the landscape forms several valleys within the upper Orari River catchment including the Mowbray River, Bernard Stream, Dry Creek and the Hewson River. The catchment size becomes smaller towards Mount Peel where the landscape becomes steeper and passes through the Orari River Gorge.

The Orari River Gorge is a key feature of this landscape character area. The gorge is a largely unmodified, braided river system which connects the upper Orari River catchment in the Eastern Mackenzie to the Timaru District downstream of the gorge.

Due to this landscape being slightly lower in elevation than its neighbour the Two Thumb Range, the Orari Landscape Character Area once contained extensive areas of beech, podocarp and podocarp hardwood forest on the mid to lower slopes and subalpine tussockland and scrub above the treeline (McEwan, 1987). Much of this landscape character has been developed to form several leasehold and freehold high-country stations which extend into the upper catchment of the Orari River. To the north-east of Mount Peel and Little Mount Peel there are areas of matagouri scrub and tussockland in higher altitude areas (McEwan, 1987). Within the Peel Forest Park which straddles the Timaru and Mackenzie Districts, some areas of podocarp and lowland podocarp-hardwood forest remain. This includes species such as broadleaf, mahoe, kowhai, ribbonwood, fivefinger, pokaka, southern rata, mountain lacebark, and kanuka (McEwan, 1987).

Within this landscape character area there are several sites of natural significance. This includes the Bernard Stream, a fast single-channel river containing habitat for the nationally vulnerable whio/blue duck; Lynn Creek Bush and Scotsburn Bush which contains diverse podocarp forest habitat for bellbird, kereru, rifleman, and South Island pied tit (tom tit); and Coopers Stream Bush and Pick Axe Bush which have extensive stands of black beech forest (Mackenzie District Council, n.d.).

4.3.2 Perceptual Characteristics

The Orari Landscape Character has an enclosed rural character which is characterised by the upper Orari River catchment. The area forms the north-eastern backdrop to the Eastern Mackenzie. Difficult to access and largely remote in character, the landscape character area contains the highly legible High Clayton Ranges and the Tarahaoa Range which includes local landmarks such as Mount Peel and Little Mount Peel. Due to the remote nature of this landscape character area, it is largely inaccessible to the public. Access to the heart of this landscape character area which is largely formed by the Blue Mountain and Lochaber Stations is by Lochaber Road near Clayton. Access from the east is available through Peel Forest.

The Orari River is a prominent and memorable feature within this character area, traversing the landscape from the Meikleburn Saddle to the Orari River Gorge.

Transient characteristics include the presence of snow during the winter months. This is particularly legible to visitors of Peel Forest where Mount Peel and Little Mount Peel are often covered in snow during the winter months.

4.3.3 Associative Characteristics

Both Mount Peel and Little Mount Peel are of significance to local Ngāi Tahu hapu Kāti Huirapa based at Arowhenua/Temuka. Tarahaoa (Mount Peel) and Huatekerekere (Little Mount Peel) are named after two passengers who survived the capsize of the Ārai-te-uru waka off Matakaea (Shag Point) (Te Rūnanga o Ngāi Tahu, 2022). Tarahaoa was accompanied by his wife Huatekerekere, and their son and daughter Kirikirikatata and Aroarokaehe. The family went on to explore what is now the Peel Forest area, and unable to return to the waka before daylight, Tarahaoa and Huatekerekere transformed into what is known today as Mount Peel and Little Mount Peel (Te Rūnanga o Ngāi Tahu, 2022). Their children are represented by two large trees within Peel Forest. Tarahaoa is named as the principal mountain for those within the Kāti Huirapa hapu.

Today the Orari Landscape Character Area largely comprises high-country farms. Hunting is permitted within the Blue Mountain Conservation Area and the Mount Peel/Waikari Hills Conservation Area. Hunters can expect to find chamois, red deer, pigs and tahr in this area (Department of Conservation, 2022).

For those wishing to explore Peel Forest Scenic Reserve, there are several walking tracks of varying degrees of difficulty. A popular track is to the summit of Little Mount Peel and Mount Peel for those wishing to traverse the ridgeline of the Tarahaoa Range.

4.3.4 Key Characteristics

- Low mountain ranges formed from Late Permian to Early Triassic greywacke sandstone
- Topography and landform are highly influenced by the Orari River
- Key features include Tripps Peak (1653 masl), Mount Catherine (1264 masl), Little Mount Peel (1311 masl), and Mount Peel (1743 masl). The western slopes of Mount Edith (1089 masl) are considered a nationally significant geopreservation site.
- The Orari River Gorge is a prominent and legible landscape feature
- Characterised by high country grassland and tussockland although several areas to the east and south of Mount Peel contain podocarp and lowland podocarp-hardwood forest.
- Five sites of natural significance are found within this landscape character area including Bernard Stream, a fast single-channel river containing habitat for the nationally vulnerable whio/blue duck
- North-eastern backdrop to the Fairlie Basin
- Transient presence of snow during the winter months
- Tarahaoa and Huatekerekerere are of significance to local Ngāi Tahu hapu Kāti Huirapa. Tarahaoa is named as the principal mountain for those within the Kāti Huirapa hapu
- Two high- country stations form the majority of this landscape character area including Blue Mountain and Lochaber Stations
- Peel Forest Scenic Reserve is a popular recreational attraction for visitors and includes the Little Mount Peel walk that allows views into the area.

4.4 Landscape Character Area 4: Albury/ Rollesby Ranges

Photograph 4: View of the Single Hill Range (left) and Rollesby Range (right) from the Rollesby Valley.

The Albury/ Rollesby Ranges Landscape Character Area is nestled between the Albury and Rollesby Ranges and includes both ranges and the valley contained between them. The Rollesby Range forms the western boundary between the Eastern Mackenzie and the Mackenzie Basin area. Highly influenced by the Albury and Dalgety Faults the landscape character area is expressive of its formative processes with the two low mountain ranges extending from Te Kopi-o-Ōpihi/Burkes Pass to Manahuna/ Mackenzie Pass and the Tengawai River. The area is difficult to access, apart from the Rollesby Valley Road, due to the vast majority of this landscape character area being in farmland. The Albury/Rollesby Range Landscape Character Area contains an expansive valley floor, steep, low mountain ranges with gently undulating foothills, and a well-established rural high-country character.

4.4.1 Physical Characteristics

The Albury/ Rollesby Ranges Landscape Character Area is characterised by the Rollesby (1377 masl) and Albury (1323 masl) Ranges. The Rollesby Range and western face of the Albury Range comprise Late Permian to Early Triassic greywacke sandstone similar to the neighbouring Two Thumb Range (*New Zealand Geopreservation Inventory*, n.d.). The eastern face of the Albury Range is characterised by the Albury Fault zone, a reverse fault (GNS Science, 2020). The faultline remains active and is orientated in a north-south direction along the eastern base of the Albury Range. The eastern face of the Albury Range in contrast is formed by Paleogene to Neogene sedimentary rock including limestone and sandstone (GNS Science, 2018).

Between the Rollesby and Albury Ranges lies the Single Hill Range and upper reaches of the Tengawai and Opihi River catchments. The catchments, separated on a low pass to the north of Single Hill, form the Rollesby Valley which extends from Te Kopi-o-Ōpihi/Burkes Pass in the north to the Manahuna/ Mackenzie Pass in the south. Extending the length of the Single Hill Range is the Dalgety Fault, a reverse fault which follows the Avalanche Stream (GNS Science, 2020). Aside from

the active faults in this landscape character area, key landscape features include the Tengawai River, and the Manahuna/ Mackenzie Pass which connects into the Mackenzie Basin.

While the area has a more remote, high-country character than the Fairlie Basin, the lower lying areas of this landscape character area are used for farming while the upper slopes are predominantly tussockland and matagouri scrub. Historic vegetation on the lower slopes would have once included extensive tussocklands including species such as silver and fescue tussock (McEwan, 1987). Within the gullies on the eastern face of the Albury Range are areas of regenerating hardwood forest including species such as mountain ribbonwood, kohuhu, lancewood spp., and mountain totara. The sub-canopy also includes species such as fuchsia, koromiko, marbleleaf, *Clematis paniculata*, korokio, astelia spp., and cabbage tree (Department of Conservation, 2006).

Within the Albury/ Rollesby Range Landscape Character Area there are two sites of natural significance (Mackenzie District Council, n.d.). The first relates to a large portion of the Rollesby Range. This area contains an excellent example of the alpine species *Dracophyllum uniflorum* (turpentine scrub) and includes abundant populations of *Helichrysum plumeum.* The banks of the Tramway Stream are also a site of natural significance due to the regenerating broadleaf forest amongst remnant Hall's totara. The area contains the nationally threatened coral broom and provides habitat for several native bird species including the New Zealand Falcon.

4.4.2 Perceptual Characteristics

The Albury Range (up to 1323 masl) is a low mountain range to the west of State Highway 8 between Albury and Te Kopi-o-Ōpihi/Burkes Pass. The landscape character area, including the Rollesby Valley, is one of the areas in the Eastern Mackenzie less travelled, predominantly containing large farm blocks with extensive grazing .

The Rollesby and Albury Ranges form an enclosed valley which contains a rolling rural landscape and mosaic of shelter belts, paddocks, gravel roads, and ancient riverbed channels. To the north of the Single Hill Range, the area has an expansive rural character which is easily accessed from the township of Te Kopi-o-Ōpihi/Burkes Pass. Southern areas of the valley near the Tengawai River and Mackenzie Pass are more difficult to access through the narrow Tengawai River valley and Warratah Saddle. Ford crossings, transmission lines and narrow gravel roads flanked by rolling hills are key characteristics of this area. From the east, the Albury Fault Zone creates a legible boundary between the Fairlie Basin and the steep slopes of the Albury Range.

Like most of the Eastern Mackenzie, transient characteristics of this landscape character area include the presence of snow during the winter months. The clusters of exotic trees around farmsteads create a distinctive sense of place in this cohesive high-country landscape.

4.4.3 Associative Characteristics

The Albury/ Rollesby Ranges Landscape Character Area was an important connection between Arowhenua/Temuka and Te Manahuna/Mackenzie Basin. The route followed the Te Ana-a-Wai/Tengawai River corridor until it reached what is now known as Manahuna/ Mackenzie Pass. Throughout this route, there are several remnant limestone rock shelters including over one hundred rock art images (Te Rūnanga o Ngāi Tahu, 2022). These have been painted on the walls and ceilings of the shelters in black, red and white pigments and reflect the activities of those who walked this route.

Te Kopi-o-Ōpihi/Burkes Pass, discovered by Europeans in 1855, it became the last village before travellers reached the Mackenzie Basin. The area was established for farmers grazing sheep and this has continued through to today where the landscape character area comprises large farm blocks and back country farms.

As this area is largely farmed, the Albury/ Rollesby Range Landscape Character Area has limited public access with few roads. Opportunities for hunting are available within the Chetwynd Conservation Area, which includes sections of the Tramway and Coal Streams to the ridgeline of the Albury Range. Hunters can expect to find chamois, red deer, and thar (Department of Conservation, 2022).

4.4.4 Key Characteristics

- The Rollesby Range and western face of the Albury Range comprise Late Permian to Early Triassic greywacke sandstone
- The eastern face of the Albury Range comprises Paleogene to Neogene sedimentary rock including limestone and sandstone
- Highly influenced by the Albury Fault Zone, a reverse faultline which extends the length of the Albury Range's eastern face
- The area also includes the Dalgety Fault, a reverse fault which follows the Avalanche Stream
- Extensive areas of tussockland and matagouri scrub above areas of grazed pasture
- Two sites of natural significance including an area of the alpine species *Dracophyllum uniflorum* (turpentine scrub) on the Rollesby Range and regenerating broadleaf forest amongst remnant Hall's totara on the banks of the Tramway Stream.
- The area has an expansive rural high-country character from Te Kopi-o-Ōpihi/Burkes Pass and a sense of remoteness from Manahuna/ Mackenzie Pass
- The southern boundary of this landscape character area was once an important connection between Arowhenua/Temuka and Te Manahuna/Mackenzie Basin and contains several remnant limestone rock shelters
- Te Kopi-o-Ōpihi/Burkes Pass was established to graze sheep and for other farming purposes. The town and the rural character associated with this landscape character area remains today.

4.5 Landscape Character Area 5: Dalgety/ Hunters Hills Ranges

Photograph 5: View of the Te Tari-a-Te-Kaumira/ Hunters Hills from Mount Nessing Road

The Dalgety/ Hunters Hills Ranges Landscape Character Area forms the south-western boundary of the Eastern Mackenzie. The area includes the Dalgety Range, Te Tari-a-Te-Kaumira/ Hunters Hills and Mount Smith, and is characterised by the steep mountain ranges, and remote and pastoral landscape which forms the headwaters of the Tengawai River catchment. Part of the landscape character area is encompassed within the Hunters Hills Conservation Area which extends through to the Waimate District. The conservation area is popular for hunting and tramping.

4.5.1 Physical Characteristics

The Dalgety/ Hunters Hills Ranges Landscape Character Area includes the northern extent of the Te Tari-a-Te-Kaumira/ Hunters Hills, the upper reaches of the Hakataramea Valley and Exe Stream. The Dalgety Range, and the Te Tari-a-Te-Kaumira/ Hunters Hills which form the south-western boundary of the Eastern Mackenzie, comprise Late Permian to Early Triassic greywacke sandstone (GNS Science, 2018). Key features within this landscape character area include Mount Dalgety (1752 masl), and Mount Nessing (1601 masl), as well as Te Huruhuru and Mount Nimrod/Kaumira (1525 masl) which are located on the boundary between the Mackenzie and Waimate Districts.

The two mountain ranges are separated by the Dalgety Fault which extends from Lockharts Stream in the north to the convergence of the Hakataramea River and the Snow River in the south. The faultline is a reverse fault and is a clearly legible feature within the upper Hakataramea and Lockhart catchments (GNS Science, 2020).

There are four major catchments within this landscape character area. The Hakataramea River and Lockhart Stream both drain into the inner Dalgety Valley catchment to the west of the Hunter Hills. On the eastern side, Exe Stream is as a major tributary of the Tengawai River headwaters; and the slopes of Mount Nessing and Mount Smith drain into the tributaries of the Opawa River. The

headwaters of the Pareora River stem from the eastern side of the Te Tari-a-Te-Kaumira/ Hunters Hills within Waimate District.

A key feature within the Dalgety/ Hunters Hills Ranges Landscape Character Area is the Pareora Gorge, which is located on the District boundary, south-east of Mount Smith. The gorge is approximately 400 metres deep and is overlooked by an extensive area of regenerating native forest and tussockland.

Historic vegetation within this landscape character area once included extensive tussocklands on the lower slopes of the Dalgety/ Hunters Hills Ranges Landscape Character Area (McEwan, 1987). This included species such as matagouri, silver tussock, snow tussock, and *Dracophyllum* scrub. Today vegetation within this landscape character area is predominantly tussockland and matagouri scrub on the upper slopes, and extensively grazed farmland on the lower slopes.

A site of natural significance is located on the eastern slopes of Mount Dalgety, which contains the only known extensive area of *Chionochloa rigida* in the Grampians Ecological District (Mackenzie District Council, n.d.). The area also includes matagouri, *Dracophyllum uniflorum*, and fescue tussock.

4.5.2 Perceptual Characteristics

The Dalgety/ Hunters Hills Ranges Landscape Character Area forms the coherent, rolling, rural backdrop to the Tengawai plains and southern part of Eastern Mackenzie. The landscape is highly expressive of its formative processes, including the active faults which define some of the valleys within this landscape character area.

The inner part of the Landscape Character Area is difficult to access, being predominantly farmland with few public roads. Due to the remote nature of this landscape character area, much of the landscape cannot be easily viewed by the public and is only accessible on four-wheel drive tracks. The skyline of the Te Tari-a-Te-Kaumira/ Hunters Hills and Dalgety Ranges forms a cohesive and scenic backdrop to this part of the district when viewed from a distance.

The landscape character area experiences the transient presence of snow during the winter months.

4.5.3 Associative Characteristics

Pureora, the correct spelling for the Pareora River, derives its name from one of the passengers on the Ārai-te-uru waka, which capsized off Matakaea (Shag Point) on the Otago coastline. Unable to return to the waka by daylight, Pureora transformed into the Pareora River (Te Rūnanga o Ngāi Tahu, 2022).

The Te Tari-a-Te-Kaumira/Hunters Hills are named after Te Kaumira, a tupuna (ancestor) of Ngāi Tahu. Te Kaumira led a travelling party from the Hakataramea Valley to the Pureora (Pareora) District, however while crossing the mountain range, the party was confronted by an unexpected snowstorm. Once reassembled after seeking shelter from the storm, the party realised that Te Kaumira was missing. Te Kaumira's body was found in a nearby rock shelter, and the mountain range was subsequently named in Te Kaumira's memory (Te Rūnanga o Ngāi Tahu, 2022).

The Te Tari-a-Te-Kaumira/ Hunters Hills received its name from the surveyor Charles Torlesse, after a local Ngāi Tahu leader, Te Huruhuru explained how the hills were an exceptional hunting ground (Te Rūnanga o Ngāi Tahu, 2022).

The Dalgety/ Hunters Hills Ranges Landscape Character Area includes a small portion of the upper Hakataramea River catchment. The river was a key route to Te Manahuna (the Mackenzie Basin) connecting to the Hakataramea Pass (Te Rūnanga o Ngāi Tahu, 2022).

The landscape character area contains several conservation areas including small sections of the Te Tari-a-Te-Kaumira/ Hunters Hills Conservation Area, Ahanui Conservation Area, and Hunter Hills

Scenic Reserve which extends into the Waimate District further south. The area also includes Mount Dalgety Conservation Area, and Tasman Smith Scenic Reserve. Within each of these conservation areas opportunities for hunting are available.

4.5.4 Key Characteristics

- The Dalgety/ Hunters Hills Ranges landscape character area comprises Late Permian to Early Triassic greywacke sandstone
- Key features include Mount Dalgety (1752 masl), and Mount Nessing (1601 masl), as well as Te Huruhuru and Mount Nimrod/Kaumira which straddle the boundary between the Mackenzie and Waimate Districts
- The Dalgety Fault is a reverse fault and is a clearly legible feature within the upper Hakataramea and Lockhart catchments
- A key feature within the Dalgety/ Hunters Hills Ranges Landscape Character Area is the Pareora Gorge, which is approximately 400 metres deep and is overlooked by an extensive area of regenerating native forest and tussockland
- Vegetation within this landscape character area is predominantly tussockland and matagouri scrub on the upper slopes, and farmland on the lower slopes
- A site of natural significance is located on the slopes of the Dalgety Range, which contains the only known extensive area of *Chionochloa rigida* in the Grampians Ecological District
- Forms the coherent and scenic skyline backdrop and rolling, rural mid-ground in views from the Tengawai plains and southern part of the Eastern Mackenzie
- Remote, and different to access with few public roads
- Transient presence of snow during the winter months
- The Hakataramea River was a key route to Te Manahuna (the Mackenzie Basin) connecting to the Hakataramea Pass
- The landscape character area includes several conservation areas including the Te Tari-a-Te-Kaumira/ Hunters Hills Conservation Area, Ahanui Conservation Area, Hunter Hills Scenic Reserve, Mount Dalgety Conservation Area, and Tasman Smith Scenic Reserve
- Opportunities for hunting available

4.6 Landscape Character Area 6: Tengawai

Photograph 6: View of the Tengawai River landscape character area looking towards the Te Tari-a-Te-Kaumira/ Hunters Hills from Mount Nessing Road.

The Tengawai Landscape Character Area forms the southern-eastern extent of the Eastern Mackenzie. The area is characterised by the gently undulating rural landscape and incised gullies which form the middle reaches of the Tengawai River catchment. Overlooked by the Albury and Dalgety Ranges, the Tengawai River is a key feature of this landscape character area, and was a historic connection for mana whenua from Arowhenua/Temuka to the Te Manahuna/Mackenzie Basin. State Highway 8 connects Fairlie to Timaru through this area and serves as one of the gateways into the area.

4.6.1 Physical Characteristics

The Tengawai Landscape Character Area is characterised by the wider Tengawai River catchment. Formed from Neogene to Late Pleistocene gravels and sandstone (GNS Science, 2018), the landscape is highly expressive of its formative processes which include ancient river terraces, and a network of narrow, braided, streams which are key tributaries of the Tengawai River. As the underlying geology is predominantly formed from greywacke derived gravels, soils within this landscape character area are often poor draining and wet during the winter, and prone to drying out in the summer (Manaaki Whenua Landcare Research, 2022). Generally, the elevation in this character area ranges from 150 masl near the settlement of Cave on the district boundary, to 350masl in the upper valleys. The elevation reaches 500 masl at the base of the northern Te Tari-a-Te-Kaumira/ Hunters Hills.

A legible feature within the Tengawai Landscape Character Area is the Opawa Fault, a small reverse fault which extends approximately six kilometres from the small settlement of Chamberlain in the south to Warratah Road in the north (GNS Science, 2020). The faultline can be observed at its northern end from Warratah Road. Immediately north of limestone valley road are also a series of

sinkholes located on the hills near the Tengawai River. The sinkholes are formed from limestone being slowly eroded away by water, which can pass through the porous stone.

The Tengawai River is the defining landscape feature within this landscape character area. The braided river system has its headwaters in the Rollesby and Dalgety Ranges and forms the key valley to the south-east of the Eastern Mackenzie. The catchment rises steeply to the west near the Te Tari-a-Te-Kaumira/ Hunters Hills and Mount Smith but has a gentle gradient on the lowland plains below. This includes the distinctive river terrace to the true left of the river which reaches 500 masl at its highest point and is formed from the now inactive Brothers Fault.

Prior to clearance for farming, historic vegetation on the plains and hills included lowland short tussockland and tall tussockland including species such as silver tussock, fescue tussocks, and *chionochloa spp* (McEwan, 1987). Remnant areas of podocarp hardwood forest remain on the Tengawai River, and include species such as mahoe, broadleaf, five finger, lancewood, *oleria spp*., *hebe spp*., totara, matai and kahikatea.

As much of the area has been cleared, there a few bird species present. Rifleman, bellbird, tomtit, and kereru are present within the areas of remnant podocarp hardwood forest (McEwan, 1987).

4.6.2 Perceptual Characteristics

The Tengawai Landscape Character Area is characterised by an open and undulating rural landscape containing shelter belts and paddocks. The area is largely experienced by travelling State Highway 8 within the Tengawai River corridor which is more enclosed in places before reaching the wider Fairlie Basin. Inland of State Highway 8 the landscape becomes more remote and difficult to access. Several dead-end gravel roads and farm tracks extend inland towards the Te Tari-a-Te-Kaumira/ Hunters Hills and Mount Nessing, following several incised gullies and braided streams. These provide access to the small settlements in the upper reaches of the catchment including Dalzell, Mount Nessing, Chamberlain, and Limestone Valley.

To the north of the landscape character area there is access to the Manahuna/ Mackenzie Pass via the Limestone Valley. This is a less travelled connection to the Mackenzie Basin and traverses the undulating lowland rural landscape and upper Tengawai River catchment.

4.6.3 Associative Characteristics

The Te Ana-a-Wai/Tengawai River was another primary route used by mana whenua when travelling from Arowhenua/Temuka to the Te Manahuna/Mackenzie Basin (Te Rūnanga o Ngāi Tahu, 2022). Te Ana-a-Wai derives its name from the upper catchment of the river where the source originates from a series of caves, hence the name Ana, the Māori name for cave (Te Rūnanga o Ngāi Tahu, 2022). The river was renowned for being a source of weka and tuna (eels), and today, the several rock art images found within the limestone caves are still visible.

The Tengawai Landscape Character Area today is largely associated with farming, with historic sites including the Mount Nessing Homestead.

4.6.4 Key Characteristics

- Characterised by the Tengawai River catchment including Neogene to Late Pleistocene gravels and sandstone, ancient river terraces, and a network of narrow, braided, streams
- The Opawa Fault, a small reverse fault which extends approximately six kilometres from the small settlement of Chamberlain in the south to Warratah Road in the north is a legible feature in this landscape character area

- The Tengawai River is the key feature in this landscape character area. The braided river system has headwaters in the Rollesby and Dalgety Ranges and forms the valley to the south-east of the Eastern Mackenzie.
- Remnant areas of podocarp hardwood forest remain on the Tengawai River, and include species such as mahoe, broadleaf, five finger, lancewood, *oleria spp*., *hebe spp*., totara, matai and kahikatea
- Largely a pastoral farming landscape with a higher level of intensification in the valleys
- Undulating rural landscape containing shelter belts and paddocks with several dead-end gravel roads and farm tracks extend inland towards the Te Tari-a-Te-Kaumira/ Hunters Hills and Mount Nessing, following several incised gullies and braided streams
- The Te Ana-a-Wai/Tengawai River was another primary route used by mana whenua when travelling from Arowhenua to the Mackenzie Basin. Te Ana-a-Wai derives its name from the upper catchment of the river where the source originates near a series of caves, hence the name Ana, the Māori name for cave.

5.0 Landscape Evaluation Methodology

5.1 Landscape Evaluation Methodology

A fundamental output of this Landscape Study is the identification of Outstanding Natural Landscapes and or Outstanding Natural Features that meet the 'outstanding' threshold under RMA Section 6(b).

The two criteria which must be met are that the landscape or feature is both 'natural' and 'outstanding'.

In terms of section 6(b), 'natural' usually means perceived naturalness rather than (for instance) the integrity or intactness of natural systems. These criteria for naturalness identified in case law (C180/1999 - WESI vs QLDC p. 57) include:

- relatively unmodified and legible physical landform and relief;
- the landscape being uncluttered by structures and/or obvious human influence;
- the presence of water (lake, river, sea);
- the presence of vegetation (especially native vegetation) and other ecological patterns.

The first two criteria of naturalness are necessary components of a natural landscape as they are indicators of human induced modification. However, the last two criteria are not essential as highly natural landscapes may have little or no water and vegetation cover in the absence of human modification, such as evidenced within parts of the mountain ranges or high country. Notwithstanding this, it is accepted that the last two criteria may enhance naturalness in landscape terms, however their absence does not necessarily detract from naturalness.

'Outstanding' encapsulates both quality and relativity: *"conspicuous, eminent, especially because of excellence"* and *"remarkable in".* It is a matter of reasoned judgement. An ONF or ONL will often be obvious. (NZILA et al., 2021)

Case law has found that the word 'outstanding' in 'outstanding natural features and landscapes' in section 6(b) means 'conspicuous, eminent, especially because of excellence' and 'remarkable' (C180 / 1999 - WESI vs QLDC p. 48). Usually, an outstanding natural landscape should be so obvious (in general terms) that there is no need for expert analysis (C180/1999 - WESI vs QLDC p. 57).

As part of this landscape study, second tier landscapes and features were also identified that did not meet the threshold for ONFs or ONLs. These landscapes and features are referred to as "Significant" in the context of this study and the identification relates more to their visual amenity as addressed under Section 7(c) of the RMA.

The RMA defines amenity values as:

> *"those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes."*

The quality of the environment is not defined by the RMA.

Hybrid terms such as 'visual amenity', 'rural amenity', and 'natural amenity', are shorthand for 'landscape values that contribute to amenity values'. 'Significant Landscapes' provides scope for broader landscape values than those limited to 'amenity values' (NZILA et al., 2021).

In recognition of the extra quality which SNF/Ls possess in comparison to other rural areas, such landscapes express important 'sensory' and 'associative' attributes that contribute to their visual amenity. In the context of this study, visibility is not in itself a criterion for a landscape to qualify as a

SNF/L. Where visible, a SNF/L generally also contributes to widely recognised sensory values which may relate to the following:

- is adjacent to an outstanding natural feature or landscape;
- includes important ridges or hills;
- provides for recreational activities;
- accommodates important scenic roads; or
- a combination of the above.

Sensory values form a key factor which leads to landscape appreciation and subsequent identification as a SNF/L. Whilst SNF/Ls may qualify as 'outstanding' in terms of sensory attributes, such areas may also be insufficiently 'natural' to qualify as an ONL. Accordingly, 'biophysical' attributes are often lower in SNF/L than in ONF/Ls, acknowledging human activity can strongly influence amenity values and landscape character. Notwithstanding this, biophysical factors which remain may continue to contribute important landscape values.

Combined with sensory values, associative values take account of how a landscape is likely to be valued by members of the community. This aspect of the study adopts a professional expert approach which considers how landscape values likely contribute to 'sense of place' through known community associations. Where associative values are identified, the sources of such values are referenced, including identification of historic sites or recorded cultural associations.

As with ONL, all SNF/Ls must also be of a sufficient scale to be recognised as a landscape. Accordingly, to qualify as a landscape it must comprise of a larger entity that is normally experienced from within or seen as the whole of the outlook.

5.2 Defining Landscape Values

Landscape values reflect the relative value of different landscapes or natural features held by society. A landscape may be valued by different people for a wide variety of reasons. Such values may also change over time. Most commonly, an assessment of landscape value underpins the traditional approach to conserving and protecting the most highly valued landscapes. This typically reflects formal acknowledgment through a recognised landscape classification process.

Landscape values can be described as the environmental or cultural benefits that are derived from various landscape attributes. These attributes will, in many instances, be the components and image of the landscape as established in the assessment of landscape character. In some instances, a particular landform may itself be considered to hold important value. It may be that the character of a given landscape makes it a particularly striking representative of its kind or providing identity based on its uniqueness or rarity.

When judging landscape value, it is recognised that there are various ways in which landscapes may be appreciated and thresholds for value determined. The range of criteria that the Environment Court has reinforced for landscape practitioners to consider when evaluating landscapes is referred to as the Amended Pigeon Bay criteria or factors (C32/1999 – Pigeon Bay Aquaculture Ltd v CRC and C180/1999 – Wakatipu Env. Society v QLDC). These criteria or factors include:

1. the natural science factors - the geological, topographical, ecological and dynamic components of the landscape;
2. its aesthetic values, including memorability and naturalness;
3. its expressiveness (legibility) - how obviously the landscape demonstrates the formative processes leading to it;
4. transient values - occasional presence of wildlife; or its values at certain times of the day or of the year;

5. whether the values are shared and recognised;
6. its value to tāngata whenua; and
7. its historical associations.

Based on the above, there is now a level of national acceptance in the use of specified criteria as an assessment framework, however it is also increasingly recognised by practitioners that while they are useful, they also have certain limitations. Whilst factors or criteria were not intended to form a definitive or 'complete' list of landscape values, this is how they have often been used. Many of the criteria actually overlap and some could be more usefully seen as subsets of one another rather than as separate value categories. This can be confusing and lead to some values being given more weight than others, or 'double-counting'.

Recent case law (see C11/2009 – Unison Networks vs Hastings District Council) and a recent review by the Tuia Pito Ora (New Zealand Institute of Landscape Architects [9](NZILA)) have reordered the Pigeon Bay criteria into three categories. This focuses an understanding of landscape values into biophysical or natural science aspects, perceptual and aesthetic aspects, and other associative aspects. Condensing the Pigeon Bay criteria factors into these three categories reduces the risk of emphasising some criteria at the cost of others and enables assessors to interpret the landscape values with greater validity and reliability. It should be noted that a cultural landscape study would provide a different perspective on the landscape from mana whenua that take a deeper connection, including whakapapa, to the landscape into account. This should include the consideration of whakapapa, mana, kawa, tikanga and mātauranga as well as identity, connections, practices, history, and future aspirations (Cain & Manihera, 2021). It was beyond the scope of this study and should be considered as a separate piece of work to identify mana whenua values in more depth.

The exercise of identifying ONFs and ONLs utilises the mapping of significant values in GIS where possible, which enables the ability to analyse where particular values overlap. The identification of an appropriate boundary reflecting the important physical, sensory and associative values identified can be conceived of as mapping the separate value attributes identified within each landscape character area (**Image 2** below). The evaluation must also recognise that not all values are able to be mapped (such as sensory or aesthetic values). From this, a judgement identifying the findings of the landscape evaluation can help to delineate areas that display notable high qualities of a range of physical, perceptual and associative values.

[9] Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines [Final Draft, May 2021]

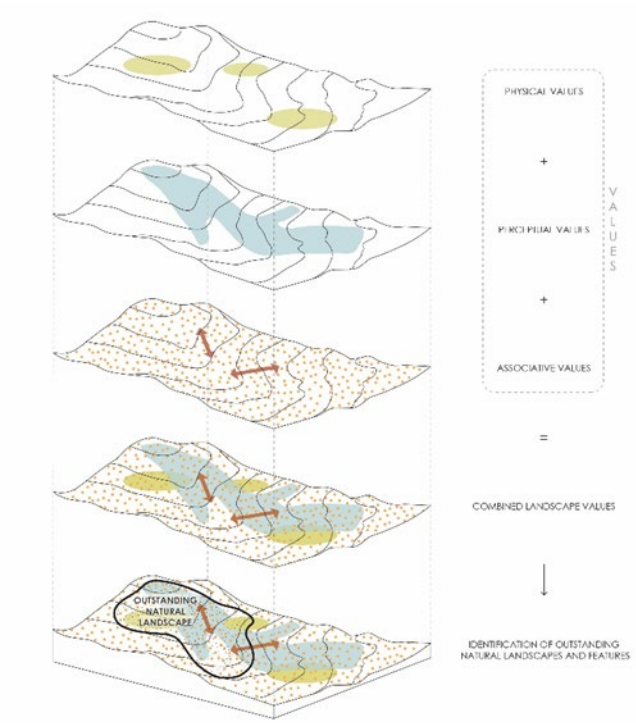


Image 2: Layering of landscape attributes to identify outstanding natural landscapes.

When identifying the potential location of ONF/Ls it is recognised that the boundaries identifying valued areas of the landscape, do not necessarily coincide with landscape character areas, the latter of which is based on determining areas of landscape with distinctive similar key characteristics. The following diagram (**Image 3** below) illustrates the different relationships between landscape character areas and identified ONF/L which may occur:

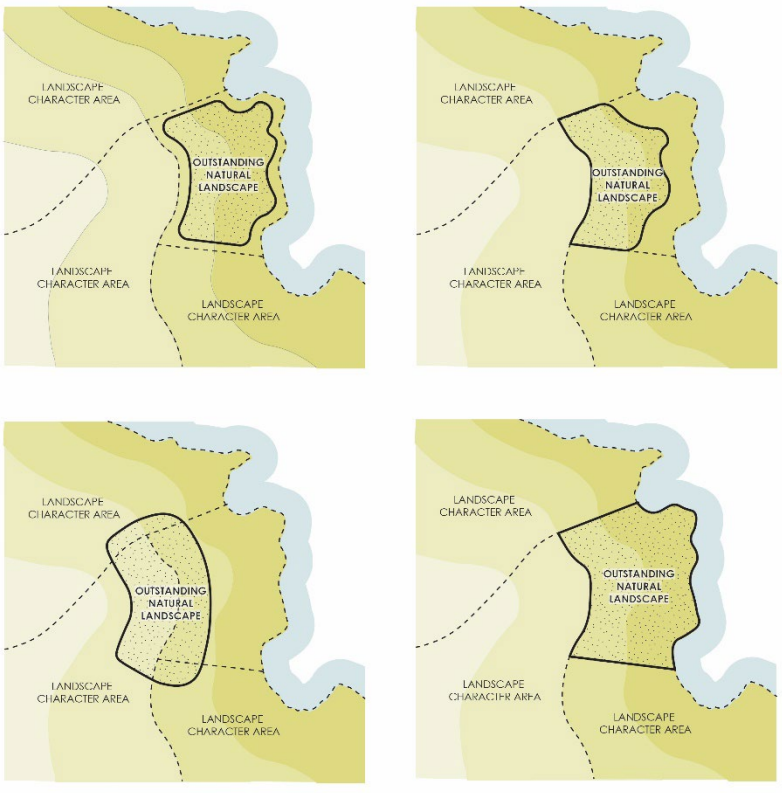


Image 3: Relationship between ONF/L and character areas

The process of determining ONF/L areas acknowledges that every attribute does not need to score very high for an area to be considered as an ONF/L, although this will depend on the landscape under consideration. By undertaking this process, a threshold of values was also determined, which essentially concluded whether a landscape (or feature) was an ONF/L or not. ONF/L were only identified in relation to features or areas of landscape which scored at least high for physical, perceptual and associative values. SNF/Ls were identified in relation to features or areas of landscape which scored at least moderate.

As required under the scope for this report, the previously identified Scenic Viewing Areas were also reviewed and amended. These viewpoints are generally identified on public roads where particularly expansive views to the surrounding landscape can be gained.

5.3 Evaluating Landscape Values

In accordance with the above, consideration of data and findings from field work were used to determine a landscapes or feature's combined physical, perceptual or associative value. This utilised the evaluation framework as set out in **Table 1** in accordance with the relevant landscape attributes as described. A more detailed understanding of the landscape attributes considered including their definitions and reliance on relevant case law is also set out in **Appendix 2**:

Table 1			
Landscape Attributes		**Description**	**Assessment**
Physical	Abiotic	The presence of important or recognised geological, hydrological or topographical features	The underlying landform or natural feature are recognised as being important for scientific or educational purposes.
	Biotic	The presence of important native vegetation communities, wildlife or ecosystems	The area of landscape or feature contains important native vegetation communities, wildlife or ecosystems.
Perceptual	Legibility	How obviously the feature or landscape demonstrates its formative processes.	Geomorphological, hydrological, climate, vegetation, coastal and /or cultural processes are actively displayed in the landscape.
	Naturalness	The perception of the predominance of nature in the landscape.	The landscape appears largely uncompromised by modification and appears to comprise of natural systems that are functional and healthy.
	Vividness	How striking or memorable an area of landscape is, including its role in the mental maps of a district or region.	The landscape is widely recognised across the community with an ability to remain clear in the memory.
	Coherence	The way in which the visual elements or components of any landscape come together.	The pattern of land cover and land use appears in harmony and is easily understood with no apparent random or significant discordant elements of land cover or land use.
	Transient Values	The presence of wildlife or other values at certain times of the day or year.	Changing elements, patterns and processes remain clearly apparent through times of the day or year.
Associative	Shared & recognised values	Whether the values are shared and recognised.	The area of landscape or natural feature is widely recognised in the community and commonly referred to in art, literature or tourist maps.
	Mana whenua Values	Cultural and spiritual values for Mana whenua	The area of landscape or natural feature contains cultural sites or values which are important to local iwi.
	Historic Heritage Associations	The presence of known historic or heritage associations	There are numerous and / or important historic sites identified within the area of landscape or feature.

In order to judge the relative value of landscape attributes the seven-point scale set out in **Diagram 1** below was used alongside a description of the relevant landscape values which are identified:

Very Low	Low	Moderate-Low	Moderate	Moderate-High	High	Very High

Diagram 1: Landscape evaluation scale (Very Low through to Very High)

At this stage of the assessment, the identification of ONF/L and SNF/L boundaries was primarily based on broad geomorphological and geographical patterns, see Image 4 below. Variations in land cover and land use are also taken into account as a secondary factor. This information was sourced from aerial photographs, and other GIS information, such as LCDB5 (Land Cover Data Base v.5.0). The process of community and land owner engagement including future consideration of associative values developed through community and Iwi engagement may further refine the areas of landscape defined.

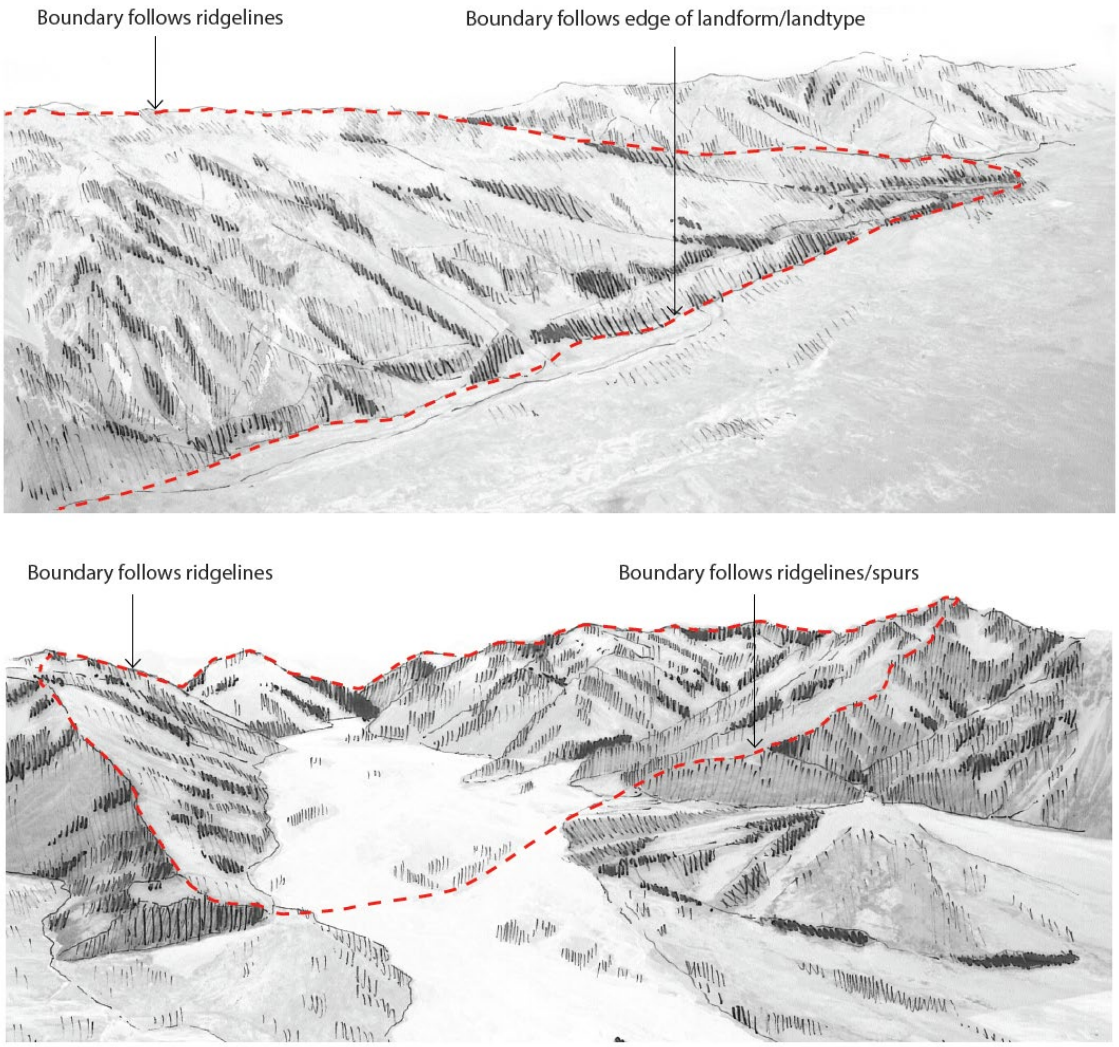


Image 4: Illustration depicting ONL and ONF boundaries

There is no automatic policy distinction between 'outstanding natural features' and 'outstanding natural landscapes', both of which essentially have the same level of significance under section 6(b) of the RMA. Consequently, outstanding natural features and outstanding natural landscapes can be collectively referred to as outstanding natural features / landscapes (ONF/Ls).

Notwithstanding this, it is recognised that features can nest within landscapes and vice versa. Such understanding of features and landscapes can be readily appreciated as being scale dependent whilst differing according to which context is considered, for example the Orari River Gorge could be identified as a feature within the broader Tarahaoa landscape, which is perceived at a broader district scale. In recognition of the scale at which values have been defined, landscapes have typically been defined as larger areas that can include several features within them. As a larger entity, landscapes are normally experienced from within (for example walking tracks or roads) or seen as the whole of the outlook (for example the wider backdrop of the Two Thumb Range).

Conversely, outstanding natural features have been identified as discrete elements, typically identified within more modified landscapes and are more generally experienced from outside the features' boundaries. Features display integrity as a single entity and can often be clearly distinguished from the surrounding landscape within which they are contained. Generally, features are defined by their geomorphology with landforms delineating boundaries, however, in some instances (such as areas of native bush) these can also reflect land cover or land use characteristics.

6.0 Outstanding Natural Landscapes and Features in the Eastern Mackenzie

Within the Eastern Mackenzie, 6 ONF/Ls, 4 SNF/Ls and 7 Scenic Viewing Areas have been identified and these are illustrated on **Figure 12**. These are all landscapes in their own right, each containing a range of physical, perceptual and associative values. Each ONF/L retains sufficient levels of naturalness to be considered a candidate for being outstanding. Significant landscapes generally display a higher level of modification.

Based on the evaluation undertaken, the following ONF/Ls have been identified and mapped (see **Figures 13-22**). Their associated values and characteristics are described in the following sections, along with a description of the boundary outlines mapped for each area.

Table 2 Outstanding Natural Features and Landscapes, and Significant Natural Features and Landscape in the Eastern Mackenzie

Outstanding Natural Landscapes and Features	
1	Tarahaoa ONL
2	Two Thumb Range ONL
3	Rollesby / Dalgety ONL
4	Pareora Gorge ONF
5	Opihi Gorge ONF
6	Raincliff ONF
Significant Natural Landscapes	
1	Upper Orari
2	Albury Range
3	Rollesby Valley
4	Mount Smith

6.1 Tarahaoa ONL

ONL 1: Tarahaoa		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Low mountain ranges formed from Late Permian to Early Triassic greywacke sandstone. • Prominent peaks include Tripps Peak (1653 masl), Mount Catherine (1264 masl), Little Mount Peel (1311 masl), and Mount Peel (1743 masl). • The Orari River Gorge is an important natural feature, due to its physical intactness. • Western slopes of Mount Edith (1089 masl) are considered a nationally significant geopreservation site due to its easily discernible patterned ground covered in tussock. • Within the Peel Forest Park some areas of podocarp and lowland podocarp-hardwood forest remain. This includes species such as broadleaf, mahoe, kowhai, ribbonwood, fivefinger, pokaka, southern rata, mountain lacebark, and kanuka. • Sites of natural significance include the Bernard Stream, containing habitat for the nationally vulnerable whio/blue duck; Lynn Creek Bush and Scotsburn Bush which contains diverse podocarp forest habitat for bellbird, kereru, rifleman, and South Island pied tit (tom tit); and Coopers Stream Bush and Pick Axe Bush which have extensive stands of black beech forest.	Very High
Perceptual	• Highly legible feature such as Tarahaoa Range, Tarahaoa / Mount Peel, and Huatekerekere / Little Mount Peel that landmarks defining the southern Canterbury Plains. • The Orari River and Gorge is a prominent and memorable feature with high aesthetic values. • Transient presence of snow during the winter months.	Very High
Associative	• Both Tarahaoa / Mount Peel, and Huatekerekere / Little Mount Peel are of significance to local Ngāi Tahu hapu Kāti Huirapa based at Arowhenua/Temuka. Tarahaoa / Mount Peel, and Huatekerekere / Little Mount Peel are named after two passengers who survived the capsize of the Ārai-te-uru waka off Matakaea (Shag Point). • A popular track is to the summit of Little Mount Peel and Mount Peel following the ridgeline of the Tarahaoa Range.	Very High
Overall landscape value		**OUTSTANDING**

Mapped Extent:

Refer to **Figure 14**. The mapped extent of the Tarahaoa ONL includes the entirety of Peel Forest Park (within the Mackenzie District), Four Peaks and the Tarahaoa Range.

Evaluation:

Based on the values above, the Tarahaoa ONL has been identified as an Outstanding Natural Landscape due to its very high physical, perceptual and associative values.

The Tarahaoa ONL provides a remote and isolated high-country character at lower elevations of the Orari River catchment and contains intact podocarp forest in gullies, gorges and on south-facing slopes. The ONL provides the backdrop to the north-east of the Eastern Mackenzie and is known for its recreational opportunities and significance to mana whenua.

6.2 Two Thumb Range ONL

ONL 2: Two Thumb Range		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Steep mountain range formed from Late Permian to Early Triassic greywacke sandstone. • Key features include Fox Peak (2330 masl), Mount Misery (2305 masl), Dobson Peak (2095 masl), and the Butler Saddle which extends into the Ben McLeod Range. • Forms the upper reaches of the Opuha River, one of the Eastern Mackenzie's largest rivers, a tributary the Opihi River. • Highly influenced by the Fox Peak Fault, a regionally significant geopreservation site. • Large intact areas of tussockland including species such as matagouri, coprosma scrub, *Festuca novae-zelandiae*, narrow-leaved snow tussock, and mountain daisy, on lower to mid slopes, with slim snow tussock present at higher altitudes. • The ranges contain several ecological communities such as high alpine boulderfield, and stonefield, and low alpine cushionfield, and herbfields. • Species such as the brown creeper, tomtit, New Zealand falcon are present within forest remnants, and, at higher elevations, kea are present. • The headwaters of the North Opuha River contain a site of natural significance with a rare and large stand of red tussock.	Very High
Perceptual	• The Two Thumb Range forms a striking and memorable backdrop to the Eastern Mackenzie, defining the northern and western boundary of the area. • Formative processes of the range and river valleys are particularly legible. • Remote character and high aesthetic values relating to the stark and exposed rock ridges and scree slopes. • Transient presence of snow during the winter months.	Very High
Associative	• The Opuha/Ōpūaha River was recorded by Ngāi Tahu kaumatua in the late 1800s as being an important place for mahinga kai where tuna (eels), and taramea (speargrass) were gathered. • Dobson and Fox Peak ski fields offer back country skiing during the winter months.	High

	• Hunting in higher altitude areas and in the upper reaches of the North Opuha river are available throughout the year. Hunters can expect to find chamois, red deer and tahr.	
Overall landscape value		**OUTSTANDING**

Mapped Extent:

Refer to **Figure 15**. The mapped extent of the Two Thumb Range ONL includes the entire mid to upper slopes of the Two Thumb Range and Sherwood Range. This excludes modified pastoral areas on the lower slopes along the base of the range where it meets the Fairlie Basin floor.

Evaluation:

Based on the values above, the Two Thumb Range ONL has been identified as an Outstanding Natural Landscape due to its high physical and associative values, and very high perceptual values.

The Two Thumb Range is an important recreational destination for skiing and hunting. The mountain range forms the distinctive and striking backdrop to the Eastern Mackenzie, and contains the popular Dobson and Fox Peak ski fields.

6.3 Hunter Hills, Dalgety, Rolleston Ranges ONL

ONL 3: Hunter Hills, Dalgety, Rollesby Ranges		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Intact Late Permian to Early Triassic greywacke sandstone mountain ranges. • Key landscape features include the Rollesby Range (1377 masl), Tengawai River headwaters, Manahuna/ Mackenzie Pass, Mount Dalgety (1752 masl), Mount Nessing (1601 masl), Te Huruhuru and Mount Nimrod/Kaumira. • Predominantly intact tussockland and matagouri scrub. • Sites of natural significance include the Rollesby Range, containing an excellent example of the alpine species *Dracophyllum uniflorum* (turpentine scrub) and includes abundant populations of *Helichrysum plumeum* and the eastern slopes of Mount Dalgety, containing the only known extensive area of *Chionochloa rigida* in the Grampians Ecological District.	High
Perceptual	• Forms the highly legible south-western boundary of the Eastern Mackenzie. • Transient presence of snow during the winter months. • Mackenzie Pass is one of Canterbury's iconic scenic back country roads connecting into the Mackenzie Basin ad further into the Hakataramea Valley.	Very High
Associative	• Includes two important connections to the Te Manahuna/ Mackenzie Basin from Arowhenua/Temuka. The routes followed the Te Ana-a-Wai/Tengawai River corridor and the Hakataramea River valley. Several remnant limestone rock shelters including over one hundred rock art images are present. • Opportunities for backcountry hunting, but limited access points.	Very High
Overall landscape value		**OUTSTANDING**

Mapped Extent:

Refer to **Figure 16**. The mapped extent of the Hunter Hills, Dalgety, Rollesby Ranges includes the upper slopes of the Rollesby Ranges and the Hunter Hills, and the eastern side of the Dalgety Range and Valley. The mountain ranges form the boundary to the Mackenzie Basin ONL.

Evaluation:

Based on the values above, the Hunter Hills, Dalgety, Rollesby Ranges have been identified as an Outstanding Natural Landscape due to their high physical, and very high perceptual, and associative values.

The Hunter Hills, Dalgety, Rollesby Ranges form a distinctive rolling backdrop to the Tengawai River plains and enclose the lower Fairlie Basin with the Tengawai headwaters. The landscape contains some of the Eastern Mackenzie's rarest plants and habitats, and retains a sense of isolation and remoteness with high-country farming and for back country hunters.

6.4 Pareora Gorge ONF

ONF 1: Pareora Gorge		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Distinctive cliffs, limestone outcrops, and escarpments, naturally eroded by the upper reaches of the Pareroa River. • Incised gorge approximately 400 metres deep. • Overlooked by an extensive area of native regenerating forest and tussockland on the upper slopes. Species present include kahikatea, matai, totara, matagouri, and kamahi. • The lowest part of the gorge contains a low limestone escarpment with areas of native vegetation and a Scenic Reserve, while transitioning to farm land and forestry areas downstream.	Very High
Perceptual	• Highly expressive of the gorge's formative processes.	High
Associative	• Pureora, the correct spelling for the Pareora River, derives its name from one of the passengers on the Ārai-te-uru waka, which capsized off Matakaea (Shag Point) on the Otago coastline. Unable to return to the waka by daylight, Pureora transformed into the Pareora River.	High
Overall landscape value		**OUTSTANDING**

Mapped Extent:

Refer to **Figure 17**. The mapped extent of the Pareora Gorge includes the entirety of the gorge from the lower slopes of the Te Tari-a-Te-Kaumira/ Hunters Hills to the Pareora Reserve.

Evaluation:

Based on the values above, the Pareora Gorge has been identified as an Outstanding Natural Feature due to its very high physical, and high perceptual and associative values. The gorge is a distinctive and legible feature to the south of the Eastern Mackenzie and is highly expressive of its formative processes. The river itself has a creation story that relates to the Ārai-te-uru waka passenger Pureora.

6.5 Opihi Gorge ONF

ONF 2: Opihi Gorge		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Distinctive, homogenous gorge, created by the Opihi River that cut through the foothills on its way to the coast • Small and narrow braided river system, a globally rare landscape. • Recognised as a site of natural significance due to its breeding habitat for black fronted dotterel, and white winged black tern. Long tailed bats have also been recorded in the regenerating lowland bush which overlooks the gorge, which contains remnant totara.	High
Perceptual	• Highly legible deep, incised gully that is highly expressive of its formative processes and known for its aesthetic vividness. • A walking track leads into the gorge from the Fairlie Basin where impressive views to the rocky outcrops above the river can be gained.	High
Associative	• The Opihi riverbed is of immense significance to the local Ngāi Tahu hapu of Kāti Huirapa. The Opihi River was the principal travel route to the Mackenzie Basin, with areas in the upper catchment containing several archaeological records of rock art within the caves along the riverbed.	Very High
Overall landscape value		**OUTSTANDING**

Mapped Extent:

Refer to **Figure 18**. The mapped extent of the of the Opihi Gorge includes the entirety of the Gorge from Opihi Gorge Road, to Rockwood.

Evaluation:

Based on the values above, the Opihi Gorge has been identified as an Outstanding Natural Feature due to its high physical, perceptual, and very high associative values.

The gorge is an intact, naturally eroded, gully system clad in significant habitat and forest for birds and long tailed bats. The gorge is also of immense significance to Ngāi Tahu hapu, Kāti Huirapa, connecting the coastal settlements to the Te Manahuna/ Mackenzie Basin.

6.6 Raincliff ONF

ONF 3: Raincliff		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Intact Paleogene-Neogene limestone outcrop. • Numerous limestone escarpments are present in the wider area, extending into the downland in Timaru District. • Naturally eroded limestone caves are present. • Areas of regenerating forest are present, including species such as cabbage trees, harakeke, and totara.	High
Perceptual	• Memorable and distinctive local feature that can be viewed from the road. • The caves form part of the Raincliff Historic Reserve and are an important feature for visitors to the area. • Highly legible landform and geological feature that is expressive of its formative processes.	High
Associative	• Located on a key historic travel route from the coast to the Te Manahuna/ Mackenzie Basin. • The Raincliff limestone caves are protected as part of the Raincliff Historic Reserve. The area was previously forested, and is now part of a restoration project. The area contains several rock paintings by Māori who periodically spent time in the rock shelters. The area is still managed by Department of Conservation and the Ngāi Tahu Rock Art Trust.	Very High
Overall landscape value		**OUTSTANDING**

Mapped Extent:

Refer to **Figure 19**. The mapped extent of the includes the entire Raincliff historic reserve and limestone outcrop to the north.

Evaluation:

Based on the values above, Raincliff has been identified as an Outstanding Natural Feature due to its high physical and perceptual, and very high associative values.

6.7 Upper Orari SNL

SNL1: Upper Orari		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Characterised by low mountain ranges formed from Late Permian to Early Triassic greywacke sandstone. • Key features include the upper reaches of the Orari River catchment, including the Mowbray River, Dry Creek, and Hewson River, and the Meikleburn Saddle. • Vegetation largely consists of low producing grassland, used for extensive high-country pastoral farming. The upper slopes of the Orari River catchment contain areas of tussockland and matagouri.	Mod - High
Perceptual	• Enclosed rural character which is characterised by the upper Orari River catchment. • Remote and back country pastoral character. • The low foothills to the north of the Four Peaks Range form the backdrop to Lake Opuha and the eastern the Fairlie Basin. • The Orari River is a prominent and memorable feature within this character area, traversing the landscape from the Meikleburn Saddle to the Orari River headwaters.	Mod - High
Associative	• Comprises quintessential Canterbury high-country landscape.	Mod
Overall landscape value		**SIGNIFICANT**

Mapped Extent:

Refer to **Figure 20**. The mapped extent of the Upper Orari Significant Natural Landscape includes the lower slopes of the High Claytons, Tarahaoa Range, and Four Peaks, and upper Orari River valley.

Evaluation:

Based on the values above, the Upper Orari Valley and adjacent foothills have been identified as a Significant Landscape due to its moderate-high physical and perceptual values, and moderate associative values.

6.8 Albury Range SNL

SNL 2: Albury Range		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• The western face of the Albury Range is characterised by Late Permian to Early Triassic greywacke sandstone, while the eastern face comprises Paleogene to Neogene sedimentary rock including limestone and sandstone. • The eastern face of the Albury Range is characterised by the Albury Fault zone, a distinctive reverse fault. • Key features include the Single Hill Range (943 masl), and the Albury Range (1,377 masl). • The banks of Tramway Stream are a site of natural significance due to the regenerating broadleaf forest amongst remnant Hall's totara. The area contains the nationally threatened coral broom and provides habitat for several native bird species including the New Zealand Falcon. • Vegetation is predominantly tussockland and matagouri scrub. • Within the gullies on the eastern face of the Albury Range are areas of regenerating hardwood forest including species such as mountain ribbonwood, kohuhu, lancewood spp., and mountain totara. The sub-canopy also includes species such as fuchsia, koromiko, marbleleaf, Clematis paniculata, korokio, astelia spp., and cabbage tree.	Mod - High
Perceptual	• The Albury Fault zone is a legible feature within this landscape and highly expressive of its formative processes. The fault creates a legible boundary between the Fairlie Basin and the steep slopes of the Albury Range. • The Albury Range forms the backdrop to State Highway 8 when approaching Fairlie from the south and visually confines the Fairlie Basin to the west. • Transient presence of snow during the winter months.	High
Associative	• Limited public access and general sense of remoteness despite the proximity to Fairlie. • Hunting opportunities available in the Chetwynd Conservation Area.	Mod
Overall landscape value		**SIGNIFICANT**

Mapped Extent:

Refer to **Figure 21**. The mapped extent of the Albury Range includes western and eastern face of the Albury Range, as well at the lower Single Hill Range.

Evaluation:

Based on the values above, the Albury Range has been identified as a Significant Natural Landscape due to its moderate- high physical values, high perceptual values, and moderate associative values.

The Albury Range is highly legible feature with a strong visual presence in the southern and western part of the Fairlie Basin. Containing a site of natural significance and distinctive active faultline, the landscape has limited public access and provides generally a remote experience. The character of this significant natural landscape is largely characterised by extensive pastoral farming and tussocklands with some remnants of native vegetation in the gullies.

6.9 Rollesby Valley SNL

SNL 3: Rollesby Valley		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Characterised by Late Permian to Early Triassic greywacke sandstone. • Southern areas of the valley form the upper Tengawai River catchment. • Includes the Dalgety Fault, a reverse fault which follows the Avalanche Stream. • Landcover is largely low producing exotic grassland (pastoral use) with some areas of tussockland and matagouri scrub.	Mod
Perceptual	• Enclosed and gently undulating rural landscape forming the valley to the south of Te Kopi-o-Ōpihi/Burkes Pass. • Contains a mosaic of shelter belts, paddocks, gravel roads, and ancient riverbed channels. • Expansive rural character sheltered by the Rollesby and Albury Ranges.	High
Associative	• The Te Ana-a-Wai/Tengawai River corridor was an important connection between Arowhenua/Temuka and Te Manahuna/ Mackenzie Basin. • The area is largely a pastoral farming landscape with iconic, remote high-country character. • The Rollesby Valley Road provides a scenic alternative route into the Mackenzie Basin and Hakataramea Valley.	High
Overall landscape value		**SIGNIFICANT**

Mapped Extent:

Refer to **Figure 22.** The mapped extent of the Rollesby Valley Significant Natural Landscape includes the valley floor at the base of the Single Hill, Rollesby, and Albury Ranges from Te Kopi-o-Ōpihi/Burkes Pass to the Tengawai River.

Evaluation:

Based on the values above, the Rollesby Valley has been identified as a Significant Natural Landscape due to its moderate physical values, and high perceptual and associative values..

The valley is a remote and isolated part of the Eastern Mackenzie, renowned for its expansive, undulating, rural high-country landscape. The valley contains the upper reaches of one of the Eastern Mackenzie's largest rivers, the Tengawai River, which has immense significance to mana whenua.

6.10 Mount Smith SNL

SNL 4: Mount Smith		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Late Permian to Early Triassic greywacke sandstone mountain. • Includes the incised gorges of Blue Duck Creek and Rocky Gully which contain remnant native vegetation. • Characterised by two inactive faults, the Hunters Fault (a reverse fault) and an inactive fault which forms the upper reaches of the Blue Duck Stream.	Mod-High
Perceptual	• Pastoral farming landscape with extensive grazing. • Homogenous elevated landform with highly legible gully systems forming a distinctive drainage pattern. • Forms the mid-ground in views from the Tengawai Valley to the Te Tari-a-Te-Kaumira/ Hunters Hills.	Mod
Associative	• Part of a wider high-country faming landscape surrounding the Fairlie Basin and Tengawai River Valley. • Any cultural values relating to mana whenua would require confirmation through Arowhenua.	Mod.-Low
Overall landscape value		**SIGNIFICANT**

Mapped Extent:

Refer to **Figure 23**. The mapped extent of the Mount Smith Significant Natural Landscape includes the elevated landform of Mt Smith, located to the north of the Pareora Gorge, including the distinctive gully systems of the Rocky Gully River, Blue Duck Creek and Mawaro Creek which drain into the mid Tengawai River.

Evaluation:

Based on the values above, Mount Smith has been identified as a Significant Natural Landscape due to its moderate- high physical values, moderate perceptual and moderate- low associative values.

Appendix 1: Bibliography and References

Boffa Miskell. (2010). *Canterbury Regional Landscape Study*.

Braid New Zealand. (2022). *Braid Plains*. https://braidedrivers.org/braidplains/

Cain, A., & Manihera, D. (2021). *Apiti Hono Tatai Honon Nga Whenua o Ngai Tau Ki Murihiku*.

Department of Conservation. (2006). *Chetwynd Pastoral Lease Conservation Resources Report*.

Department of Conservation. (2016). *Conservation Management Strategy Canterbury (Waitaha)* (p. 328). https://dcon01mstr0c21wprod.azurewebsites.net/globalassets/documents/about-doc/role/policies-and-plans/canterbury-cms/canterbury-cms-2016-volume-1.pdf

Department of Conservation. (2022). *Discover the Outdoors*. https://www.doc.govt.nz/map/index.html?banner=0&layerlist=0&base=Topo&layers=Hunting%20areas&search=Hunting%20areas:7218396

GNS Science. (2018). *New Zealand Geology Web Map*. http://data.gns.cri.nz/geology/

GNS Science. (2020). *Active Faults Database*. https://data.gns.cri.nz/af/

Graham Densem Landscape Architects, & Boffa Miskell Limited. (2016). *Eastern Mackenzie Landscape Review* (p. 127).

Mackenzie District Council. (n.d.). *Sites of Natural Significance* (p. 15) [Mackenzie District Plan]. https://www.mackenzie.govt.nz/__data/assets/pdf_file/0020/514190/Appendix-I-Sites-of-Natural-Significance.pdf

Manaaki Whenua Landcare Research. (2022). *S-Map Online*. https://smap.landcareresearch.co.nz/maps-and-tools/app/

McEwan, M. (1987). *Ecological regions and districts of New Zealand*. 161.

New Zealand Geopreservation Inventory. (n.d.). Retrieved August 13, 2021, from http://www.geomarine.org.nz/NZGI/

NZILA, de Lambert, R., Titchner, A., & Lister, G. (2021). *Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines [final draft subject to final editing, graphic design, illustrations, approved by Tuia Pito Ora/NZILA 5 May 2021]*. Tuia Pito Ora New Zealand Institute of Landscape Architects.

Te Rūnanga o Ngāi Tahu. (2022). *Ka Huru Manu Cultural Mapping Project*. https://www.kahurumanu.co.nz/atlas

Wardle, K. (2021). *Ecological Asessment of Mount Dobson Ski Area, South Canterbury*. https://www.doc.govt.nz/contentassets/cd12c8f0ba4e4807a337cc2c12dc4f8d/mt-dobson-ski-area-ecological-assessment.pdf

Appendix 2: Landscape Evaluation Attributes

Physical

Physical aspects incorporate a landscape's natural science elements, including its geological, hydrological, ecological and dynamic components and associations. The natural science aspects considered by the Environment Court were described in the Queenstown decision as "the geological, ecological and dynamic components of the landscape" (C180/1999 – Waikatipu Env. Society v QLDC). In broad terms, this identifies that natural science values can represent both abiotic (including geology and soils) and biotic (in particular native vegetation communities, wildlife and ecosystems) components. Where biophysical aspects are relevant, the key components of the landscape will be present in a way that more generally defines the character of the place. Natural features in a good state of preservation are representative and characteristic of the natural geological processes and diversity of the district. Natural features are unique or rare in the district, region or nationally, if few comparable examples exist. Natural features may also form a landscape feature or an element / component of the landscape. Where possible, the analysis of biophysical aspects of landscape should use objective and quantifiable data to support a particular decision made. The Department of Conservation is one of the largest landholders in the district, with land areas encompassing significant parts of the inland hill country.

In summary, the key biophysical aspects of landscape value include the following:

- Abiotic components including the presence of important or recognised geological. hydrological or topographical features
- Biotic components including the presence of important native vegetation communities, wildlife or ecosystems

Perceptual

Perceptual qualities are landscape phenomena as directly perceived and experienced by humans, such as the view of a scenic landscape or the distinctive smell and sound of the foreshore. Determining sensory and aesthetic aspects of landscape involves judgmental and subjective interpretations of nature and beauty, as well as transient matters contributing to human perception.

While an individual feature may have an aesthetic value when viewed from beyond its boundaries, aesthetic quality of landscape is more likely to relate to a place or an area. The Oxford English Dictionary (2002) defines 'aesthetic' as 'concerned with beauty or the appreciation of beauty; of pleasing appearance'. This appreciation of beauty encompasses not only the visual aspects of a landscape, but also other sensory experiences, such as sound, smell and touch.

The aesthetic value aspects considered by the Environment Court were described in the Queenstown decision as "including memorability and naturalness" (C180/1999 – Waikatipu Env. Society v QLDC). This decision also included some discussion of the adequacy of this description. It was of the view that traditional scenic and visual considerations may be underplayed. It noted that considerations such as pleasantness raised in the RMA amenity definition with reference to RMA section 7(c) will also be relevant.

The memorability of an area of landscape is often closely associated with its vividness or symbolic contribution to an area due to its recognisable and iconic qualities. Vivid or striking landscapes are more typically widely recognised across the community and have the ability to remain clear in the memory. Highly memorable landscapes often comprise a key component of a person's recall or mental map of a region or district. It is not necessary for vivid landscapes to have a high degree of naturalness. A landscape may be vivid or striking through other recognised scenic associations.

By contrast, the perception of naturalness is where landscapes appear largely uncompromised by modification and appear to comprise of natural systems that are functional and healthy. Naturalness describes the perception of the predominance of nature in the landscape. A landscape may retain a high degree of aesthetic naturalness even though its natural systems may be modified. Similarly, landscapes that have high ecological values may not display high qualities of visual naturalness.

In accordance with the above, the Courts have indicated that 'natural' in the context of landscape identification under RMA section 6(b) does not signify ecological intactness (e.g. EC C387/2011 – PC13 Mackenzie Basin). It is therefore important to make a distinction between ecological naturalness (indigenous nature) and landscape naturalness (perceptions of nature). Parts of the landscape can appear highly natural but are ecologically degraded. Other landscape elements require prior knowledge in order to appreciate whether they are native or exotic, despite being perceived as highly natural.

To further assist an assessment of the level of naturalness of a landscape, the Environment Court has determined four criteria for assessing naturalness (A78/2008, Long Bay – Okura Great Park Society v North Shore City Council):

- Relatively unmodified and legible physical landform and relief;
- The landscape being uncluttered by structures and /or obvious human influences;
- The presence of water (lake, river, sea); and
- The presence of vegetation (especially native vegetation) and other ecological patterns.

The first two criteria of naturalness are necessary components of a natural landscape as they are indicators of human induced modification. However, the last two criteria are not essential as highly natural landscapes may have little or no water and vegetation cover in the absence of human modification, such as parts of the high country. Notwithstanding this, it is accepted that the last two criteria may enhance naturalness in landscape terms, however their absence does not necessarily detract from naturalness.

In combination with the above, legibility forms a key aspect or criteria for assessing the sensory or aesthetic value. The Environment Court described this criterion as "how obviously the landscape demonstrates the formative processes leading to it" (C180/99 – WESI vs QLDC), in other words the degree to which the processes (geomorphological, hydrological, climate, vegetation, coastal and cultural) are actively displayed in the landscape. Some landscapes (or natural features) clearly express past natural and cultural processes.

The criterion of legibility is closely linked to geological values. However, landscapes or features which are significant in terms of their geomorphological values, may not be expressive of these processes, whilst those which are highly expressive may not have a specific geomorphological value. Natural features and landscapes that exemplify the particular processes that formed them may also have strong historical connotations and a distinctive sense of place. Legibility need not necessarily relate to 'attractiveness', but clarity of natural and cultural processes is important.

Coherence forms a related aesthetic criterion which can contribute to the value of a landscape. Coherence describes the way in which the visual elements or components of any landscape come together. People generally respond positively to a landscape they can read and understand. The patterns of land cover and land use are largely in harmony with the underlying natural pattern of the landform of the area and there are no apparent random or significant discordant elements of land cover or land use.

Landscapes with high levels of coherence will have their visual elements in harmony and reinforcing each other. They will have unity, whilst they may be either visually diverse or relatively simple in terms of their elements. They 'hang together' in terms of their composition.

Transient values describe the contribution which wildlife, climate and hydrological processes make to landscape. A landscape may gain significance due to the way in which wildlife seasonally (or at times

in the day) gathers or occupies a specific area. Similarly, locations that benefit from the rising or setting sun, time of day and seasons of the year may be elevated in value due to this 'transient characteristic'. This criterion is linked to those of the ecological values set and provide for the recognition of the contribution to wildlife – which may or may not have intrinsic scientific value – to the perception of landscape.

The consistent occurrence of transient features (for example the seasonal changes in the mountains or particular weather patterns and cloud formations) contribute to the character, qualities and values of the landscape. Some landscapes are widely recognised for their transient features and the contribution these make to the landscape. Where these characteristics occur regularly they become a recognised and integral part of the landscape.

In summary, the key perceptual and aesthetic aspects of landscape value include the following:

- Legibility - how obviously the feature or landscape demonstrates its formative processes
- Naturalness - the perception of the predominance of nature in the landscape
- Vividness - how striking or memorable an area of landscape is, including its role in the mental maps of a district or region
- Coherence – where land cover and land use are largely in harmony with the underlying landform and there are no significant discordant elements
- Transient values - including presence of wildlife or other values at certain times of the day or year

Associative

Certain natural features and landscapes are widely known and valued by the immediate and wider community for their contribution to a sense of place leading to a strong community association with or high public esteem for the place. There should be a substantial measure of agreement between professional and public opinion as to the value of natural features and landscapes, for example as reflected through writings and paintings or through favourite locations for visitors. The presence of existing protected sites is also likely to reflect shared and recognised values.

Research has shown that many professional landscape assessments frequently reflect the views of the general public. Nonetheless, it is fully accepted that in some circumstances the expert's perceptions may be different and the findings of this assessment should be validated through community engagement. Some of the main tourist attractions in the district are often considered to be 'iconic landscapes' such as mountain ranges or coastal areas. Certain types of recreation destinations reflect the landscape resource. Conservation areas and popular recreation opportunities within them have been considered under this set of values. Scenic reserves and a number of other protected areas reflect community recognition of an area's landscape quality affording them a high level of protection.

Cultural legibility is a vital component of landscapes where many centuries of human endeavour can be unravelled through study of the present landscape. In New Zealand this aspect of landscape has received only limited and belated attention and has led to increasing contemporary recognition of how modified our 'natural' landscapes really are.

Some natural features and landscapes are clearly special or widely known and influenced by their connection to Māori values. These landscapes (or parts of them) have been identified as having particular regional importance to mana whenua. The developing awareness of complexity of the 'cultural landscape' of the mana whenua is covered under the cultural and spiritual values for mana whenua evaluation criterion.

Consultation with iwi has yet to be undertaken through the landscape evaluation process which will inevitably enrich the associative values which contribute to the understanding of landscape value.

Where such values are recognised, this will inevitably add to increasing the significance attached to the perceptual associations and legibility of our landscapes.

Cultural and historical values are based on traditional land uses such as gathering food and materials, traditional settlement patterns, architectural periods, or notable landmarks, events or figures. Some of them are specific sites of significance, others are wider areas that reflect a high degree of unity or integrity as a setting for historic sites or activities. Individuals and communities leave their different marks on the landscape. From our choices of architecture and land use to our memories of events, landscapes can tell stories of from where and from whom we came and why we have responded to the physical environment in the ways we have.

All landscapes are inextricably linked to historic processes.

In summary, the key associative aspects of landscape value include the following:

- Whether the values are shared and recognised
- Cultural and spiritual values for mana whenua
- Historic and heritage associations

Appendix 3: Geopreservation Site Index Table

New Zealand has a unique and extremely diverse natural landform, geology and soil heritage, due to its location and formative processes. The Geological Society of New Zealand (Hayward, B.W; Kenny, J.A (1998) Inventory and Maps of Important Geological Sites and Landforms in the Canterbury Region, including the Chatham Islands (Geological Society of New Zealand Miscellaneous Publication 98) has identified and listed information regarding the internationally, nationally and many of the regionally important earth science sites throughout the country, irrespective of their current protected status.

Within the Eastern Mackenzie there are five recognised sites of geological importance. Whilst the majority of these sites/ landscapes have been mapped by hand by the Society in their reference books, they have been indicated by locator spots for this study on **Figure 3**.

Each Site is listed for its Importance and Significance.

For Importance, the Inventory categorises the Sites into three levels (A-C):

A: International: Site of International Scientific Importance;

B: National Site of National Scientific, Educational or Aesthetic Importance;

C: Regional: Site of Regional Scientific, Educational or Aesthetic Importance;

For Vulnerability, each Site has been classified (1-5) depending on its perceived vulnerability to human activities:

1. Highly vulnerable to complete destruction or major modification by humans;
2. Moderately vulnerable to modifications by humans;
3. Unlikely to be damaged by humans;
4. Could be improved by humans activity;
5. Site already destroyed (not necessarily by human activity).

ID	Name	Significance	General Location	Importance	Vulnerability
1	Fox Peak Fault, Tasman Ski Club	Example of active traces in basement, and range front "scalloped" nature of the Fox Peak reverse fault in the N.	North Opuha River, Tasman ski club area.	C	3
2	Mt Edith patterned ground	An area of patterned ground is covered in tussock and thus easily discernible	Northwest flank of Mt Edith Trig, east of Bernard Stream.	B	3

ID	Name	Significance	General Location	Importance	Vulnerability
3	Fox Peak Fault, Dobson skifield to Firewood Stream	Example of progressive vertical displacement of late Quaternary terraces on the S part of the Fox Peak Fault. Maximum displacement of 8 m (W side up) and youngest terrace offset of 0.5 m. Terraces generally younger than 16,000 years. Regarded as a reverse fault, with traces distributed across a c.2 km wide zone.	Dobson skifield Road - Firewood Stream.	C	3
4	Upper Tengawai River Oligocene fossils	Diverse Waitakian molluscan fauna.	River section downstream of Limestone Gorge to opposite mouth of Exe Creek.	B	3
5	Kings Cave, Pareora	Fossil bird bone deposits.	Pareora, South Canterbury.	C	3

Appendix 4: List of Figures

Figure 1: Study Area

Figure 2: Geology

Figure 3: Geopreservation Inventory

Figure 4: Soils

Figure 5: River Catchments

Figure 6: Elevation

Figure 7: Slope

Figure 8: Land Cover

Figure 9: Recorded Natural Areas

Figure 10: Recorded Cultural Heritage

Figure 11: Character Areas

Figure 12: ONFL and SNL Overview

Figure 13: ONL 1 Tarahaoa

Figure 14: ONL 2 Two Thumb Range

Figure 15: ONL 3 Hunters Hills, Dalgety, Rollesby Ranges

Figure 16: ONF 1 Pareora Gorge

Figure 17: ONF 2 Opihi Gorge

Figure 18: ONF 3 Raincliff

Figure 19: SNL 1 Upper Orari

Figure 20: SNL 2 Albury Range

Figure 21: SNL 3 Rollesby Valley

Figure 22: SNL 4 Mount Smith

About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Auckland, Hamilton, Tauranga, Wellington, Christchurch, Dunedin and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural heritage, graphics and mapping. Over the past four decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.

---

www.boffamiskell.co.nz

Auckland	**Hamilton**	**Tauranga**	**Wellington**	**Christchurch**	**Queenstown**	**Dunedin**
+64 9 358 2526	+64 7 960 0006	+65 7 571 5511	+64 4 385 9315	+64 3 366 8891	+64 3 441 1670	+64 3 470 0460

File Ref: BM200372_001_A4P_Study_Area.mxd

Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Study Area

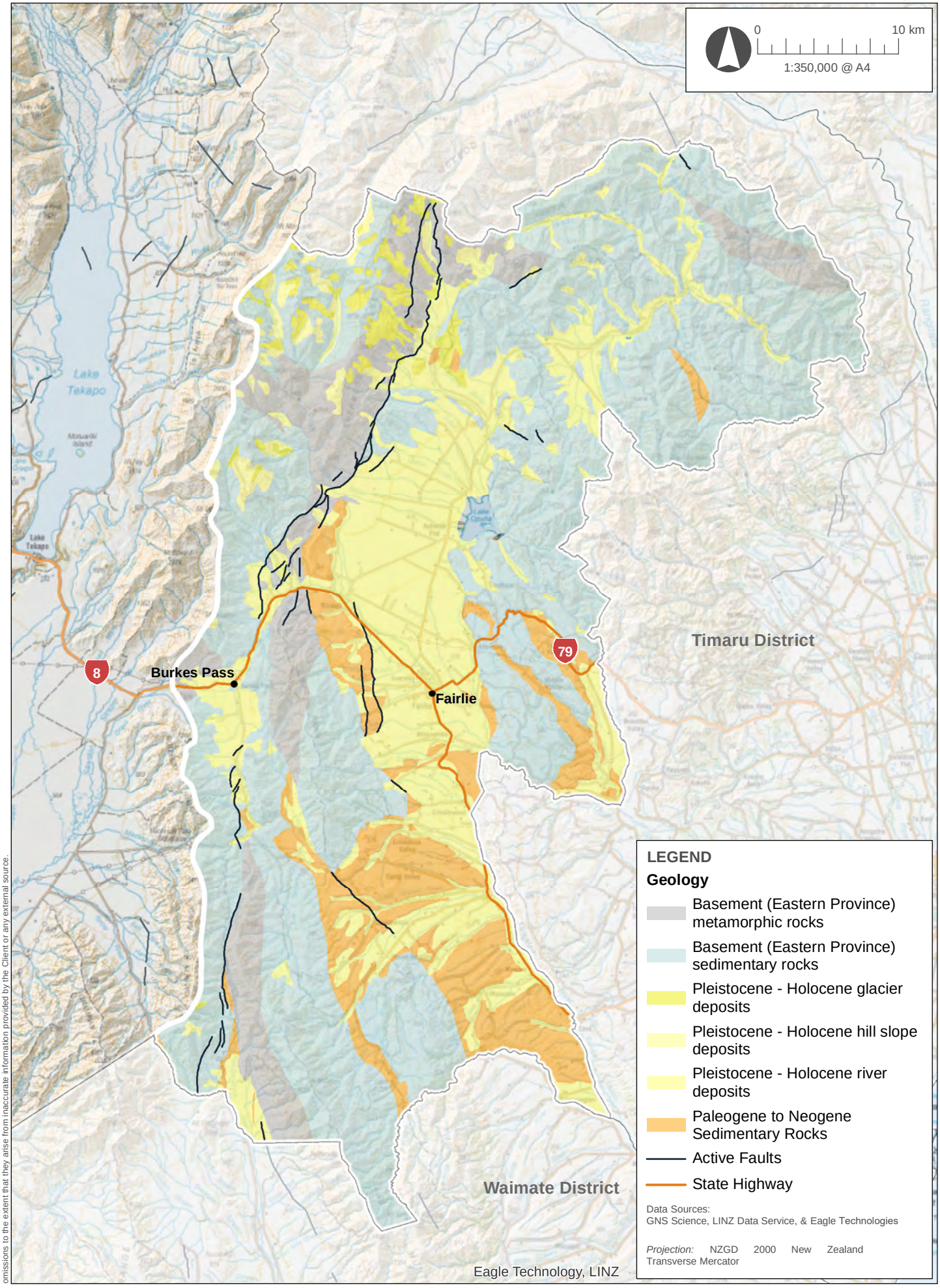
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 1

File Ref: BM200372_002_A4P_Geology.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Geology

Date: 05 May 2022 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

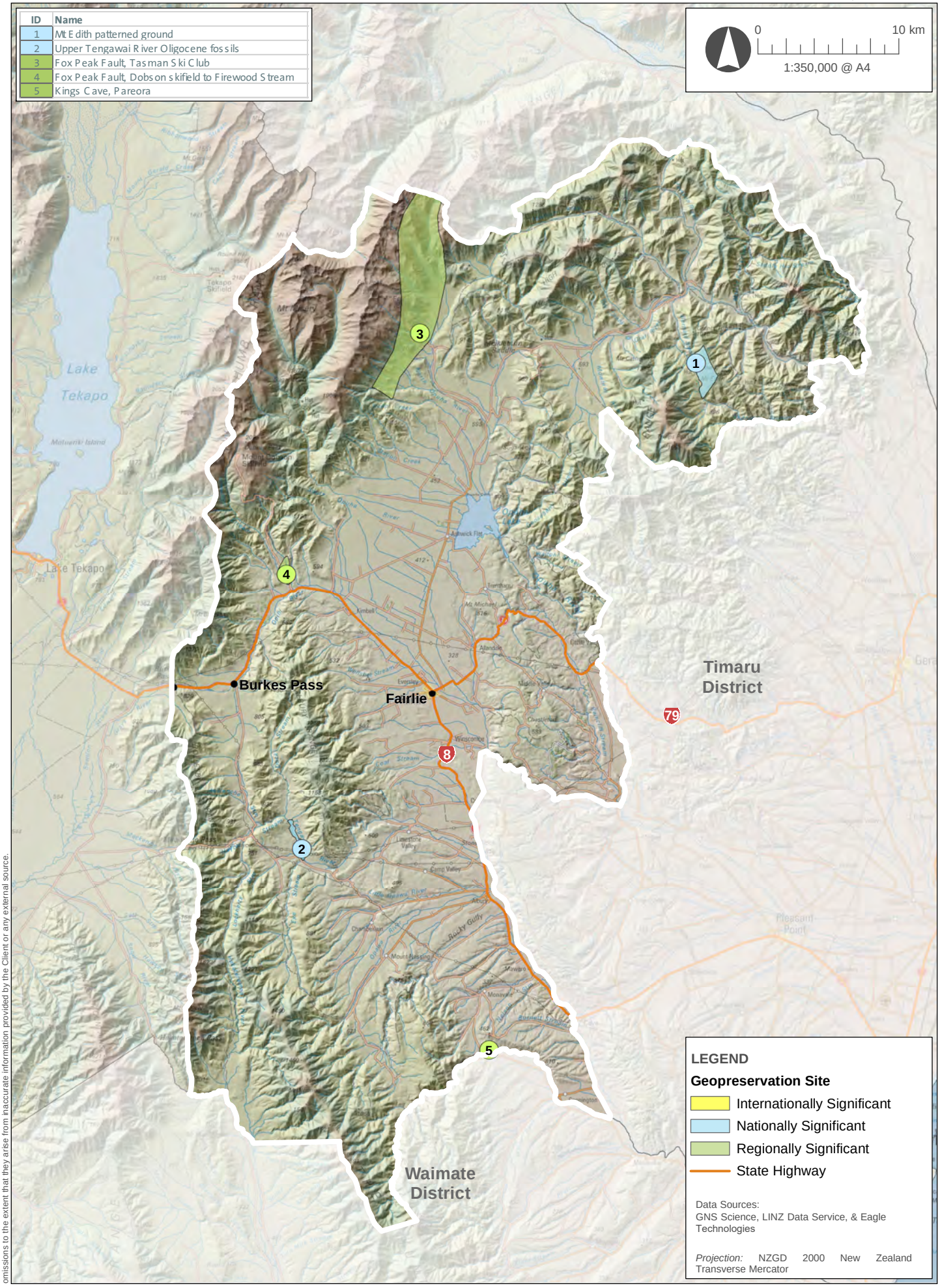
Figure 2

File Ref: BM200372_003_A4P_Geopreservation.mxd

ID	Name
1	Mt Edith patterned ground
2	Upper Tengawai River Oligocene fossils
3	Fox Peak Fault, Tasman Ski Club
4	Fox Peak Fault, Dobson skifield to Firewood Stream
5	Kings Cave, Pareora

0 10 km

1:350,000 @ A4



LEGEND

Geopreservation Site

- Internationally Significant
- Nationally Significant
- Regionally Significant
- State Highway

Data Sources:
GNS Science, LINZ Data Service, & Eagle Technologies

Projection: NZGD 2000 New Zealand Transverse Mercator

Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Geopreservation Sites

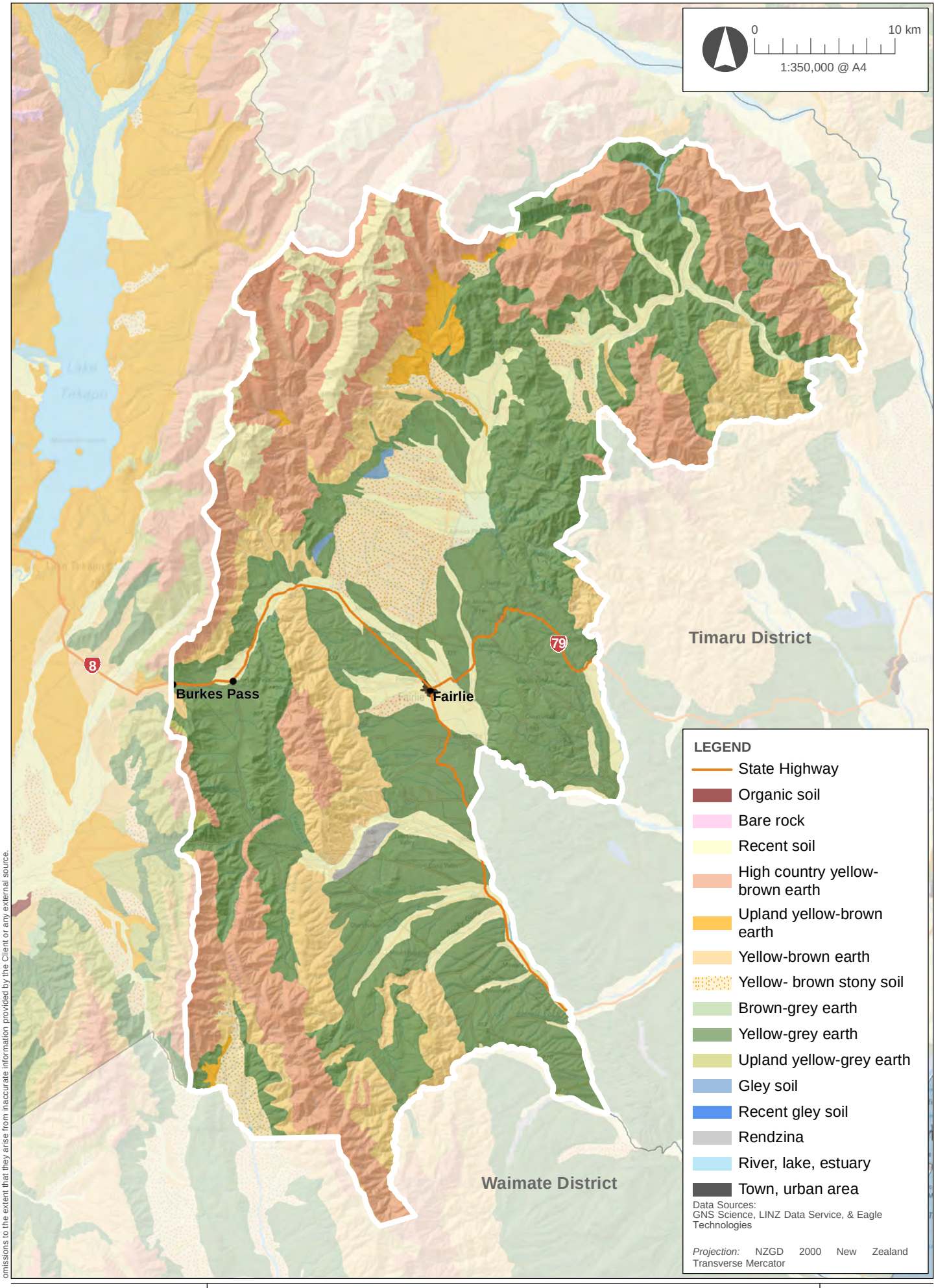
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 3

File Ref: BM200372_004_A4P_Soils.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Soils

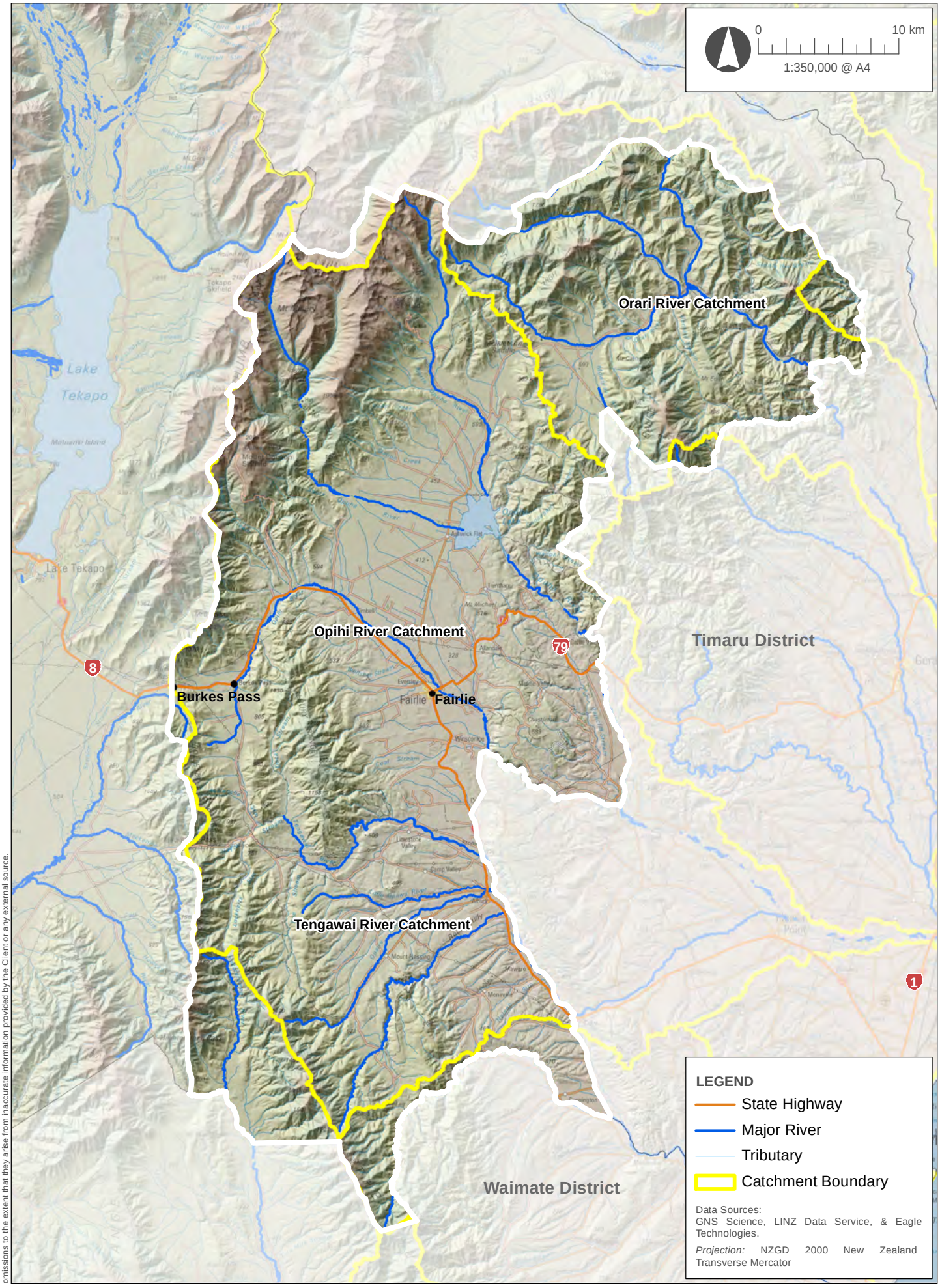
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 4

File Ref: BM200372_005_A4P_REC.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

River Catchments

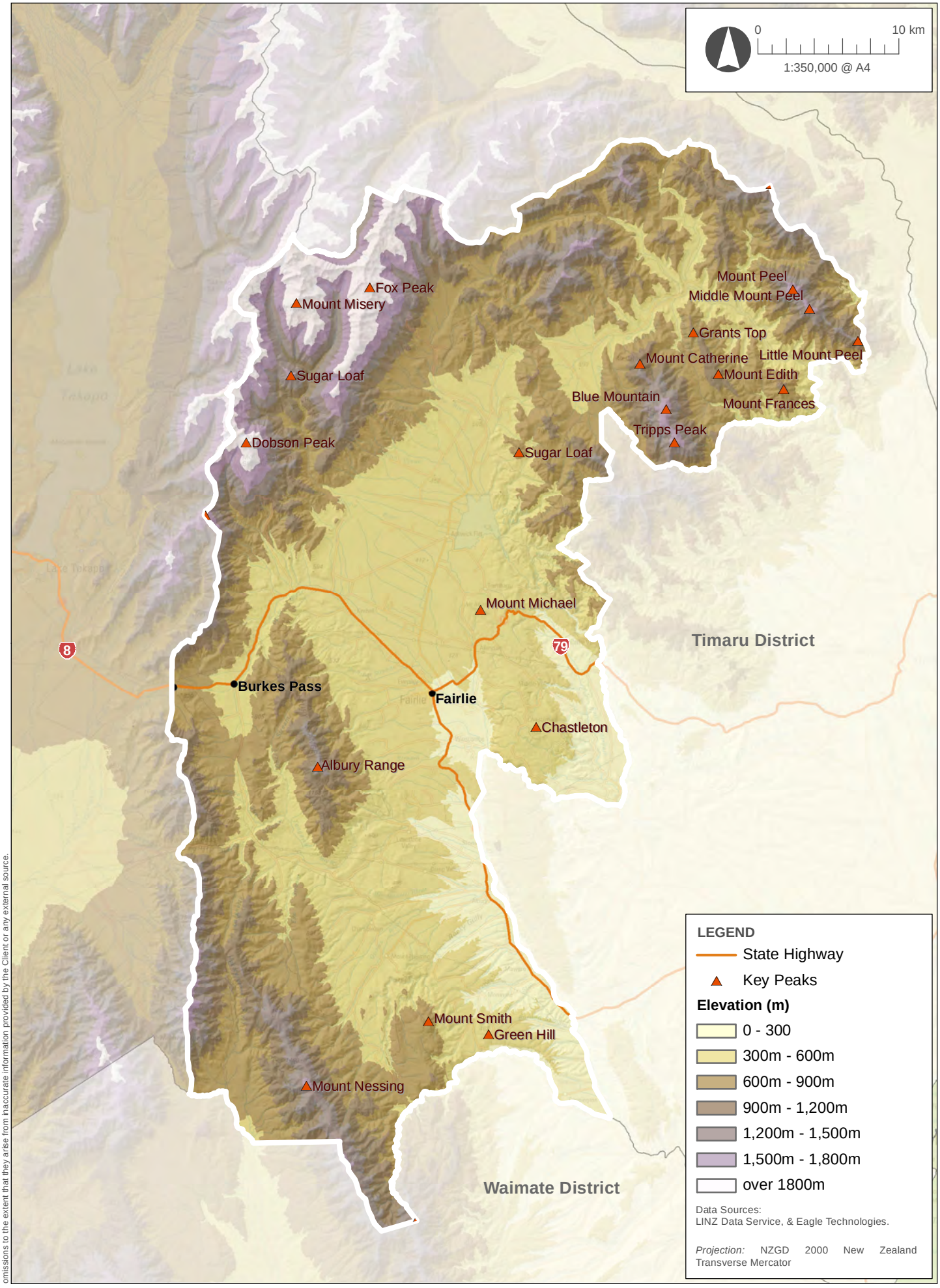
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 5

File Ref: BM200372_006_A4P_Elevation.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Elevation

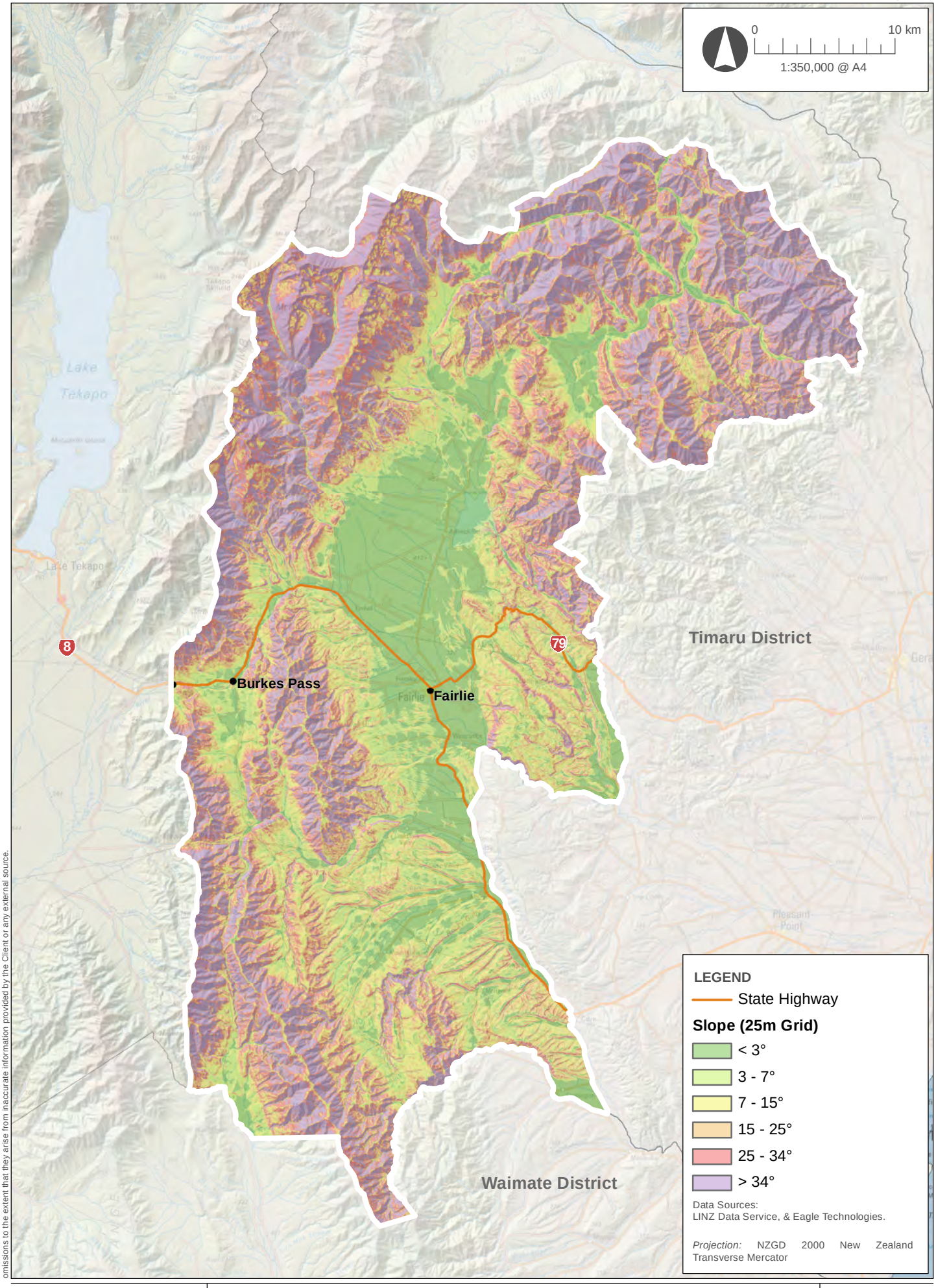
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 6

File Ref: BM200372_007_A4P_Slope.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Slope

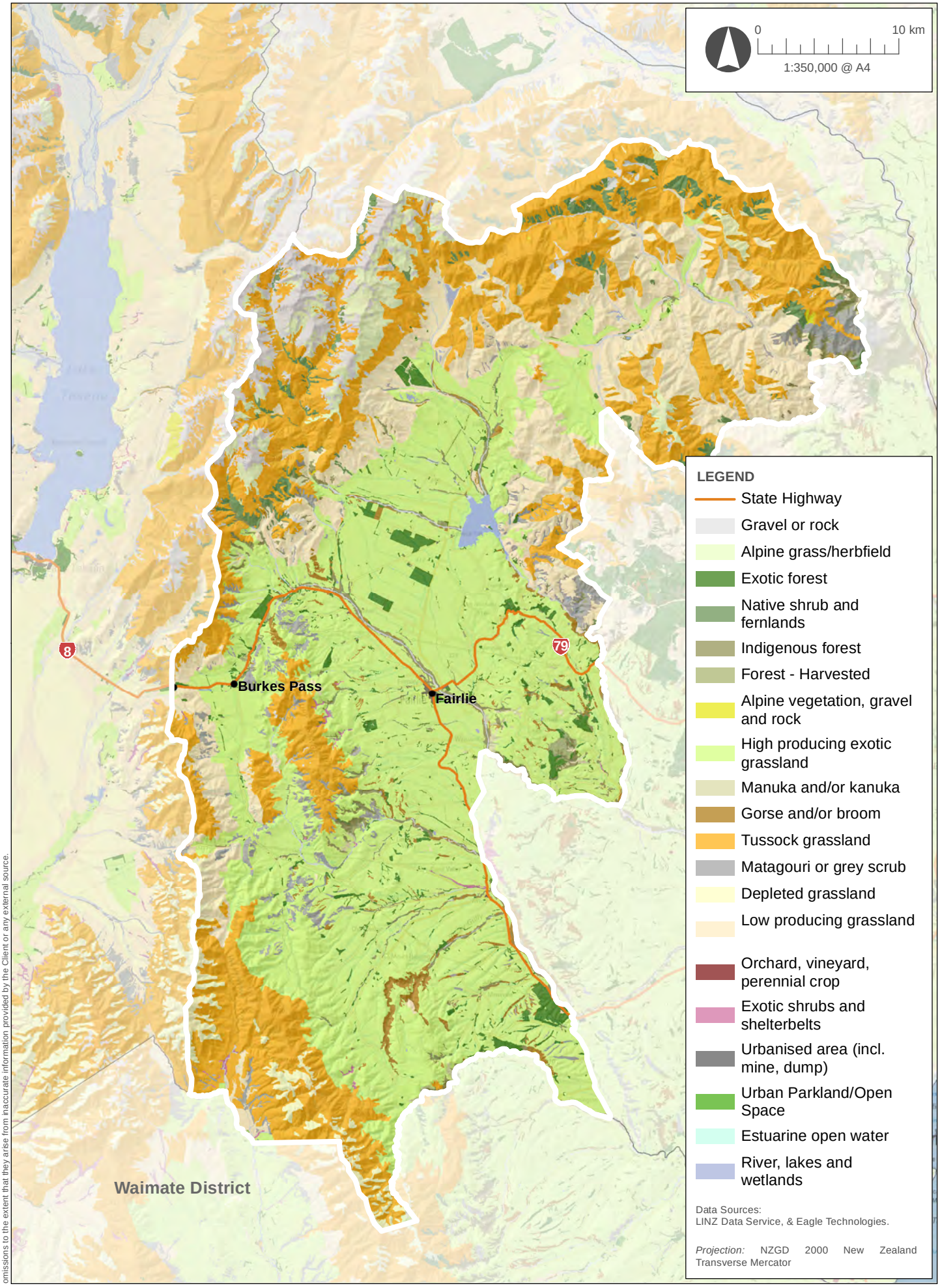
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 7

File Ref: BM200372_008_A4P_Landcover.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Landcover

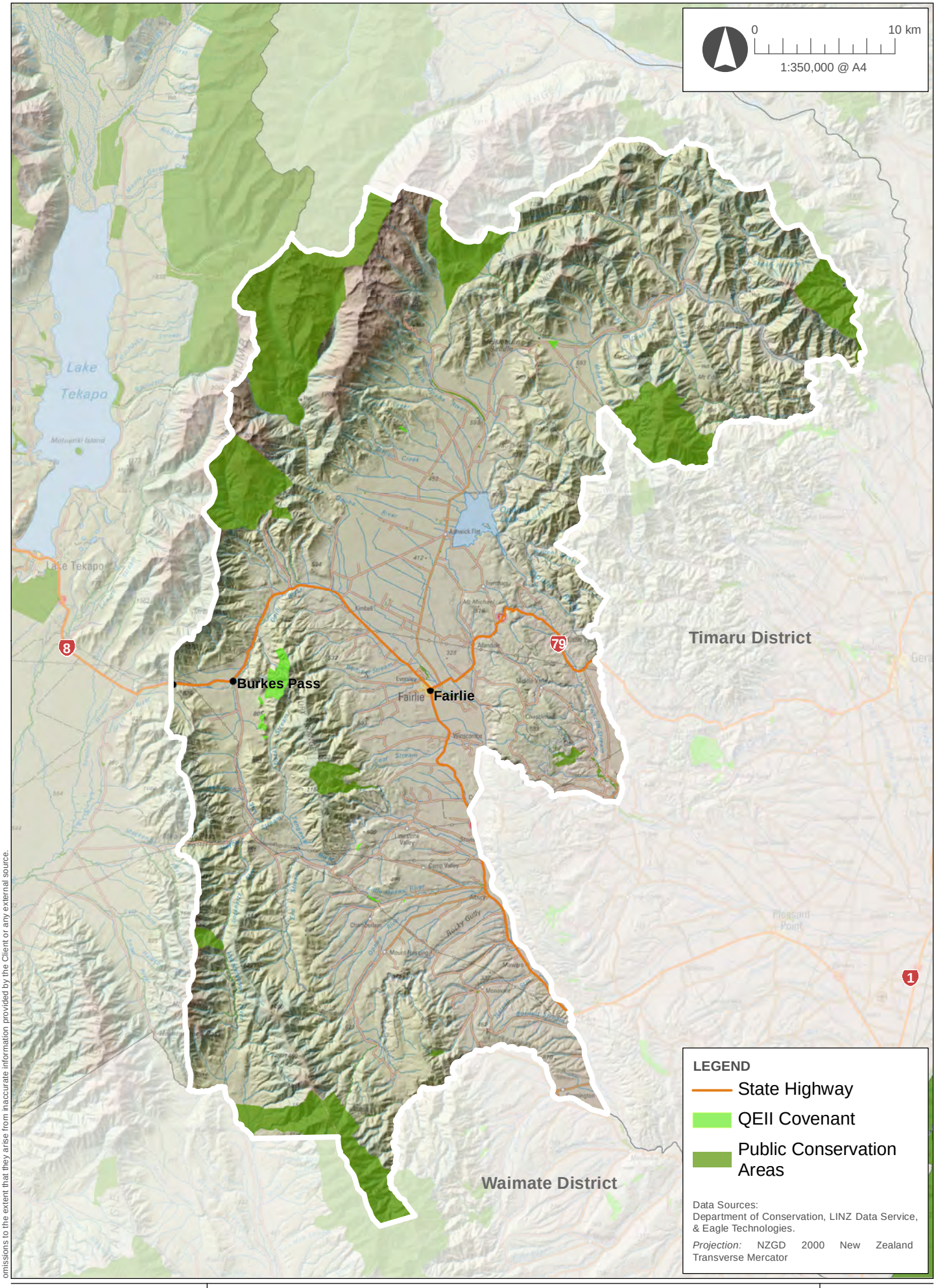
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 8

File Ref: BM200372_009_A4P_Recorded_Natural_Areas.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Recorded Natural Areas

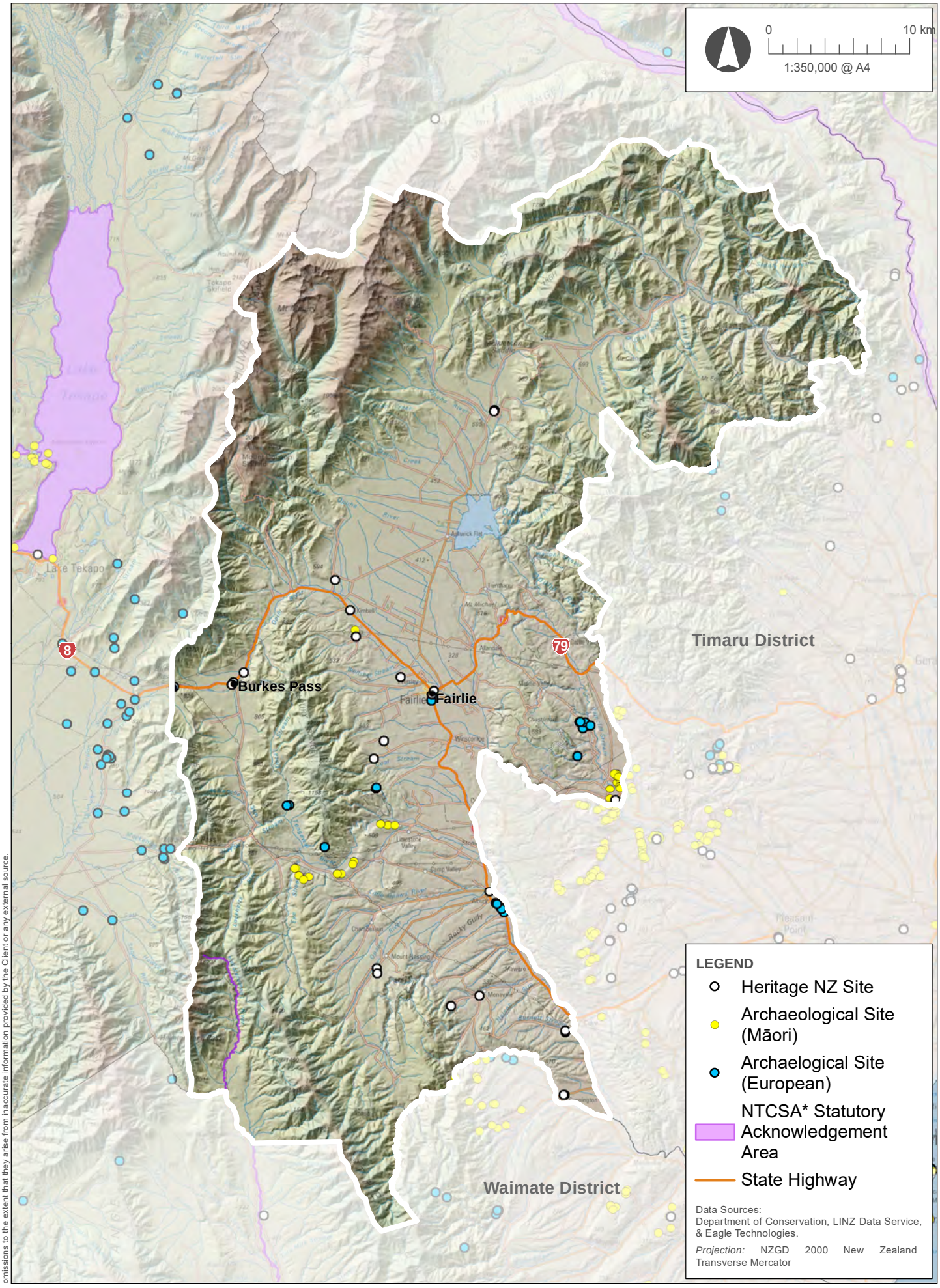
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 9

File Ref: BM200372_010_A4P_Recorded_Cultural_Areas.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

Recorded Cultural Areas

Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 10

File Ref: BM200372_012_A4P_Character_Areas.mxd

Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

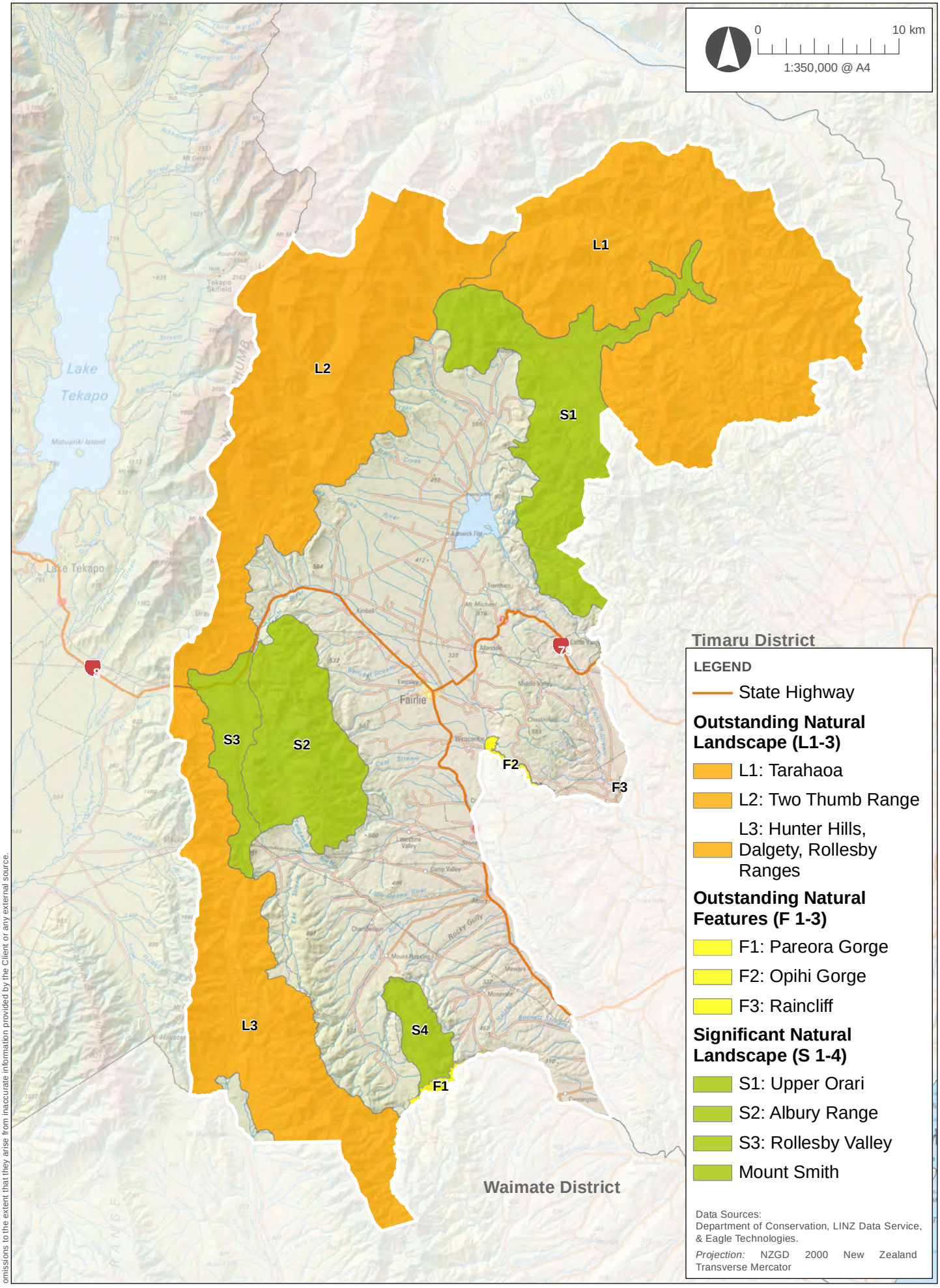
Landscape Character Areas

Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 11



Boffa Miskell
www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

ONFL and SNL Overview

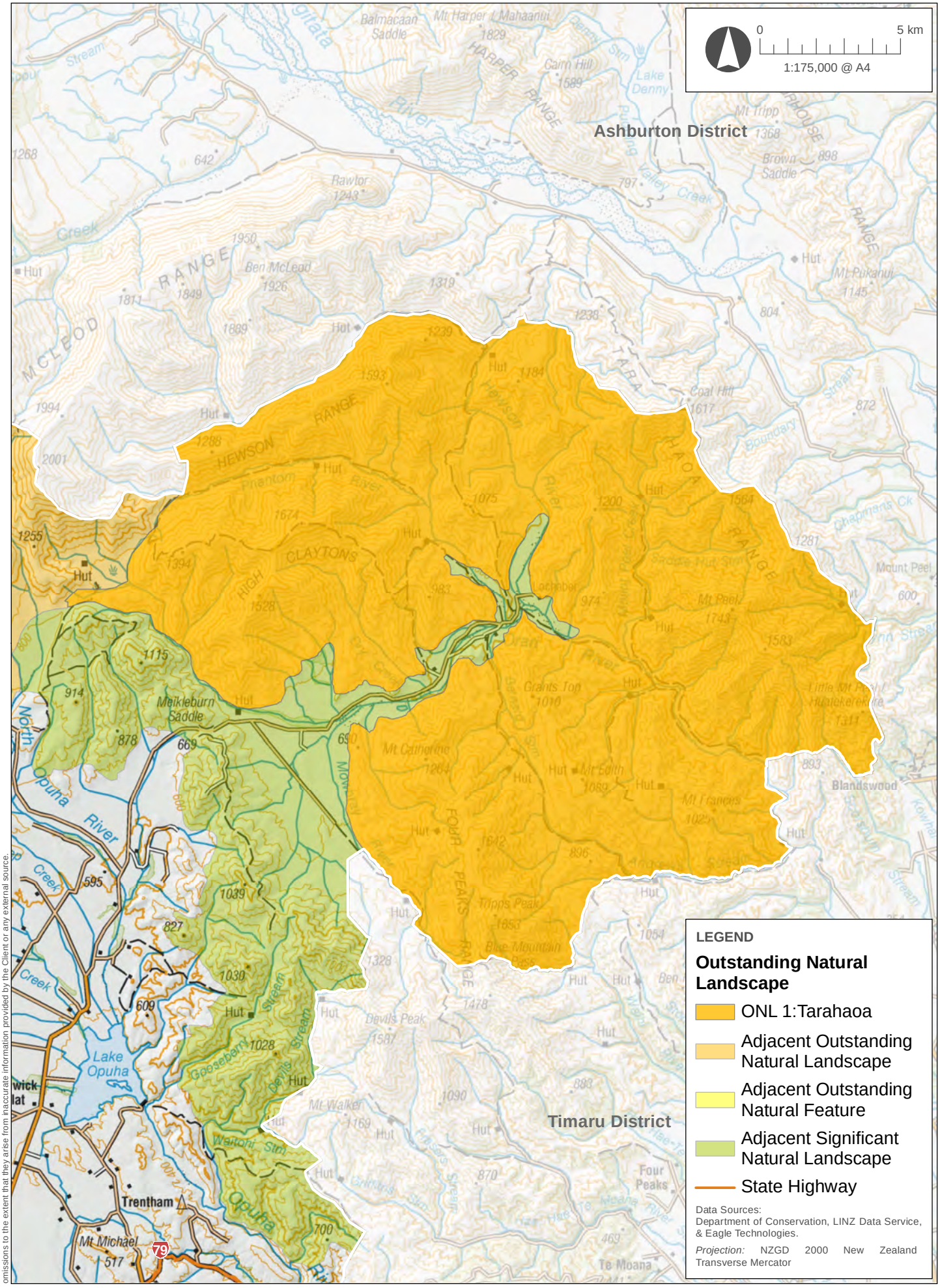
Date: 10 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 12

File Ref: BM200372_014_A4P_ONL_1_Tarahaoa.mxd



Boffa Miskell
www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

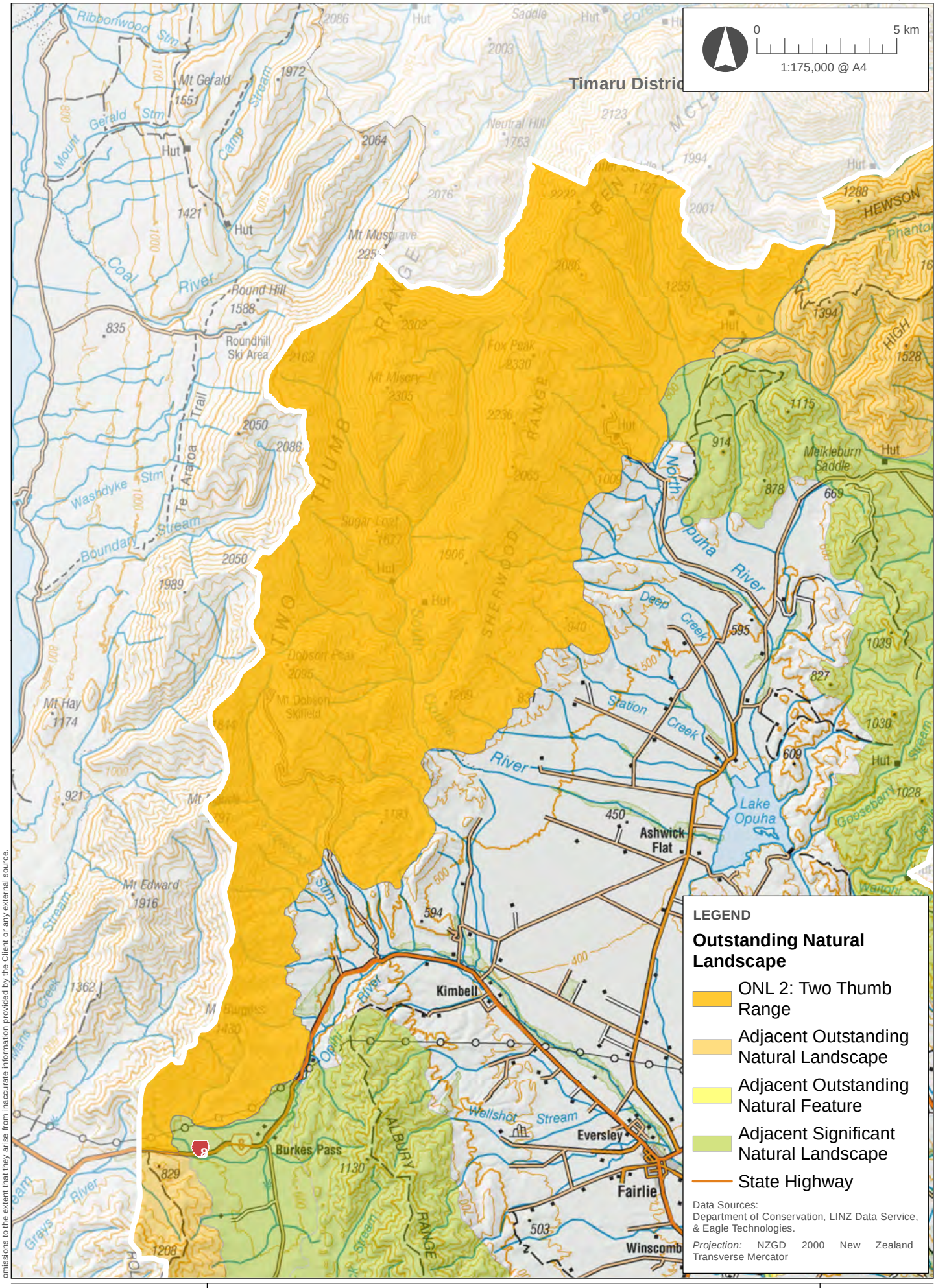
ONL 1: Tarahaoa

Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 13



LEGEND

Outstanding Natural Landscape

- ONL 2: Two Thumb Range
- Adjacent Outstanding Natural Landscape
- Adjacent Outstanding Natural Feature
- Adjacent Significant Natural Landscape
- State Highway

Data Sources:
Department of Conservation, LINZ Data Service, & Eagle Technologies.

Projection: NZGD 2000 New Zealand Transverse Mercator

Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

ONL 2: Two Thumb Range

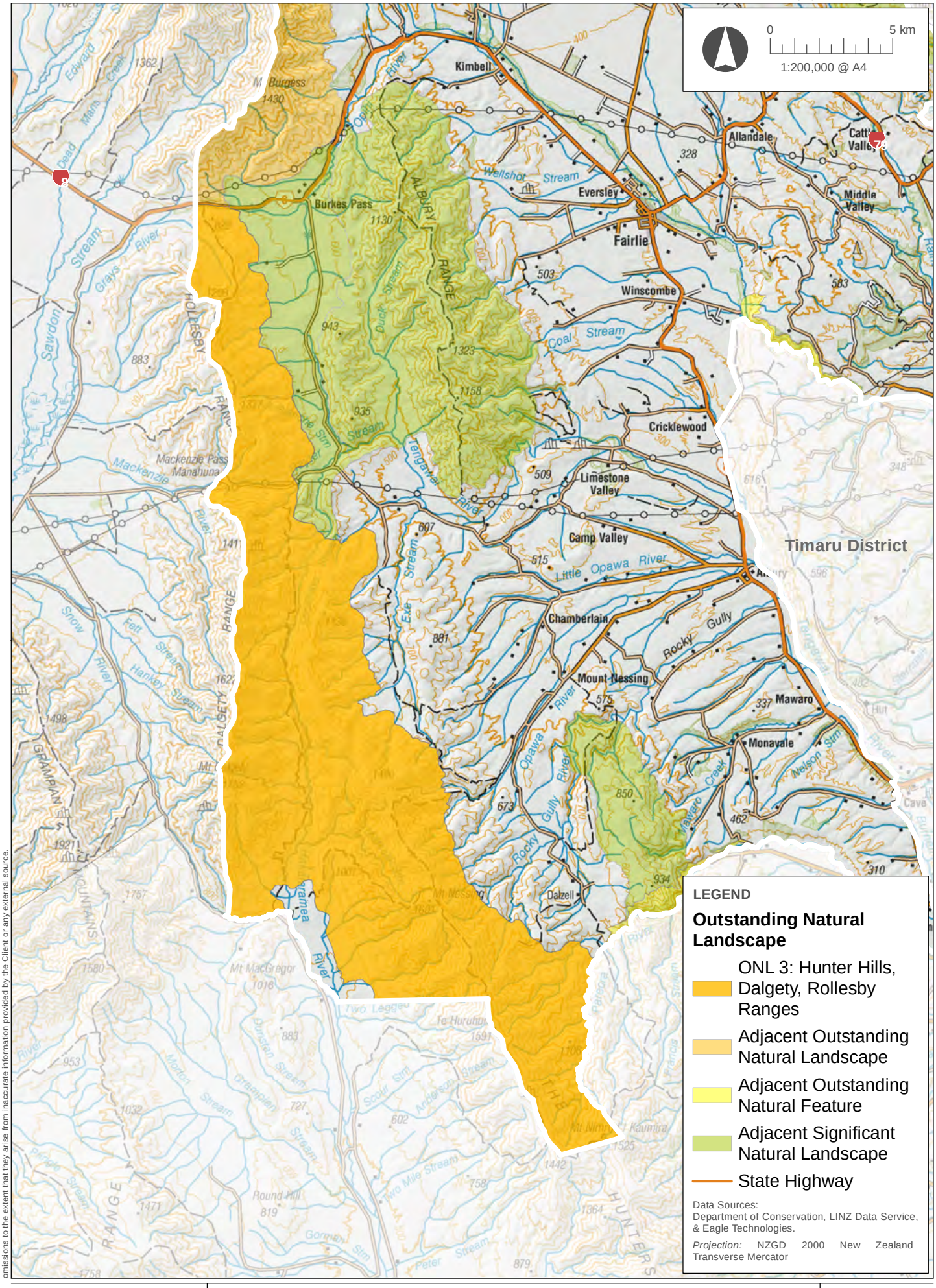
Date: 10 October 2023 | Revision: 2

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 14

File Ref: BM200372_016_A4P_ONL_3_Hunter Hills_Dalgety_Rollesby_Ranges.mxd



Boffa Miskell
www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

ONL 3: Hunters Hills, Dalgety, Rollesby Ranges

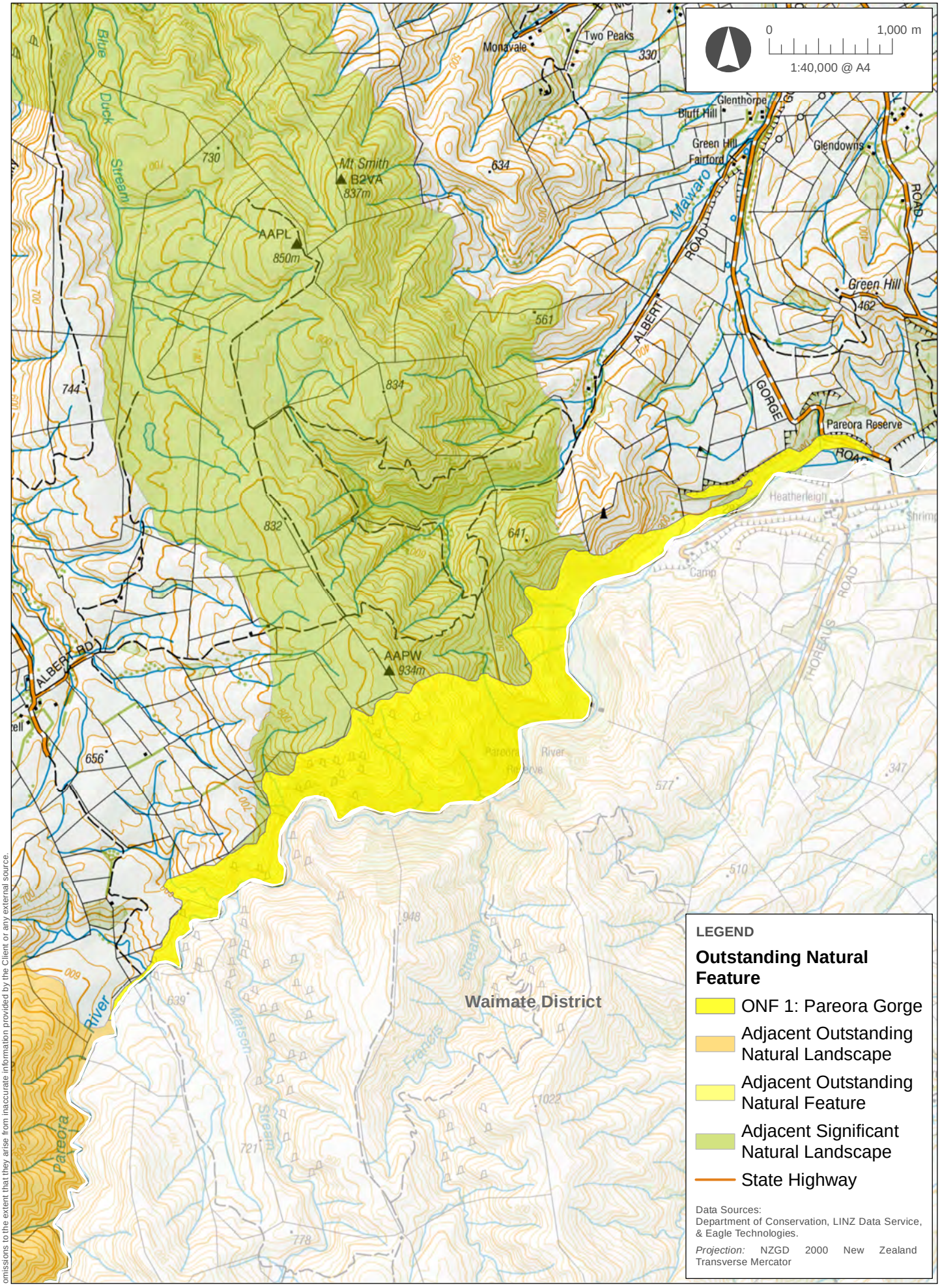
Date: 10 October 2023 | Revision: 2

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 15

File Ref: BM200372_017_A4P_ONF_1_Pareora_Gorge.mxd



LEGEND

Outstanding Natural Feature

- ONF 1: Pareora Gorge
- Adjacent Outstanding Natural Landscape
- Adjacent Outstanding Natural Feature
- Adjacent Significant Natural Landscape
- State Highway

Data Sources:
Department of Conservation, LINZ Data Service, & Eagle Technologies.

Projection: NZGD 2000 New Zealand Transverse Mercator

Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

ONF 1: Pareora Gorge

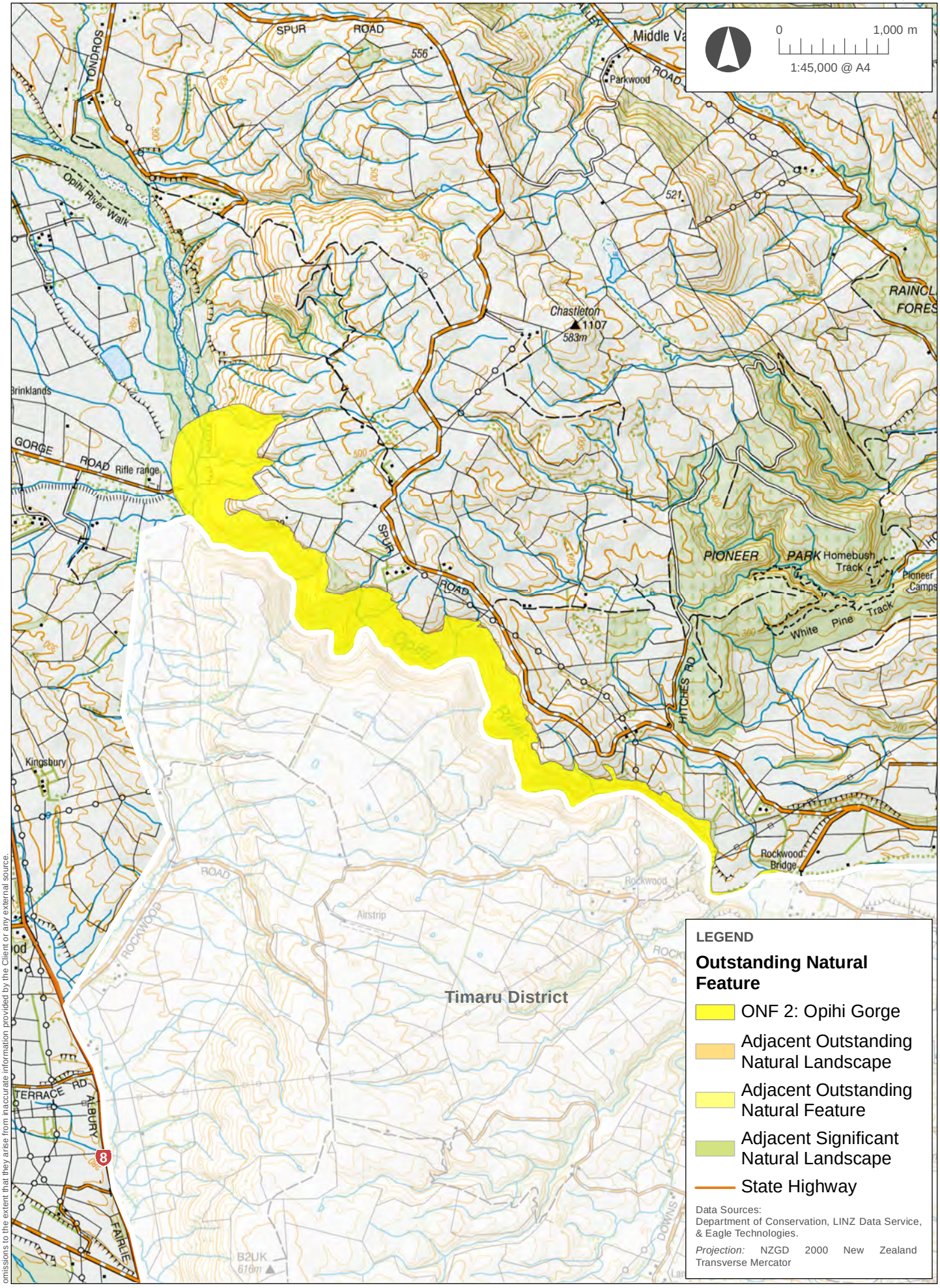
Date: 10 October 2023 | Revision: 2

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 16

File Ref: BM200372_018_A4P_ONF_2_Opihi_Gorge.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

ONF 2: Opihi Gorge

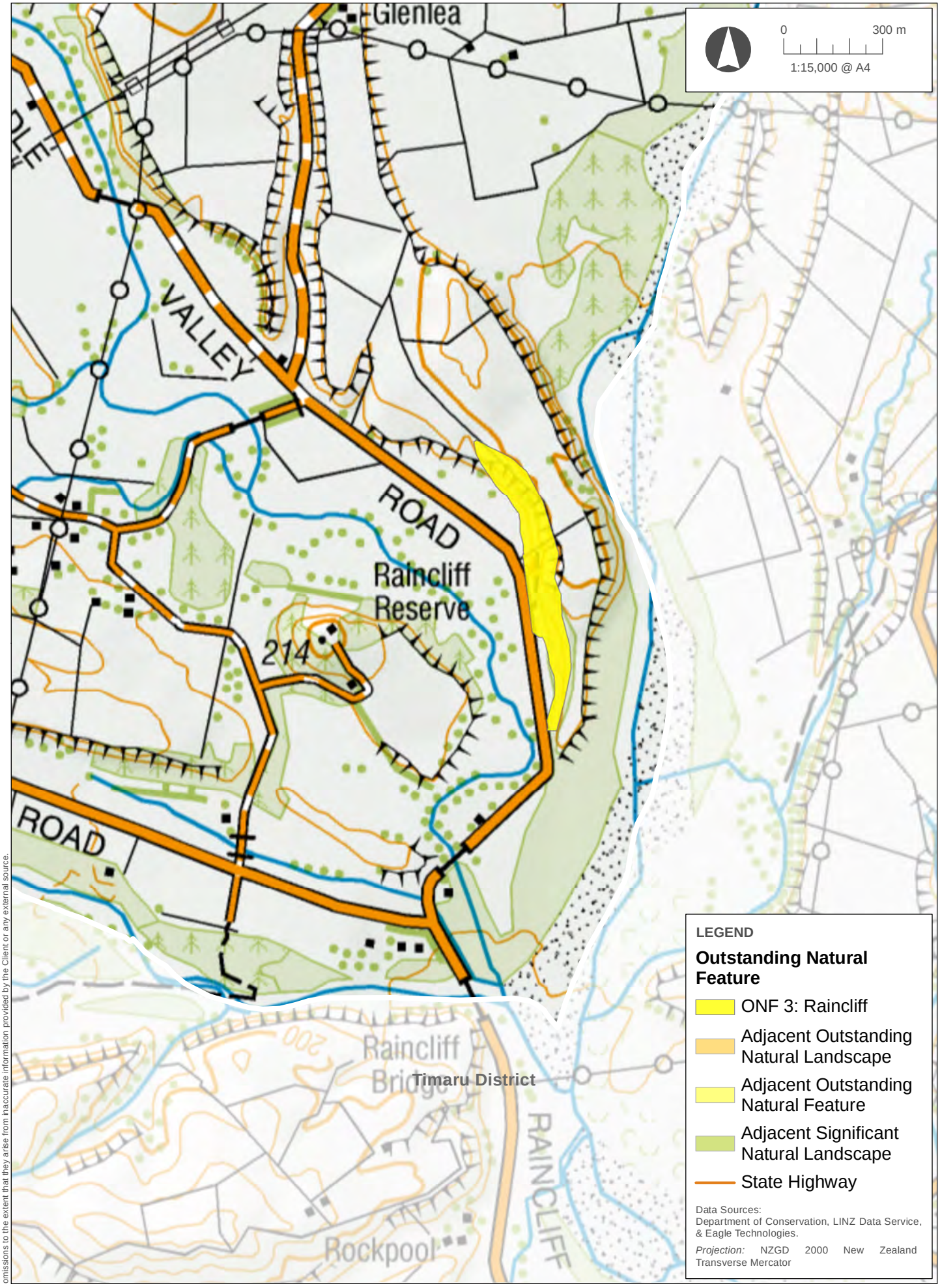
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 17

File Ref: BM200372_019_A4P_ONF_3_Raincliff.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

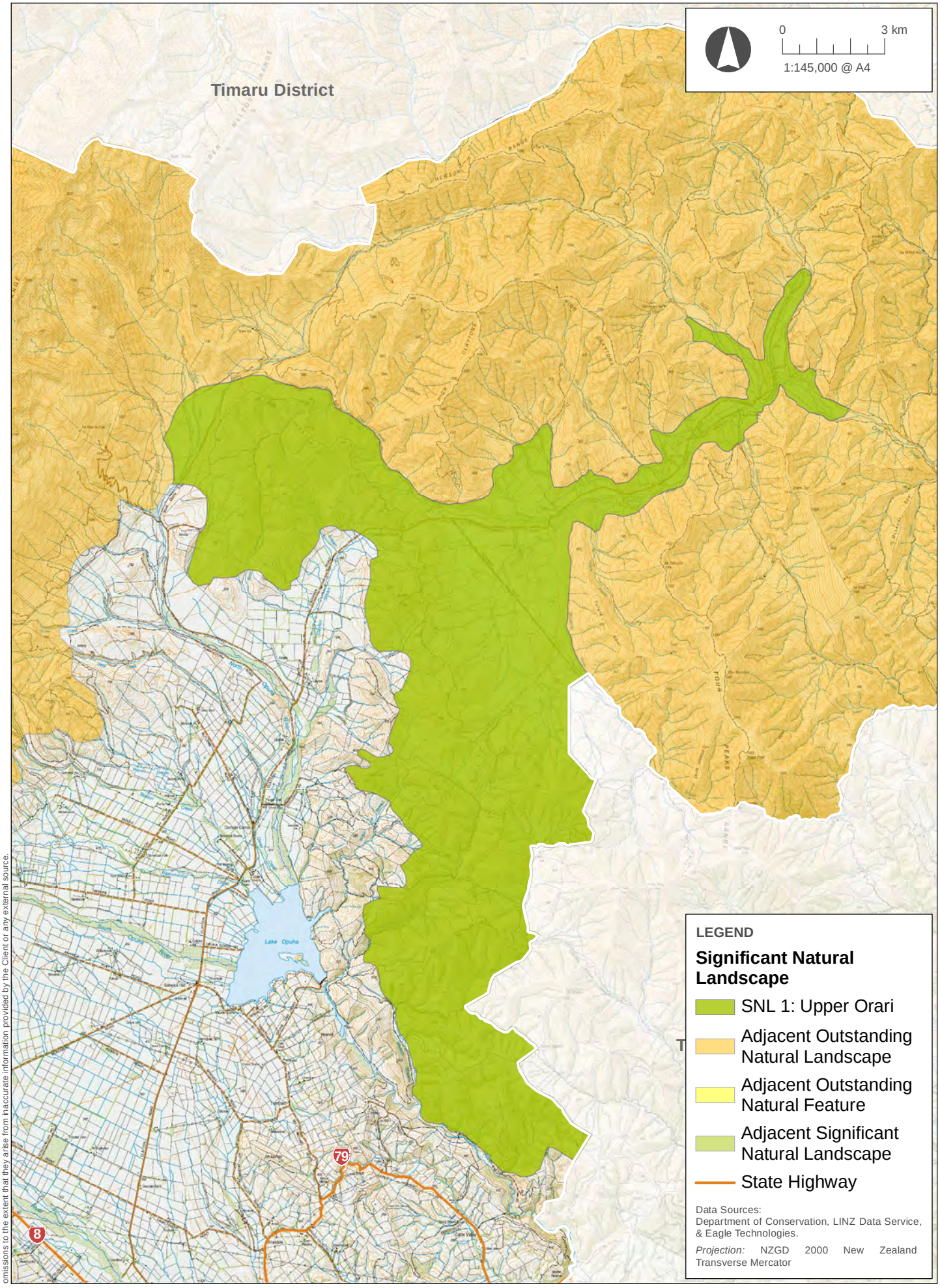
ONF 3: Raincliff

Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 18



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

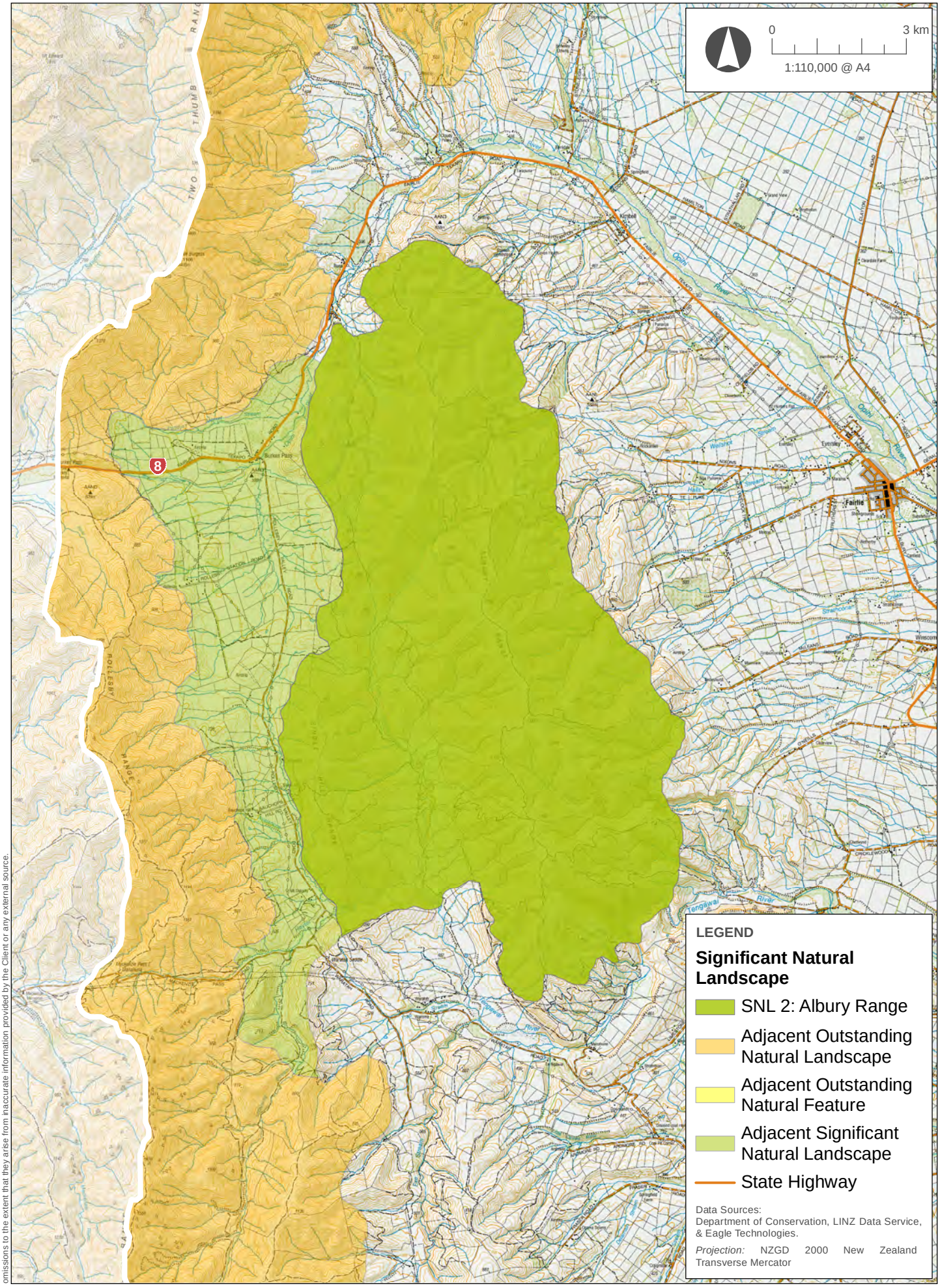
SNL 1: Upper Orari

Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 19



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

SNL 2: Albury Range

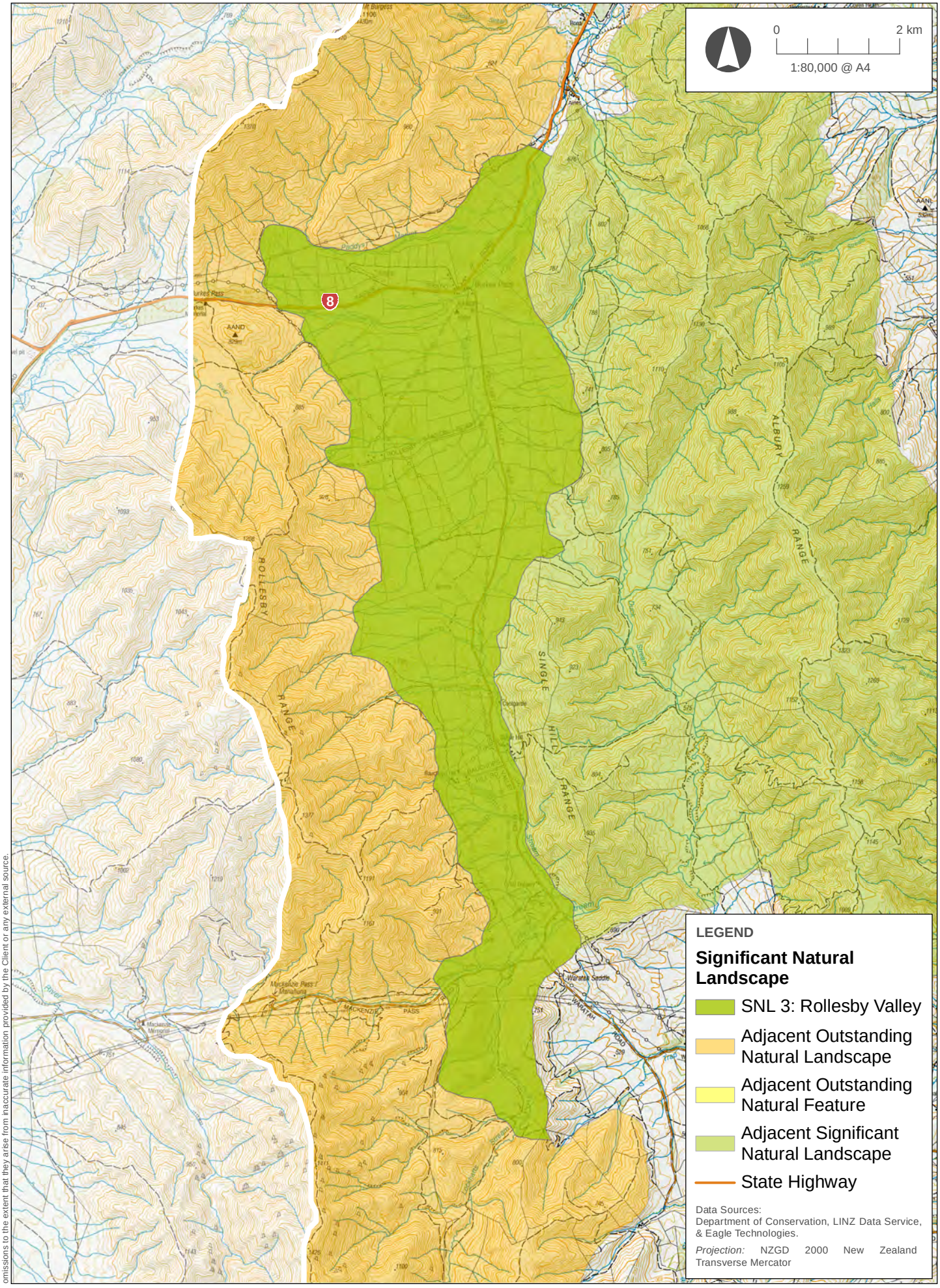
Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 20

File Ref: BM200372_022_A4P_SNL_3_Rollesby_Valley.pdf.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

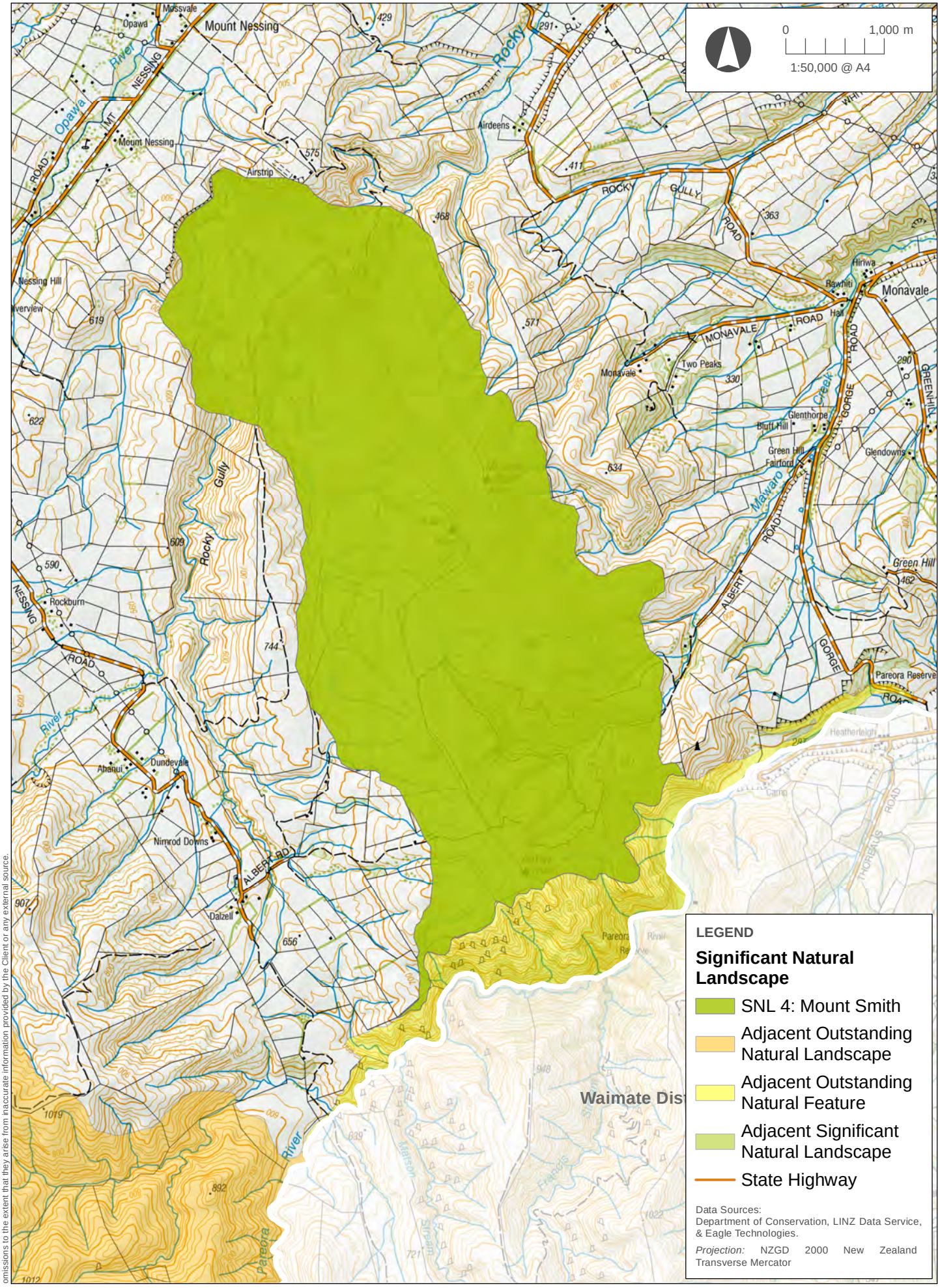
SNL 3: Rollesby Valley

Date: 27 June 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 21



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE LANDSCAPE STUDY

SNL 4: Mount Smith

Date: 10 October 2023 | Revision: 2

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure 22

Appendix 2 – Western Mackenzie Landscape Study

Boffa Miskell

Western Mackenzie Landscape Assessment

Landscape Characterisation and Evaluation Report
Prepared for Mackenzie District Council

11 October 2023

Boffa Miskell is proudly a
Toitū carbonzero® consultancy

Document Quality Assurance

Bibliographic reference for citation:
Boffa Miskell Limited 2023. *Western Mackenzie Landscape Assessment: Landscape Characterisation and Evaluation Report*. Report prepared by Boffa Miskell Limited for Mackenzie District Council.

Prepared by:	Yvonne Pflüger Associate Partner Landscape Planner Boffa Miskell Limited Hannah Wilson Landscape Architect Boffa Miskell Limited	
Reviewed by:	Yvonne Pflüger Associate Partner Landscape Planner Boffa Miskell Limited	
Status: [DRAFT]	Revision / version: 1	Issue date: 11 October 2023

Cover photograph: Hopkins Valley (Yvonne Pfluger)

CONTENTS

1.0 Introduction 1

1.1 Location of the Western Mackenzie 1
1.2 Landscape 3
1.3 Study Approach 4

2.0 Statutory Context 4

2.1 Resource Management Act 4
2.2 Canterbury Regional Policy Statement 5
2.3 Mackenzie District Plan 6

3.0 Landscape Characterisation Methodology 7

3.1 Landscape Description 7
3.2 Landscape Characterisation Process 8
3.3 Land Typing 8

4.0 The Landscape Character Areas of the Western Mackenzie 9

4.1 Landscape Character Area 1: Dobson / Hopkins Valleys 11
4.2 Landscape Character Area 2: Aoraki/Mount Cook 15

5.0 Landscape Evaluation Methodology 19

Defining Landscape Values 20
Evaluating Landscape Values 22

6.0 Outstanding Natural Landscapes and Features in the Western Mackenzie 25

6.1 Dobson / Hopkins Valleys, incl Ben Ohau Range 26
6.2 Aoraki/Mount Cook National Park 28

Appendix 1: Bibliography and References 30

Appendix 2: Landscape Evaluation Attributes 31

Appendix 3: Geopreservation Site Index Table 35

Appendix 4: List of Figures 37

1.0 Introduction

Mackenzie District Council has engaged Boffa Miskell Ltd (BML) to assist in assessing the landscape values and identifying areas of Outstanding Natural Features and Landscapes (ONF/Ls) within the western part of the Mackenzie District.

The **Western Mackenzie District Landscape Assessment** included the following tasks:

- Desktop Review of Information
- Landscape Characterisation
- Landscape Evaluation to identify Outstanding Natural Features and Landscapes (ONF/Ls), Significant Natural Features and Landscapes (SNF/Ls) and Scenic Viewing Areas.
- Mapping of Outstanding Natural Features and Landscapes

A key outcome of this Landscape Assessment is to ensure that Outstanding Natural Features and Landscapes are consistent with each other and those already identified in the Plan within the Mackenzie Basin, in terms of their value and boundary identification. A detailed methodology for the characterisation and evaluation stages, as well as the mapping, is provided at the start of the respective report sections.

The preparation of the Landscape Study is in response to the Councils' obligation under the Resource Management Act (RMA) and the Canterbury Regional Policy Statement (CRPS) to protect ONF/Ls.

Through a review of the CRPS in 2010, Environment Canterbury (ECAN) completed a statutory review of the management of its landscapes and natural features in accordance with the requirements of the RMA[1]. This Landscape Study contains a review of existing information, including the Canterbury Regional Landscape Study (2010), while assessing all of the district's landscapes within a comprehensive, up-to-date study based on best practice methodology.

Recent relevant case law is considered as well as advances in the understanding of the concept of 'landscape' since the introduction of the RMA 1991.

1.1 Location of the Western Mackenzie

Refer to **Figure 1: Study Area.**

The boundary of the Western Mackenzie follows:

- The Canterbury and Westland Regional Boundary in the west defined by the Main Divide.
- The Timaru/ Ashburton District Boundary to the north.
- The Mackenzie Basin to the east.
- The Waitaki District to the south.

[1] Canterbury Regional Landscape Study Review (July 2010) Boffa Miskell.

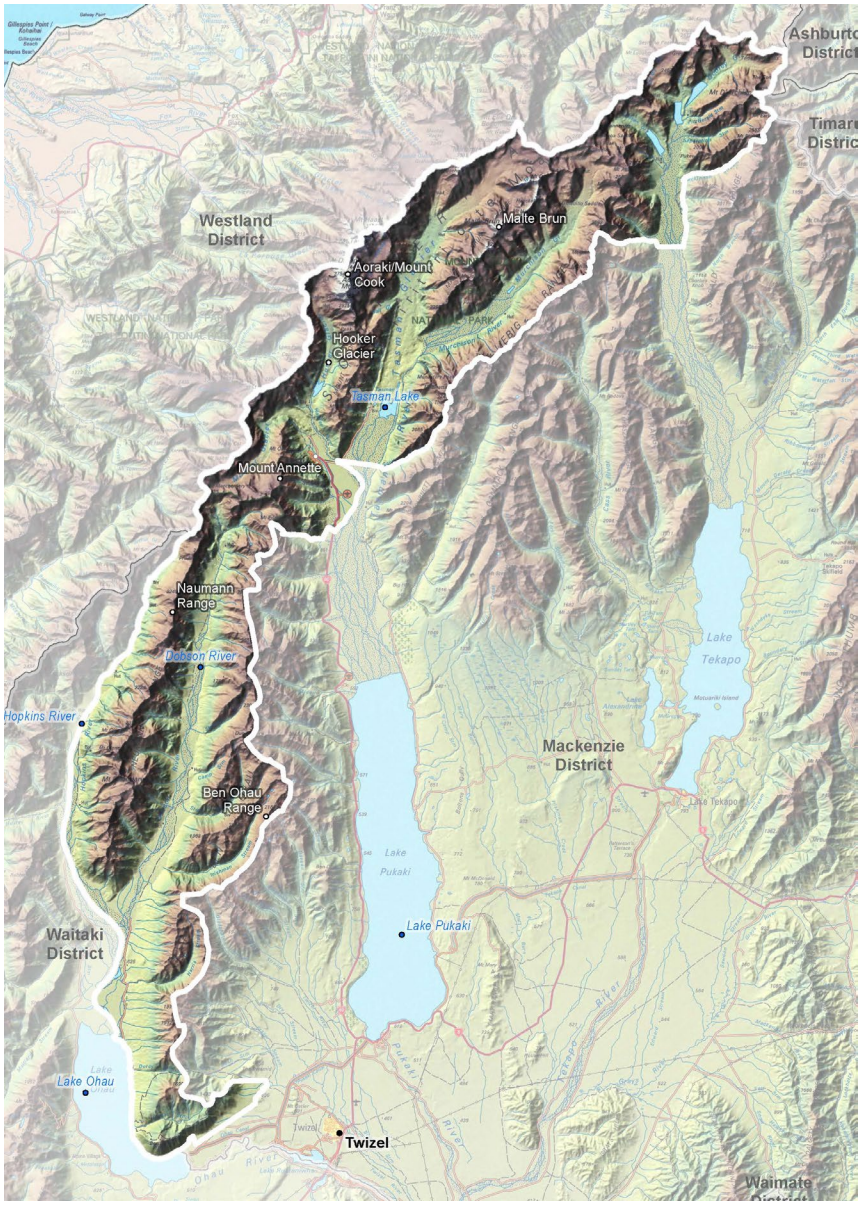


Figure 1: Map of Western Mackenzie Study Area

1.1.1 Neighbouring Districts

The Western Mackenzie forms an important, but fairly isolated part of the wider Mackenzie District. It is adjoined by the Timaru District to the north, the Waitaki District to the south, and the Westland District to the west. The Ben Ōhau Range and Liebig Range form the boundary between Western Mackenzie and the Mackenzie Basin (see Image 1 above) and the Hopkins River/ Lake Ohau form the boundary to Waitaki District.

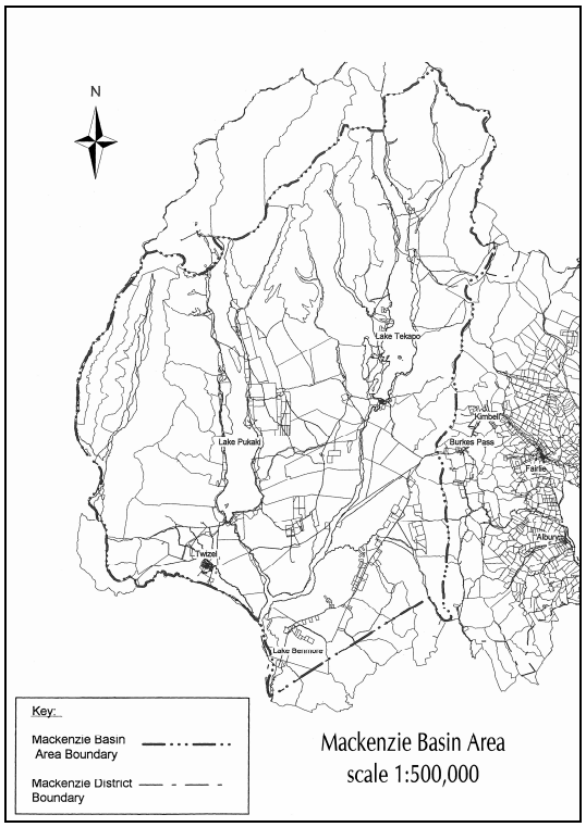


Figure 2: Map of the Mackenzie Basin Area

1.2 Landscape

Landscape, as defined by Tuia Pito Ora New Zealand Institute of Landscape Architects (NZILA), is the "relationship between people and place: It is the character of an area, how the area is experienced and perceived, and the meanings associated with it" (NZILA et al., 2021). While all landscapes are dynamic and continually change, the rate of change varies under different physical, social and economic conditions.

Defining landscape character relies on an analysis of topographic and various other mapping and spatial data (datasets), field survey and photography and aerial photography. For this particular study, much of the work has been based on a desk top analysis with field work to verify findings. The mapping of ONF/Ls has been undertaken at a broad, district-wide scale, based on a variety of information at different scales.

Within the Western Mackenzie District (refer to **Figure 1**), the landscape varies from expansive braided rivers to steep mountain ranges and high-country valleys. The description of landscape and subsequent landscape characterisation, undertaken as a first stage in the preparation of this assessment, provides valuable information on the key attributes that contribute to landscape character. This involves the review of a range of existing information, including other research documents, field work and input from related technical experts.

However, description and characterisation alone gives little assistance to the identification of the importance of values attributed to the landscape and associated influences directing the management of landscape change. To inform a rational decision on what constitutes landscape values and associated management techniques, including areas requiring legal protection such as ONF/L, criteria and justification must also be made explicit.

Within landscape character areas there are often sites or features that are significant components of the wider landscape such as geological formations or mountain ranges, native vegetation, or important historic or cultural areas or features.

These areas and features add depth and meaning to the landscape and contribute to landscape character and its values. Communities identify with them and seek to recognise them in some way – through naming them and representing them in art and literature, for example. Once these characteristics have been identified, then values can be assigned and a special status or protection in terms of resource planning and management can be applied if necessary. This occurs through identifying the areas and features in regional policy statements and district plans and developing specific policies and rules around them.

Effective landscape management is underpinned by landscape assessment. If robustly and rigorously applied, landscape assessment should inform both the approach and decision-making process relating to how landscapes are or can be managed.

1.3 Study Approach

This Landscape Study comprises the following main assessment stages.

The first part of the Landscape Study includes a **Landscape Characterisation** of the Western Mackenzie. This first stage comprises the classification of the landscape into broad land-types and character areas, drawing from land typing analysis conducted by Landcare Research on a regional scale[2].

The second stage comprises an **evaluation** of the different landscape values, including the identification of landscapes in accordance with Section 6b of the RMA. This stage has led to recommendations on which areas should be identified as ONF/L. A detailed assessment of landscape values present in each ONF/L is provided as part of this report.

As outlined, this Landscape Study was undertaken as an independent technical assessment by Boffa Miskell's landscape planners. The brief for this landscape assessment did not involve the engagement of cultural specialist advice or mana whenua liaison.

2.0 Statutory Context

2.1 Resource Management Act

The Resource Management Act (RMA) is the principal statute governing the management of New Zealand's landscapes. The relevant directives within the Act regarding the protection and management of landscapes are set out in Part II, and include:

Section 6(b): The protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.

Natural features and landscapes that do not meet the criteria for being ranked as 'outstanding' can nonetheless qualify for protection under other clauses in section 6, or are required to be "maintained and enhanced" either as "amenity values" or part of the wider "quality of the environment" encompassed under RMA section 7(c) or section 7(f) respectively.

[2] and contained within the Canterbury Regional Landscape Study Review (Boffa Miskell, 2010)

In addition, landscapes of the coastal environment, wetlands, rivers or lakes that are not “outstanding natural features and landscapes” are still required to have their “natural character” preserved under RMA section 6(a), or significant areas of indigenous vegetation or habitats of indigenous fauna protected under section 6(c).

Other related topics include Section 6(e) concerning the relationship of Māori and their culture and traditions with their ancestral lands, water, mahinga kai or settlement sites, waahi tapu, and other taonga. While publicly available information was used to inform the assessment in respect of mana whenua values, it should be noted that this landscape study is unlikely to include all mana whenua values. As part of the wider environment to be managed under Part 5 of the RMA, adverse landscape effects resulting from inappropriate activities must be avoided, remedied or mitigated.

2.2 Canterbury Regional Policy Statement

The Canterbury Regional Policy Statement 2013 (CRPS) provides a regional level approach to objectives, policies and methods to resolve the resource management issues of the Region and to achieve the integrated management of the natural and physical resources of Canterbury. Chapter 12 sets out the issues, objectives, policies and methods in relation to Landscape. Of particular relevance to this study is the identification of an issue around the inconsistent identification and management of ONF/Ls around the region and thus variable levels of protection of values.

To address this issue, the CRPS includes objectives seeking the identification of ONF/L and their recognition and protection, and also the identification and management of other landscapes of importance for natural character, amenity or historic and cultural heritage reasons. The third objective seeks consistency of assessment of landscapes.

Policy 1 requires identification of ONF/L including recognition of the values set out in Appendix 4 to the Statement (which sets out the ONF/L at a regional scale from the 2010 Regional Landscape Study). To achieve this policy, territorial authorities are required to set out objectives, policies and methods, including maps, to identify ONF/Ls at the time of a relevant district plan review, or within 7 years of the CRPS becoming operative; whichever is sooner.

Policy 3 provides for identification of other important landscapes that are not outstanding natural landscapes, for natural character, historic cultural, historic heritage and amenity purposes. This is not a mandatory requirement for territorial authorities.

Consistency of identification is managed through policy 4 which states:

> *12.3.4 Consistency of identification and management of outstanding natural features and outstanding natural landscapes*
>
> *Seek to achieve regional consistency in the identification of outstanding natural features and landscape areas and values by:*
>
> *1. considering the following assessment matters which address biophysical, sensory and associative values when assessing landscapes in the Canterbury region:*
>
> *(a) Natural science values*
> *(b) Legibility values*
> *(c) Aesthetic values*
> *(d) Transient values*
> *(e) Tāngata whenua values*
> *(f) Shared and recognised values*
> *(g) Historic values*

The preparation of landscape assessments that take into account these values is a mandatory requirement for territorial authorities within the Canterbury Region.

2.3 Mackenzie District Plan

The Mackenzie Basin was the subject of Plan Change 13 to the Mackenzie District Plan and involved identification of the majority of the basin as an ONL with only small exclusions in the settlement and farm homestead areas. This finding in the Environment Court decision is consistent with the regional 2010 ONL study.

However, the ODP for Mackenzie District currently does not include any ONFLs outside the Mackenzie Basin, including the Western Mackenzie area (west of the Ben Ōhau and Liebig Ranges).

Mackenzie District Council (MDC) is undertaking a staged District Plan Review (DPR), which commenced in 2022. Since there are currently no ONLs identified for Western Mackenzie in the Operative District Plan, this report will inform the landscape related aspects of the DPR in relation to the Western Mackenzie area. It is anticipated that the findings of this report will be subject to community consultation and submissions where some amendments may arise.

The key operative landscape related plan provisions relate to the higher-lying parts of the district, located above the 900m contour which restricts built development in the rural zone. Appendix K of the ODP includes Landscape Guidelines that provide guidance on siting, design, material and colours of buildings and structures; fences, power lines; tracks and roads; siting and design of tree planting and signs. These guidelines contain non-statutory recommendations, and their contents will require review in light of change in the district's landscape over the past three decades.

2.3.1 Section 4 - Takata Whenua

The landscapes of the Western Mackenzie are of cultural and spiritual importance to Kāti Huirapa (hapu), and Ngāi Tahu (Iwi). This is due to the natural and physical resources of the area, including traditional areas such as mahinga kai sites. Arowhenua Runaka, the principal Māori kainga of South Canterbury, still maintains kaitiaki over the health and survival of these resources, ensuring they are available for future generations. For Kāti Huirapa people, a way of life developed which was closely related to the natural environment and gave them intimate knowledge of the land and resources through their movement through Te Wai Pounamu.

The stories of the ancestor's journeys of exploration and creation and the shaping of the land also acted as "oral maps", with place name meanings woven carefully into them. Within the Mackenzie District many of the hills and mountains bear the names of the waka (canoes) and members of their crews important to the hapu of Ngāi Tahu. Many of the rivers, lakes and plains are named to represent the movements and marks upon the land of these ancestral vessels and people (Dacker, 1990[3]). Natural resources were managed by strict tikaka (resource management protocols and practises) and observance to these tipuna. Today's knowledge of these traditional resource management techniques is maintained by Kaumatua (elders) of Kāti Huirapa.

Section 4 of the Mackenzie District Plan outlines the issues, objectives and policies directly relating to takata whenua. It includes areas of concern for takata whenua, including consultation, Arowhenua Runaka being recognised and Kaitiaki Runaka, the identification of waahi tapu, and the maintenance and enhancement of mahinga kai areas.

The draft report has not undergone any iwi, stakeholder or wider public consultation. It is assumed that engagement with manawhenua is intended to take place through Mackenzie District Council. Once this engagement has taken place, the recognition of important values to manawhena can be integrated into this report.

[3] Bill Dacker- The People of the Place: Mahika Kai (1990)

3.0 Landscape Characterisation Methodology

As a starting point, this assessment recognises that all landscapes have values and form an integral part of the environment. Accordingly, an understanding of landscape character can provide an important tool which assists with managing landscape change. Whilst a primary focus of this assessment relates to identifying areas or features with notable landscape values, wider everyday rural landscapes can also be vulnerable to extensive landscape change.

To identify landscape values, the Western Mackenzie Landscape Study has relied upon professional judgement and drawn upon available information including GIS databases. This application of professional judgment will subsequently sit within a process of community input and validation if the findings are adopted into the District Plan through a review process. Ultimately, landowners and the community, together with Council, will have input into the refinement of the landscape study and the implications for landuse through a notification process.

In summary, the outputs from the Landscape Study, seek to develop an understanding of landscape values and provide guidance on how best to manage landscape character and landscape values, be it for protection, productive land uses, development, enhancement or rehabilitation.

3.1 Landscape Description

'Landscape description' involves a process of data compilation during which the layers or components that make up the landscape are identified. The data gathered can also include available GIS datasets which include: landform, soil, geology, drainage patterns, vegetation cover, land uses, built development, infrastructure, heritage sites, cultural meaning and associations as well as associations with water bodies such as lakes, rivers and the sea.

Relevant GIS information that has been used to inform the extent of information, included:

- Topographical Maps (LINZ)
- Digital contour information at 20-meter intervals (LINZ)
- Land Cover Database v5.0 (LCDB Mainland New Zealand)
- Aerial Photography
- Geology (QMAP Geological Map of New Zealand Project - GNS Science)
- Soils (New Zealand Land Resources Inventory)
- Geopreservation Sites and Areas (GNS/qmap geology and New Zealand Geopreservation Inventory)
- Land Typing (Landcare Research – used for the Regional Landscape Study, 2010, Environment Canterbury)
- Heritage Sites (New Zealand Historic Places Trust)
- Ngāi Tahu Cultural Sites of Significance (various sources including Kā Huru Manu – Ngāi Tahu)
- Ecological Regions and Districts
- Elevation and Slopes
- Active Faults (GNS Science)

3.2 Landscape Characterisation Process

Landscape character can be defined as 'a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse'. It is an expression of the landscapes' collective attributes. Landscape character is each landscape's distinct combination of physical[4], associative[5] and perceptual[6] attributes. Put simply, landscape character is what makes an area unique

'Landscape characterisation' is the term used for the process of identifying, mapping and describing landscape character. Each area of landscape can be understood as having an identifiable character based on its individual or cumulative natural and cultural expression.

Characterisation provides a sound descriptive and analytical basis defining what makes an area of landscape distinct. Communities identify with 'their' landscapes and recognise them as having a particular combination of attributes and features that give them their distinctive 'character'. As defined in the latest NZILA guidance document[7] landscape character entails:

- Both tangible and intangible attributes; and
- The attributes in combination (as a whole); and
- Especially the combination that makes a place distinct or individual

Landscape characterisation typically involves identifying a series of landscape character areas or units. The process of landscape characterisation relies largely (although not entirely) on objective information and is intended to develop an understanding of 'sense of place'.

This element of the study is largely descriptive and objective. It draws on an understanding of the natural and cultural features, patterns and processes. Its focus is to identify distinguishing characteristics, which make one part of a district different from another. An understanding of the landscape characterisation of all landscapes at a district level provides a meaningful basis for the identification of significant and important landscapes within a subsequent landscape evaluation exercise.

For the Western Mackenzie Landscape Study the land typing work undertaken by Landcare Research as part of the Canterbury Regional Landscape Study Review (Boffa Miskell 2010) was of assistance. This parcel of work described and mapped 'Land types' to distinguish major physiographic land units on the basis of topography and lithology. In New Zealand, 'land typing' has proved a useful basis for landscape characterisation and subsequently identifying natural features and landscapes.

3.3 Land Typing

'Land types' are used to distinguish major physiographic land units on the basis of topography and lithology. In New Zealand, 'land typing' has proved a useful basis from which landscape characterisation has been based and forms a minimum requirement for identifying natural features and landscapes.

In the Western Mackenzie there are 2 Land Types, which have been determined by Landcare Research and are contained within the Canterbury Regional Landscape Study Review (Boffa Miskell 2010). These include the **High-Country Land Types**, Southern Subhumid to Humid Mountain Range Land Type, and Southern Main Divide and Associated Ranges Land Type.

[4] The physical elements of the landscape, including its geomorphological, ecological and biological elements, and involving more objective and quantifiable data.
[5] Sometimes referred to as the 'meaning' of the landscape and including: cultural; historic values; shared and recognised values; and recreational and scenic values.
[6] involving consideration of aesthetic characteristics; the degree of naturalness of a landscape; its memorability, legibility and expressiveness; transient matters; and experiential aspects such as smells, sounds and a sense of remoteness
[7] Te Tangi a te Manu_Aotearoa New Zealand Landscape Assessment Guidelines [Final Draft, May 2021]

4.0 The Landscape Character Areas of the Western Mackenzie

The landscapes of the Western Mackenzie are internationally renowned and form the backdrop to the Mackenzie and Waitaki Basins. The Western Mackenzie straddles the eastern face of the Main Divide and is known for its striking mountainous landscapes, remote high-country farms, and several recreational opportunities.

The spectacular braided river valleys are significant features of the Western Mackenzie. These were widened and straightened by vast glaciers which left expansive valleys that extend from the Southern Alps to the Mackenzie Basin downstream. The Hopkins and Dobson Valleys to the south-west and Tasman/ Murchison Valley to the north-east form the headwaters of the large intermontane basins that extend across the Mackenzie and Waitaki Districts. The Te Awa Aruhe/Hopkins River, Ōtaao/Dobson River, and upper tributaries of the Te Awa Whakamau/Tasman River area are braided rivers and globally rare ecosystems providing habitat for several native threatened bird and freshwater species. Within the lower reaches of these valleys, indigenous plant communities have been modified by pastoralism and vegetation and the area is now dominated by pasture and tussock grasslands in parts that have been more intensively grazed, such as those around the Glen Lyon Station buildings. The low-growing nature of this vegetation found in the basins, along the river terraces and on the slopes of the ranges allows the landforms to dominate the landscape and define the horizons. This accentuates the vastness of these landscapes.

Much of the Ōtaao/Dobson River valley is encompassed within the Glen Lyon Station, which includes the Ben Ōhau Range and the eastern slopes of the Naumann Range. The high-country station is typical of the wider Mackenzie District, containing extensive areas of the low producing grassland, tussockland, and alpine herbfield at higher altitudes. The Te Awa Aruhe/Hopkins River remains less modified, clad in extensive areas of mountain and silver beech forest.

The imprint of glaciation is clearly expressed within the Western Mackenzie. As the Western Mackenzie forms the foreground to the Main Divide, the landscape largely comprises steep, dissected, isolated mountain blocks, with extensive scree and rock outcrops. The Hopkins and Dobson Ranges are framed by the Barrier Range to the south, the Ben Ōhau Range to the north and separated by the Naumann Range, which extends to the Main Divide.

To the north, the striking mountain ranges within Aoraki/Mount Cook National Park are largely characterised by the peaks of the Main Divide. This area of the Western Mackenzie is renowned for its sublime landscape features including glaciers, glacial lakes, and more notably, New Zealand's tallest mountain, Aoraki/Mount Cook. Of immense significance to mana whenua, Aoraki is central to Ngāi Tahu creation and is one of the more prominent features within the Western Mackenzie at 3,724 masl. The national park is internationally renowned for its recreational and tourism opportunities.

There is very limited settlement in this landscape, with isolated homestead and farm buildings associated with high-country farming and Aoraki/Mount Cook Village. This includes the internationally renowned Hermitage Hotel.

In total, the following two Landscape Character Areas have been identified for the Western Mackenzie area:

1. Hopkins and Dobson Valleys
2. Aoraki/ Mt Cook National Park

A description of each Character Area is provided in the following section and the character areas are shown on **Figure 11**.

Please note that a full analysis of cultural values, sites and areas has not been undertaken as part of this study, however existing and publicly available information on cultural sites and values has formed part of this assessment. It is intended that a more comprehensive analysis will be integrated via engagement with manawhenua, which may also allow incorporation of the work on Ngāi Tahu Cultural Sites of Significance.

4.1 Landscape Character Area 1: Dobson / Hopkins Valleys

Photograph 1: View of the Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River confluence from the Ben Ōhau Range.

The Dobson / Hopkins Valleys Landscape Character Area forms the south-western extent of the Western Mackenzie. The area is bound by the Ben Ōhau Range in the east, Aoraki Mount Cook in the north, and the Main Divide to the west. The landscape character area is defined by the steep, beech clad mountain ranges to the west, high country grazing to the east on the Ben Ōhau Range, and the braided river valleys which separate them.

4.1.1 Physical Characteristics

The Dobson / Hopkins Valleys Landscape Character Area is characterised by greywacke sandstone mountain ranges and alluvial gravels deposited by the Te Awa Aruhe/Hopkins and Ōtaao/Dobson Rivers. The topography of the landscape is steep and mountainous with the upper reaches of the character area extending above 2,500 masl. These areas include several features such as moraines, rôches moutonnées, and terraces. Within the valley there are several steep streams and creeks which form the wider catchment of the Te Awa Aruhe/Hopkins and Ōtaao/Dobson Rivers. These tributaries form distinctive alluvial fans within the valleys below.

The Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River are both braided rivers and form the valleys within this character area. Braided rivers are considered globally rare ecosystems and provide habitat for several species including the banded dotterel/turiwhatu, paradise shelduck/pūtakitaki, and South Island pied oystercatcher/tōrea (Department of Conservation, n.d.-b). The rivers are also home to several native fish species including long fin eel/tuna and are recognised as a Site of Natural Significance within the Mackenzie District Plan (Mackenzie District Council, n.d.).

Other key landscape features within this landscape character area include the Ben Ōhau Range, Naumann Range, and the eastern slopes of the Main Divide. The southern extent of the Ben Ōhau Range and Te Awa Aruhe/Hopkins River valley comprises predominantly grazed pasture on the lower slopes and exposed gravels and alpine herbfield in the upper reaches. To the north of the range within the Ōtaao/Dobson River valley, the landscape becomes less modified and comprises areas of mountain and silver beech forest, and isolated areas of grazed pasture. On the upper slopes this transitions into alpine herbfield and exposed scree slopes. To the west of the character area within the upper reaches of the Te Awa Aruhe/Hopkins River valley, the landscape becomes more remote and intact, with more extensive areas of mountain and silver beech forest before steeply transitioning into alpine herbfield and exposed gravels.

The extensive areas of beech forest within this landscape character area provide habitat for several native bird species including fantail/pīwakawaka, bellbird/korimako, grey warbler/riroriro, long-tailed cuckoo/koekoeā, rifleman/tītitipounamu and the tomtit/miromiro. Other bird species found throughout the area include New Zealand falcon/kārearea, New Zealand pipit/pīhoihoi, rock wren/pīwauwau, and the Australasian harrier hawk/kāhu.

The upper reaches of the Dobson / Hopkins Valleys Landscape Character Area are included within either the Ruataniwha Conservation Area or Ruataniwha Conservation Park. The lower reaches of the Te Awa Aruhe/Hopkins River valley and upper reaches of the Ōtaao/Dobson River valley are also encompassed with Glen Lyon Station.

In addition to the Dobson and Hopkins Rivers, there are several other Sites of Natural Significance identified within the Mackenzie District Plan. Irishman Stream, Dorcy Stream, and Greta Stream each contain an intact riparian strip of mountain beech (Mackenzie District Council, n.d.). Greta Stream also supports extensive areas of *Chionochloa rigida* grasslands, as well as *Dracophyllum pronum*, matagouri, and *Festuca matthewsii* (Mackenzie District Council, n.d.). To the south of Greta Stream, the lower slopes of Ben Ohau support a regenerating stand of Hall's totara (Mackenzie District Council, n.d.). Halls Block, at the western extent of Ben Ohau Road also contains an intact area of manuka and low stand of *Chionochloa rigida* (Mackenzie District Council, n.d.).

4.1.2 Perceptual Characteristics

The Dobson / Hopkins Valleys Landscape Character Area forms the upper reaches of Lake Ōhau and the foreground to the Main Divide. The mountainous headwaters of the catchment have special wilderness character, expansive and vast valley settings, and landscape features with a high degree of naturalness.

The formative processes of this landscape character area are highly legible through the glacially carved mountain ranges and presence of alluvial fans throughout the Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River valleys. The vastness of the river valleys enables spectacular views of the Main Divide, enhanced by the open areas of grassland and exposed gravel within the riverbeds.

A key feature within this landscape are the braided river patterns formed by the Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River. The rivers are highly expressive of their formative processes and are a continually changing landscape feature. This includes the change in the river channels and braid patterns throughout the year, especially during large rainfall events.

Transient characteristics of the Dobson / Hopkins Valleys Landscape Character Area include the snow-capped mountains and valley floors which are striking landscape features during the winter months, contrasting with the deep green of the extensive beech forest within this landscape character area. During the summer months in contrast, the landscape becomes more dominated by the expansive area of grassland within the valleys and alpine herbfield on the upper slopes.

4.1.3 Associative Characteristics

The landscape has several features of importance to mana whenua, Ngāi Tahu iwi, including Te Tari o Mauka Atua, the Ben Ōhau Range. Tari translates to mountain range, while Mauka Atua is one of the ancestors who capsized at Matakaea (Shag Point) on the Otago coastline. Many of the passengers on the Ārai te uru waka went on to explore Te Waipounamu. As many of the passengers did not return to the waka by daylight, they were transformed into the geographic features found throughout the South Island, including Te Tari o Mauka Atua (Te Rūnanga o Ngāi Tahu, 2023).

The Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River are also of significance to Ngāi Tahu as a kāinga mahinga kai (food gathering place). Aruhe (bracken fernroot), weka, kākāpō, were gathered in the Te Awa Aruhe/Hopkins River, while weka and tuna were gathered in the Ōtaao/Dobson River (Te Rūnanga o Ngāi Tahu, 2023). Tarahaka Tirau (Brodericks Pass) also connected the northern shores of Lake Ōhau to Tititira Head on the West Coast via the Te Awa Aruhe/Hopkins River.

The high-country landscape has a long association with agriculture and pastoral settlement. Glen Lyon Station encompasses part of the Ōtaao/Dobson River valley and Ben Ōhau Range and combined with the Huxley Gorge (outside of this study area) is one of the largest Crown Pastoral Units in Canterbury (Land Information New Zealand, 2000).

The mountain ranges and expansive braided river valleys within this landscape character area are typical of the high-country landscapes found within the Canterbury Region. The landscape has inspired numerous artists and writers for generations to express their impressions in paintings, poetry and prose and has a remote and wild character. Literary references to the Hopkins and Dobson Valleys have dated back to the mid-nineteenth century and are renowned for their outstanding scenic quality.

Within the upper reaches of the landscape character area there are exceptional panoramic views of the surrounding mountains and braided river plains within the Hopkins and Ōtaao/Dobson River valleys, as well as views which extend across to the Mackenzie Basin. An extensive variety of recreation activities, particularly within the numerous Department of Conservation reserves and parks, are also available within this landscape character area. Recreation opportunities include fishing, hunting, boating, four-wheel driving, and walking.

4.1.4 Key Characteristics

- Characterised by greywacke sandstone mountain ranges and alluvial gravels deposited by the Te Awa Aruhe/Hopkins and Ōtaao/Dobson Rivers.
- Throughout this landscape character area there are several large alluvial fans.
- Both valleys are characterised by the Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River, both considered globally rare ecosystems and a Site of Natural Significance within the Mackenzie District Plan
- Lower slopes are predominately characterised by grazed pasture while upper reaches contain alpine herbfield, exposed gravels, and extensive areas of mountain and silver beech forest.
- Native bird species include fantail/pīwakawaka, bellbird/korimako, grey warbler/riroriro, long-tailed cuckoo/koekoeā, rifleman/tītitipounamu, tomtit/miromiro, New Zealand falcon/kārearea, New Zealand pipit/pīhoihoi, rock wren/pīwauwau, and the Australasian harrier hawk/kāhu.
- Large portion of this landscape character area is encompassed within the Ruataniwha Conservation Area or Ruataniwha Conservation Park.
- Irishman Stream, Dorcy Stream, and Greta Stream each contain an intact riparian strip of mountain beech.
- Greta Stream supports *Chionochloa rigida* grasslands, as well as *Dracophyllum pronum*, matagouri, and *Festuca matthewsii*.
- The lower slopes of Ben Ohau support a regenerating stand of Hall's totara.
- Halls Block at the western extent of Ben Ohau Road contains an intact area of manuka and low stand of *Chionochloa rigida*.
- Formative processes are highly legible through the glacially carved mountain ranges, braided rivers, and presence of alluvial fans throughout the Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River valleys.
- Spectacular views of the Main Divide are available.
- Snow-capped mountains and valley floors are striking landscape features during the winter months
- During the summer months, the landscape is dominated by expansive areas of grassland within the valleys and alpine herbfield on the upper slopes.
- Te Tari o Mauka Atua, the Ben Ōhau Range, is of significance to Ngāi Tahu. Mauka Atua is one of the ancestors who capsized at Matakaea (Shag Point) on the Otago coastline.
- The Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River are of significance to Ngāi Tahu as a kāinga mahinga kai (food gathering place).
- The landscape character area has a long association with high country farming, including Glen Lyon Station.
- Recreation opportunities include fishing, hunting, boating, four-wheel driving, and walking.

4.2 Landscape Character Area 2: Aoraki/Mount Cook

Photograph 2: Tasman Glacier terminal lake with Aoraki/ Mt Cook in the backdrop.

The Aoraki/Mount Cook Landscape Character Area encompasses the upper reaches of the Mackenzie District and forms the entirety of Aoraki/Mount Cook National Park. The landscape character area is defined by the Main Divide in the west, and the Liebig Range in the east and has an internationally renowned mountainous and remote character.

4.2.1 Physical

The Aoraki/Mount Cook Landscape Character Area comprises steep greywacke sandstone and schist mountains uplifted by the globally significant Alpine Fault (GNS Science, n.d.). The fault extends in a south-west to north-east direction and is responsible for the formation of the Southern Alps. Due to the mountainous topography of the area, the elevation within this landscape area reaches in excess of 3,500 masl, with Aoraki/Mount Cook rising to 3,724 masl. The landscape is subjected to severe erosion which has stunted the 20km of uplift caused by the Alpine Fault within the last 12 million years (GNS Science, n.d.).

The valleys within this landscape character area have also been formed through the presence and recession of glaciers. The Haupapa/Tasman Glacier is the largest glacier still present within this landscape character area and forms the upper reaches of the Te Awa Whakamau/Tasman River. Other glaciers present within the area include Godley Glacier, Mueller Glacier, Hooker Glacier, and Murchison Glacier. Within the lower reaches of these valleys several glacial lakes have formed where the glacier once extended, including the Mueller Lake, Hooker Lake, Tasman Lake, and Murchison Lake.

Within the lower reaches of this landscape character area are several braided rivers which form the upper headwaters of the Te Awa Whakamau/Tasman River. The Murchison River and Hooker River form the main tributaries of the Te Awa Whakamau/Tasman River, each of which are globally rare ecosystems. The Te Awa Whakamau/Tasman River and its upper tributaries, and the Whimiahoa/ Godley River are also considered a Sites of Natural Significance within the Mackenzie District Plan. The The Te Awa Whakamau/Tasman River contains threatened plants such as *Carmichaelia kirkii* (vulnerable), *Luzula celata, Coprosma intertexta* (vulnerable), and *Triglochin palustre* (Mackenzie District Council, n.d.), while the Whimiahoa/Godley River provides habitat for black stilt, wrybill, banded dotterel, blackfronted tern breeding, marsh crake also present.

Due to the mountainous and harsh environment, there is virtually no forest in the landscape character area however, a vast number of alpine species, including *Olearia frimbriata, Epilobium purpuratum* (a willow herb), *Ranunculus godleyanus* (yellow mountain buttercup) and *Ranunculus grahamii* (an alpine buttercup) are present (Department of Conservation Canterbury Conservancy, 2001). The lower reaches of the Te Awa Whakamau/Tasman River valley are sparsely clad in low producing grassland. The upper reaches of the landscape character area contain a mixture of alpine herbfields, tussock grasslands, and isolated areas of indigenous shrubland and forest. The alpine snow-meadows of Aoraki/Mt Cook have also been recognised as a critical site by the Department of Conservation.

The Aoraki/Mount Cook Landscape Character area remains almost entirely devoid of structures and modification, with the exception of Mount Cook Road and Tasman Valley Road to the south, and the huts which are located in the upper reaches of the landscape character area. Browsing, introduced animals such as thar and chamois have however had significant impact on alpine and sub-alpine plant communities.

The Aoraki/Mount Cook Landscape Character Area is home to several native bird species including the kea, karearea/New Zealand falcon, karoro/black backed gills, and piwauwau/wren (Department of Conservation, n.d.-a). The braided rivers also provide habitat for the kakī//black stilt, a nationally critical species. In addition to several native bird species, the landscape character area contains several dragonfly, grasshopper, moth and butterfly species. Above the snowline the Mount Cook flea (a black alpine weta) are also present.

4.2.2 Perceptual

The Aoraki/Mount Cook Landscape Character Area is highly expressive of its tectonic, and glacial formative processes. While the geology of this landscape character area is fairly uniform, the creation of the landscape through compression and uplift of the Alpine Fault is of interest to experts and lay-people alike. Earthquakes generated by movement along this contact front are a recurring natural hazard of the Southern Alps, in addition to avalanches and landslips. Glacial processes include the permanent snow and ice which have shaped the steep actively eroding mountains. The impressive views to the high peaks and extensive glaciers create a sublime landscape that is unique in Aotearoa.

The seasonal change of the landscape character area, as well as dramatic weather changes and cloud formations are key ephemeral values. “He kapua kei runga i Aoraki, whakarewa whakarewa” (“The cloud that floats aloft Aoraki, for ever fly, stay aloft”) refers to the cloud that often surrounds Aoraki. Aoraki does not always “come out” for visitors to see, just as a great chief does not always give audience. It is for Aoraki to choose when to emerge from his cloak of mist, a power and influence that is beyond mortals, symbolising the mana of Aoraki (Ngāi Tahu Claims Settlement Act, 1998).

4.2.3 Associative

The landscape has several features of importance to mana whenua, Ngāi Tahu iwi. Aoraki/Mount Cook is central to Ngāi Tahu creation traditions. Aoraki and his brothers came down from the heavens to visit their step-mother Papatūānuku, but when attempting to return to the heavens, Aoraki misquoted his karakia, capsizing the canoe. As they climbed on top of the overturned canoe the brothers turned to stone, forming the principal mountains within the Southern Alps, with Aoraki being the highest. His brothers Rarakiroa (the Silberhorn), Rakiroa (Mount Dampier) and Rakirua (Mount Teichelmann) are also within this landscape character area. Consequently, Ngāi Tahu know the South Island as Te Waka o Aoraki.

The landscape character area includes the entirety of the Aoraki Mount Cook National Park (created in 1953) and is not only a significant landscape for mana whenua, but for alpine recreationalists and tourists. While there were attempts to reach the summit of Aoraki Mount Cook, the first successful ascent was in 1894 by Tom Fyfe, Jack Clarke and George Graham (Department of Conservation, n.d.).

Recreational opportunities within this landscape character area include several tramping tracks and alpine routes, camping, climbing, and hunting. Popular tramping tracks include the Muller Hut Route, and Hooker Valley Track.

The landscape character area also forms the north-eastern extent of the Te Wāhipounamu South West New Zealand World Heritage Area which extends as far south as Fiordland National Park. It is internationally recognised as a UNESCO World Heritage Site (Department of Conservation, n.d.).

To the south-west of the landscape character area is the Hermitage hotel, renowned for its history and today's luxury remote accommodation within the national park. To the south of the hotel is the Sawyer Hydroelectric Power Scheme which was constructed in 1925 to power the hotel. The historic scheme is now protected as an abandoned site, however it is still accessible by experienced climbers (Department of Conservation, n.d.).

4.2.4 Key Characteristics

- Steep greywacke sandstone and schist mountains uplifted by the globally significant Alpine Fault
- Elevation exceeding 3,500 masl, with Aoraki/Mount Cook rising to 3,724 masl.
- Key landscape features include the Godley Glacier, Haupapa/Tasman Glacier, Mueller Glacier, Hooker Glacier, Murchison Glacier, Mueller Lake, Hooker Lake, Tasman Lake, and Murchison Lake.
- The Murchison River and Hooker River, both braided rivers, are globally rare ecosystems.
- The Te Awa Whakamau/Tasman River and its upper tributaries, and the Whimiahoa/Godley River are considered Sites of Natural Significance within the Mackenzie District Plan, containing several threatened plant species and habitat for native birds.
- The Whimiahoa/Godley River provides habitat for black stilt, wrybill, banded dotterel, blackfronted tern breeding, marsh crake also present.
- Several alpine flower species present including *Olearia frimbriata, Epilobium purpuratum* (a willow herb), *Ranunculus godleyanus* (yellow mountain buttercup) and *Ranunculus grahamii* (an alpine buttercup).
- The lower reaches of the Te Awa Whakamau/Tasman River valley are sparsely clad in low producing grassland.
- The upper reaches contain a mixture of alpine herbfields, tussock grasslands, and isolated areas of indigenous forest.
- The alpine snow-meadows of Aoraki/Mt Cook are considered recognised as a critical site by the Department of Conservation.
- Almost entirely devoid of structures and modification, with the exception of Mount Cook Road and Tasman Valley Road to the south, and the huts which are located in the upper

reaches of the landscape character area.

- Browsing, introduced animals such as thar and chamois have had significant impact on alpine and sub-alpine plant communities.
- Native bird species present include the kea, karearea/New Zealand falcon, karoro/black backed gills, piwauwau/wren, and kakī//black stilt, a nationally critical species.
- Several dragonfly, grasshopper, moth and butterfly species present including the Mount Cook flea (a black alpine weta) above the snow line.
- The landscape is highly expressive of its tectonic, and glacial formative processes.
- The seasonal change of the landscape character area, as well as dramatic weather changes and cloud formations are key ephemeral characteristics.
- Aoraki/Mount Cook is central to Ngāi Tahu creation traditions and a significant landscape feature in conjunction with Rarakiroa (the Silberhorn), Rakiroa (Mount Dampier) and Rakirua (Mount Teichelmann)
- Entirely included within the Aoraki Mount Cook National Park (1953)
- Recreational opportunities include tramping tracks and alpine routes, camping, climbing, and hunting
- Forms the north-eastern extent of the Te Wāhipounamu South West New Zealand World Heritage Area, an internationally recognised UNESCO World Heritage Site.

5.0 Landscape Evaluation Methodology

A fundamental output of this Landscape Study is the identification of Outstanding Natural Landscapes and or Outstanding Natural Features that meet the 'outstanding' threshold under RMA Section 6(b).

The two criteria which must be met are that the landscape or feature is both 'natural' and 'outstanding'.

In terms of section 6(b), 'natural' usually means perceived naturalness rather than (for instance) the integrity or intactness of natural systems. These criteria for naturalness identified in case law (C180/1999 - WESI vs QLDC p. 57) include:

- relatively unmodified and legible physical landform and relief;
- the landscape being uncluttered by structures and/or obvious human influence;
- the presence of water (lake, river, sea);
- the presence of vegetation (especially native vegetation) and other ecological patterns.

The first two criteria of naturalness are necessary components of a natural landscape as they are indicators of human induced modification. However, the last two criteria are not essential as highly natural landscapes may have little or no water and vegetation cover in the absence of human modification, such as evidenced within parts of the mountain ranges or high country. Notwithstanding this, it is accepted that the last two criteria may enhance naturalness in landscape terms, however their absence does not necessarily detract from naturalness.

'Outstanding' encapsulates both quality and relativity: *"conspicuous, eminent, especially because of excellence"* and *"remarkable in".* It is a matter of reasoned judgement. An ONF or ONL will often be obvious. (NZILA et al., 2021)

Case law has found that the word 'outstanding' in 'outstanding natural features and landscapes' in section 6(b) means 'conspicuous, eminent, especially because of excellence' and 'remarkable' (C180 / 1999 - WESI vs QLDC p. 48). Usually, an outstanding natural landscape should be so obvious (in general terms) that there is no need for expert analysis (C180/1999 - WESI vs QLDC p. 57).

As part of this landscape study, second tier landscapes and features were also identified that did not meet the threshold for ONFs or ONLs. These landscapes and features are referred to as "Significant" in the context of this study and the identification relates more to their visual amenity as addressed under Section 7(c) of the RMA.

The RMA defines amenity values as:

> *"those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes."*

The quality of the environment is not defined by the RMA.

Hybrid terms such as 'visual amenity', 'rural amenity', and 'natural amenity', are shorthand for 'landscape values that contribute to amenity values'. 'Significant Landscapes' provides scope for broader landscape values than those limited to 'amenity values' (NZILA et al., 2021).

In recognition of the extra quality which SNF/Ls possess in comparison to other rural areas, such landscapes express important 'sensory' and 'associative' attributes that contribute to their visual amenity. In the context of this study, visibility is not in itself a criterion for a landscape to qualify as a SNF/L. Where visible, a SNF/L generally also contributes to widely recognised sensory values which may relate to the following:

- is adjacent to an outstanding natural feature or landscape;
- includes important ridges or hills;
- provides for recreational activities;
- accommodates important scenic roads; or
- a combination of the above.

Sensory values form a key factor which leads to landscape appreciation and subsequent identification as a SNF/L. Whilst SNF/Ls may qualify as 'outstanding' in terms of sensory attributes, such areas may also be insufficiently 'natural' to qualify as an ONL. Accordingly, 'biophysical' attributes are often lower in SNF/L than in ONF/Ls, acknowledging human activity can strongly influence amenity values and landscape character. Notwithstanding this, biophysical factors which remain may continue to contribute important landscape values.

Combined with sensory values, associative values take account of how a landscape is likely to be valued by members of the community. This aspect of the study adopts a professional expert approach which considers how landscape values likely contribute to 'sense of place' through known community associations. Where associative values are identified, the sources of such values are referenced, including identification of historic sites or recorded cultural associations.

As with ONL, all SNF/Ls must also be of a sufficient scale to be recognised as a landscape. Accordingly, to qualify as a landscape it must comprise of a larger entity that is normally experienced from within or seen as the whole of the outlook.

Defining Landscape Values

Landscape values reflect the relative value of different landscapes or natural features held by society. A landscape may be valued by different people for a wide variety of reasons. Such values may also change over time. Most commonly, an assessment of landscape value underpins the traditional approach to conserving and protecting the most highly valued landscapes. This typically reflects formal acknowledgment through a recognised landscape classification process.

Landscape values can be described as the environmental or cultural benefits that are derived from various landscape attributes. These attributes will, in many instances, be the components and image of the landscape as established in the assessment of landscape character. In some instances, a particular landform may itself be considered to hold important value. It may be that the character of a given landscape makes it a particularly striking representative of its kind or providing identity based on its uniqueness or rarity.

When judging landscape value, it is recognised that there are various ways in which landscapes may be appreciated and thresholds for value determined. The range of criteria that the Environment Court has reinforced for landscape practitioners to consider when evaluating landscapes is referred to as the Amended Pigeon Bay criteria or factors (C32/1999 – Pigeon Bay Aquaculture Ltd v CRC and C180/1999 – Wakatipu Env. Society v QLDC). These criteria or factors include:

1. the natural science factors - the geological, topographical, ecological and dynamic components of the landscape;
2. its aesthetic values, including memorability and naturalness;
3. its expressiveness (legibility) - how obviously the landscape demonstrates the formative processes leading to it;
4. transient values - occasional presence of wildlife; or its values at certain times of the day or of the year;
5. whether the values are shared and recognised;
6. its value to tāngata whenua; and
7. its historical associations.

Based on the above, there is now a level of national acceptance in the use of specified criteria as an assessment framework, however it is also increasingly recognised by practitioners that while they are useful, they also have certain limitations. Whilst factors or criteria were not intended to form a definitive or 'complete' list of landscape values, this is how they have often been used. Many of the criteria actually overlap and some could be more usefully seen as subsets of one another rather than as separate value categories. This can be confusing and lead to some values being given more weight than others, or 'double-counting'.

Recent case law (see C11/2009 – Unison Networks vs Hastings District Council) and a recent review by the Tuia Pito Ora (New Zealand Institute of Landscape Architects [8](NZILA)) have reordered the Pigeon Bay criteria into three categories. This focuses an understanding of landscape values into biophysical or natural science aspects, perceptual and aesthetic aspects, and other associative aspects. Condensing the Pigeon Bay criteria factors into these three categories reduces the risk of emphasising some criteria at the cost of others and enables assessors to interpret the landscape values with greater validity and reliability. It should be noted that a cultural landscape study would provide a different perspective on the landscape from mana whenua that take a deeper connection, including whakapapa, to the landscape into account. This should include the consideration of whakapapa, mana, kawa, tikanga and mātauranga as well as identity, connections, practices, history, and future aspirations (Cain & Manihera, 2021). It was beyond the scope of this study and should be considered as a separate piece of work to identify mana whenua values in more depth.

The exercise of identifying ONFs and ONLs utilises the mapping of significant values in GIS where possible, which enables the ability to analyse where particular values overlap. The identification of an appropriate boundary reflecting the important physical, sensory and associative values identified can be conceived of as mapping the separate value attributes identified within each landscape character area (**Image 3** below). The evaluation must also recognise that not all values are able to be mapped (such as sensory or aesthetic values). From this, a judgement identifying the findings of the landscape evaluation can help to delineate areas that display notable high qualities of a range of physical, perceptual and associative values.

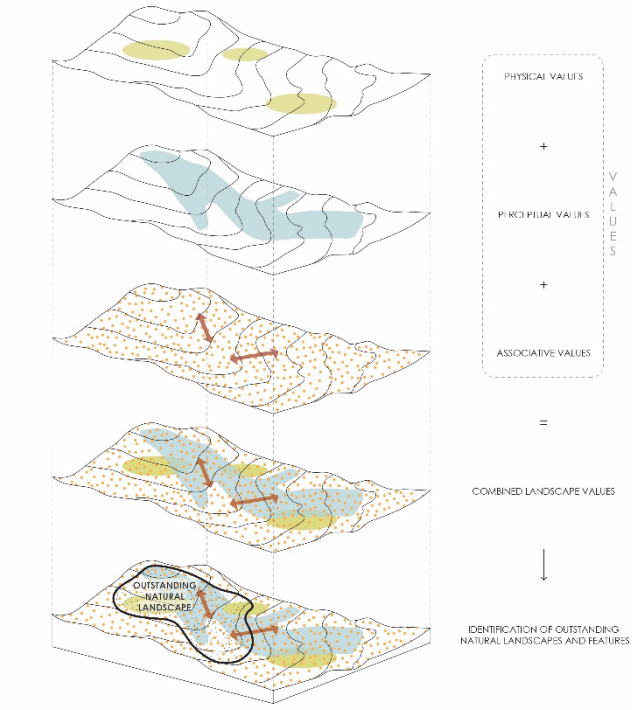


Image 2: Layering of landscape attributes to identify outstanding natural landscapes.

[8] Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines [Final Draft, May 2021]

When identifying the potential location of ONF/Ls it is recognised that the boundaries identifying valued areas of the landscape, do not necessarily coincide with landscape character areas, the latter of which is based on determining areas of landscape with distinctive similar key characteristics. The following diagram (**Image 4** below) illustrates the different relationships between landscape character areas and identified ONF/L which may occur:

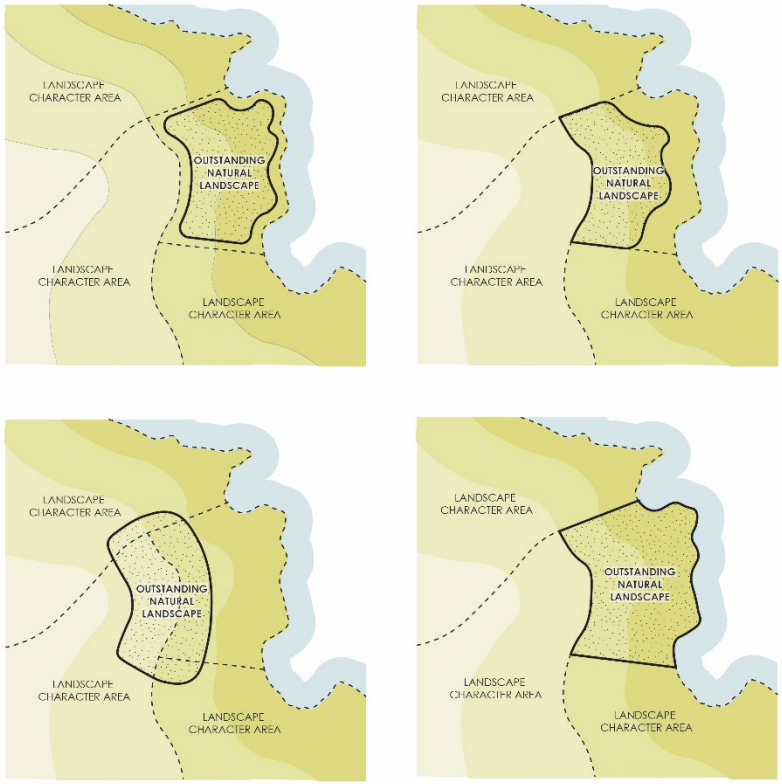


Image 3: Relationship between ONF/L and character areas

The process of determining ONF/L areas acknowledges that every attribute does not need to score very high for an area to be considered as an ONF/L, although this will depend on the landscape under consideration. By undertaking this process, a threshold of values was also determined, which essentially concluded whether a landscape (or feature) was an ONF/L or not. ONF/L were only identified in relation to features or areas of landscape which scored at least high for physical, perceptual and associative values.

Evaluating Landscape Values

In accordance with the above, consideration of data and findings from field work were used to determine a landscapes or feature's combined physical, perceptual or associative value. This utilised the evaluation framework as set out in **Table 1** in accordance with the relevant landscape attributes as described. A more detailed understanding of the landscape attributes considered including their definitions and reliance on relevant case law is also set out in **Appendix 2**:

Table 1			
Landscape Attributes		**Description**	**Assessment**
Physical	Abiotic	The presence of important or recognised geological, hydrological or topographical features	The underlying landform or natural feature are recognised as being important for scientific or educational purposes.
	Biotic	The presence of important native vegetation communities, wildlife or ecosystems	The area of landscape or feature contains important native vegetation communities, wildlife or ecosystems.
Perceptual	Legibility	How obviously the feature or landscape demonstrates its formative processes.	Geomorphological, hydrological, climate, vegetation, coastal and /or cultural processes are actively displayed in the landscape.
	Naturalness	The perception of the predominance of nature in the landscape.	The landscape appears largely uncompromised by modification and appears to comprise of natural systems that are functional and healthy.
	Vividness	How striking or memorable an area of landscape is, including its role in the mental maps of a district or region.	The landscape is widely recognised across the community with an ability to remain clear in the memory.
	Coherence	The way in which the visual elements or components of any landscape come together.	The pattern of land cover and land use appears in harmony and is easily understood with no apparent random or significant discordant elements of land cover or land use.
	Transient Values	The presence of wildlife or other values at certain times of the day or year.	Changing elements, patterns and processes remain clearly apparent through times of the day or year.
Associative	Shared & recognised values	Whether the values are shared and recognised.	The area of landscape or natural feature is widely recognised in the community and commonly referred to in art, literature or tourist maps.
	Mana whenua Values	Cultural and spiritual values for Mana whenua	The area of landscape or natural feature contains cultural sites or values which are important to local iwi.
	Historic Heritage Associations	The presence of known historic or heritage associations	There are numerous and / or important historic sites identified within the area of landscape or feature.

In order to judge the relative value of landscape attributes the seven-point scale set out in **Diagram 1** below was used alongside a description of the relevant landscape values which are identified:

Very Low	Low	Moderate-Low	Moderate	Moderate-High	High	Very High

Diagram 1: Landscape evaluation scale (Very Low through to Very High)

At this stage of the assessment, the identification of ONF/L boundaries was primarily based on broad geomorphological and geographical patterns, see Image 5 below. Variations in land cover and land use, including zoning boundaries, are also taken into account as a secondary factor. This information was sourced from aerial photographs, and other GIS information, such as LCDB5 (Land Cover Data Base v.5.0). The process of community and land owner engagement including future consideration of associative values developed through community and Iwi engagement may further refine the areas of landscape defined.

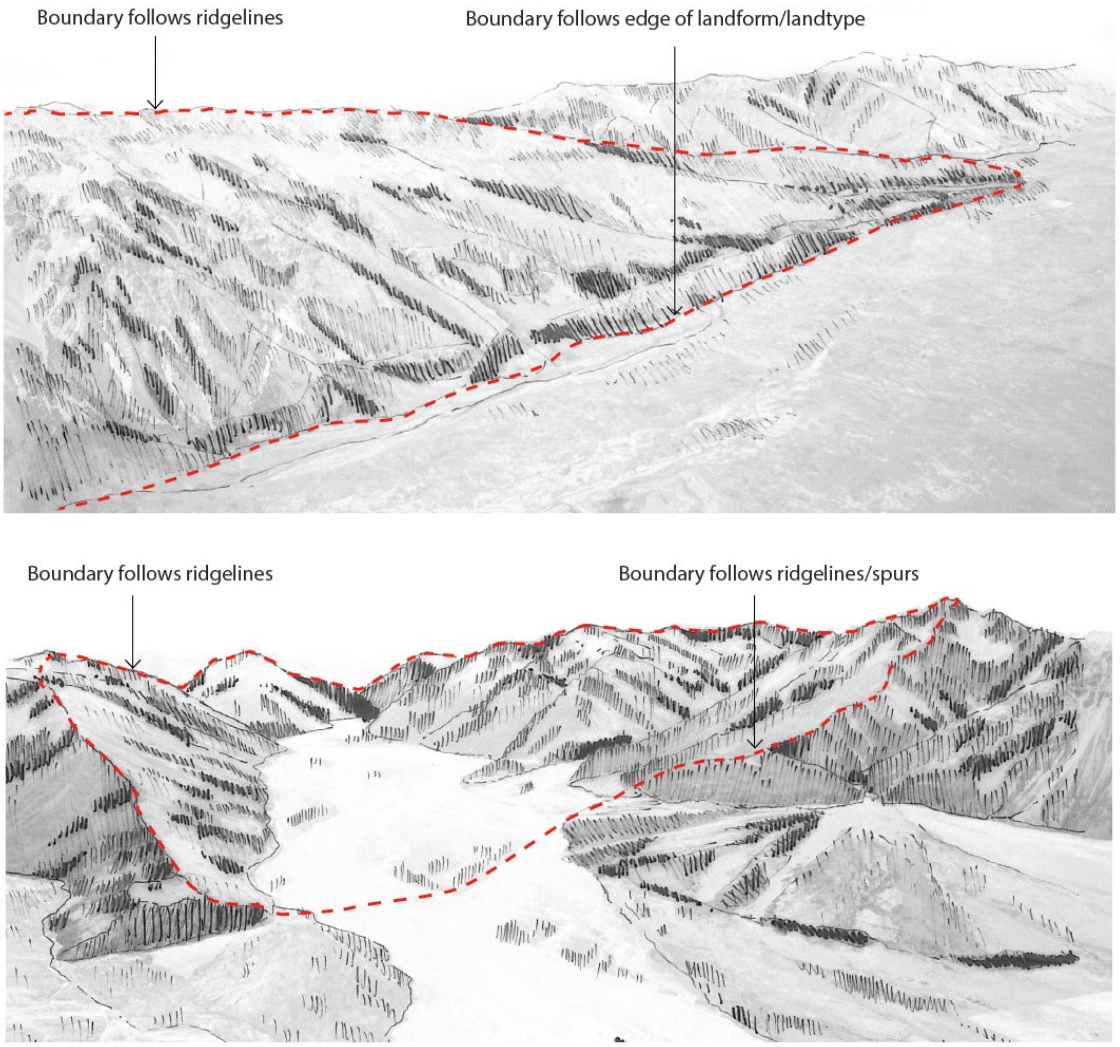


Image 5: Illustration depicting ONL and ONF boundaries

There is no automatic policy distinction between 'outstanding natural features' and 'outstanding natural landscapes', both of which essentially have the same level of significance under section 6(b) of the RMA. Consequently, outstanding natural features and outstanding natural landscapes can be collectively referred to as outstanding natural features / landscapes (ONF/Ls).

Notwithstanding this, it is recognised that features can nest within landscapes and vice versa. Such understanding of features and landscapes can be readily appreciated as being scale dependent whilst differing according to which context is considered, for example the Tasman Glacier and Valley could be identified as a feature within the broader Aoraki landscape, which is perceived at a broader district scale. In recognition of the scale at which values have been defined, landscapes have typically been defined as larger areas that can include several features within them. As a larger entity, landscapes are normally experienced from within (for example walking tracks or roads) or seen as the whole of the outlook (for example the wider backdrop of the Ben Ohau Range).

Conversely, outstanding natural features have been identified as discrete elements, typically identified within more modified landscapes and are more generally experienced from outside the features' boundaries. Features display integrity as a single entity and can often be clearly distinguished from the surrounding landscape within which they are contained. Generally, features are defined by their geomorphology with landforms delineating boundaries, however, in some instances (such as areas of native bush) these can also reflect land cover or land use characteristics.

6.0 Outstanding Natural Landscapes and Features in the Western Mackenzie

Within the Western Mackenzie, two outstanding natural landscapes have been identified and these are illustrated on **Figure 12**. These are both landscapes in their own right, each containing a range of physical, perceptual and associative values. Each outstanding natural landscape retains sufficient levels of naturalness to be considered a candidate for being outstanding.

Based on the evaluation undertaken, the following outstanding natural landscapes have been identified and mapped (see **Figures 13-14**). Their associated values and characteristics are described in the following sections, along with a description of the boundary outlines mapped for each area.

Table 2 Outstanding Natural Features and Landscapes in the Western Mackenzie.

Outstanding Natural Features and Landscapes	
1	Dobson / Hopkins Valleys, including Ben Ohau Range
2	Aoraki/Mount Cook National Park

6.1 Dobson / Hopkins Valleys, incl Ben Ohau Range

ONL 1: Dobson / Hopkins Valleys, incl Ben Ohau Range		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Characterised by highly legible greywacke sandstone mountain ranges and alluvial gravels in the valley, deposited by the Te Awa Aruhe/Hopkins and Ōtaao/Dobson Rivers. • Both valleys are characterised by the Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River, both considered globally rare ecosystems and a Site of Natural Significance within the Mackenzie District Plan • Upper reaches contain extensive alpine herbfields, exposed gravels, and extensive areas of mountain and silver beech forest. • Native bird species include fantail/pīwakawaka, bellbird/korimako, grey warbler/riroriro, long-tailed cuckoo/koekoeā, rifleman/tītitipounamu, tomtit/miromiro, New Zealand falcon/kārearea, New Zealand pipit/pīhoihoi, rock wren/pīwauwau, and the Australasian harrier hawk/kāhu. • Large portion of this area is encompassed within the Ruataniwha Conservation Area or Ruataniwha Conservation Park. • Irishman Stream, Dorcy Stream, and Greta Stream each contain an intact riparian strip of mountain beech. • Greta Stream supports *Chionochloa rigida* grasslands, as well as *Dracophyllum pronum*, matagouri, and *Festuca matthewsii*. • The lower slopes of Ben Ohau support a regenerating stand of Hall's totara. • Halls Block at the western extent of Ben Ohau Road contains an intact area of manuka and low stand of *Chionochloa rigida*.	High
Perceptual	• Formative processes are highly legible through the glacially carved mountain ranges, braided rivers, and presence of alluvial fans throughout the Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River valleys. • Spectacular views of the Main Divide are available. • Snow-capped mountains and valley floors are striking landscape features during the winter months	Very High

	• The Ben Ohau Range frames the area and forms an important backdrop to Lake Pukaki when viewed from the east. • During the summer months, the landscape is dominated by expansive areas of grassland within the valleys and alpine herbfield on the upper slopes.	
Associative	• Te Tari o Mauka Atua, the Ben Ōhau Range, is of significance to Ngāi Tahu. Mauka Atua is one of the ancestors who capsized at Matakaea (Shag Point) on the Otago coastline. • The Te Awa Aruhe/Hopkins River and Ōtaao/Dobson River are of significance to Ngāi Tahu as a kāinga mahinga kai (food gathering place). • Long association with high country farming, including Glen Lyon Station. • Recreation opportunities include fishing, hunting, boating, four-wheel driving, and walking.	Very High
Overall landscape value		**OUTSTANDING**

Mapped Extent:

Refer to **Figure 13**. The mapped extent of the Dobson/Hopkins Valleys ONL includes the entirety of the Ōtaao/Dobson River valley to the west of the Ben Ōhau Range, and the Te Awa Aruhe/Hopkins River valley within the Mackenzie District territorial area.

Evaluation:

Based on the values above, the Dobson/Hopkins Valleys ONL has been identified as an Outstanding Natural Landscape due to its high physical, and very high perceptual, and associative values.

The Dobson/Hopkins Valleys ONL provides a remote, and vast high-country character. The lower reaches are characterised by Dobson and Hopkins braided rivers, both considered globally rare ecosystems. The upper reaches of the catchment are characterised by intact beech forest and alpine herbfield.

The ONL is largely associated with high-country farming, however there are several opportunities for skilled recreationalists to experience the panoramic views of the Main Divide and rugged character of the landscape.

6.2 Aoraki/Mount Cook National Park

ONL 2: Aoraki/Mount Cook National Park		
Landscape Attributes	**Evaluation**	**Rating**
Physical	• Striking greywacke sandstone and schist mountains uplifted by the globally significant Alpine Fault • Elevation exceeding 3,500 masl, with Aoraki/Mount Cook rising to 3,724 masl. • Key landscape features include the Godley Glacier, Haupapa/Tasman Glacier, Mueller Glacier, Hooker Glacier, Murchison Glacier, Mueller Lake, Hooker Lake, Tasman Lake, and Murchison Lake. • The Murchison River, Whimiahoa/Godley River, and Te Awa Whakamau/Tasman River are braided rivers, and globally rare ecosystems. • The Te Awa Whakamau/Tasman River and its upper tributaries, and the Whimiahoa/Godley River are considered Sites of Natural Significance within the Mackenzie District Plan, containing several threatened plant species and habitat for native birds. • The Whimiahoa/Godley River provides habitat for black stilt, wrybill, banded dotterel, blackfronted tern breeding, marsh crake also present. • Several alpine species present including *Olearia frimbriata, Epilobium purpuratum* (a willow herb), *Ranunculus godleyanus* (yellow mountain buttercup) and *Ranunculus grahamii* (an alpine buttercup). • The upper reaches contain a mixture of alpine herbfields, tussock grasslands, and isolated areas of indigenous forest. • The alpine snow-meadows of Aoraki/Mt Cook are considered recognised as a critical site by the Department of Conservation. • Almost entirely devoid of structures and modification, with the exception of Mount Cook Road and Tasman Valley Road to the south, and the huts which are located in the upper reaches. • Native bird species present include the kea, karearea/New Zealand falcon, karoro/black backed gills, piwauwau/wren, and kakī//black stilt, a nationally critical species. • Several dragonfly, grasshopper, moth and butterfly species present including the Mount Cook flea (a black alpine weta) above the snow line.	Very High

	• The Tasman Glacier is the longest glacier in New Zealand and most accessible glacier on the east side of the Southern Alps. Its terminal lake is an excellent and easily accessible example of moraine-dammed lakes, including very good examples of ablation moraine and moraine kettles.	
Perceptual	• The landscape is highly expressive of its tectonic, and glacial formative processes. • A sublime glacial landscape where impressive icefalls and peaks can be viewed unlike anywhere else in Aotearoa. • The Mueller Glacier moraine walls are two of the best and most often photographed moraine walls in the Southern Alps. • Hooker Glacier and meltwater lake is an excellent example of a mountain valley glacier and its meltwater lake and very frequently photographed by the numerous tourists to the area. • The seasonal change of the landscape, as well as dramatic weather changes and cloud formations are key ephemeral characteristics.	Very High
Associative	• Aoraki/Mount Cook is central to Ngāi Tahu creation traditions and a significant landscape feature in conjunction with Rarakiroa (the Silberhorn), Rakiroa (Mount Dampier) and Rakirua (Mount Teichelmann) • Entirely included within the Aoraki Mount Cook National Park (1953) • Recreational opportunities include tramping tracks and alpine routes, camping, climbing, and hunting • Forms the north-eastern extent of the Te Wāhipounamu South West New Zealand World Heritage Area, an internationally recognised UNESCO World Heritage Site.	Very High
Overall landscape value		**OUTSTANDING**

Mapped Extent:

Refer to **Figure 14**. The mapped extent of the Aoraki Mount Cook ONL includes the entirety of the Aoraki Mount Cook National Park.

Evaluation:

Based on the values above, the Aoraki/Mount Cook National Park has been identified as an Outstanding Natural Landscape due to its very high physical, perceptual, and associative values.

The Aoraki/Mount Cook National Park ONL is recognised internationally for its striking and remote landscape values. The ONL is of immense significance to mana whenua and has high recreational and tourism values in addition to the landscape's highly expressive formative processes and unique flora and fauna.

Appendix 1: Bibliography and References

Boffa Miskell. (2010). *Canterbury Regional Landscape Study*.

Cain, A., & Manihera, D. (2021). *Apiti Hono Tatai Honon Nga Whenua o Ngai Tau Ki Murihiku*.

Department of Conservation Canterbury Conservancy. (2001). *Aoraki/Mount Cook National Park management plan* (Canterbury Conservation Management Planning Series No. 12). Department of Conservation, Canterbury Conservancy.

Department of Conservation. (n.d.-a). *Aoraki/Mount Cook National Park*. Retrieved February 12, 2023, from https://www.doc.govt.nz/parks-and-recreation/places-to-go/canterbury/places/aoraki-mount-cook-national-park/

Department of Conservation. (n.d.). *History of Aoraki/Mount Cook*. Retrieved February 12, 2023, from https://www.doc.govt.nz/parks-and-recreation/places-to-go/canterbury/places/aoraki-mount-cook-national-park/historic-aoraki-mount-cook/

Department of Conservation. (n.d.-b). *Ruataniwha Conservation Park*. Retrieved February 12, 2023, from https://www.doc.govt.nz/parks-and-recreation/places-to-go/canterbury/places/ruataniwha-conservation-park/

Department of Conservation. (n.d.). *Te Wāhipounamu - South West New Zealand World Heritage Area*. Retrieved February 12, 2023, from https://www.doc.govt.nz/about-us/international-agreements/world-heritage/te-wahipounamu/

Department of Conservation Canterbury Conservancy. (2001). *Aoraki/Mount Cook National Park management plan* (Canterbury Conservation Management Planning Series No. 12). Department of Conservation, Canterbury Conservancy.

GNS Science. (n.d.). *Alpine Fault*. GNS Science | Te Pū Ao. Retrieved February 12, 2023, from https://www.gns.cri.nz/our-science/land-and-marine-geoscience/our-plate-boundary/alpine-fault/

GNS Science. (2018). *New Zealand Geology Web Map*. http://data.gns.cri.nz/geology/

GNS Science. (2020). *Active Faults Database*. https://data.gns.cri.nz/af/

Land Information New Zealand. (2000). *Crown Pastoral Land Tenure Review: Glen Lyon* (p. 28). https://www.linz.govt.nz/sites/default/files/cp/glenlyon-and-huxley-gorge-crr-part1.pdf

Mackenzie District Council. (n.d.). *Sites of Natural Significance* (p. 15) [Mackenzie District Plan]. https://www.mackenzie.govt.nz/__data/assets/pdf_file/0020/514190/Appendix-I-Sites-of-Natural-Significance.pdf

NZILA, de Lambert, R., Titchner, A., & Lister, G. (2021). *Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines [final draft subject to final editing, graphic design, illustrations, approved by Tuia Pito Ora/NZILA 5 May 2021]*. Tuia Pito Ora New Zealand Institute of Landscape Architects.

Te Rūnanga o Ngāi Tahu. (2023). *Ka Huru Manu Cultural Mapping Project*. https://www.kahurumanu.co.nz/atlas

Appendix 2: Landscape Evaluation Attributes

Physical

Physical aspects incorporate a landscape's natural science elements, including its geological, hydrological, ecological and dynamic components and associations. The natural science aspects considered by the Environment Court were described in the Queenstown decision as "the geological, ecological and dynamic components of the landscape" (C180/1999 – Waikatipu Env. Society v QLDC). In broad terms, this identifies that natural science values can represent both abiotic (including geology and soils) and biotic (in particular native vegetation communities, wildlife and ecosystems) components. Where biophysical aspects are relevant, the key components of the landscape will be present in a way that more generally defines the character of the place. Natural features in a good state of preservation are representative and characteristic of the natural geological processes and diversity of the district. Natural features are unique or rare in the district, region or nationally, if few comparable examples exist. Natural features may also form a landscape feature or an element / component of the landscape. Where possible, the analysis of biophysical aspects of landscape should use objective and quantifiable data to support a particular decision made. The Department of Conservation is one of the largest landholders in the district, with land areas encompassing significant parts of the inland hill country.

In summary, the key biophysical aspects of landscape value include the following:

- Abiotic components including the presence of important or recognised geological. hydrological or topographical features
- Biotic components including the presence of important native vegetation communities, wildlife or ecosystems

Perceptual

Perceptual qualities are landscape phenomena as directly perceived and experienced by humans, such as the view of a scenic landscape or the distinctive smell and sound of the foreshore. Determining sensory and aesthetic aspects of landscape involves judgmental and subjective interpretations of nature and beauty, as well as transient matters contributing to human perception.

While an individual feature may have an aesthetic value when viewed from beyond its boundaries, aesthetic quality of landscape is more likely to relate to a place or an area. The Oxford English Dictionary (2002) defines 'aesthetic' as 'concerned with beauty or the appreciation of beauty; of pleasing appearance'. This appreciation of beauty encompasses not only the visual aspects of a landscape, but also other sensory experiences, such as sound, smell and touch.

The aesthetic value aspects considered by the Environment Court were described in the Queenstown decision as "including memorability and naturalness" (C180/1999 – Waikatipu Env. Society v QLDC). This decision also included some discussion of the adequacy of this description. It was of the view that traditional scenic and visual considerations may be underplayed. It noted that considerations such as pleasantness raised in the RMA amenity definition with reference to RMA section 7(c) will also be relevant.

The memorability of an area of landscape is often closely associated with its vividness or symbolic contribution to an area due to its recognisable and iconic qualities. Vivid or striking landscapes are more typically widely recognised across the community and have the ability to remain clear in the memory. Highly memorable landscapes often comprise a key component of a person's recall or mental map of a region or district. It is not necessary for vivid landscapes to have a high degree of naturalness. A landscape may be vivid or striking through other recognised scenic associations.

By contrast, the perception of naturalness is where landscapes appear largely uncompromised by modification and appear to comprise of natural systems that are functional and healthy. Naturalness describes the perception of the predominance of nature in the landscape. A landscape may retain a high degree of aesthetic naturalness even though its natural systems may be modified. Similarly, landscapes that have high ecological values may not display high qualities of visual naturalness.

In accordance with the above, the Courts have indicated that 'natural' in the context of landscape identification under RMA section 6(b) does not signify ecological intactness (e.g. EC C387/2011 – PC13 Mackenzie Basin). It is therefore important to make a distinction between ecological naturalness (indigenous nature) and landscape naturalness (perceptions of nature). Parts of the landscape can appear highly natural but are ecologically degraded. Other landscape elements require prior knowledge in order to appreciate whether they are native or exotic, despite being perceived as highly natural.

To further assist an assessment of the level of naturalness of a landscape, the Environment Court has determined four criteria for assessing naturalness (A78/2008, Long Bay – Okura Great Park Society v North Shore City Council):

- Relatively unmodified and legible physical landform and relief;
- The landscape being uncluttered by structures and /or obvious human influences;
- The presence of water (lake, river, sea); and
- The presence of vegetation (especially native vegetation) and other ecological patterns.

The first two criteria of naturalness are necessary components of a natural landscape as they are indicators of human induced modification. However, the last two criteria are not essential as highly natural landscapes may have little or no water and vegetation cover in the absence of human modification, such as parts of the high country. Notwithstanding this, it is accepted that the last two criteria may enhance naturalness in landscape terms, however their absence does not necessarily detract from naturalness.

In combination with the above, legibility forms a key aspect or criteria for assessing the sensory or aesthetic value. The Environment Court described this criterion as "how obviously the landscape demonstrates the formative processes leading to it" (C180/99 – WESI vs QLDC), in other words the degree to which the processes (geomorphological, hydrological, climate, vegetation, coastal and cultural) are actively displayed in the landscape. Some landscapes (or natural features) clearly express past natural and cultural processes.

The criterion of legibility is closely linked to geological values. However, landscapes or features which are significant in terms of their geomorphological values, may not be expressive of these processes, whilst those which are highly expressive may not have a specific geomorphological value. Natural features and landscapes that exemplify the particular processes that formed them may also have strong historical connotations and a distinctive sense of place. Legibility need not necessarily relate to 'attractiveness', but clarity of natural and cultural processes is important.

Coherence forms a related aesthetic criterion which can contribute to the value of a landscape. Coherence describes the way in which the visual elements or components of any landscape come together. People generally respond positively to a landscape they can read and understand. The patterns of land cover and land use are largely in harmony with the underlying natural pattern of the landform of the area and there are no apparent random or significant discordant elements of land cover or land use.

Landscapes with high levels of coherence will have their visual elements in harmony and reinforcing each other. They will have unity, whilst they may be either visually diverse or relatively simple in terms of their elements. They 'hang together' in terms of their composition.

Transient values describe the contribution which wildlife, climate and hydrological processes make to landscape. A landscape may gain significance due to the way in which wildlife seasonally (or at times

in the day) gathers or occupies a specific area. Similarly, locations that benefit from the rising or setting sun, time of day and seasons of the year may be elevated in value due to this 'transient characteristic'. This criterion is linked to those of the ecological values set and provide for the recognition of the contribution to wildlife – which may or may not have intrinsic scientific value – to the perception of landscape.

The consistent occurrence of transient features (for example the seasonal changes in the mountains or particular weather patterns and cloud formations) contribute to the character, qualities and values of the landscape. Some landscapes are widely recognised for their transient features and the contribution these make to the landscape. Where these characteristics occur regularly they become a recognised and integral part of the landscape.

In summary, the key perceptual and aesthetic aspects of landscape value include the following:

- Legibility - how obviously the feature or landscape demonstrates its formative processes
- Naturalness - the perception of the predominance of nature in the landscape
- Vividness - how striking or memorable an area of landscape is, including its role in the mental maps of a district or region
- Coherence – where land cover and land use are largely in harmony with the underlying landform and there are no significant discordant elements
- Transient values - including presence of wildlife or other values at certain times of the day or year

Associative

Certain natural features and landscapes are widely known and valued by the immediate and wider community for their contribution to a sense of place leading to a strong community association with or high public esteem for the place. There should be a substantial measure of agreement between professional and public opinion as to the value of natural features and landscapes, for example as reflected through writings and paintings or through favourite locations for visitors. The presence of existing protected sites is also likely to reflect shared and recognised values.

Research has shown that many professional landscape assessments frequently reflect the views of the general public. Nonetheless, it is fully accepted that in some circumstances the expert's perceptions may be different and the findings of this assessment should be validated through community engagement. Some of the main tourist attractions in the district are often considered to be 'iconic landscapes' such as mountain ranges or coastal areas. Certain types of recreation destinations reflect the landscape resource. Conservation areas and popular recreation opportunities within them have been considered under this set of values. Scenic reserves and a number of other protected areas reflect community recognition of an area's landscape quality affording them a high level of protection.

Cultural legibility is a vital component of landscapes where many centuries of human endeavour can be unravelled through study of the present landscape. In New Zealand this aspect of landscape has received only limited and belated attention and has led to increasing contemporary recognition of how modified our 'natural' landscapes really are.

Some natural features and landscapes are clearly special or widely known and influenced by their connection to Māori values. These landscapes (or parts of them) have been identified as having particular regional importance to mana whenua. The developing awareness of complexity of the 'cultural landscape' of the mana whenua is covered under the cultural and spiritual values for mana whenua evaluation criterion.

Consultation with iwi has yet to be undertaken through the landscape evaluation process which will inevitably enrich the associative values which contribute to the understanding of landscape value.

Where such values are recognised, this will inevitably add to increasing the significance attached to the perceptual associations and legibility of our landscapes.

Cultural and historical values are based on traditional land uses such as gathering food and materials, traditional settlement patterns, architectural periods, or notable landmarks, events or figures. Some of them are specific sites of significance, others are wider areas that reflect a high degree of unity or integrity as a setting for historic sites or activities. Individuals and communities leave their different marks on the landscape. From our choices of architecture and land use to our memories of events, landscapes can tell stories of from where and from whom we came and why we have responded to the physical environment in the ways we have.

All landscapes are inextricably linked to historic processes.

In summary, the key associative aspects of landscape value include the following:

- Whether the values are shared and recognised
- Cultural and spiritual values for mana whenua
- Historic and heritage associations

Appendix 3: Geopreservation Site Index Table

New Zealand has a unique and extremely diverse natural landform, geology and soil heritage, due to its location and formative processes. The Geological Society of New Zealand (Hayward, B.W; Kenny, J.A (1998) Inventory and Maps of Important Geological Sites and Landforms in the Canterbury Region, including the Chatham Islands (Geological Society of New Zealand Miscellaneous Publication 98) has identified and listed information regarding the internationally, nationally and many of the regionally important earth science sites throughout the country, irrespective of their current protected status.

Within the Western Mackenzie there are eleven recognised sites of geological importance. These are shown on **Figure 3**.

Each Site is listed for its Importance and Significance.

For Importance, the Inventory categorises the Sites into three levels (A-C):

A: International: Site of International Scientific Importance;

B: National Site of National Scientific, Educational or Aesthetic Importance;

C: Regional: Site of Regional Scientific, Educational or Aesthetic Importance;

For Vulnerability, each Site has been classified (1-5) depending on its perceived vulnerability to human activities:

1. Highly vulnerable to complete destruction or major modification by humans;
2. Moderately vulnerable to modifications by humans;
3. Unlikely to be damaged by humans;
4. Could be improved by humans activity;
5. Site already destroyed (not necessarily by human activity).

ID	Name	Significance	General Location	Importance	Vulnerability
1	Tasman Glacier	Longest glacier in New Zealand and most accessible glacier on the east side of the Southern Alps.	Tasman Valley, Mt Cook.	A	3
2	Tasman Glacier Blue Lakes Moraine	An excellent and easily accessible example of moraine-dammed lakes, including very good examples of ablation moraine and moraine kettles.	Blue Lakes, snout of Tasman Glacier.	B	3

ID	Name	Significance	General Location	Importance	Vulnerability
3	Celmisia Flat moraine wall	A very good example of a moraine wall.	Celmisia Flat on Ball Shelter Road - southwest Tasman Glacier.	B	2
4	Copland Pass schist section	A section containing both soft sediment and metamorphic structures.	East of Copland Pass.	B	3
5	Mt Glenmary debris covered glacier	A debris covered glacier.	Mt Glenmary.	B	3
6	Mueller Glacier moraine walls	Two of the best and most often photographed moraine walls in the Southern Alps.	Lower Mueller valley, from Point Niccolo to the Hooker Valley Track on the northern side and Kea Point to White Horse Hill on the southern side.	B	3
7	Haeckel Fold, Murchison Valley	An example of macroscopic folding.	West of Haeckel Peak, Murchison Valley, Malte Brun Range.	C	V
8	Ben Ōhau vein, folds and fault structures	Excellent exposures of deformation in metagreywackes.	Near Mueller hut, in the Sealy Range, approximately 3 km NW of The Hermitage, Mt Cook.	C	3
9	Hooker Glacier and meltwater lake	One of the most photographed glaciers in New Zealand. Excellent example of a mountain valley glacier and its meltwater lake.	Valley west of Mt Cook Range	C	3

Appendix 4: List of Figures

Figure 1: Study Area

Figure 2: Geology

Figure 3: Geopreservation Inventory

Figure 4: Soils

Figure 5: River Catchments

Figure 6: Elevation

Figure 7: Slope

Figure 8: Land Cover

Figure 9: Recorded Natural Areas

Figure 10: Recorded Cultural Heritage

Figure 11: Character Areas

Figure 12: Outstanding Natural Landscapes

Figure 13: ONL 1: Dobson / Hopkins Valleys

Figure 14: ONL 2: Aoraki / Mount Cook

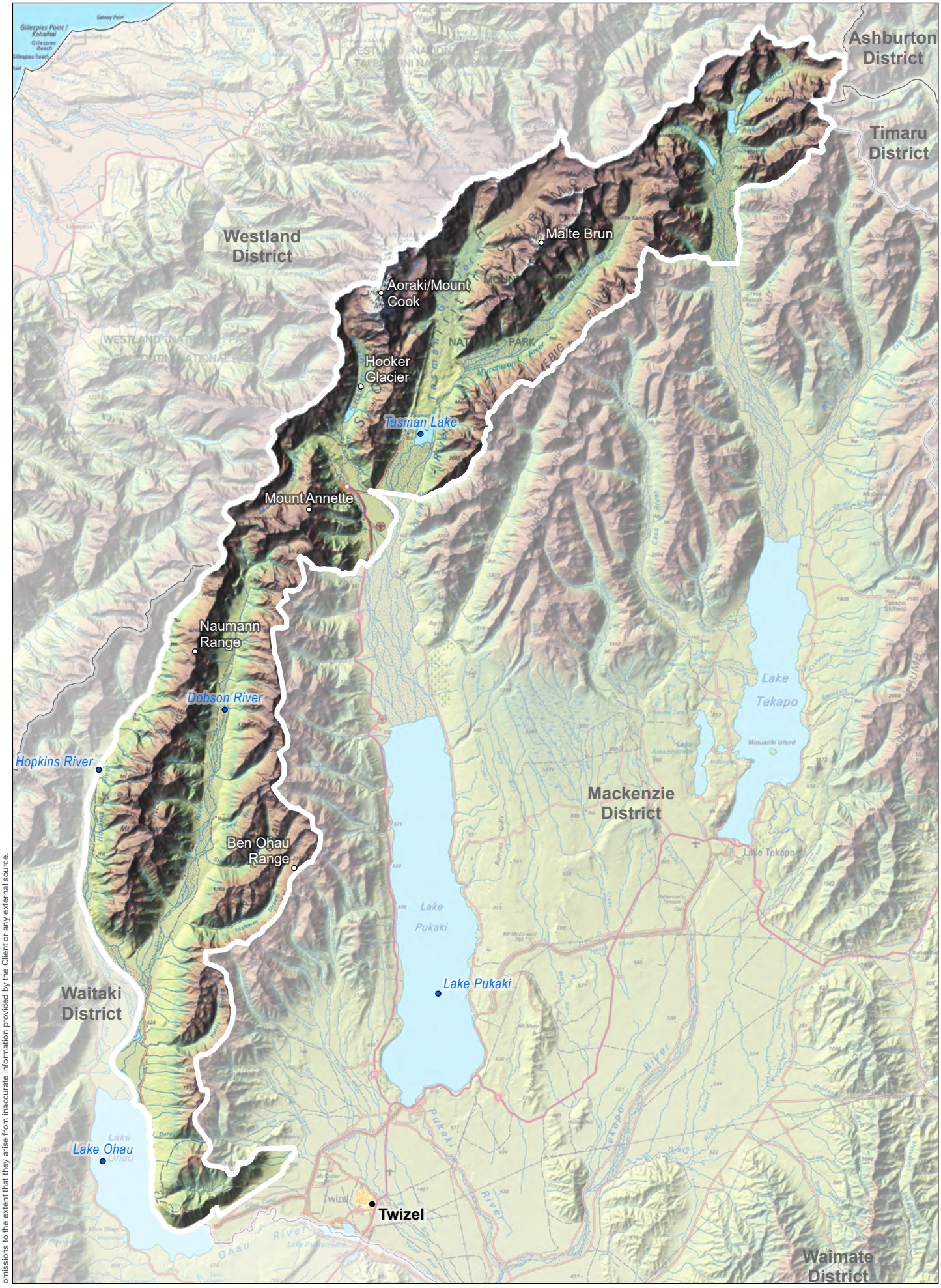
About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Auckland, Hamilton, Tauranga, Wellington, Christchurch, Dunedin and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural heritage, graphics and mapping. Over the past four decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.

---

www.boffamiskell.co.nz

Auckland	**Hamilton**	**Tauranga**	**Wellington**	**Christchurch**	**Queenstown**	**Dunedin**
+64 9 358 2526	+64 7 960 0006	+65 7 571 5511	+64 4 385 9315	+64 3 366 8891	+64 3 441 1670	+64 3 470 0460



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

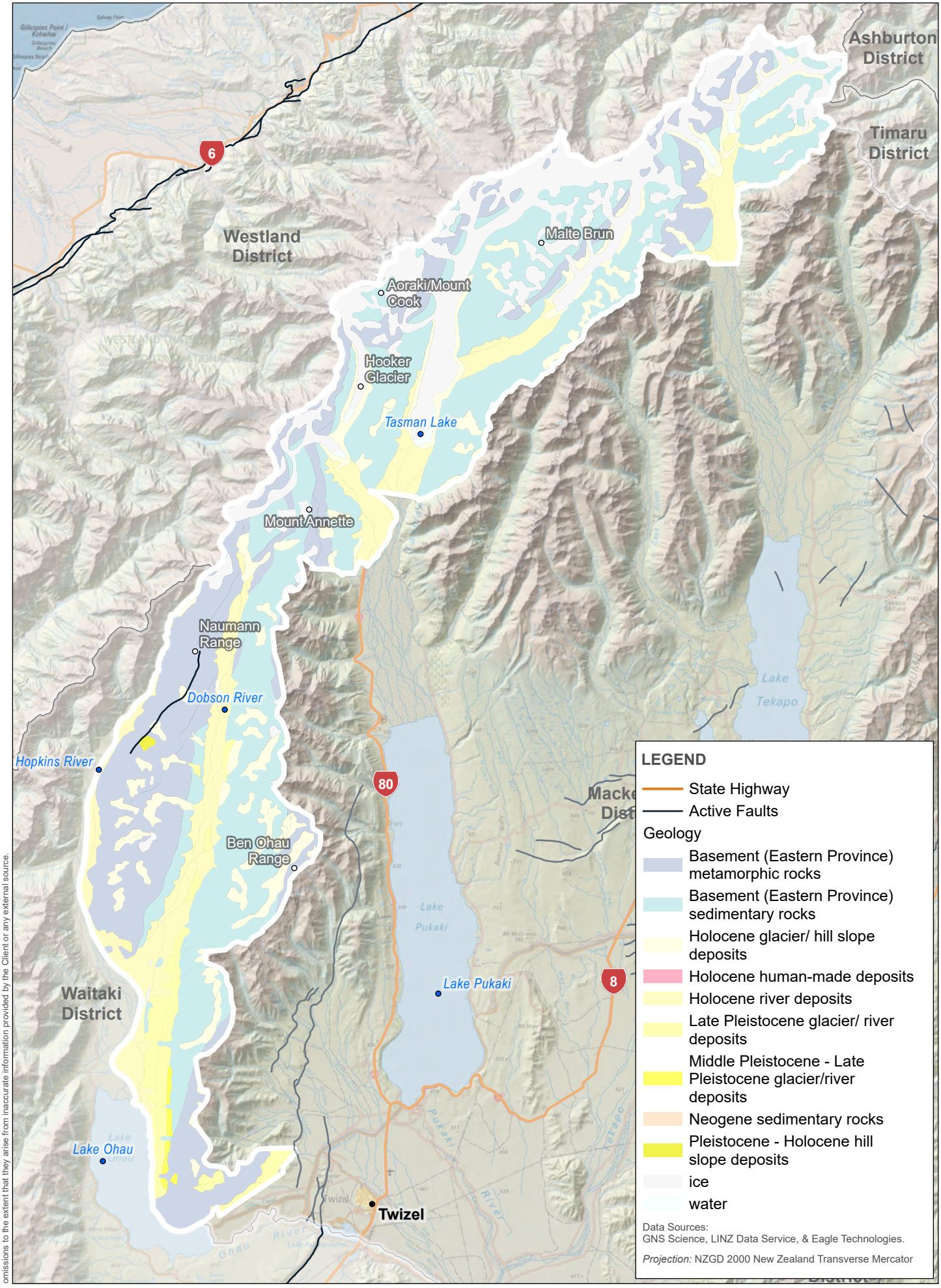
Study Area

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 1



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

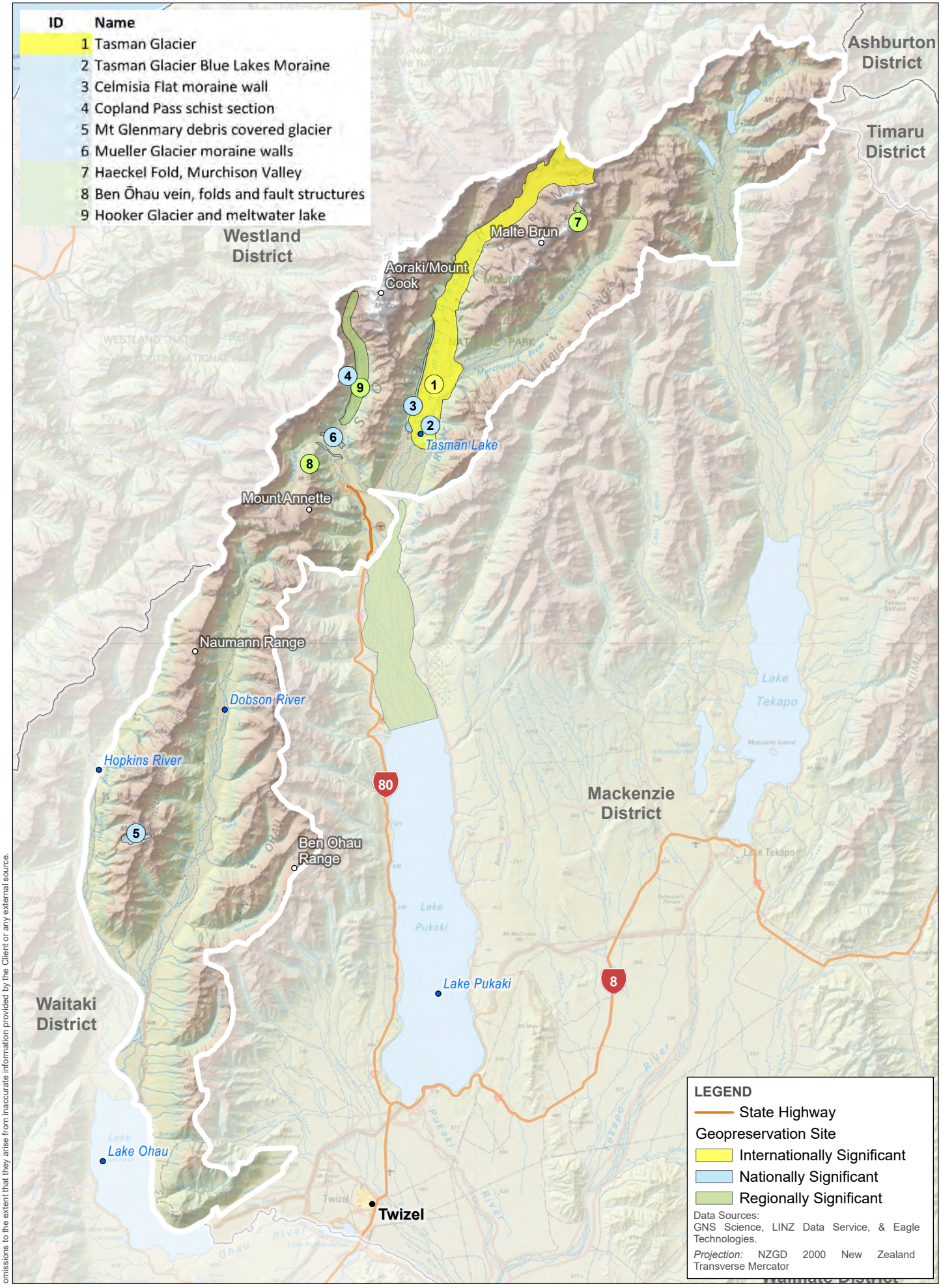
Geology

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 2



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

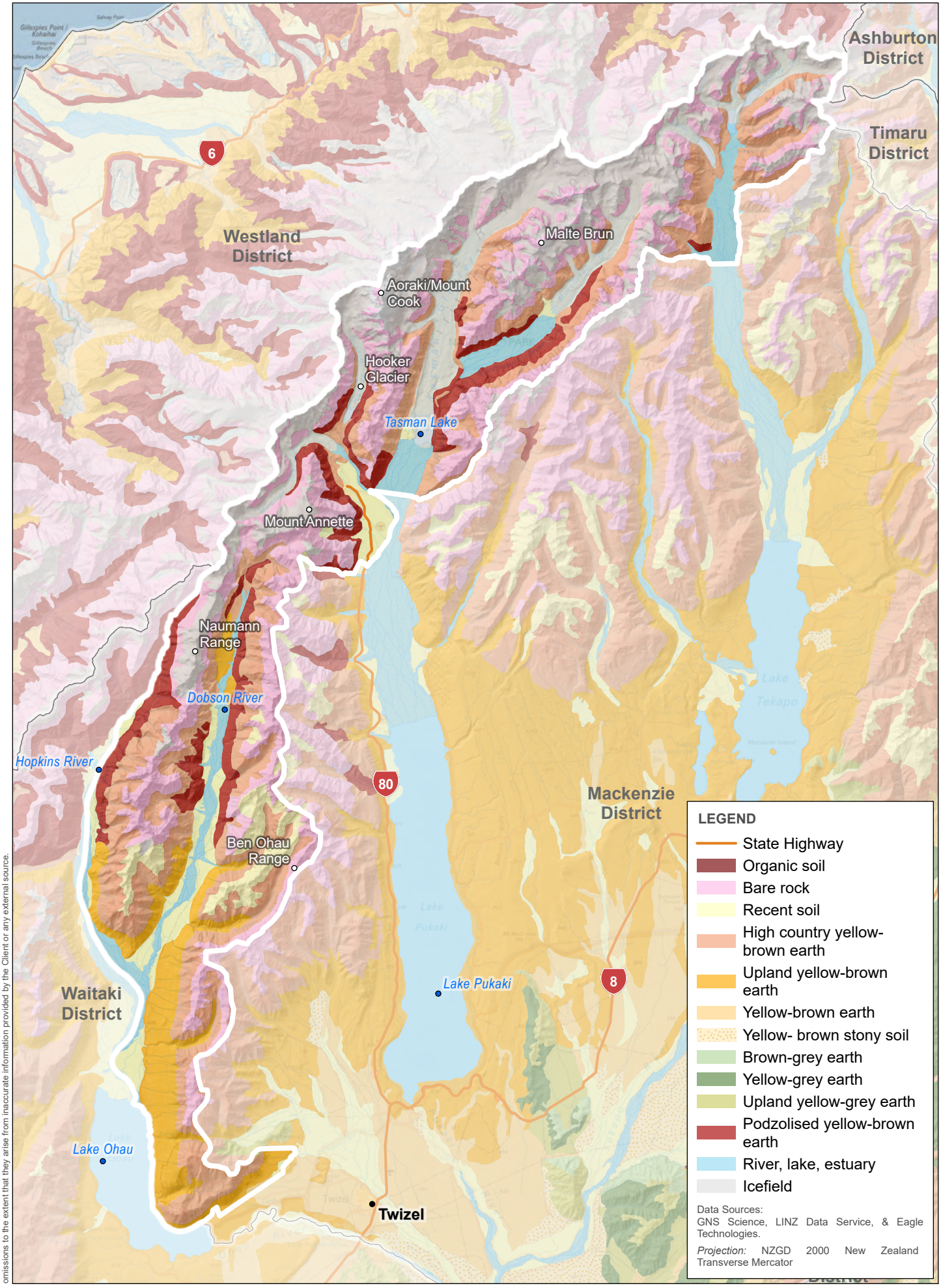
Geopreservation Sites

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 3



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

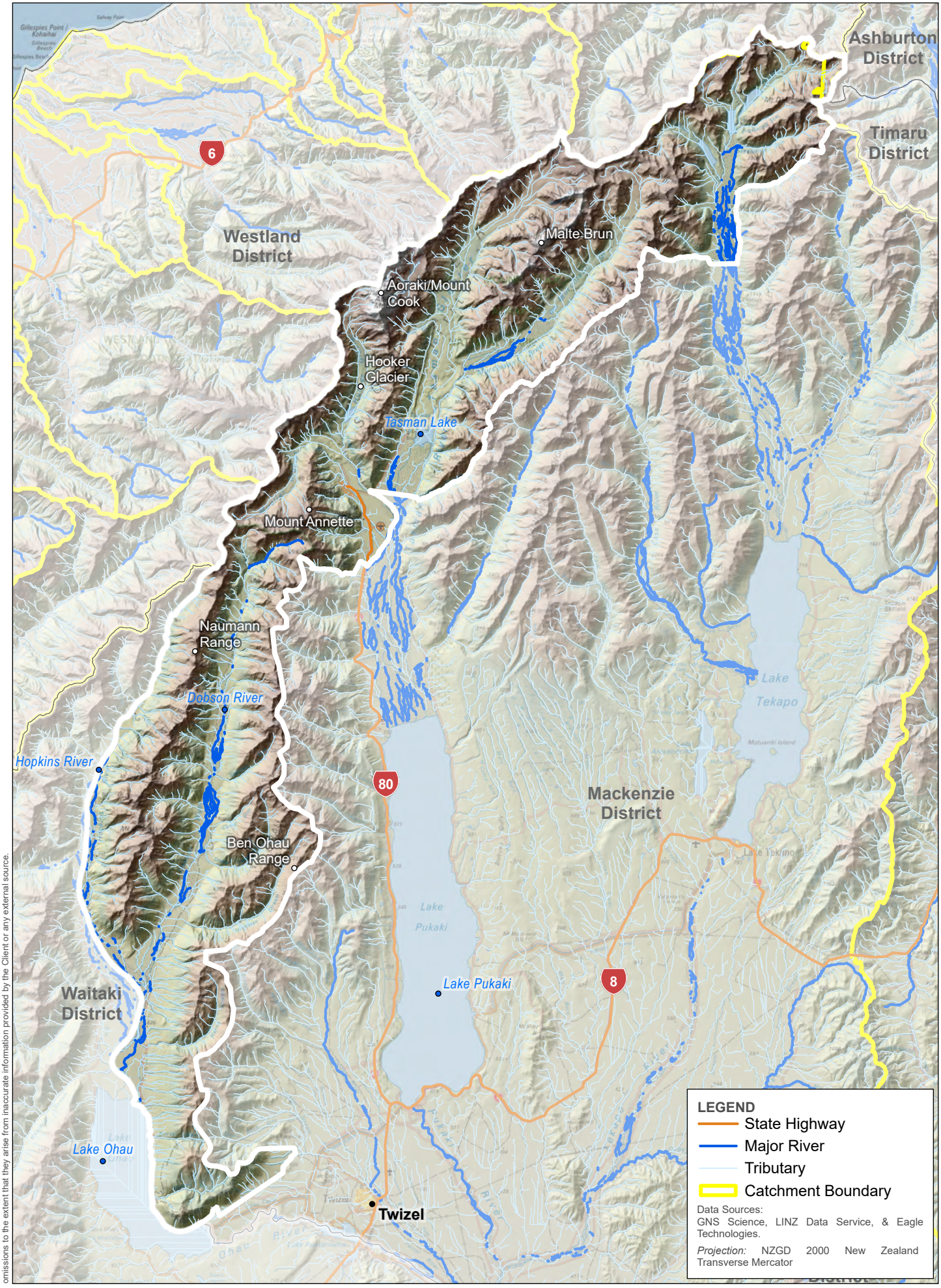
Soils

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 4



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

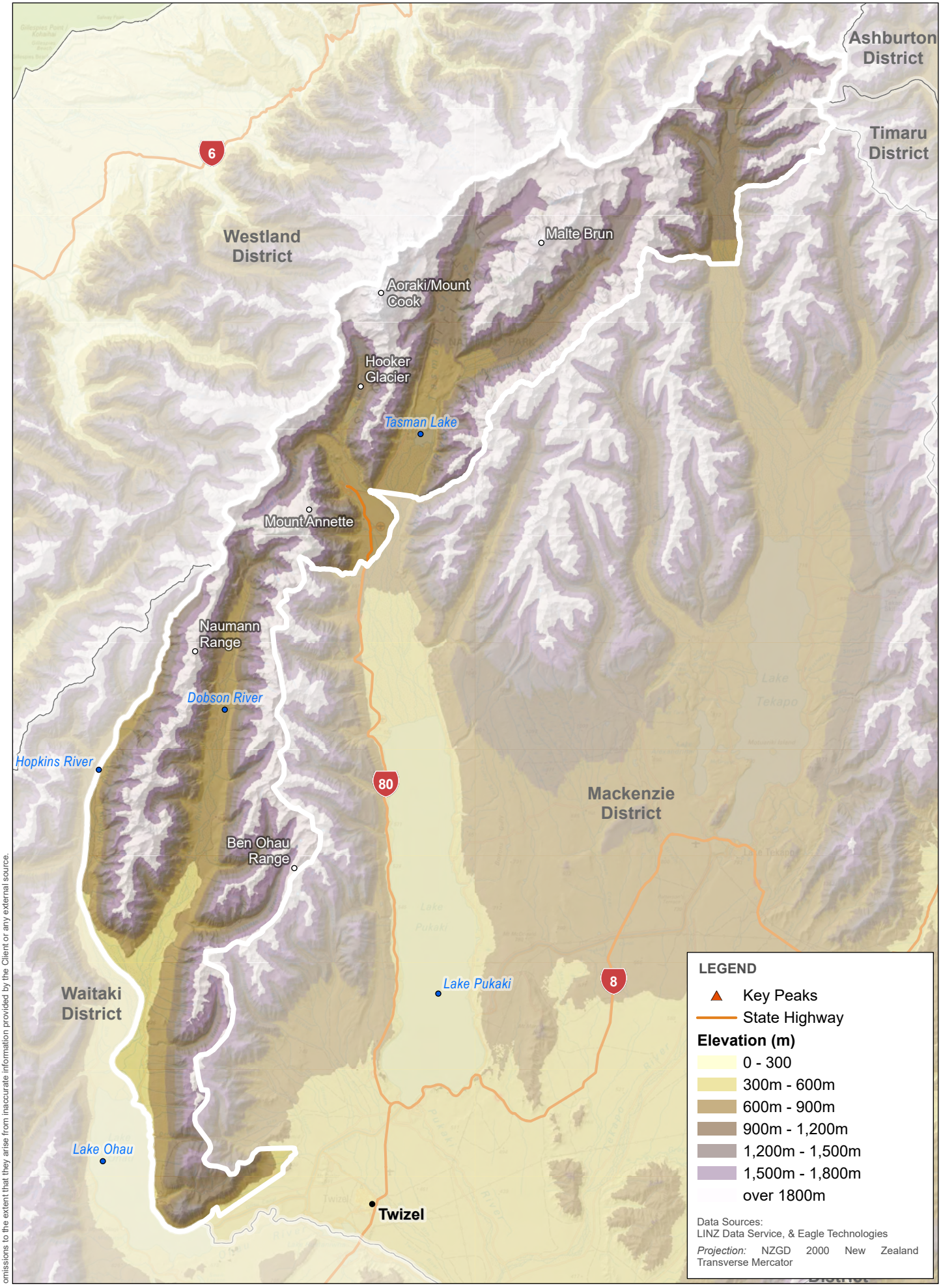
River Catchments

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 5



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

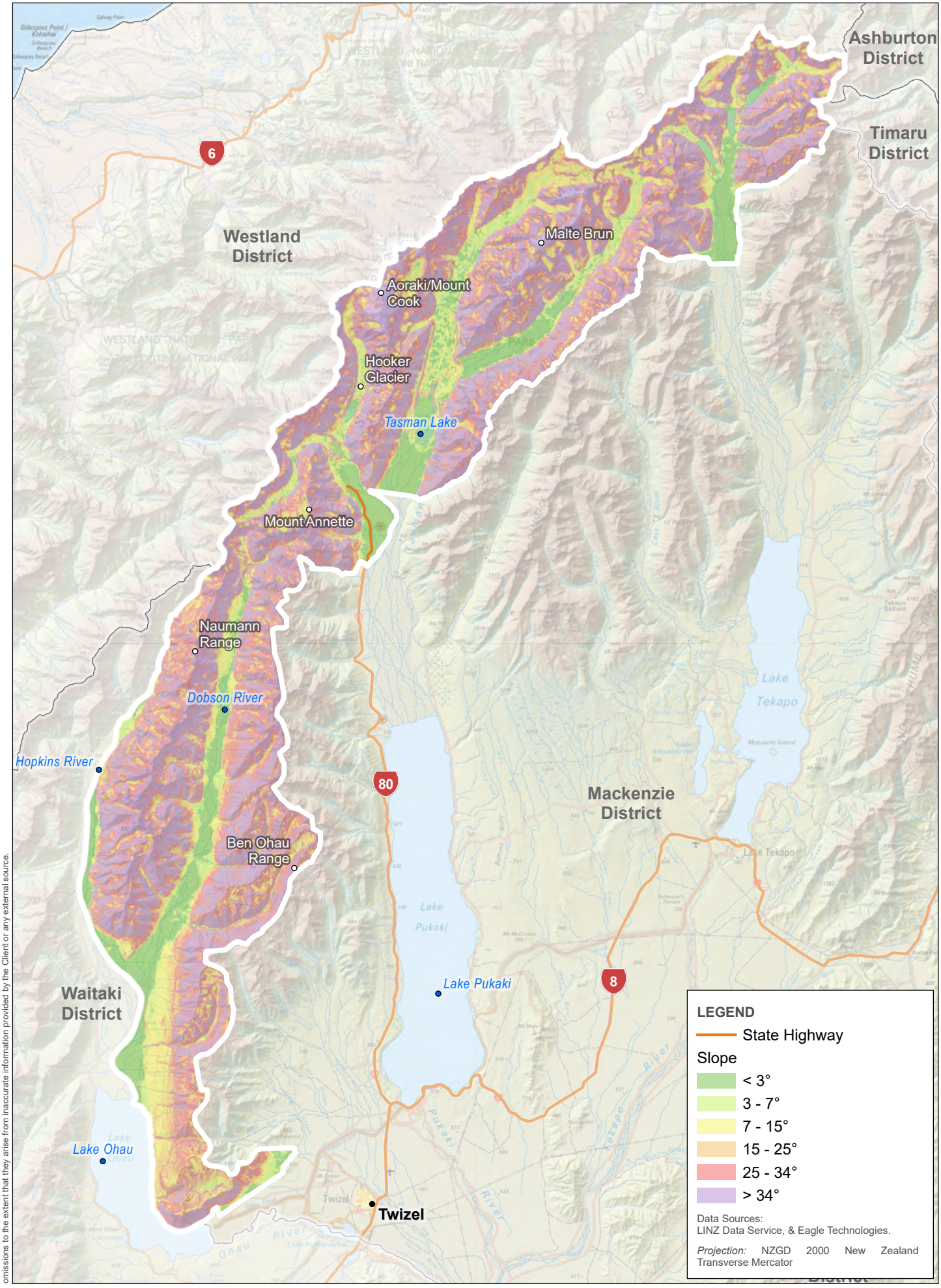
Elevation

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 6



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

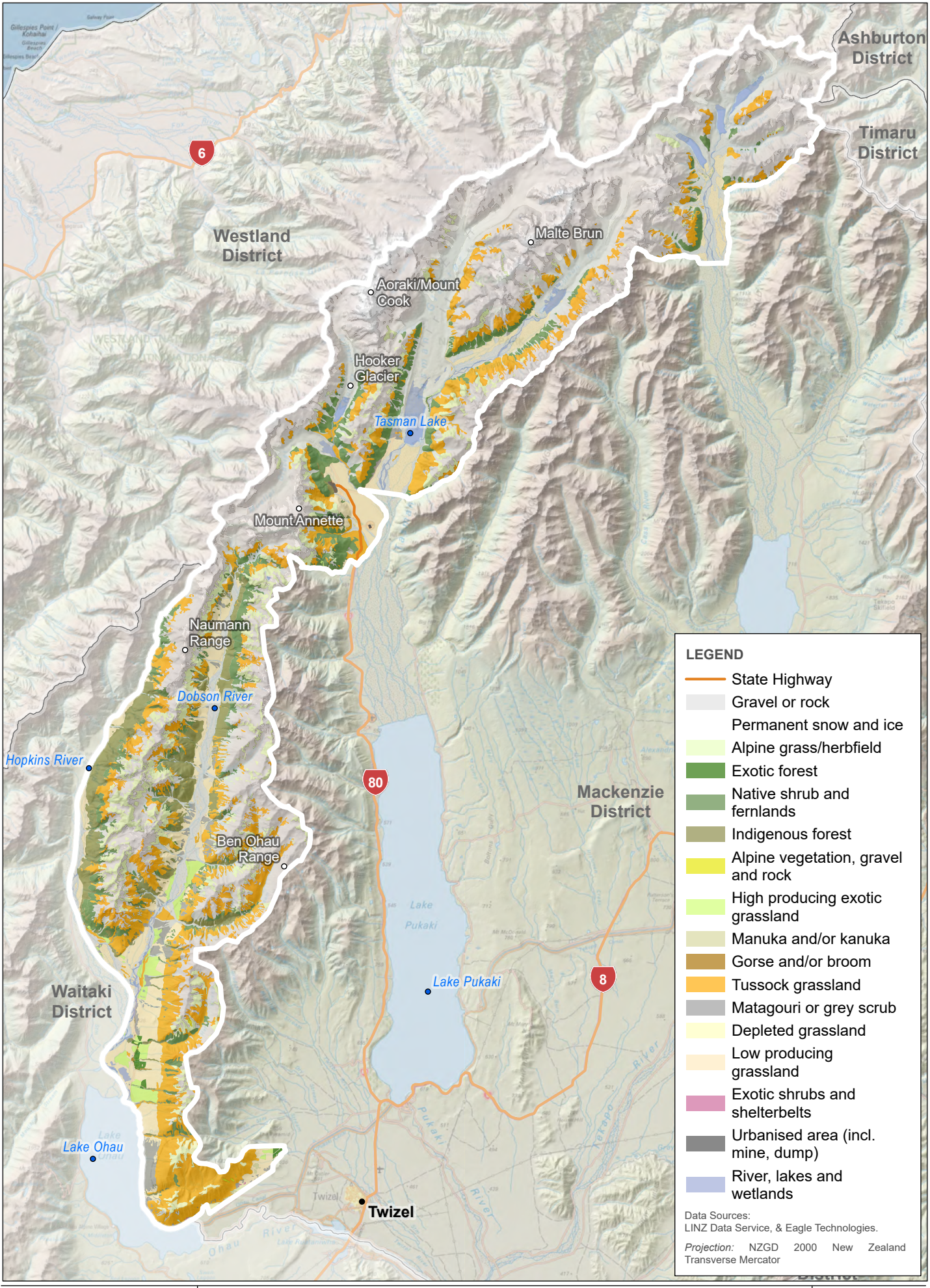
Slope

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 7



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

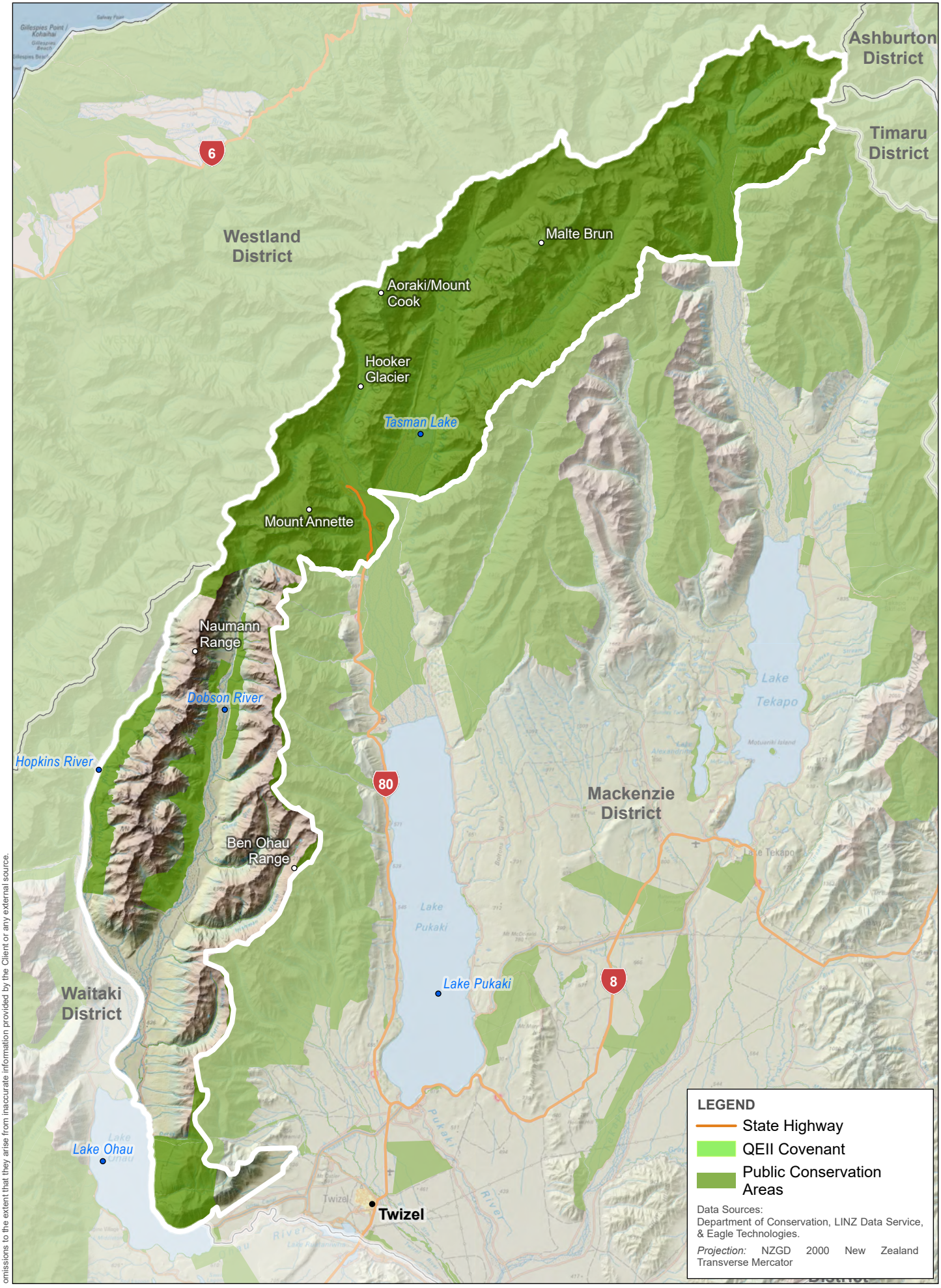
Landcover

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 8



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

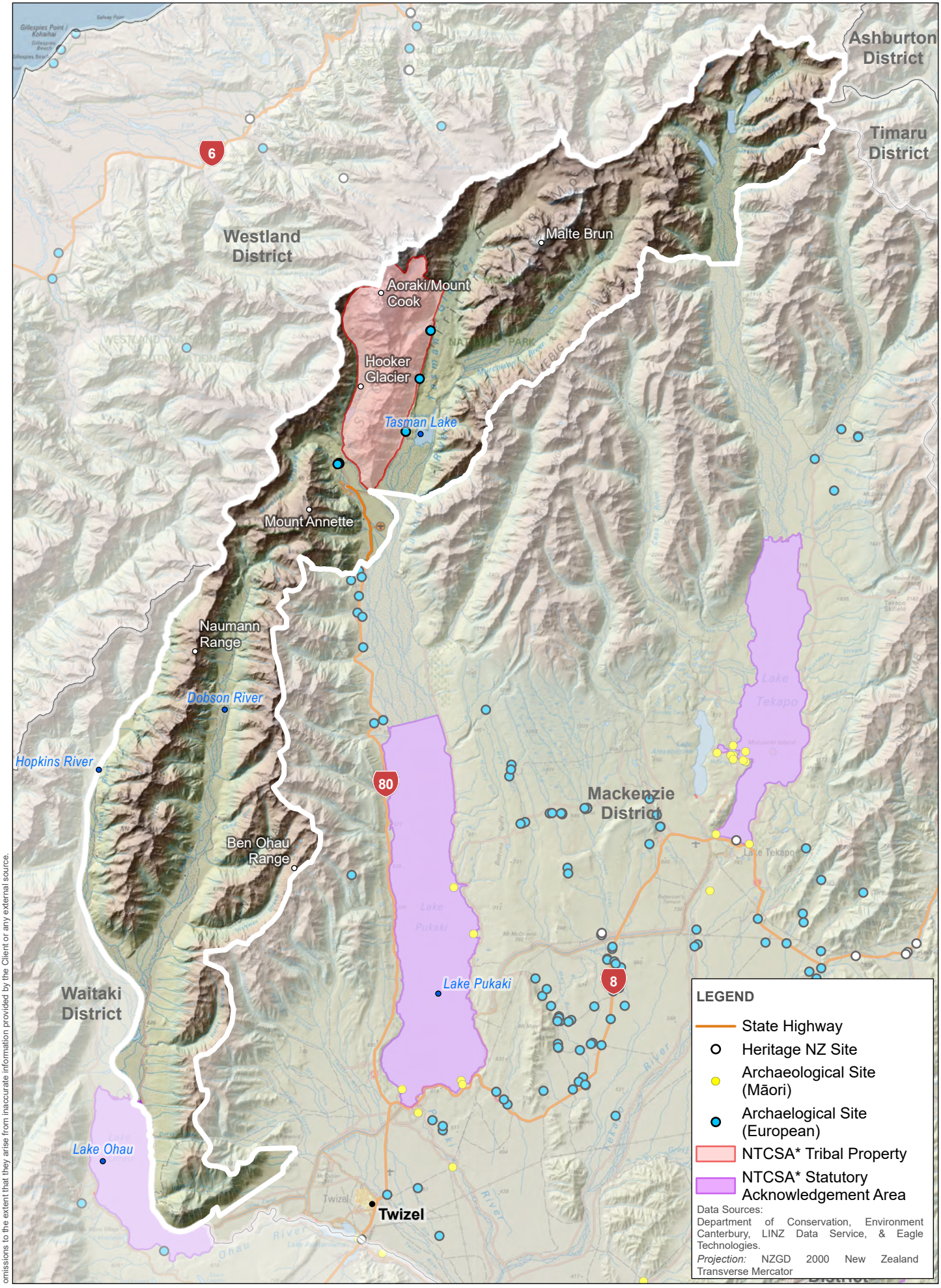
Recorded Natural Areas

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 9



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

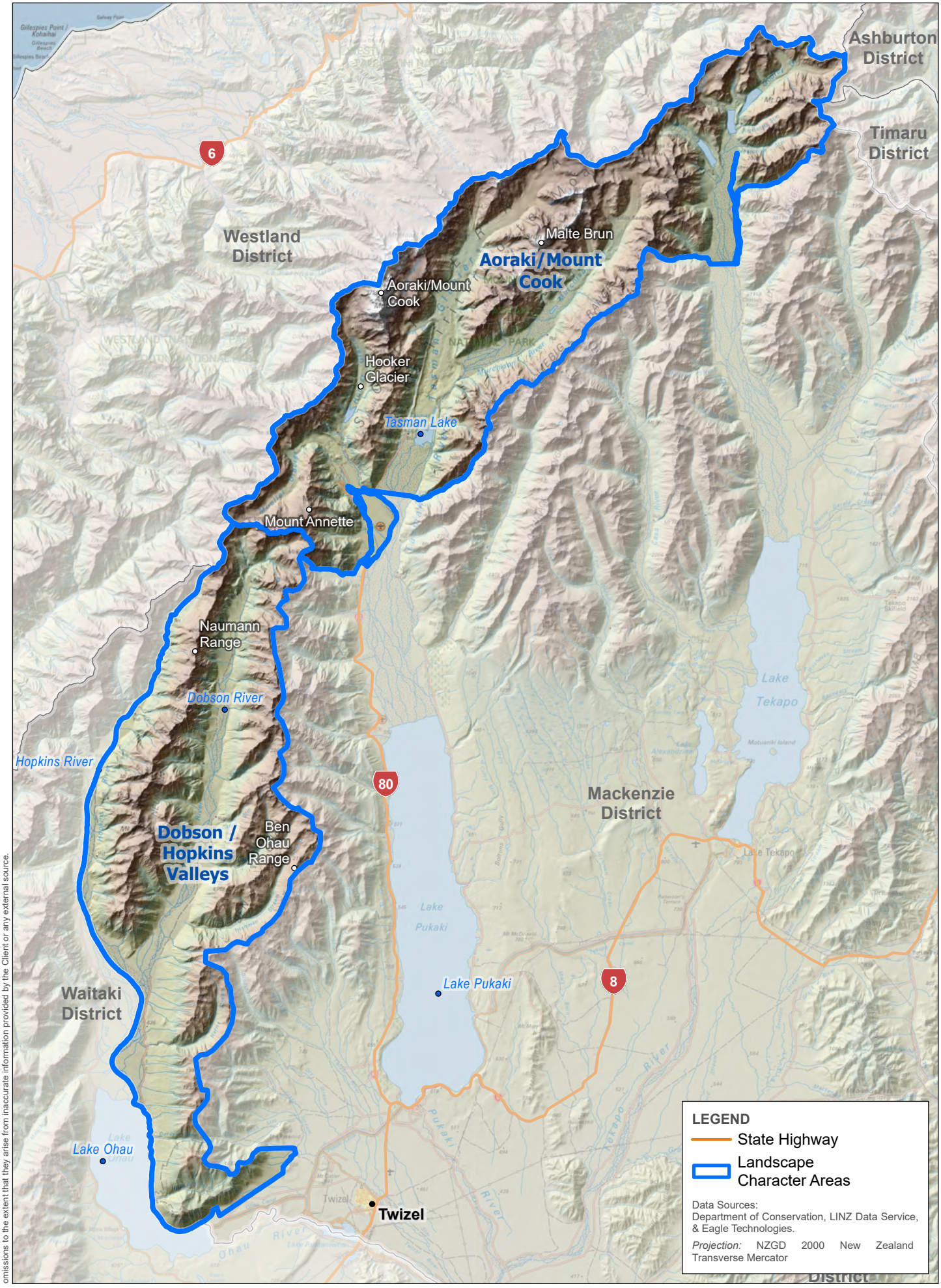
Recorded Cultural Areas

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 10



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

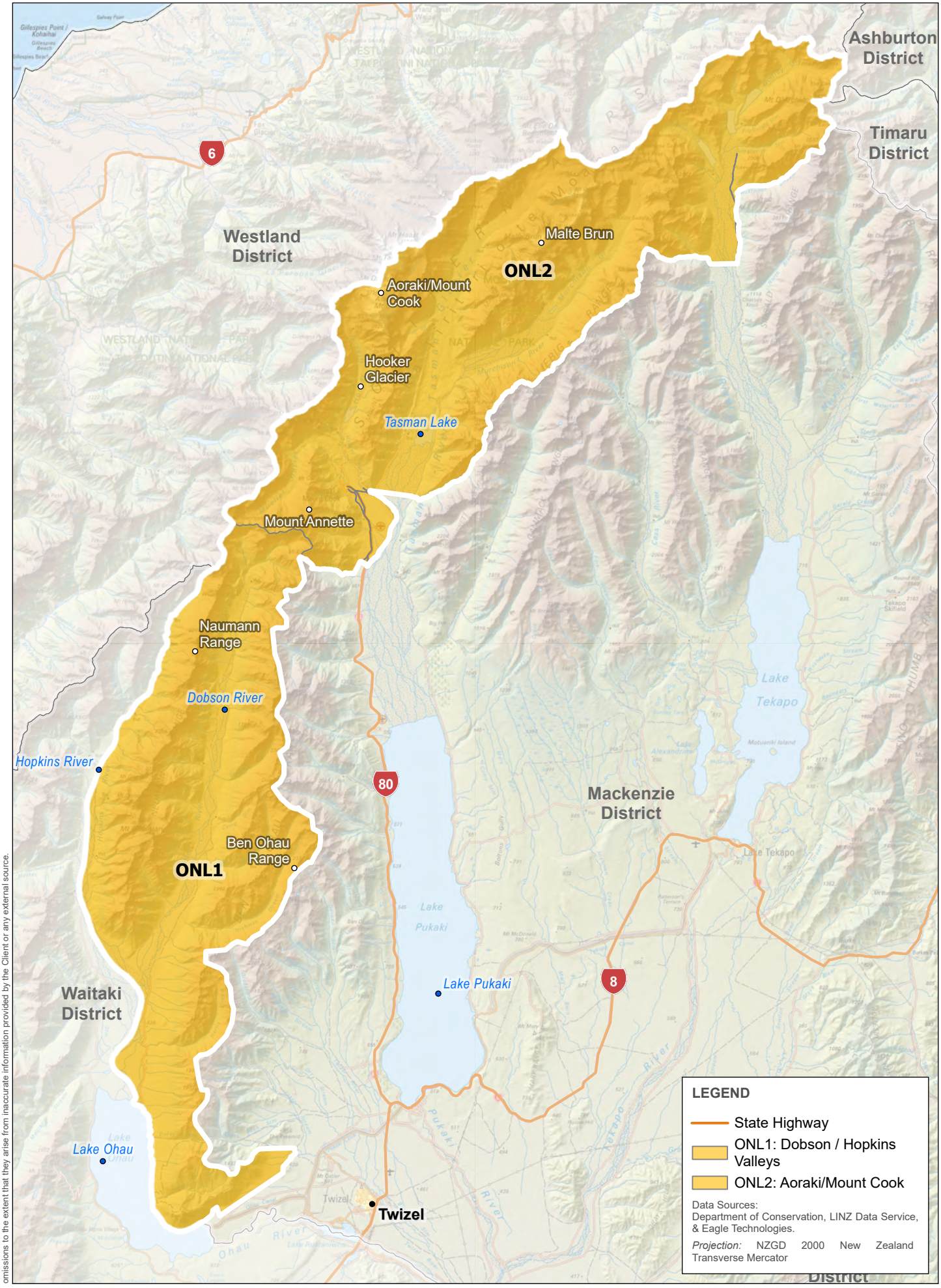
Character Areas

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 11



Boffa Miskell

www.boffamiskell.co.nz

0 10 km

1:400,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

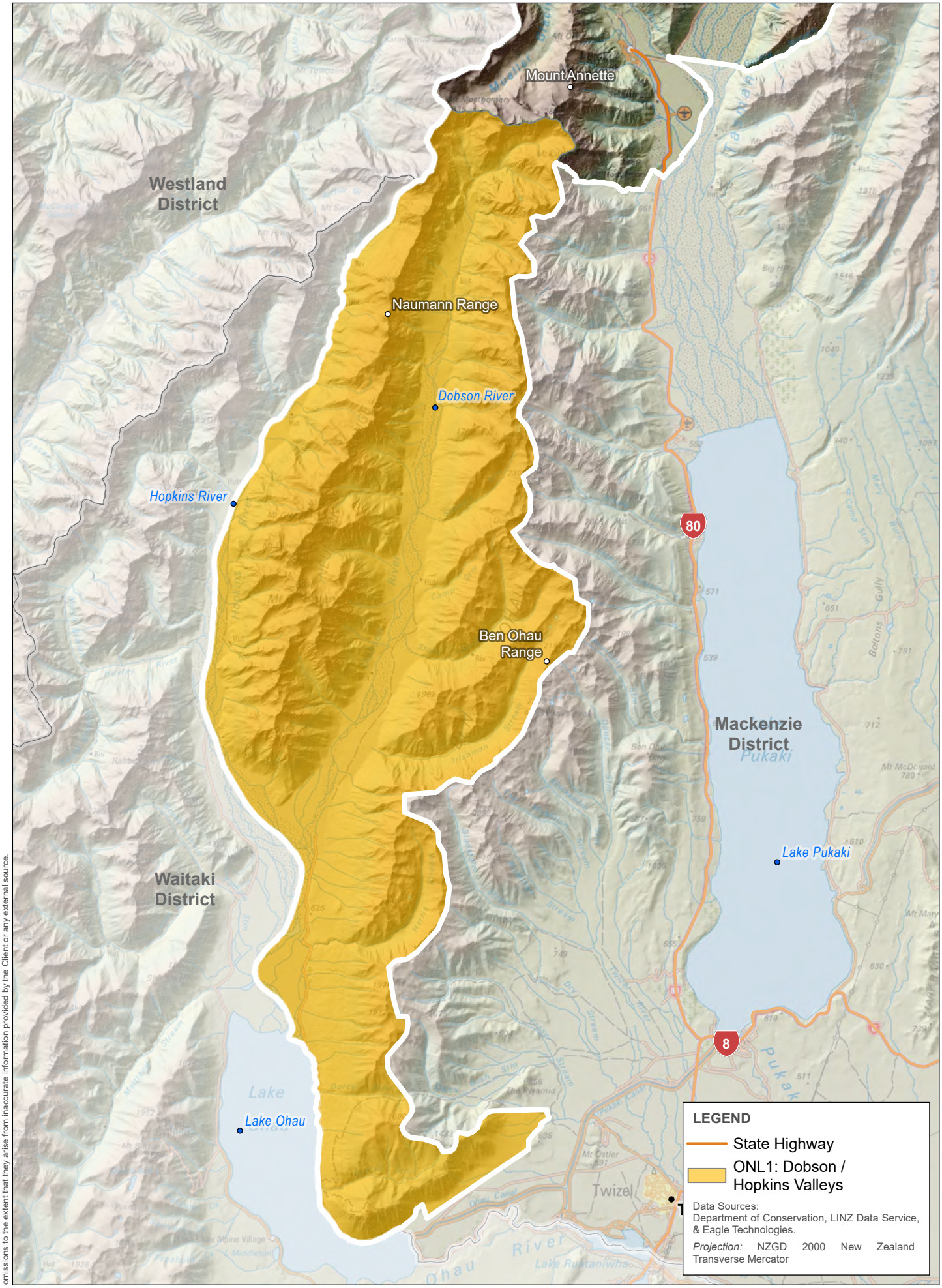
Outstanding Natural Landscapes

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 12



Boffa Miskell

www.boffamiskell.co.nz

0 5 km

1:250,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

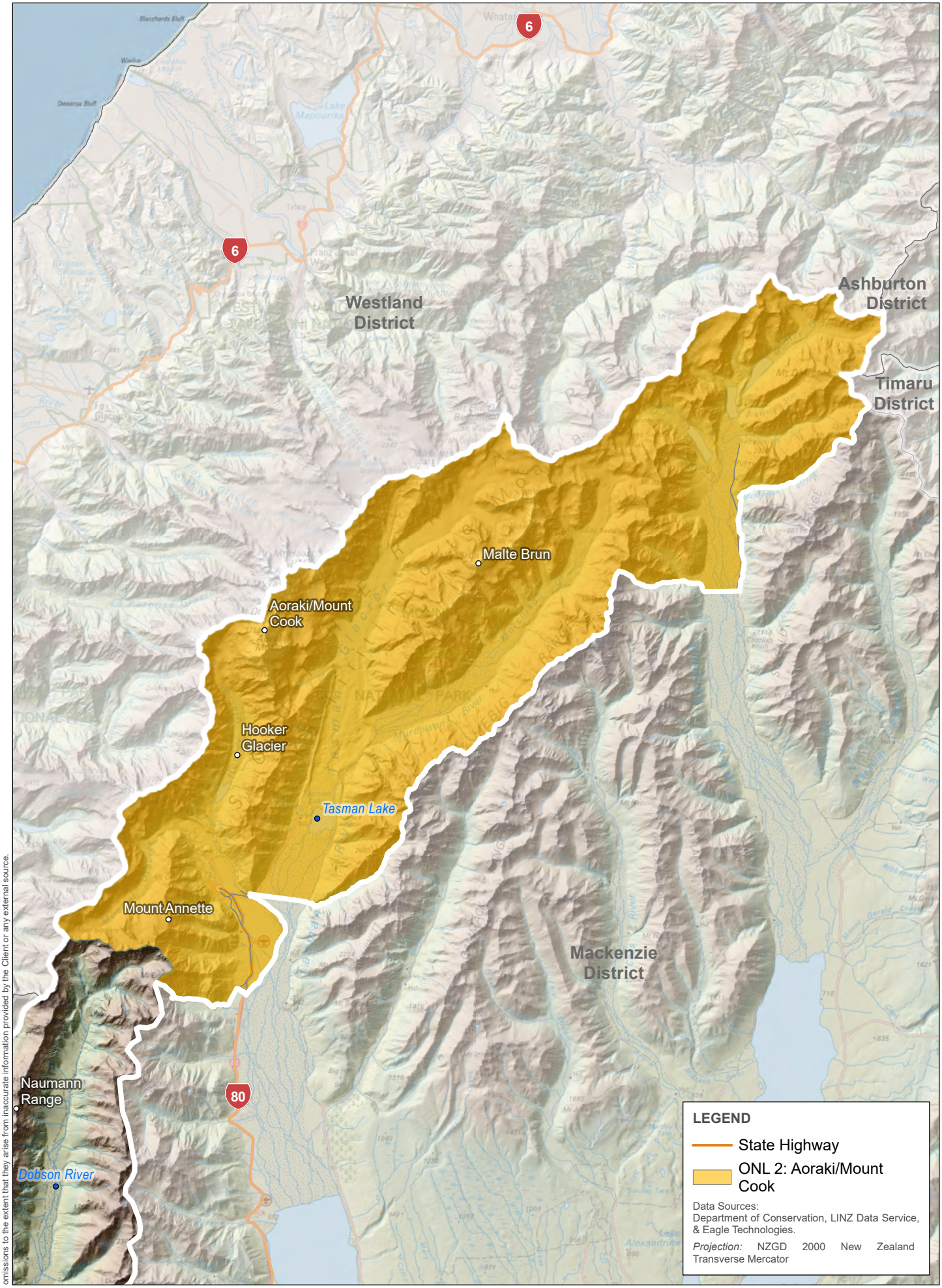
ONL1: Dobson / Hopkins Valleys

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 13



Boffa Miskell

www.boffamiskell.co.nz

0 5 km

1:300,000 @ A4

WESTERN MACKENZIE LANDSCAPE STUDY

ONL 2: Aoraki / Mount Cook

Date: 11 October 2023 | Revision: 1

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: KMa | Checked: HWi

Figure 14

Appendix 3 – Eastern Mackenzie Rural Character Study

Boffa Miskell

Eastern Mackenzie Rural Character Study

Rural Zone Character Assessment Report
Prepared for Mackenzie District Council

23 June 2023

Boffa Miskell is proudly a
Toitū net carbonzero certified consultancy

Document Quality Assurance

Bibliographic reference for citation: Boffa Miskell Limited 2023. *Eastern Mackenzie Rural Character Study: Rural Zone Character Assessment Report*. Report prepared by Boffa Miskell Limited for Mackenzie District Council.		
Prepared by:	Hannah Wilson Landscape Architect Boffa Miskell Limited	
Reviewed by:	Yvonne Pfluger Partner Landscape Planner Boffa Miskell Limited	
Status: [FINAL]	Revision / version: [1]	Issue date: 23 June 2023

Cover photograph: View from Geraldine Fairlie Lookout, State Highway 79, 2023

CONTENTS

1.0 Introduction and background 1

1.1 Scope 1

1.2 Study Approach 1

1.3 Background 2

1.4 Rural Character within the Eastern Mackenzie 2

1.5 Determining Areas Capable of and Suitable for Rural Residential Development. 3

1.6 Terminology 4

2.0 Rural Character Assessment 5

2.1 Rural Character Area 1: Orari 6

2.2 Rural Character Area 2: Opuha 9

2.3 Rural Character Area 3: Fairlie 13

2.4 Rural Character Area 4: Raincliff 16

2.5 Rural Character Area 5: Albury Range 19

2.6 Rural Character Area 6: Tengawai 23

3.0 Conclusion 26

4.0 Bibliography and References 28

Appendix 1: Land Type Descriptions 29

Appendix 2: List of Figures 32

1.0 Introduction and background

Mackenzie District Council (MDC) has engaged Boffa Miskell Limited (BML) to undertake an assessment of the rural character of the rural zone within Eastern Mackenzie District to inform the District Plan Review (DPR). This includes a review of the zoning and associated provisions for the General Rural Zone within Eastern Mackenzie that fall outside any landscape protection overlays (Outstanding Natural Landscapes/ ONL and Significant Landscapes/ SL). This assessment will inform the management of activities and effects within and around the General Rural Zone, including the relationship with rural residential activities and existing small-lot rural development.

The district's rural environment contains a range of landscapes and land uses including extensive farming, lifestyle farming, rural residential lots, settlements, forestry, non-primary production businesses and natural areas.

Subdivision throughout the Rural Zone of Mackenzie District, including the Eastern Mackenzie is a controlled activity under the Operative Plan apart from areas where landscape overlays occur. The entirety of the Mackenzie Basin (west of Burkes Pass) has been identified as ONL which means that this does not apply. For Eastern Mackenzie currently, there are no minimum allotment sizes within the Rural Zone with subdivision consents being assessed against a series of assessment matters. Existing subdivision has been undertaken at a small scale throughout the Eastern Mackenzie, mostly on the outskirts of Fairlie, and Ashwick Flat.

1.1 Scope

The scope of this assessment is to:

- Identify character areas that make up the rural zone and describe the physical, perceptual, associative, rural character, and key characteristics that typify each character area.
- Determine any areas that are suitable capable of absorbing residential development or smaller-scale subdivision (that is consistent with the character of each identified area).

This landscape characterisation work will be used to inform the development of recommended objectives and policies, activity-based rules, and standards for the Rural Zone in the DPR process. Proposed Outstanding Natural Landscapes have not been included within the scope of this study (refer to **Figure 1** for Study Area).

1.2 Study Approach

This rural character assessment was undertaken by landscape architects as an independent technical assessment. The study approach included the following:

- Initial desktop review of existing information available on the district's landscapes, such as aerial photos, GIS data sets, analysis of existing residential densities and land typing information, and identification of draft character areas.
- Field survey and site visits to assess existing topography, land use patterns, rural activities and rural residential development. Identification of the rural elements and

character of the draft areas, review and refinement of the draft character area boundaries. A comprehensive photographic record was established.

- Collation and documentation of rural character descriptions for each area and refinement of boundary delineations.
- Analysis of the rural landscape's capacity for further/more rural residential development and subdivision, additional rural development and non-rural activities.

1.3 Background

The first draft of this assessment included a review of the boundaries of the Eastern Plains Specific Control Area. Initial recommendations included the refinement of the south-western part of the Eastern Plains Specific Control Area to exclude the upper Opawa and Little Opawa River catchments. These areas currently have a remote, and uncluttered rural character with open grazed paddocks and expansive areas of crops with limited structures and dwellings. It was determined that rural residential development in these areas would be more appropriate at densities proposed for the General Rural Zone (outlined in Section 1.5 of this report) to retain the rural character of this landscape.

These recommendations from the draft report have been adopted by Mackenzie District Council and the revised boundary/ area has formed the basis for this final assessment.

1.4 Rural Character within the Eastern Mackenzie

Landscape as defined within Te Tangi a Te Manu, Aotearoa Landscape Assessment Guidelines, is "the relationship between people and place. It is the character of an area, how the area is experienced and perceived, and the meanings associated with it"[1].While all landscapes are dynamic and continually change, the rate of change varies under different physical, social and economic conditions.

Rural landscapes are inhabited landscapes, not to be confused with "wilderness" or "natural" landscapes where human presence is minimally present or absent.

Rural landscapes are, by their nature, strongly influenced by the type of rural activity and the intensity of associated settlement. Natural elements generally remain strongly evident but are overlaid by patterns and processes of human activity. Natural systems operate but, in places, are manipulated to enhance productivity. Human induced patterns and processes are related predominantly to productive land uses such as agriculture, horticulture and forestry, typically including paddocks, shelterbelts, woodlot and forest blocks, and cropping regimes. In more recent times some rural areas have seen a proliferation of residential activity typified by smaller land holdings, residences, buildings, structures, and enclosing shelter and amenity plantings.

This assessment has included an analysis of the combined result of the physical, perceptual, and associative attributes in conjunction with the existing rural characteristics and land use patterns. It does not consider in detail associated infrastructure such as transport and traffic, or factors that contribute to rural amenity such as noise or air quality.

When considered at a finer scale there are distinctly different types of rural character within the General Rural Zone of the Eastern Mackenzie. The rural character varies along a continuum

[1] *'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines', Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022.*

from the denser settlement patterns where rural residential activities dominate (e.g. surroundings of Fairlie) to open farmland areas with predominantly productive land uses to the north of the Fairlie Basin and the hill country inland from Albury. Although these landscapes all have a rural character, the nature of the patterns and elements that combine to define that character are quite different; one type of rural character is not better or worse than another.

This assessment describes the current rural character within the rural zone; any subsequent development of policy for the DPR needs to consider what type of rural character is being managed and/or protected for these specific areas.

The existing planning provisions currently influence the type of rural character that defines an area, primarily through lot size provisions which affect the overall density of dwellings. Currently the District Plan does not specify the minimum allotments sizes within the Rural Zone and subdivision is considered a controlled activity assessed against a series of assessment matters, rather than managed through density standards. Nevertheless, subdivision has occurred at a small scale within relatively confined pockets in the Eastern Mackenzie. Land use on these smaller rural lots is typically focused on rural residential use with the balance land generally maintained for ancillary domestic use or for small scale primary production.

While rural residential use is currently quite limited within the Eastern Mackenzie, allowing small lot subdivision in the General Rural Zone has the potential to attract commercial activities that do not serve non-primary production and are not typical of rural landscapes. This can in turn affect the rural character and create reverse sensitivity situations[2].

1.5 Determining Areas Capable of and Suitable for Rural Residential Development.

Study Objective: *Provide a high-level rural character assessment of the East Mackenzie rural environment to inform appropriate minimum allotment sizes for rural zones, including any specific control areas.*

In order to consider the potential capacity for residential development in the rural zone, a clear understanding of the community and Council aspirations for the rural zone in the future is required.

Existing work to date has included public consultation of proposed allotment sizes within the General Rural Zone, and the two subzones within the Eastern Mackenzie. Each have a differing proposed restricted discretionary, and discretionary allotment sizes for subdivision (see below).

	General Rural Zone	**Eastern Plains Specific Control Area**	**ONL Overlay** *(Consistent with Mackenzie Basin Subzone – out of scope)*
Restricted Discretionary	100ha	20ha	200ha
Discretionary	N/A	4ha	N/A
Non-Complying	<100ha	<4ha	<200ha

[2] *"Reverse sensitivity is when occupants of an activity complain about the effects of an existing lawfully established activity. This can have the effect of imposing economic burdens or operational limitations on the existing activity thereby reducing their viability"* Quality Planning, 2017.

The aim of proposing the introduction of these allotment sizes linked to a specific activity status, is to provide more guidance and direction regarding subdivision within the Eastern Mackenzie which has currently been undertaken on a case-by-case basis, with no assessment matters concerning landscape and rural character effects. Therefore, there is currently no clear direction for rural residential development within the rural zone of the Eastern Mackenzie.

The purpose of this report is to provide recommendations as to where rural residential development is appropriate and what controls and assessment matters should be considered in these areas.

1.6 Terminology

Lot Size

The terms relating to rural lot size used in this report are defined below for clarity. The terms set out below have been used for the purpose of describing rural character in this report. The lot sizes referred to below are not hard and fast bands but intended to be indicative and representative of the understanding applied to this analysis.

Rural Residential / Lifestyle

Refers to lots generally between about 5000m^2 and 4ha, with the primary purpose being residential rather than productive use. Within this report the term rural lifestyle lots has been used to refer to larger lots in this category (2 – 4 ha) which are often used for grazing of domestic animals.

Small rural lots

In this report lot sizes of 4ha to 20ha as proposed within the Eastern Plains Specific Control Area are referred to as small rural lots. These lots are a combination of residential and small-scale primary production operations, woodlots, horticulture, and livestock. In locations with a high density of small rural lots, the resulting rural character can be at the 'residential' end of the rural character scale rather than 'productive' rural end due to the relatively high density of buildings, fences, shelterbelts and small enclosed paddocks.

Productive Rural

20ha+. Large lots/land parcels that support large scale or extensive primary production. Productive rural landscapes are associated with a low density of dwellings and buildings, large paddocks and farming equipment/buildings, lower density of shelterbelts, and plantation forestry.

Settlement

The term 'settlement' has been used in this report as a generic term referring to locations where communities, dwellings, schools, halls etc. are clustered or focused. Generally, these have originated from the historic settlement pattern of small community centres throughout the rural area, but some may be more recent. Settlements referred to in this report include recognised townships or villages such as Fairlie as well as the very small clusters of small lots that identify with a known location such as Burkes Pass. Use of the term settlement does not infer an urban character.

In addition to this report, the Mackenzie Spatial Plans have been undertaken and outline the 30-year vision for future development within three of the district's main townships, including Fairlie.

Rural settlement plans have been undertaken for each of these smaller settlements, outlining residential growth and development[3].

2.0 Rural Character Assessment

This section of the report describes the physical, perceptual, and associative attributes that combine to define the rural character of an area that make it distinctive from the other character areas in the Eastern Mackenzie district. The study area consists of 3 broad character typologies, largely based primarily on their contrasting topography: the Hill Country, Plains, and Downlands.

These character types can be broken down further into rural character areas based on the land use, vegetation patterns and settlement patterns which influence the overall character. Inevitably the subdivision pattern (lot size, lot density, extent of subdivision) has a strong influence on the land use activities and landcover patterns and therefore the subsequent rural character of an area. For example, an area dominated by small rural lots is generally typified by small paddocks, fenced and vegetated boundaries and road frontages, entranceway features and gates, long driveways, dwellings and out buildings. In contrast, larger lots associated with productive farmland are usually typified by large paddocks, with a lower frequency of boundary planting, fences, buildings and dwellings.

Six Rural Character Areas have been identified within the Eastern Mackenzie study area (refer **Figure 2**). **Figure 3** shows these character areas with the parcel size analysis referred to throughout this assessment.

The six Rural Character Areas within the Eastern Mackenzie Rural Zone (excluding any ONLs) are described in the following section of the report.

- **Hill Country:** Orari.
- **Plains:** Opuha, and Fairlie.
- **Downlands:** Raincliff, Albury Range, and Tengawai

The parcel size analysis is based on a GIS analysis of lot sizes, without taking into account individual ownership of lots. It shows a pattern of parcel sizes, highlighting the presence of smaller lots in some parts of the study area. It is acknowledged that some lots are owned by one land owner and farmed as a whole. In other instances, one or multiple parcels may be leased for farming by a third party.

The plans also show the presence of residential dwellings (based on consents obtained from MDC). This shows a pattern of relating to the presence of residential dwellings in the rural zone. In some instances, the consented dwellings may not have been implemented yet, but they form part of the existing environment since consent has been granted and it can be assumed that dwellings will be erected on these lots.

[3] Mackenzie Spatial Plans, Rationale & Boffa Miskell Limited, September 2021.

2.1 Rural Character Area 1: Orari

Photograph 1: View from Lochaber Road looking north towards the lower slopes of Mount Catherine.

The Orari Rural Character Area includes the Mowbray River Valley, Clayton Stream, and Foothills of Mount Walker. The rural character area forms the north-eastern backdrop to the Fairlie Basin (refer to **Figure 4**).

2.1.1 Physical

The Orari Rural Character Area forms the upper reaches of the Fairlie Basin. The rolling topography of the landscape forms the foothills of Mount Walker and Devils Peak and lower slopes of the High Claytons to the north, and Four Peaks Range to the south.

The Orari Rural Character Area once contained extensive areas of beech, podocarp and podocarp hardwood forest on the mid to lower slopes and subalpine tussockland and scrub above the treeline (McEwan, 1987). Much of this landscape character has been modified through agricultural use through several leasehold and freehold high-country stations which extend into the upper catchment of the Orari River. Landcover now includes areas of improved or extensively grazed pasture. Generally, low-lying flat land is used for more intensive grazing than the surrounding slopes.

Within the Orari Rural Character Area there is one site of natural significance. A large stand of red tussock is located to the true left of the North Opuha River south-west of Walkers Spur and extends south towards the North Opuha Track. The site is of significance due to the rare occurrence of this species within the Eastern Mackenzie and wider Mackenzie District. (Mackenzie District Council, n.d.).

2.1.2 Perceptual

The Orari Rural Character Area forms the north-eastern backdrop to the Eastern Mackenzie. Largely inaccessible to the public and remote in character, the landscape character area contains the highly legible foothills of Mount Walker, and the High Claytons, as well as local features such as the Meikleburn Saddle and Devils Peak. Access to the northern-most extent of this rural character area is by Lochaber Road which extends further into the Orari Valley. However, relatively few people venture into the area.

Transient characteristics include the presence of snow during the winter months. This is particularly legible on the slopes of Mount Walker and Devils Peak.

2.1.3 Associative

The Orari Landscape Character Area largely comprises high-country stations. This includes Blue Mountain and Lochaber Station.

2.1.4 Rural Character

The Orari Rural Character Area is characterised by the rolling foothills of Mount Walker and Devils Peak to the east, and the High Claytons to the north. The area is a high-country farming landscape comprising rolling grazed pasture, clusters of exotic forestry, and willows which extend along the waterways found throughout the catchment. Parts of the Mowbray and Orari Valley are low-lying and flat where shelterbelts, clusters of trees and fertilised pasture dominate.

Lots within this rural character area are mostly over 500 hectares in size, with smaller lots located near the Blue Mountain and Lochaber Stations. There are limited structures and dwellings within this rural character area due to the steep topography and remote location. The slopes of the High Claytons, Devils Peak, and Mount Walker show a lower degree of modification with natural landform patterns, while the lower reaches of the character area are characterised by a patchwork of paddocks, and linear shelter belts. Existing dwellings present within this rural character area are largely located within the valleys, and are surrounded by clusters of trees, farm sheds, and other ancillary structures. These clusters of buildings are located sporadically throughout the landscape, often surrounded by wide expanses of open pasture, and rolling hill country.

The Orari Rural Character Area forms the interface between the northern extent of the Fairlie Basin and the mountain ranges which form the wider backdrop of the Eastern Mackenzie. The higher mountain ranges surrounding the area have been identified as ONLs due to their landscape values and low level of modification.

2.1.5 Key Characteristics

- Rolling hills which form the foothills of Mount Walker and Devils Peak and lower slopes of the High Claytons, and Four Peaks Range.
- Several leasehold and freehold high-country stations which include extensive areas of improved or grazed pasture with lot sizes of over 500 hectares.
- A large stand of red tussock is located to the true left of the North Opuha River south-west of Walkers Spur and extends south towards the North Opuha Track and is a Site of Natural Significance.
- Largely inaccessible to the public and remote in character.

- This rural character area is largely formed by Blue Mountain and Lochaber Stations.
- High-country farming landscape characterised by rolling, extensively grazed pasture, small clusters of exotic forestry, and willows.
- Limited structures and dwellings within this rural character area due to the steep topography and remote character
- Low-lying, flat land within the character area, such as in the Mowbray and Orari Valleys, are characterised by a patchwork of paddocks, and linear shelter belts.
- Buildings are located sporadically throughout the landscape, often surrounded by an expanse of open pasture, and rolling hill country

2.1.6 Potential for rural residential development

Due to the remoteness, high sensitivity of this rural character area, and existing land use which largely relates to quite extensive high country farming activities, the Orari Rural Character does not have the capacity to allow for rural residential/lifestyle or small rural lot development.

The southern hills form the backdrop to Lake Opuha when viewed from the Fairlie Basin and the elevated land in this area is visually sensitive to development.

The proposed 100ha allotment size is supported to maintain the existing low density of residential development within this part of the Eastern Mackenzie District. In order to ensure that any new residential buildings maintain the physical, perceptual, and associative attributes, they should be sensitively sited in parts of the landscape that can absorb the change. Low-lying, visually confined locations are preferable and appearance of buildings on ridgelines or prominent high-lying areas should be avoided. This includes consideration of whether any dwellings are visually prominent and detract from the existing landscape character and values of the General Rural Zone in this area.

2.2 Rural Character Area 2: Opuha

Photograph 2: Photograph taken from Clayton Road looking towards Four Peaks Station.

The Opuha Rural Character Area encompasses the northern extent of the Fairlie Basin to the north of the Opihi River (refer to **Figure 5**) and includes the Opuha River and Lake Opuha. The boundary of the rural character area is formed by the foothills of the Two Thumb Range, Low Claytons, and foothills of Mount Walker.

2.2.1 Physical

The Opuha Rural Character Area is substantially influenced by rivers and streams which traverse the landscape in a west to east direction. The landscape character area contains local features such as Lake Opuha, to the north-east and the northern tributaries of the Opihi River. Characterised by historic braided riverbeds and alluvial plains, the area forms the wider catchment for the Opuha and Opihi Rivers and includes a small, artificial, recreational lake and irrigation/ hydro-electricity reservoir, Lake Opuha.

Historically, the Fairlie Basin was characterised by predominantly lowland short and tall tussockland, but also podocarp and hardwood forests, scrub and wetlands (McEwan, 1987). Given the development within the Fairlie Basin the landscape largely comprises expansive areas of pasture, including smaller areas of exotic forest near Pioneer Park and Ashwick Flat. Today the landscape has been developed to allow for rural land use and is characterised by gently undulating paddocks and rural foothills used for grazing, crops and forestry.

2.2.2 Perceptual

The Opuha Rural Character Area forms the foreground to the larger mountain ranges including the Two Thumb Range, Ben McLeod Range, and Four Peaks Range, and is characterised by a patchwork of paddocks, forestry blocks, shelter belts, gravel roads, and rural settlements.

The area contains several small, braided rivers which are highly expressive of their formative processes, connecting the mountain ranges to the plains below. Historic river channels of the larger rivers, including the North and South Opuha Rivers, are still legible features in this landscape today.

Lake Opuha, which is an irrigation reservoir, is popular for fishing and boating, as well as camping and passive recreation and contributes to the aesthetic values in this part of the basin. Panoramic views of the basin and ranges are available throughout this rural character area. Between occasional shelterbelts the area is relatively open and the expansive views encompass the flat pastoral area.

2.2.3 Associative

The Opihi River is of immense significance to the local Ngāi Tahu hapu of Kāti Huirapa and was the principal travel route to the Te Manahuna/Mackenzie Basin. The river contained a rich food supply, with the lower reaches providing food for tuna, inaka, kokopu, and other native fish species.

The Opuha Rural Character Area, along with much of the Eastern Mackenzie is strongly embedded in agricultural history and rural land use. More recently rural lifestyle developments have started to extend around Ashwick Flat in the vicinity of Lake Opuha which has somewhat changed the productive rural character in this area.

2.2.4 Rural Character

The Opuha Rural Character Area is characterised by a gently sloping pastoral landscape dissected by several small, braided rivers associated with the upper Opuha catchment. The northern, western, and southern extent of the rural character area has been developed for several rural land uses including crop production, sheep grazing, dairy farming, beef farming, and deer farming.

To the west of Lake Opua is Ashwick Flat which has existing rural residential and small rural lots which are accessed from Clayton Road. These properties on average range between five to ten hectares in size and are clustered immediately north and south of the South Opuha River. Dwellings found throughout the remainder of the rural character area are associated with larger productive rural lots and are generously spaced and scattered throughout the landscape. Large farm sheds, machinery and stock yards are also common in proximity to these dwellings and form a local farm base. Clusters of exotic trees are also often found within these farm bases and residential dwellings, in addition to the several linear shelter belts found throughout the landscape.

As the landform is flat with only a gentle slope towards Lake Opuha, the landscape is more intensively farmed and grazed. Structures in the landscape include irrigation ponds, pivot irrigators, and dairy sheds. Nevertheless, the landscape has an expansive and open character with panoramic views towards the Two Thumb Range, Ben McLeod Range, and Four Peaks

Range. Lake Opuha provides recreational and visual amenity that has the potential to attract further residential development into the area.

2.2.5 Key Characteristics

- Highly influenced by several rivers and streams and characterised by historic riverbeds and alluvial plains.
- Lake Opuha is a local, artificially created feature within this rural character area.
- Today the landscape has gently undulating paddocks and rural foothills used for grazing, crops and forestry. Overall, agricultural land use in the area is more intensive than on the surrounding, more undulating and elevated terrain.
- Characterised by a patchwork of paddocks, forestry blocks, shelter belts, gravel roads, and rural settlements
- The area contains several small, braided rivers which are highly expressive of their formative processes.
- Historic river channels of the larger rivers, including the North and South Opuha Rivers, are still legible features today. Willows lining the waterways visually divide the plains.
- The Opihi River is of immense significance to the local Ngāi Tahu hapu of Kāti Huirapa and was the principal travel route to the Te Manahuna/Mackenzie Basin.
- Land uses include crop production, sheep grazing, dairy farming, beef farming, and deer farming.
- Large lifestyle properties associated with Ashwick Flat ranging from five to ten hectares in size. Amenity planting is often associated with these dwellings.
- Otherwise, dwellings are largely located within farm blocks and are accompanied by large farm sheds, machinery, stock yards and clusters of exotic trees.
- The landscape is more intensively farmed and grazed due to gently sloping topography.
- Structures in the landscape include irrigation ponds, pivot irrigators, and dairy sheds.
- Expansive and open character with panoramic views towards the Two Thumb Range, Ben McLeod Range, and Four Peaks Range in the background.

2.2.6 Potential for rural residential development

The Opuha Rural Character Area has an open and expansive character, containing a mixture of rural residential and lifestyle lots, small rural lots, and productive rural lots. Existing rural residential and small rural lot development within this rural character area is present near Ashwick Flat, while the remainder of the rural character area contains scattered residential dwellings within productive rural lots.

The Opuha Rural Character Area is largely encompassed within the proposed Eastern Plains Specific Control Area with the intention of the sub zone to allow for a higher density of development within the Fairlie Basin. While this rural character area can absorb some additional rural residential and lifestyle development, this should ideally be concentrated in proximity of the existing rural residential node near Ashwick Flat. In the vicinity of this existing node of rural residential development, the rural subdivision at lot sizes of 4ha would lead to similar landscape outcomes to the current situation. Should this type of development occur across the entire character area, this would likely lead to landscape outcomes that are akin to rural residential sprawl.

Within the wider Opuha Rural Character Area there are no other substantial clusters of rural residential development, therefore there is a risk that rural residential development could

compromise the open character of the landscape, and existing agricultural land use. Given that subdivision to 4ha lots would be a discretionary activity, cumulative effects and the appearance of residential sprawl could be assessed through the consenting process. Other relevant considerations in relation to the discretionary activity status for subdivision to 4ha density would be whether any dwellings are visually prominent from public roads, and if rural residential/ lifestyle land use would lead to cumulative effects that could compromise the existing landscape character and values.

It is understood that subdivision to a 20ha lot size is currently proposed as a restricted discretionary activity. It is considered that this density would largely maintain the rural character currently associated with the existing land use of the General Rural Zone in this character area.

2.3 Rural Character Area 3: Fairlie

Photograph 3: View from State Highway 8 looking south-west towards the Albury Range.

The Fairlie Rural Character Area includes the lower foothills and plains to the east of the Albury Range. The extent of this rural character area is bound by the Opihi River in the north, the district boundary in the east, and the Tengawai River in the south (refer to **Figure 6**).

2.3.1 Physical

The Fairlie Rural Character Area is located on a plain created by the rivers and streams which traverse the foothills of the Albury Range and plains below. Elevation in this character area ranges from approximately 300 to 600 masl and the underlying landform comprises historic riverbeds and alluvial plains. The rural character area forms the southern catchment for the Opihi River.

Historically, the Fairlie Rural Character Area was characterised by predominantly lowland short and tall tussockland, but also podocarp and hardwood forests, scrub and wetlands (McEwan, 1987). Given the development within the wider Fairlie Basin the landscape today largely comprises expansive areas of pasture, exotic forestry, and cropland. Remnant forest species occur on the banks of streams and major rivers, together with exotic vegetation. Due to the intensification of the Fairlie Basin for farming there remains limited habitat for native birds and other species.

2.3.2 Perceptual

The Fairlie Rural Character Area forms the foreground on the lower slopes in views to the Albury Range, and is characterised by a patchwork of paddocks, forestry blocks, shelter belts, gravel roads, and rural settlements. Panoramic views of the basin and ranges are available throughout this character area. Clusters of exotic vegetation are present within this landscape, including deciduous species which change colour throughout the year.

2.3.3 Associative

The Fairlie Rural Character Area, along with much of the Eastern Mackenzie has historic ties to agricultural land use. The southern extent of the Fairlie Basin is associated with the lower slopes of the Albury Range, and largely comprises private properties inaccessible to the public.

2.3.4 Rural Character

The Fairlie Rural Character Area is characterised by the lower slopes of the Albury Range which form an extensive area of raised plains south of Fairlie. The landscape has an undulating topography, dissected by numerous small streams draining the Albury Range. The land is currently mostly used for crop farming, and stock grazing. Lot sizes within this rural character area vary from several rural residential properties immediately west of Fairlie township, to larger productive rural lots which are predominantly used for farming.

Rural residential and lifestyle properties are more common along Nixons Road and School Road to the west of Fairlie, with some also present on the edge of Kimbell to the north-west. These properties are often surrounded by domestic curtilage and vegetation including sheds, and clusters of exotic trees. Within the wider context, the landscape has a predominantly open and undeveloped character with scattered residential dwellings usually found in proximity to local gravel roads that provide access into the valleys along the foot of the Albury Range. These dwellings are generally associated with larger productive rural lots and are often accompanied by large farm sheds, machinery, clusters of exotic trees, and stock yards. In addition, linear shelter belts, and paddocks are features within this landscape. Agricultural infrastructure such as centre pivot irrigators are present but uncommon due to the gently undulating topography.

2.3.5 Key Characteristics

- Highly influenced by rivers and streams which traverse the foothills of the Albury Range and plains below.
- Underlying landform comprises historic riverbeds and alluvial plains and forms the southern catchment for the Opihi River.
- The landscape largely comprises expansive areas of pasture, exotic forestry, and cropland.
- Remnant forest is present on the banks of some streams and major rivers, while exotic species, such as willows are common along waterways.
- The area forms the foreground to the Albury Range in views from the Fairlie Basin, and is characterised by a patchwork of paddocks, forestry blocks, shelter belts, gravel roads, and few small rural settlements, such as Kimbell, and on the outskirts of Fairlie.
- Panoramic views of the basin and ranges are available throughout this character area.
- Clusters of exotic vegetation are also present within this landscape, including deciduous species which change colour throughout the year.

- Historic ties to agricultural land use.
- Undulating topography and is currently used for crop farming, and stock grazing.
- Within the wider context, the landscape has an open and undeveloped character with scattered residential dwellings usually found in proximity to local gravel roads.
- Lot sizes within this rural character include rural residential properties and larger productive rural lots which are predominantly used for farming.
- Rural lifestyle properties are more densely clustered on Nixons Road, School Road, and on the edge of Kimbell to the north-west. These properties are often surrounded by domestic curtilage and vegetation including sheds, and clusters of exotic trees.
- Agricultural infrastructure such as centre pivot irrigators are present but uncommon due to the gently undulating topography.

2.3.6 Potential for rural residential development

The Fairlie Rural Character Area contains a mix of small rural lots and larger productive rural lots. The area is also located within the Eastern Plains Specific Control Area which encompasses the Fairlie Basin.

Smaller lots within this character area are largely associated with the outskirts of Fairlie and Kimbell. Rural residential development should preferably be clustered around these existing areas of rural residential and lifestyle development. Through the consenting process continued sprawl from the Fairlie township and Kimbell can be managed to ensure it does not encroach on the elevated and more sensitive slopes of the Albury Range, and plains below. Currently, residential dwellings in the rural zone predominantly occur along existing roads and within lower-lying parts around the foot slopes of the Albury Range.

Within the wider Fairlie Rural Character Area the clusters of rural residential development are relatively confined, including Winscombe and Cricklewood. Should rural residential and lifestyle development on smaller (4ha) lots extend into areas between these clusters there is a risk that the open character of the landscape, including the landscape's highly legible formative processes, would be undermined over time. While the landscape has the potential to absorb additional rural residential and lifestyle development of this kind, consideration in consenting processes should include whether any future dwellings are visually prominent, the proposed land use compromises the existing landscape character and values, and whether cumulative effects with other existing/ consented developments in the General Rural Zone would arise.

2.4 Rural Character Area 4: Raincliff

Photograph 4: View from State Highway 79 looking towards the Two Thumb Range.

The Raincliff Rural Character Area forms the eastern gateway to the Mackenzie District and is characterised by enclosed valleys surrounded by rolling hills. The extent of the Raincliff Rural Character Area is defined by the Mackenzie District boundary to the south and east, the Opuha Gorge in the north, and the edge of the Fairlie plains in the west (refer to **Figure 7**).

2.4.1 Physical

The Raincliff Rural Character Area is characterised by a gently undulating rural landscape formed from mudstone and limestone. Key landscape features within this rural character area include the Raincliff limestone escarpment and the Opihi Gorge.

The Raincliff Reserve to the south-east of this rural character area contains a distinctive limestone outcrop which overlooks the Opuha River (GNS Science, 2018). Upstream of the Opuha and Opihi River confluence is the Opihi Gorge. The gorge extends approximately five kilometres upstream of Rockwood and is located on the District boundary to Timaru. The gorge is approximately 200 metres deep and has been identified as a site of natural significance in the Mackenzie District plan due to its bird breeding habitat values.

Historically, the Raincliff Rural Character Area was characterised by predominantly lowland short and tall tussockland, but also podocarp and hardwood forests, scrub and wetlands (McEwan, 1987). Since the establishment of several farms within the rural character area, the landscape now largely comprises expansive areas of pasture, and cropland, as well as clusters of exotic forestry. Remnant forest tends to be present on the banks of streams and major rivers such as the forest found within the Opihi Gorge.

2.4.2 Perceptual

The Raincliff Rural Character Area is one of the gateways to the Eastern. The area is characterised by a patchwork of paddocks, forestry blocks, shelter belts, and gravel roads as well as scattered dwellings and ancillary structures. Views of the surrounding mountain ranges are available throughout this character area, including seasonal changes such as snow-capped mountains during the winter months.

The Opihi River Gorge is a highly legible feature within this rural character area. The deep, incised gorge section is highly expressive of its formative processes and known for its aesthetic vividness.

2.4.3 Associative

The Opihi riverbed is of immense significance to the local Ngāi Tahu hapu of Kāti Huirapa. The Opihi River was the principal travel route to the Mackenzie Basin, with areas in the upper catchment containing several archaeological records of rock art within the caves along the riverbed including near Raincliff. The river was also a known as having a rich food supply, with the lower reaches providing food for tuna, inaka, kokopu, and other native fish species.

The Raincliff Historic Reserve at the confluence of the Opuha and Opihi Rivers, is of immense cultural significance due to the several rock paintings found in the caves within the reserve. The area is now part of a forest restoration project and is collaboratively managed by Department of Conservation and the Ngāi Tahu Rock Art Trust (Department of Conservation, 2016).

Today the Raincliff Rural Character Area is associated with the agrarian landscape found throughout the Eastern Mackenzie. To the south of the rural character area, Pioneer Park has heritage associations with early European settlement in the district.

2.4.4 Rural Character

The Raincliff Rural Character Area is characterised by rolling hill country which overlooks the Opihi River, and Opuha River Gorge. Land use within this rural character area is largely associated with stock grazing, exotic forestry, and crop farming, however within the lower reaches of the valley pivot irrigation also occurs. Larger forestry blocks occur at Pioneer Park and Raincliff Forest.

Most of the lot sizes within this rural character area are larger than 50 hectares, with no residential settlements. Small rural lots are located in clusters near Raincliff reserve.

Land use patterns within this rural character area include a patchwork of pasture, exotic forestry, and cropland framed by exotic shelter belts and clusters of mature exotic trees near residential dwellings. Unlike the Fairlie Basin however, land use patterns are dictated by the undulating topography of the Raincliff area, and wider catchment patterns of the Opihi and Opuha Rivers.

Structures and dwellings within this rural character area are limited. Dwellings are scattered throughout the landscape and are associated with large farm blocks. Often accompanying these residential dwellings are several farm sheds, machinery, and stock yards associated with the farm base.

State Highway 79 connects Geraldine to Fairlie via Cattle Valley. There are few roads within this rural character area, however there are local gravel roads within Middle Valley and leading to Pioneer Park.

2.4.5 Key Characteristics

- Gently undulating rural landscape formed from underlying mudstone and limestone.
- Key landscape features within this rural character area include the Raincliff limestone escarpment and the Opihi Gorge.
- The Opihi gorge has been identified as a site of natural significance in the Mackenzie District plan.
- Remnant forest is present within the Opihi Gorge. Species include mahoe, broadleaf, fivefinger as well as lancewood, olearia spp. and large podocarps such as totara, matai and kahikatea.
- The Opihi River Gorge is a highly legible feature and expressive of its formative processes.
- The Opihi riverbed is of immense significance to the local Ngāi Tahu hapu of Kāti Huirapa and was the principal travel route to the Mackenzie Basin. Immense cultural significance of rock paintings found in the caves of Raincliff Historic Reserve.
- Gateway to the Eastern Mackenzie and wider Mackenzie country.
- Characterised by a patchwork of paddocks, forestry blocks, shelter belts, and gravel roads as well as scattered dwellings and ancillary structures.
- Views of the surrounding mountain ranges are available throughout elevated parts of this character area.
- Land use within this rural character area is largely associated with stock grazing, exotic forestry, and crop farming.
- The landscape contains a patchwork of pasture, exotic forestry, and cropland framed by exotic shelter belts and clusters of mature exotic trees.
- Dwellings within this landscape are often accompanied by several farm sheds, machinery, and stock yards associated with the farm base.

2.4.6 Potential for rural residential development

The Raincliff Rural Character Area is not included within the Eastern Plains Specific Control Area. The proposed 100ha allotment size is supported due to open rural character of this landscape and existing lack of structures and residential development that defines this undulating landscape.

Should subdivision occur in accordance with the proposed minimum density standards as a restricted discretionary activity, consideration of the visual and landscape effects relating to the location of any proposed dwellings and structures would be appropriate.

2.5 Rural Character Area 5: Albury Range

Photograph 5: View from Rollesby Valley Road looking north towards Burkes Pass.

The Albury Range Rural Character Area extends along the western part of the Eastern Mackenzie and includes Burkes Pass, where the transition between the Eastern Mackenzie and Mackenzie Basin occurs. The extent of the Albury Range Rural Character Area includes the entirety of the Albury Range and foothills of the Rollesby Range and extends between Burkes Pass and Mackenzie Pass along the Rollesby Valley (refer to **Figure 8**).

2.5.1 Physical

The Albury Range Rural Character Area is defined by a rolling expansive valley to the north, and an enclosed, sheltered valley to the south, as well as the elevated land of the Albury Range. The landform is highly expressive of its formative processes, with the steep slopes of the Albury Range in the east, and Rollesby Range to the west. The Albury Range (up to 1323 masl) is a prominent feature defining the Fairlie Basin to the west. Single Hill (943 masl) is also a prominent feature within this rural character area, forming the narrow valley to the south of the Rollesby Valley Road

This area has a more remote, high-country character than the Fairlie Basin. The lower lying areas of this landscape character area are used for farming, while the upper slopes are predominantly tussockland and matagouri scrub which are only extensively grazed. Historic vegetation on the lower slopes would have once included extensive tussocklands including species such as silver and fescue tussock (McEwan, 1987). Within the gullies on the eastern face of the Albury Range are small areas of regenerating hardwood forest including species such as mountain ribbonwood, kohuhu, lancewood spp., and mountain totara. The sub-canopy also includes species such as fuchsia, koromiko, marbleleaf, Clematis paniculata, korokio, astelia spp., and cabbage tree (Department of Conservation, 2006).

Within this rural character area there is one Site of Natural Significance on the banks of the Tramway Stream due to the regenerating broadleaf forest amongst remnant Hall's totara (McEwan, 1987). The area contains the nationally threatened coral broom and provides habitat for several native bird species including the New Zealand Falcon.

2.5.2 Perceptual

The Albury Range Rural Character Area, including the Rollesby Valley, is one of the areas in the Eastern Mackenzie less travelled, predominantly containing large farm blocks with extensive grazing. The Rollesby and Albury Ranges form an enclosed valley which contains a rolling rural landscape and mosaic of shelter belts, paddocks, gravel roads, and ancient riverbed channels. To the north of the Single Hill Range, the area has an expansive rural character which is easily accessed from the township of Te Kopi-o-Ōpihi/Burkes Pass. Southern areas of the valley near the Tengawai River and Mackenzie Pass are more difficult to access through the narrow Tengawai River valley and Warratah Saddle. Ford crossings, transmission lines and narrow gravel roads flanked by rolling hills are key characteristics of this area. From the east, the Albury Fault Zone creates a legible boundary between the Fairlie Basin and the steep slopes of the Albury Range.

In the winter months the Albury Range is often accentuated by the presence of snow as it forms the visual backdrop to the Fairlie Basin. The clusters of exotic trees around farmsteads create a distinctive sense of place in this cohesive high-country landscape.

2.5.3 Associative

The Albury/ Rollesby Ranges Landscape Character Area contains a formerly important connection between Arowhenua/Temuka and Te Manahuna/Mackenzie Basin. The route followed the Te Ana-a-Wai/Tengawai River corridor until it reached what is now known as Manahuna/ Mackenzie Pass. Throughout this route, there are several remnant limestone rock shelters including over one hundred rock art images (Te Rūnanga o Ngāi Tahu, 2022). These have been painted on the walls and ceilings of the shelters in black, red and white pigments and reflect the activities of those who walked this route.

Te Kopi-o-Ōpihi/Burkes Pass, discovered by Europeans in 1855, became the last village before travellers reached the Mackenzie Basin. The area was established for farmers grazing sheep and this has continued through to today where the landscape character area comprises large farm blocks and back country farms.

As this area is largely farmed, the Albury/ Rollesby Range Landscape Character Area has limited public access with few roads. It is a remote part of the district that is only occasionally frequented by 4WD vehicles accessing Mackenzie Pass.

2.5.4 Rural Character

The Albury Range Rural Character Area is expansive and vast with limited public access and a remote character. Lot sizes within this rural character area are mostly over 500 hectares in size, with smaller rural residential and small rural lots located near Burkes Pass.

The northern extent of this rural character area has an open and uncluttered character with uninterrupted views towards the Two Thumb Range, Albury Range, and Rollesby Range. The southern extent includes the upper reaches of the Tengawai River and has a more remote and

enclosed character. The southern part of the valley adjoins the Mackenzie Pass, a narrow gravel road which provides an alternative route the Mackenzie Basin. Access to this area is by a narrow gravel road which connects the north and south of the valley. The remainder of the rural character area is encompassed within privately owned farms and inaccessible to the public.

Land use within the Albury Range Rural Character Area is largely for stock grazing and crop production. Due to the steep topography within the upper reaches of the valley and along the mountain slopes, agricultural infrastructure, including pivot irrigation, is almost entirely absent, although structures such as sheds and transmission lines are present.

To the north of this rural character area there are limited residential dwellings within the valley itself, with much of the residential development located near Burkes Pass. To the south, residential dwellings are limited and often nestled within small valleys in sheltered locations. Dwellings throughout this rural character area are often accompanied by clusters of exotic trees, sheds, machinery, and stock yards.

2.5.5 Key Characteristics

- Characterised by a rolling expansive valley to the north, and an enclosed, sheltered valley to the south.
- Highly expressive of its formative processes, with the steep slopes of the Albury Range in the east, and Rollesby Range to the west.
- The Albury Range (up to 1323 masl) and Single Hill (943 masl) are prominent features.
- Lower lying areas of this landscape character area are used for farming while the upper slopes are predominantly tussockland and matagouri scrub
- Site of Natural Significance on the banks of the Tramway Stream due to the regenerating broadleaf forest amongst remnant Hall's totara.
- The Rollesby and Albury Ranges form an enclosed valley containing a rolling rural landscape and mosaic of shelter belts, paddocks, gravel roads, and ancient riverbed channels.
- The Albury Fault Zone creates a legible boundary between the Fairlie Basin and the steep slopes of the Albury Range.
- The area was an important connection between Arowhenua/Temuka and Te Manahuna/Mackenzie Basin.
- Te Kopi-o-Ōpihi/Burkes Pass, became the last village before travellers reached the Mackenzie Basin and was established for sheep grazing which has continued today.
- Limited public access with few roads.
- Lot sizes within this rural character area are largely over 500 hectares in size.
- The northern extent has an open and uncluttered character, while the south of this rural character area has a more enclosed character.
- Land use is largely for stock grazing and crop production. On the steeper slopes grazing is extensive, while the valley floor supports more intensively used pasture. Agricultural infrastructure, including pivot irrigation, is almost entirely absent, although structures such as sheds and transmission lines are present.
- Much of the residential development is located near Burkes Pass. To the south, residential dwellings are limited and often nestled within small valleys. Dwellings in the area are almost all related to the farming use of the associated land.

2.5.6 Potential for rural residential development

Due to the remoteness, high sensitivity of this rural character area, and existing land use which is largely for high country farming activities, the Albury Rural Character has limited capacity to absorb rural residential development. There is potential for limited additional development near Burkes Pass where there are existing small rural lots and rural residential lots. Any further subdivision near the Burkes Pass settlement should, however, ensure that residential development does not sprawl into the wider open rural landscape. The area has a high level of visual amenity which relates to the rural outlook and panoramic views of the mountain ranges which is complemented by the clusters of vegetation in the valleys. While it is unlikely that the remote areas will attract rural living that does not relate to the agricultural use of the land, the northern extent of the Rollesby Valley may be attractive for holiday houses in the vicinity of Burkes Pass settlement.

Rural residential and lifestyle, and small lot development within the wider Albury Range Rural Character Area has the potential to lead to adverse effects on the open, remote, and undeveloped rural character. The rural valley landscape is viewed in conjunction with the steep and undulating topography of the mountain ranges which is particularly open and sensitive to residential development. The proposed 100ha minimum density standard for subdivision is appropriate for this character area, and careful consideration of structures and dwellings would be appropriate. While parts of the valley floor could absorb change reasonably well, in particular where it relates to existing landform, vegetation or clusters of existing buildings, the open slopes are vulnerable to visual and landscape effects relating to buildings and earthworks required for construction of access.

2.6 Rural Character Area 6: Tengawai

Photograph 6: View from Camp Valley Road towards the Hunters Hills.

The Tengawai Rural Character Area forms the southern extent of the Eastern Mackenzie. The area is defined by the district boundary to the east and south, the Hunters Hills in the west, and Mackenzie Pass and the Albury Range in the north (refer to **Figure 9**).

2.6.1 Physical

The Tengawai Rural Character Area is characterised by the wider Tengawai River catchment. The landscape is highly expressive of its formative processes which include ancient river terraces, and a network of narrow, braided, streams which are key tributaries of the Tengawai River.

The Tengawai River and its tributaries are the defining landscape features within this landscape character area. The braided river system has its headwaters in the Rollesby and Dalgety Ranges and forms the key valley to the south-east of the Eastern Mackenzie. The catchment rises steeply to the west near the Te Tari-a-Te-Kaumira/ Hunters Hills and Mount Smith but has a gentle gradient on the lowland plains below. This includes the distinctive river terrace to the true left of the river which reaches 500 masl at its highest point and is formed from the now inactive Brothers Fault.

Prior to clearance for farming, historic vegetation on the plains and hills included lowland short tussockland and tall tussockland including species such as silver tussock, fescue tussocks, and *chionochloa spp* (McEwan, 1987). Remnant areas of podocarp hardwood forest remain on the Tengawai River, and include species such as mahoe, broadleaf, five finger, lancewood, *oleria spp*., *hebe spp*., totara, matai and kahikatea.

2.6.2 Perceptual

The Tengawai Landscape Character Area is characterised by an open and undulating rural landscape containing shelter belts and paddocks. The area is largely experienced by travellers along State Highway 8 within the Tengawai River corridor which is more enclosed in places before reaching the wider Fairlie Basin. West of State Highway 8 the landscape becomes more remote and enclosed. Several dead-end gravel roads and farm tracks extend inland towards the Te Tari-a-Te-Kaumira/ Hunters Hills and Mount Nessing, following several incised gullies and braided streams. These provide access to the small settlements in the upper reaches of the catchment including Dalzell, Mount Nessing, Chamberlain, and Limestone Valley.

2.6.3 Associative

The Te Ana-a-Wai/Tengawai River was another primary route used by mana whenua when travelling from Arowhenua/Temuka to the Te Manahuna/Mackenzie Basin (Te Rūnanga o Ngāi Tahu, 2022). Te Ana-a-Wai derives its name from the upper catchment of the river where the source originates from a series of caves, hence the name Ana, the Māori name for cave (Te Rūnanga o Ngāi Tahu, 2022). The river was renowned for being a source of weka and tuna (eels).

The Tengawai Rural Character Area today is largely associated with farming, with historic sites including the Mount Nessing Homestead.

2.6.4 Rural Character

The Tengawai Rural Character Area has an undulating and remote rural character. Lot sizes within this rural character area are productive rural lots and are often larger than 100 hectares. Near the settlement of Albury, the lots sizes are smaller and subdivision in this area is more often associated with rural residential and lifestyle properties.

The Tengawai Rural Character Area is characterised by incised gullies formed by the Little Opawa River, Opawa River, and Mawaro Creek, and their tributaries. Within the upper reaches of the rural character area the topography is steep and undulating, containing limited structures and agricultural infrastructure. Therefore, the area is predominantly used for extensive stock grazing and crop production. In the lower reaches of the rural character area, where the landscape becomes more gently undulating and flat the landscape is more intensively grazed.

Existing residential dwellings within the Tengawai Rural Character Area are largely clustered on the outskirts of Albury. Within the river valleys there are, however, residential dwellings associated with larger productive rural lots with small clusters near Cannington, Monavale, Rocky Gully, and Chamberlain. These side valleys have a high rural amenity with typical clusters of mature vegetation.

2.6.5 Key Characteristics

- The landscape is highly expressive of its formative processes which includes ancient river terraces, and a network of narrow, braided, streams which are key tributaries of the Tengawai River.
- The catchment rises steeply to the west near the Te Tari-a-Te-Kaumira/ Hunters Hills and Mount Smith but has a gentle gradient on the lowland plains below.

- Remnant areas of podocarp hardwood forest remain on the Tengawai River. Gnerally exotic vegetation follows the banks of waterways throughout the area..
- Today the landcover is largely grazed pasture, and cropland.
- Characterised by an open and undulating rural landscape containing shelter belts and paddocks, defined by the distinctive drainage pattern that created valleys and spurs.
- The Te Ana-a-Wai/Tengawai River was another primary route used by mana whenua when travelling from Arowhenua/Temuka to the Te Manahuna/Mackenzie Basin.
- Largely associated with farming, with historic sites including the Mount Nessing Homestead.
- Lot sizes within this rural character area allow for productive rural lots which are often larger than 100 hectares.
- Enclosed and undulating character inland from State Highway 8, characterised by incised gullies formed by the Little Opawa River, Opawa River, and Mawaro Creek.
- Limited structures and agricultural infrastructure, therefore the area is predominantly used for stock grazing and crop production.
- Existing residential dwellings within the Tengawai Rural Character Area are largely clustered on the outskirts of Albury. Small clusters present near Cannington, Monavale, Rocky Gully, and Chamberlain.

2.6.6 Potential for rural residential development

A large portion of the Tengawai Rural Character Area is encompassed within the Eastern Plains Specific Control Area. The proposed minimum subdivision size of 20ha (RD) and 4ha (D) is generally considered appropriate for this area. Should subdivision to 4ha lots become more common, it should ideally be concentrated in the vicinity of existing nodes of development near Albury where residential development on the outskirts of the settlement is currently occurring. Through the discretionary regime smaller-scale lifestyle-lot subdivision should be carefully managed to ensure it does not result in sprawl into the wider Opawa and Little Opawa River valleys.

The northern extent of the Tengawai Rural Character Area, including Camp Valley and Limestone Valley, is currently characterised by a remote and open landscape which is highly expressive of its formative processes. Therefore, this part of the character area may be more susceptible to change.

To the south and west of this character area, outside of the Eastern Plains Specific Control Area, rural residential and lifestyle development has the potential to adversely affect the rural character. This is due to the currently open, remote, and undeveloped character, in conjunction with the steep and undulating topography of the landscape which is more sensitive to residential development. Therefore, the proposed 100ha allotment size, as proposed for the General Rural Zone, is considered appropriate in this area along the lower slopes of the Hunter Hills and Mt Smith. The boundaries of the area have been amended to reflect initial recommendations made as part of this assessment along the south-western extent of the zone.

Within both the Eastern Plains Specific Control Area and General Rural Zone consideration of location, design and colour of dwellings would assist in maintaining the existing rural landscape character.

3.0 Conclusion

At present there is no minimum allotment size stipulated in the operative District Plan for areas outside the Mackenzie Basin Subzone. The Operative Plan instead relies on a series of assessment matters to guide decision-making. This represents a lack of guidance for Planners applying the provisions and has contributed to previous ad hoc decision-making. In reality this means that there are areas within the General Rural Zone (particularly around Fairlie) that have already been subdivided to a size that would typically be described as Rural Lifestyle.

Should this approach to subdivision within the Eastern Mackenzie continue, there is a risk that rural character within the area cannot be retained. While the Spatial Plan process addresses expansion of settlements within the district, the introduction of appropriate minimum density standards controlling both subdivision and land use (i.e., the establishment of dwellings) has been identified as another key issue for this Stage of the Mackenzie District Plan Review (MDPR).

The currently proposed framework would mean that the General Rural zone would be subject to a 100ha minimum allotment size (for subdivision and residential density). Within that General Zone there would be two sub-zones or Specific Control Areas. Any ONL areas identified within the General Rural Zone would be subject to an increased 200ha minimum allotments size, which is consistent with that already applying in the Mackenzie Basin Subzone ONL. In addition, the low-lying, more modified farmland around Fairlie Township has been identified as an East Mackenzie Plain Specific Control Area, with a reduced minimum allotment size of 20ha, with development down to 4ha being a discretionary activity. While these provisions allow for the creation of smaller lots than in the surrounding hills, the existing rural character of the basin could be maintained with 20ha lots that allow for ongoing productive use.

Given that the subdivision to 4ha would be a discretionary activity, council has the ability to refuse consent in circumstances where the proposal would compromise the rural character. From a landscape perspective this could be either due to the location and design of a proposed subdivision, visual prominence of proposed dwellings, reduction of openness and cumulative effects with existing/ consented development. In addition, sprawl of 4ha lots across the majority of the area would change the existing rural landscape character along the continuum from a productive working landscape to a rural lifestyle landscape where elements of domestication would visually dominate. Recommendations are included for each character area identified in the report, outlining where sprawling 4ha development that is not associated with existing clusters of development/ small settlements should be avoided. These considerations could be addressed in a consenting process through the use of specific assessment matters. Concentration of small rural lots and rural residential subdivision in the vicinity of existing clusters of dwellings or settlements would be preferable landscape outcome rather than the sporadic fragmentation of the rural land, which has the potential to compromise the open productive rural character. While areas with a rural lifestyle character with a higher density of residential dwellings on 4ha lots is considered appropriate near existing dwellings and settlements, extensive proliferation across the East Mackenzie Plain Specific Control Area would substantially change the existing rural character that provides for a high degree of openness and views to the surrounding mountain ranges. It is assumed that this would be assessed as part of each application with a discretionary activity status. The introduction of

landscape/ rural character specific assessment matters could provide further guidance to applicants.

If rural residential activities are to be concentrated around existing nodes of rural residential development, it would help to grow existing areas where smaller lots and rural residential lots are already present. There is opportunity for further rural lifestyle development near Albury, Fairlie, Kimbell, and Ashwick Flat which have existing small lot and rural residential lots. The majority of the Fairlie Basin is characterised by an open landscape, largely devoid of structures and includes features such as river terraces, and elevated foothills of the Hunters Hills, Albury Range, Two Thumb Range, High Claytons, and Mount Walker. These areas are more sensitive to development due to their visual prominence in the landscape. The part of the study area which remains within the General Rural Zone has a lower ability to absorb rural residential development, and therefore the proposed allotment size of 100ha is considered an appropriate minimum density standard for these areas.

While the minimum density standard addresses the expected number of residential dwellings in both the Eastern Plains Specific Control Area and the General Rural Zone, visual and landscape effects often relate to the location and design of dwellings. If the inclusion of assessment matters was to be contemplated the following considerations could be addressed through potential assessment matters:

- Effects of dwellings and creation of unnatural lines through visible boundaries (e.g., shelterbelts, hedges etc) on landscape character and quality, including the consideration of effects on physical, perceptual, and associative attributes.
- Whether any the built form or areas associated structures and vegetation will detract from the wider rural views and existing landscape characteristics. Visual prominence of built form should be avoided and structures should be sited in locations where they do not break the skyline of prominent ridgelines.
- It is considered preferable if the location of building platforms within subdivided lots was to be assessed through the subdivision consenting process to provide certainty regarding landscape outcomes relating to built form.
- The design of the built form, including size, height, bulk, colour and materials may also be considered through the consenting process.

4.0 Bibliography and References

Department of Conservation. (n.d.). *North Opuha Conservation Area hunting*. Retrieved April 13, 2023, from https://www.doc.govt.nz/parks-and-recreation/things-to-do/hunting/where-to-hunt/canterbury/mid-and-south-canterbury-hunting/where-to-hunt/north-opuha/

Department of Conservation. (2016). *Conservation Management Strategy Canterbury (Waitaha)* (p. 328). https://dcon01mstr0c21wprod.azurewebsites.net/globalassets/documents/about-doc/role/policies-and-plans/canterbury-cms/canterbury-cms-2016-volume-1.pdf

Department of Conservation. (2022). *Discover the Outdoors*. https://www.doc.govt.nz/map/index.html?banner=0&layerlist=0&base=Topo&layers=Hunting%20areas&search=Hunting%20areas:7218396

GNS Science. (2018). *New Zealand Geology Web Map*. http://data.gns.cri.nz/geology/

Mackenzie District Council. (n.d.). *Sites of Natural Significance* (p. 15) [Mackenzie District Plan]. https://www.mackenzie.govt.nz/__data/assets/pdf_file/0020/514190/Appendix-I-Sites-of-Natural-Significance.pdf

McEwan, M. (1987). *Ecological regions and districts of New Zealand*. 161.

Te Rūnanga o Ngāi Tahu. (2023). *Ka Huru Manu Cultural Mapping Project*. https://www.kahurumanu.co.nz/atlas

Appendix 1: Land Type Descriptions

'Land types' are used to distinguish major physiographic land units on the basis of topography and lithology. In New Zealand, 'land typing' has proved a useful basis from which landscape characterisation has been based and forms a minimum requirement for identifying natural features and landscapes.

In the Eastern Mackenzie there are 9 Land Types, which have been determined by Landcare Research and are contained within the Canterbury Regional Landscape Study Review (Boffa Miskell 2010). These can be divided into 5 broad categories of which some are made up of accumulated land types:

Low Altitude Plains
L2 Lower Plains Land Type

Lower Canterbury plains; broad very low angle coalescing outwash fans and associated low terraces of the major rivers (Waimakariri, Rakaia, Rangitata, and the Waitaki Rivers), comprising Pleistocene glacial outwash gravels with variable loess cover, and extensive Holocene alluvium, coastal swamp deposits and minor inland dune belts. Elevation ranges from 0 - 150m, and rainfall from 600 to 800mmlA

L24 Inland Basins and Major Valleys

Inland basins and valleys with extensive, gently sloping alluvial fans, terrace lands, floodplains and associated wetlands. Elevation ranges from 150 to 650 m and rainfalls between 600 and 1000 mm/A. The degree of agronomic development varies from the intensively developed, irrigated Culverden basin, to extensive dryland farming of the upper Fairlie basin. Other example areas include the Hakataramea valley.

Downlands and Foothills
L14 Southern Loess Mantled Soft Rock Hills and Downlands

Smooth, rounded, rolling to strongly rolling downland landscapes developed on loess mantled Cretaceous/Tertiary sedimentary and igneous strata, and early Pleistocene gravels, with minor associated terraces, floodplains and fans. Elevation ranges from 0 to 500m and rainfall from 600 to 1000mm/A. Example areas would include the Timaru Downlands and Green Hills areas.

L16 Southern Structural Soft Rock Hills

Prominent structurally controlled hill and valley landscapes underlain by Cretaceous tertiary calcareous sedimentary rocks, igneous strata, and minor associated Torlesse Group and low-grade schist rocks; structurally controlled hill slopes, e.g., cuestas and hogbacks, with pronounced dip and scarp slopes, and minor 'hard rock' hill slopes, and associated terraces, floodplains and fans. Elevation ranges from 50 to 500 m and rainfalls from less than 600 to 1000 mm/A. Example areas would include Waihao Downs. Livingstone and Limestone Valley areas.

L17 Loess Mantled Hard Rock Hills and Downlands

Smooth, rolling to strongly rolling to moderately steep downland landscapes developed on loess mantled hard Torlesse sedimentary rock, low grade schist, and minor igneous strata, with

associated minor terraces, floodplains and fans. Elevation ranges from 150 to 500 m, and rainfalls from less than 600 to 1000 mm/A. The land type incorporates the South Canterbury downlands adjacent to the Waitaki River, in the Kurow – Danseys Pass area and the Gawler Downs.

L22 Southern Hard Rock Hills and Mountain.

Strongly rolling to steep and very steep, moderately dissected, stable, lowland to upper montane, Torlesse sedimentary and low grade schist, hard rock hill and mountain country, with rock outcrop especially on ridge and spur crests and summits, and slight to moderate scree and sheet erosion on upper slopes. Elevation ranges from 250 to 1600 m (Mt Nessing) with the balance below 1300 m, and rainfalls from 800 to 1250 mm/A. Lower slopes are predominantly oversown and top dressed but with a high scrub component: matagouri, manuka, with some gorse and broom, mixed native scrub in gullies and around rock outcrops, and minor remnant native forest. Upper slopes are predominantly undeveloped short tussock grassland with snow tussock at higher elevations. South Canterbury hard rock foothill terrain, example area would include the Hunters Hills and the Albury Range, typically with Hurunui and Tengawai Steepland soils on eastern aspects at lower elevations, Meyer Hill and Omarama Steepland soils on north westerly aspects, and Kaikoura Steepland soils on the higher ridge crests and summits.

Front Ranges
H10 Southern Eastern Front Range

Steep to very steep, dissected, front mountain ranges fringing the upper plains in the southeast and rising to 2200 m; minor cirque glaciation, although with a distinctive periglacial imprint, extensive scree and bedrock outcrop especially at higher elevations; sharp crested and smooth flat-topped summits. Deep colluvium and moraine mantle moderately steep to steep rectilinear lower mountain slopes. Elevation ranges from 450 to 2200 m and rainfall between 1200 and 2000 mm/A. Snow tussock, subalpine scrub and alpine and rockfield vegetation features above 1100 to 1200 with an induced short tussock grassland and scrubland at lower elevations. Significant remnant forest cover is present only on the south easterly aspect. Example locations include Mt Hutt, Mt Peel and the Four Peaks Ranges.

Intermontane Ranges and Basins
H5 Small Intermontane Basins and Valleys

Intermediate sized intermontane basin and valleys with extensive gently sloping, alluvial fans, Terrace lands, floodplains and wetlands, and associated soft rock Tertiary and hard rock. Elevation ranges from 280 to 620 m and rainfall from 1000 to 1250 mm/A. The degree of agronomic development varies significantly from intensively developed mixed farming to extensive grazing. Example areas include the Hanmer basin and Lees valley.

Semi-Arid Ranges
H17 Semi-Arid to Humid Mountain Range

Steep to very steep, dissected, semi-arid (lower slopes), to subhumid (summits) mountain ranges and associated foothills, from 350 to 2000 m; largely non-glaciated although with a heavy periglacial imprint, extensive scree and rock outcrops especially at higher elevations and strongly rolling to rounded summits (>1500 m); moderately steep to steep broken, lower mountain and hill slopes with some broad rolling spurs, and minor river beds, and associated

terraces. Elevation ranges from 350 to 2000 m and rainfall between 480 and 1200 mm/A. Low elevation vegetation is highly modified, depleted, short tussock grassland with extensive hieracium, sweet briar, and matagouri scrub. Snow tussock, alpine, and rockfield vegetation occurs above 1000 m. The semi-arid to humid mountain range land type includes the Benmore, St Cuthbert, Kirkliston and Dalgety Ranges

Appendix 2: List of Figures

Figure 1: Study Area

Figure 2: Rural Character Areas

Figure 3: Land Parcel Size Analysis

Rural Character Area Maps

Figure 4: Orari Rural Character Area

Figure 5: Opuha Rural Character Area

Figure 6: Fairlie Rural Character Area

Figure 7: Raincliff Rural Character Area

Figure 8: Albury Range Rural Character Area

Figure 9: Tengawai Rural Character Area

Figure A: Soils

Figure B: Elevation

Figure C: Slope

Figure D: Landcover

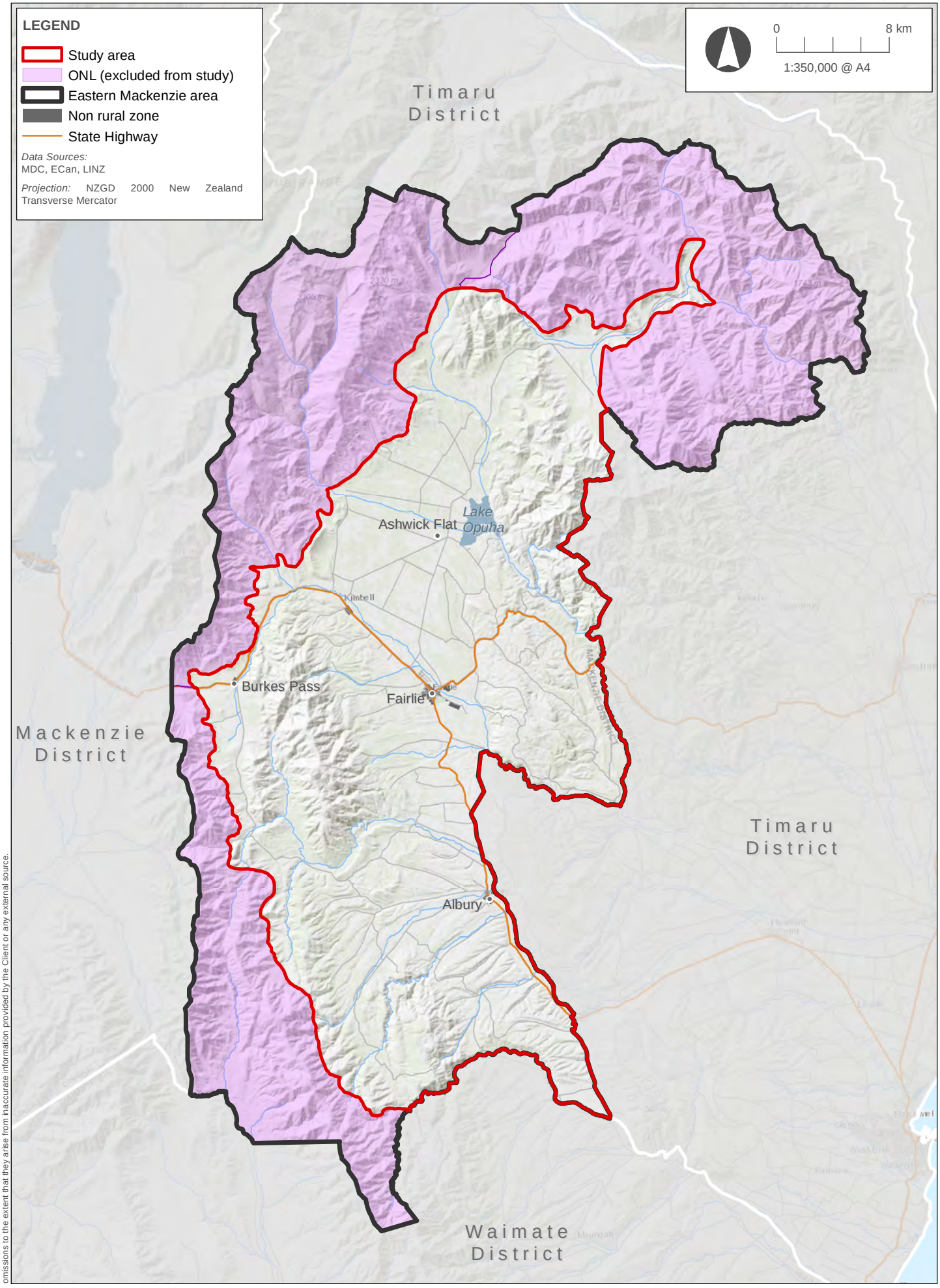
About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Whangarei, Auckland, Hamilton, Tauranga, Wellington, Nelson, Christchurch, Dunedin, and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural advisory, graphics and mapping. Over the past five decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.

www.boffamiskell.co.nz

Whangarei	**Auckland**	**Hamilton**	**Tauranga**	**Wellington**	**Nelson**	**Christchurch**	**Queenstown**	**Dunedin**
09 358 2526	09 358 2526	07 960 0006	07 571 5511	04 385 9315	03 548 8551	03 366 8891	03 441 1670	03 470 0460

File Ref: BM230132_001_A4P_StudyArea.mxd



Boffa Miskell
www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Study Area

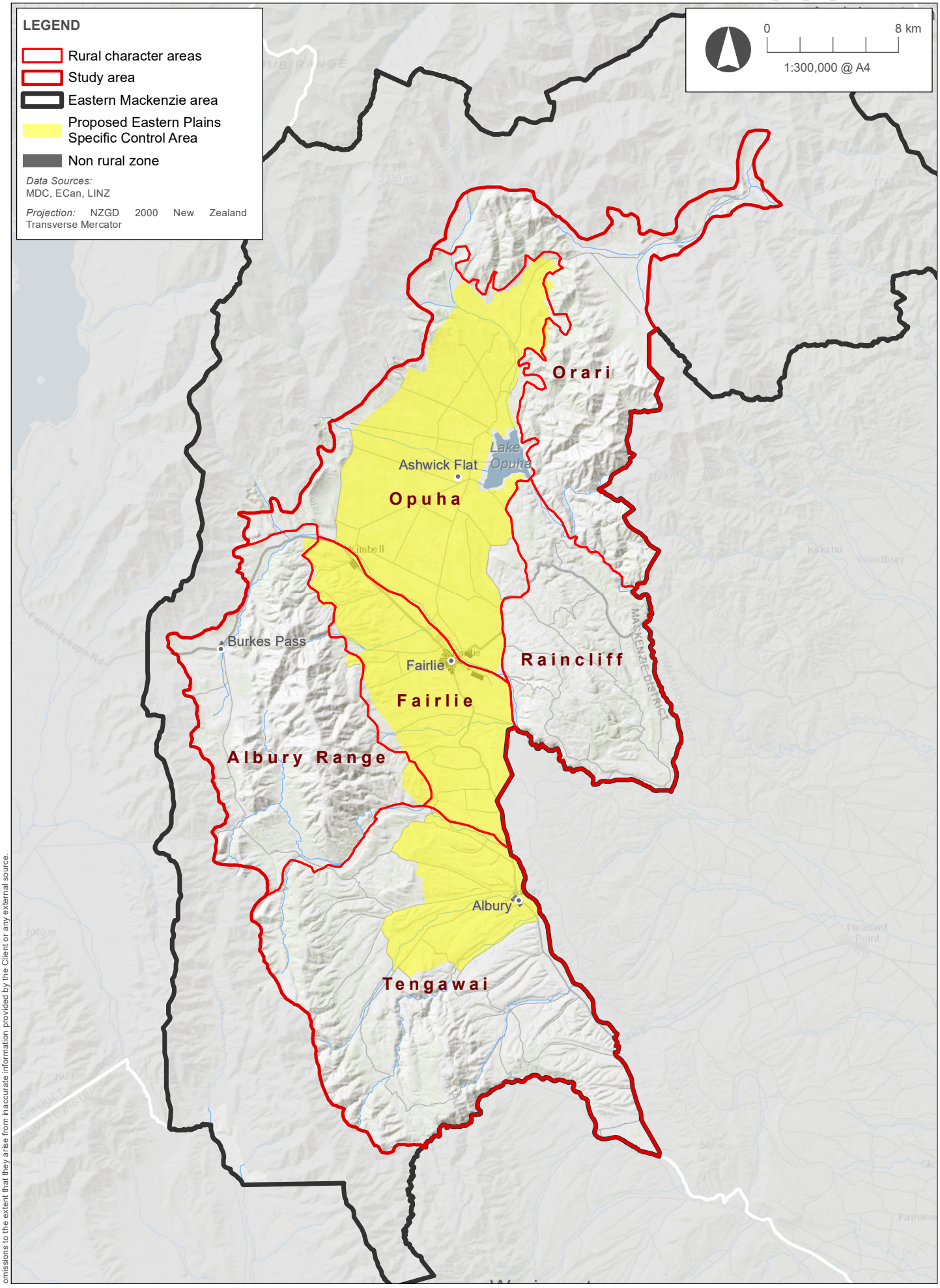
Date: 13 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 1

File Ref: BM230132_002a_A4P_CharacterAreas.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Rural Character Areas

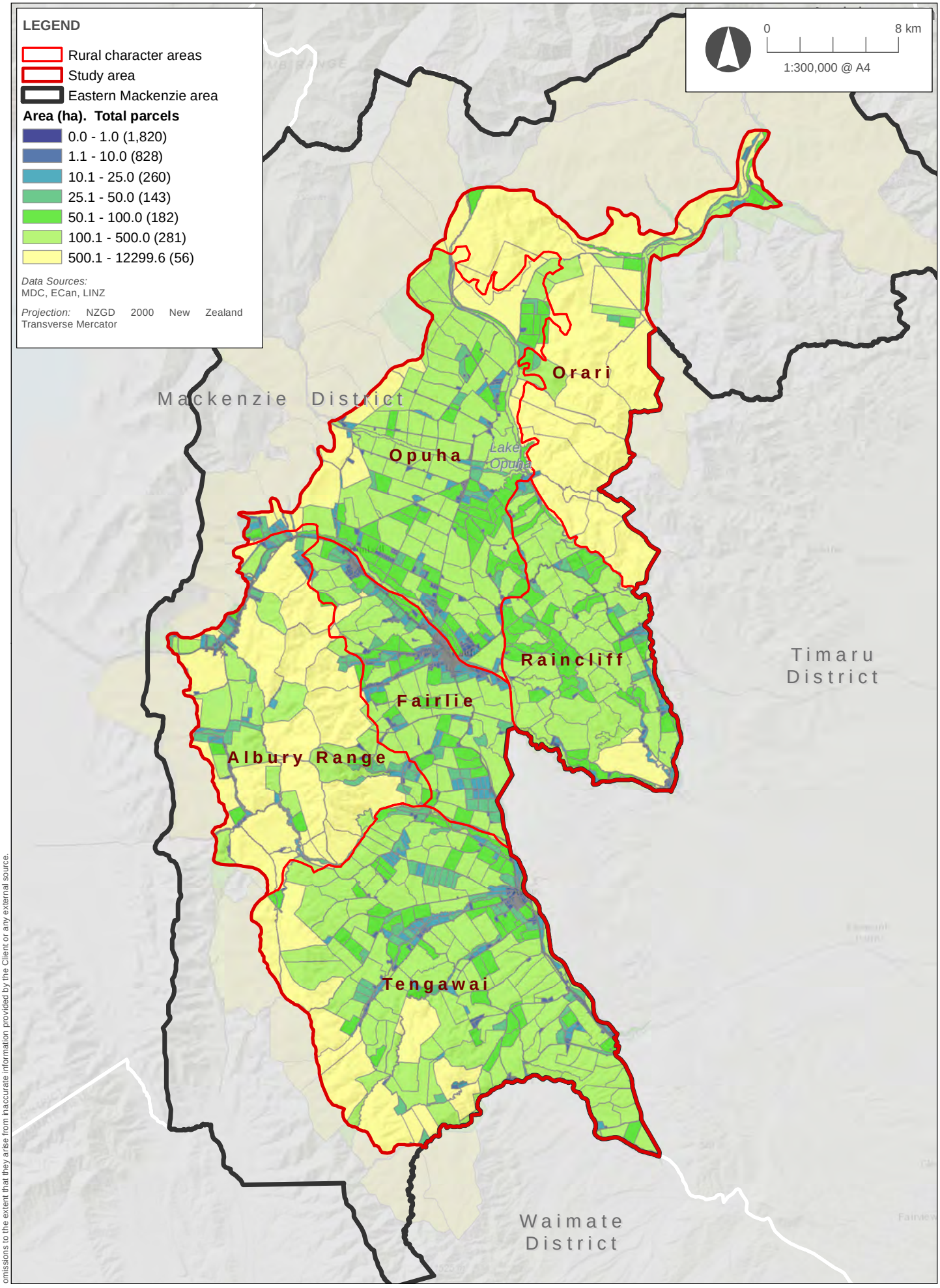
Date: 23 June 2023 | Revision: 2

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 2

File Ref: BM230132_003_A4P_LandParcel.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

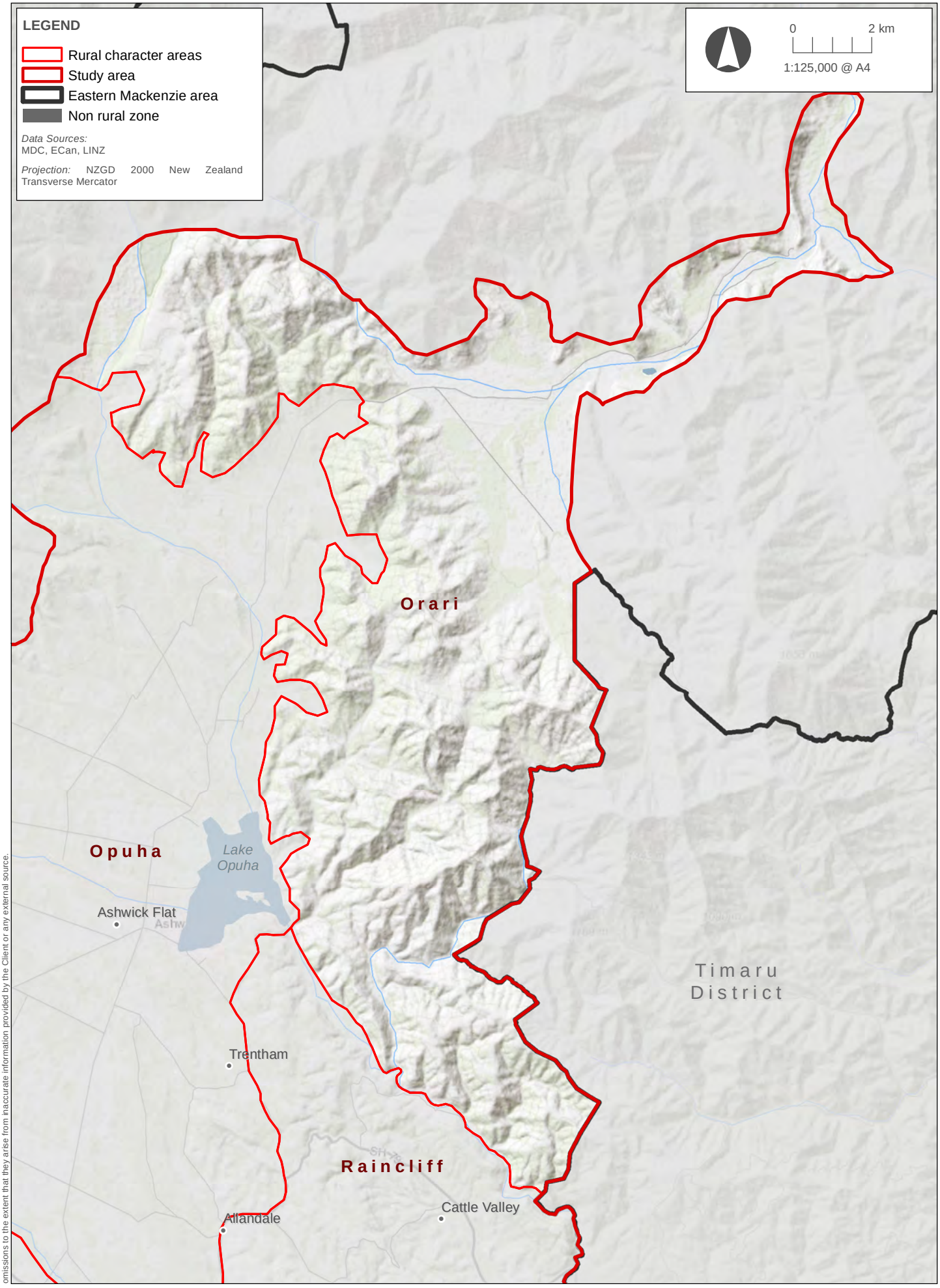
Land Parcel Size Analysis

Date: 12 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 3



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Orari Character Area

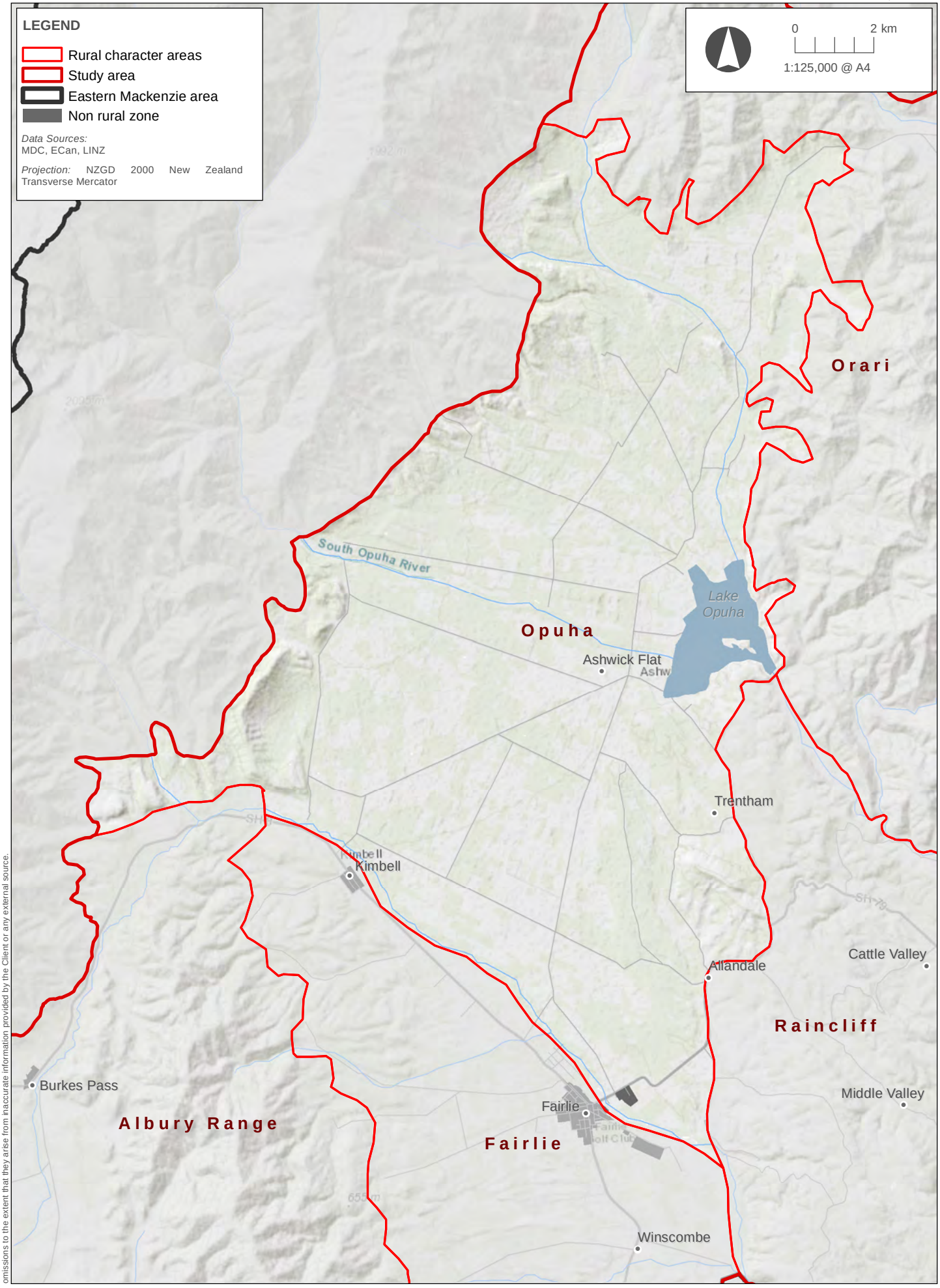
Date: 14 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 4

File Ref: BM230132_005_A4P_CharacterAreas_Opuha.mxd



Boffa Miskell
www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Opuha Character Area

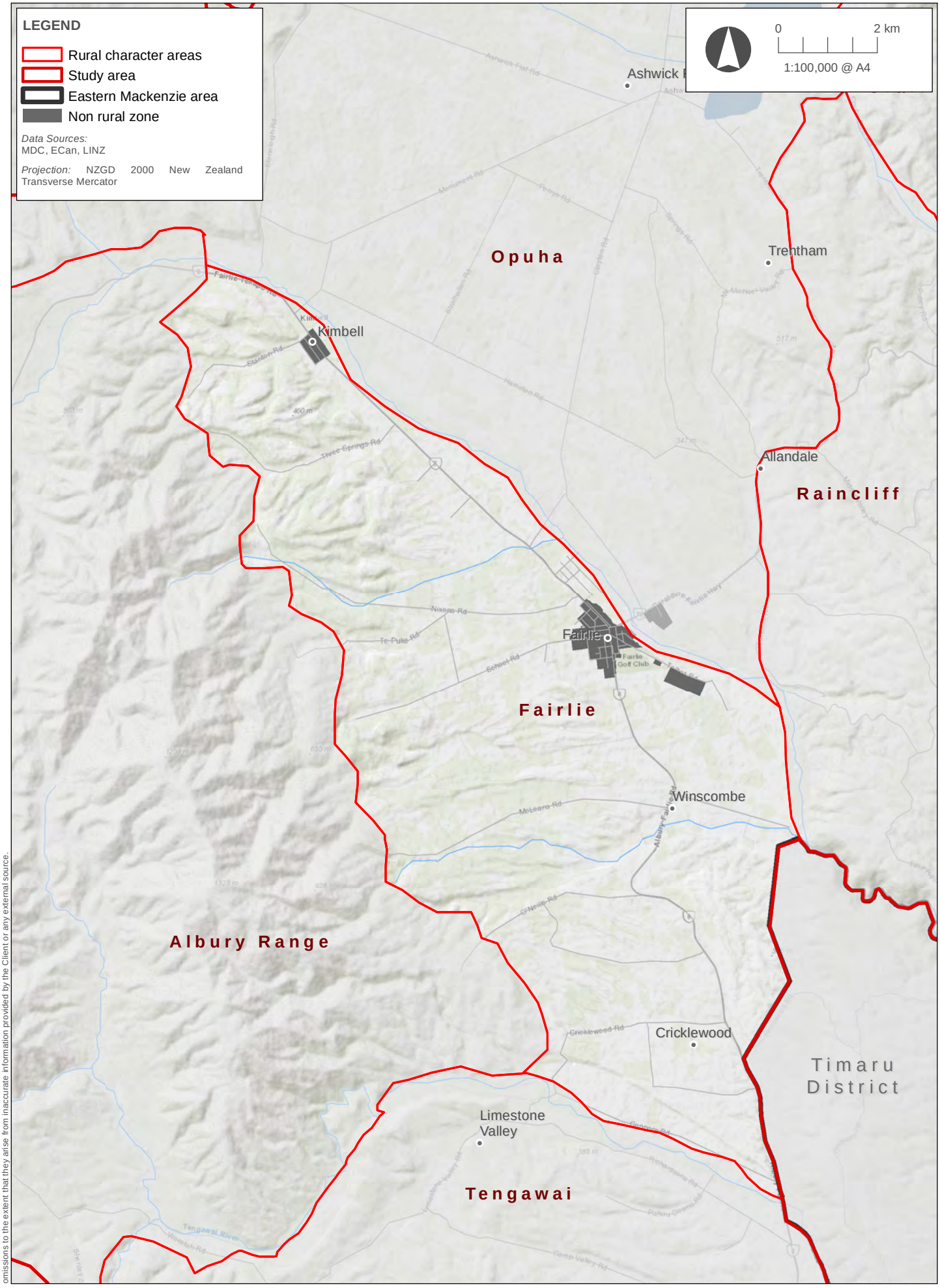
Date: 14 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 5

File Ref: BM230132_007_A4P_CharacterAreas_Fairlie.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Fairlie Character Area

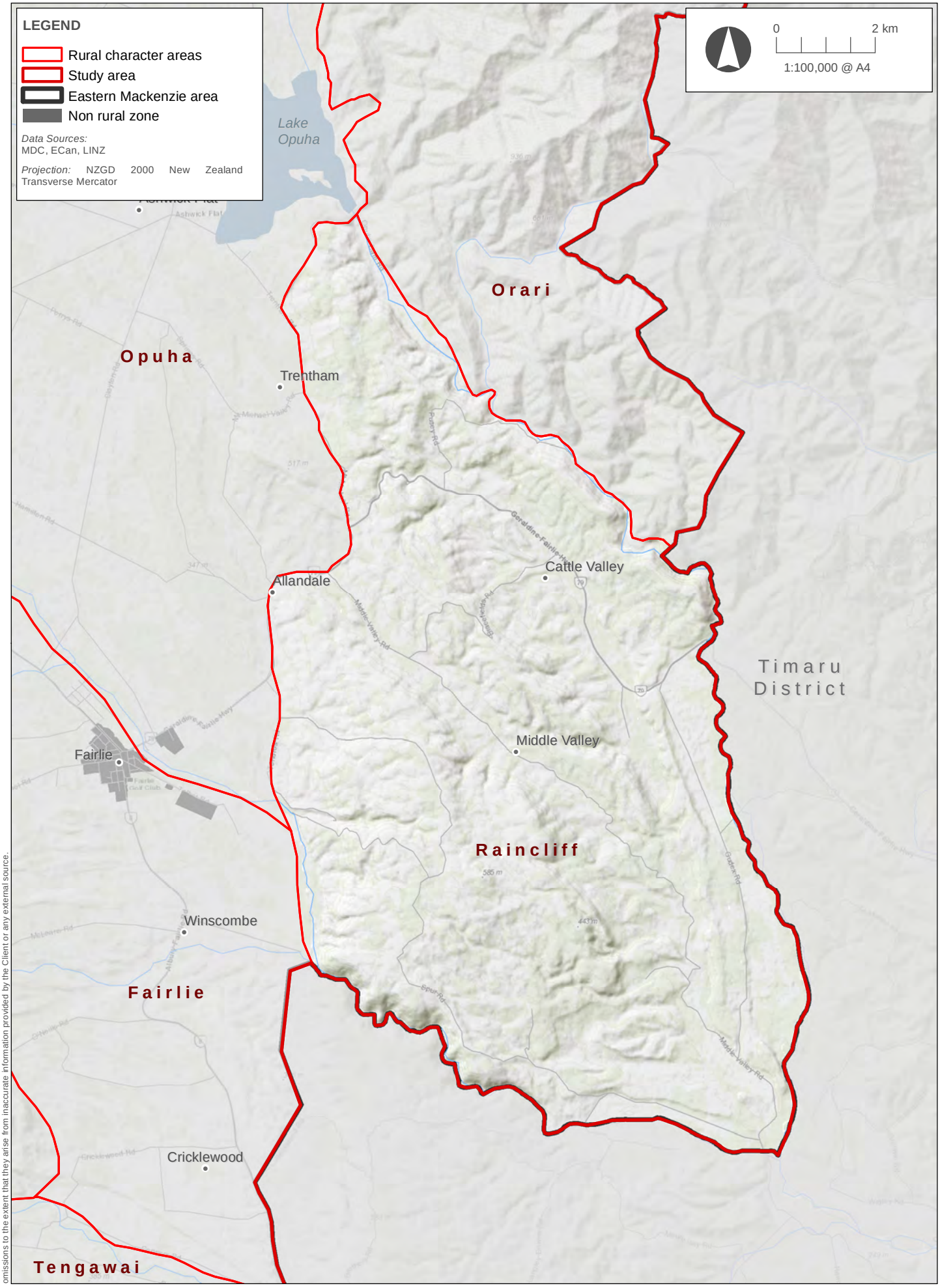
Date: 14 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 6

File Ref: BM230132_006_A4P_CharacterAreas_Raincliff.mxd



Boffa Miskell
www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Raincliff Character Area

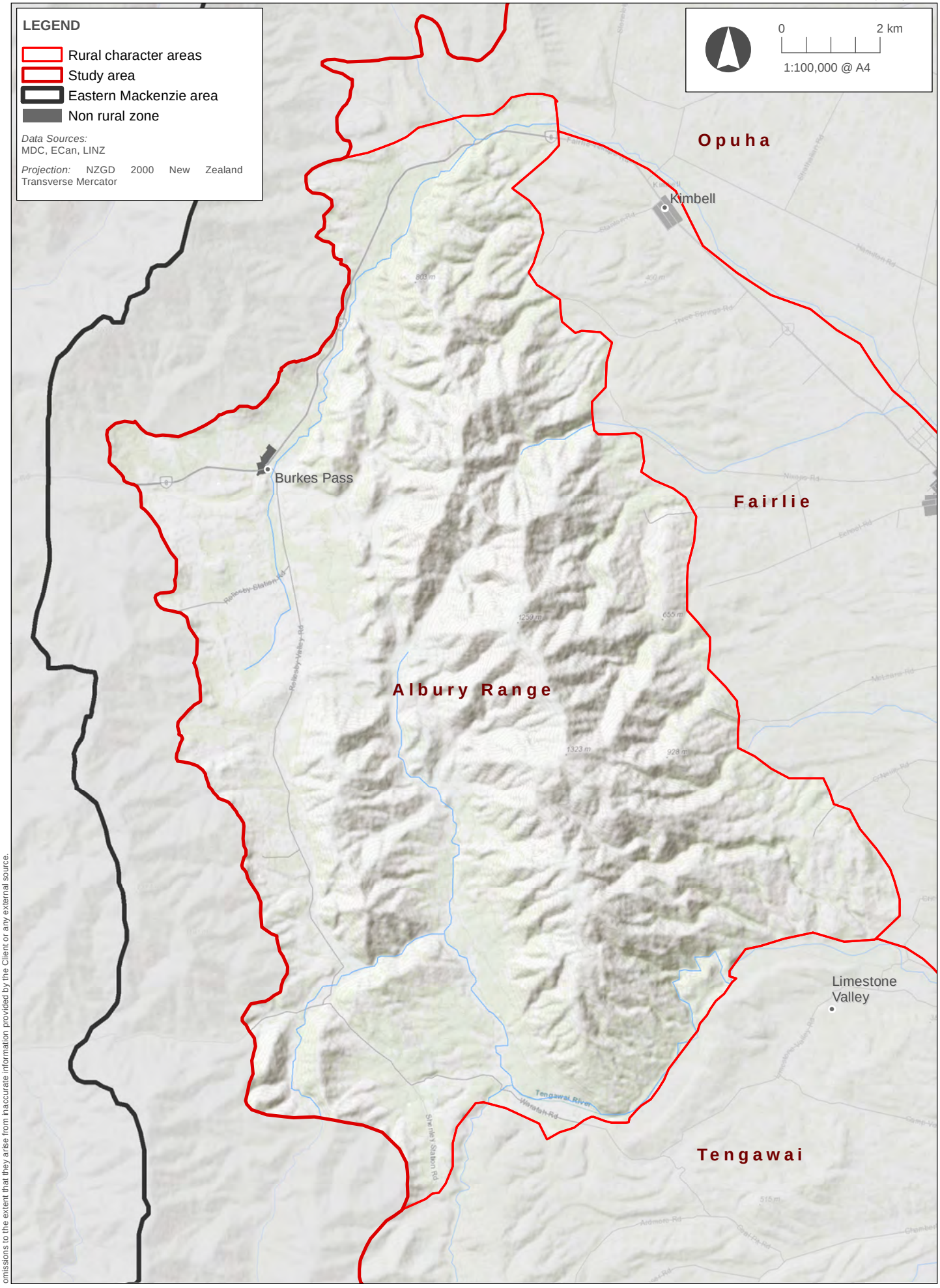
Date: 14 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 7

File Ref: BM230132_008_A4P_CharacterAreas_AlburyRange.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Albury Range Character Area

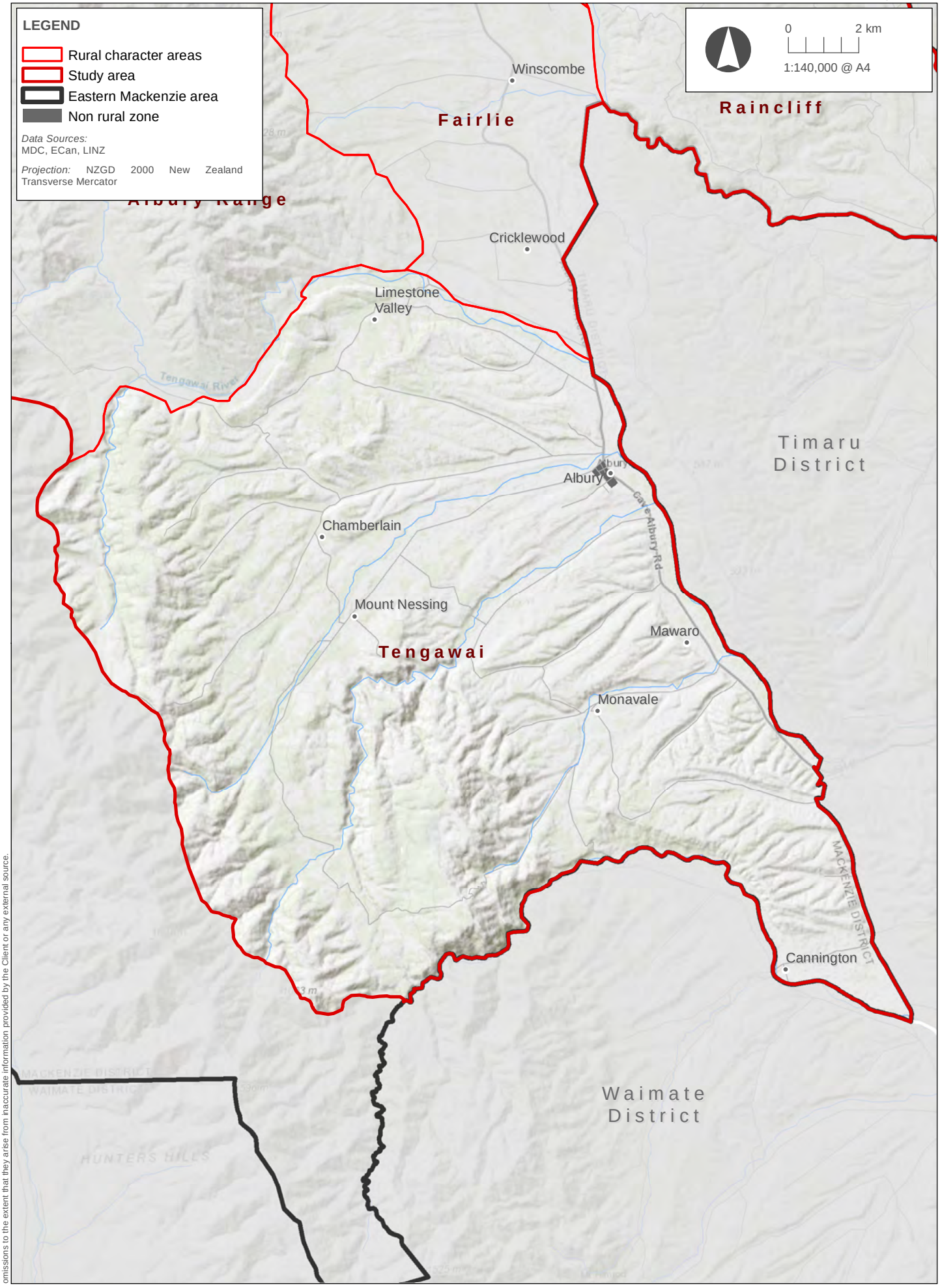
Date: 14 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 8

File Ref: BM230132_009_A4P_CharacterAreas_Tengawai.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

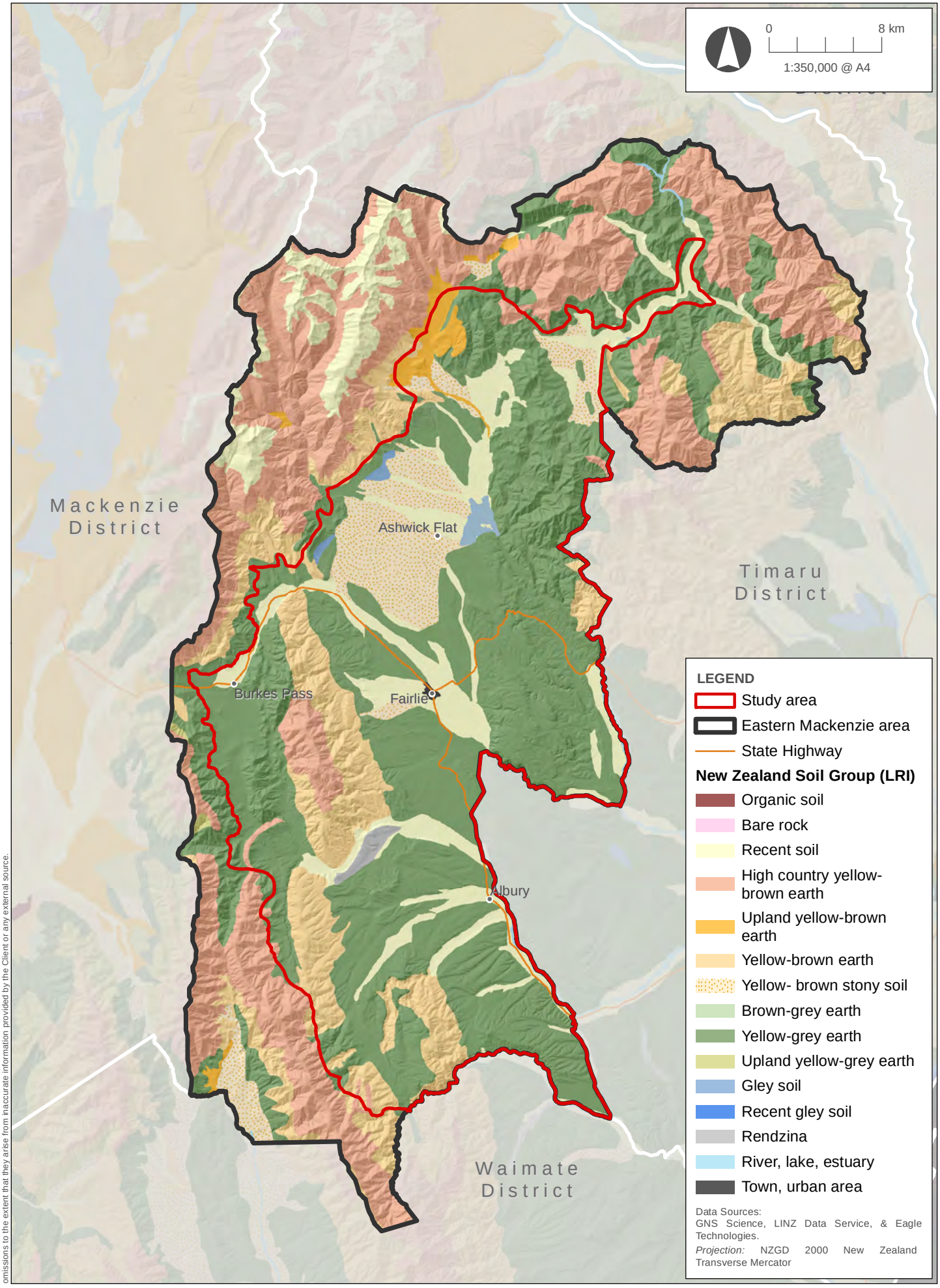
Tengawai Character Area

Date: 14 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfluge@boffamiskell.co.nz | Drawn: BMc | Checked: HWi

Figure 9



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Soils

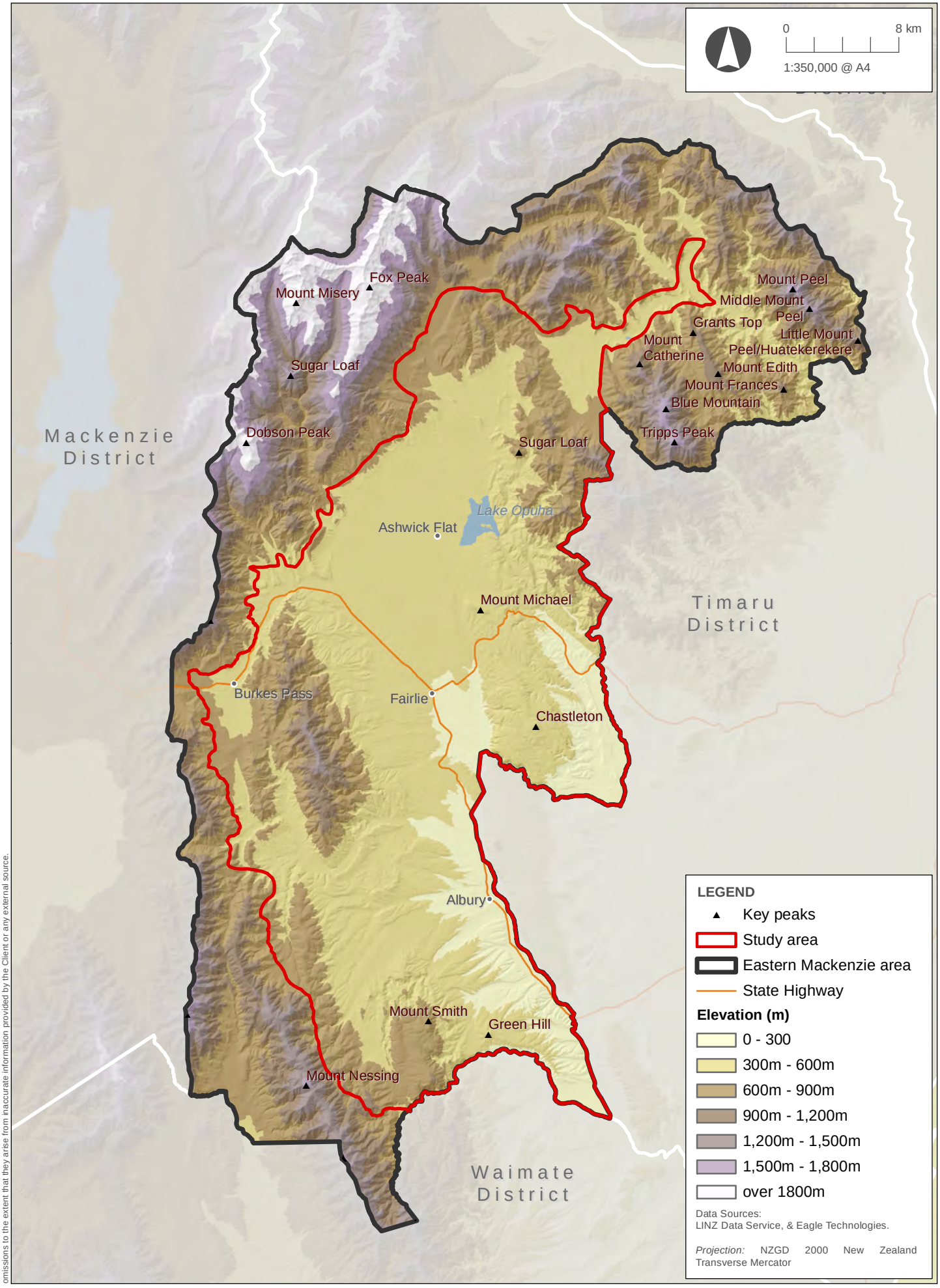
Date: 13 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure A

File Ref: BM230132_011_A4P_Elevation.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Elevation

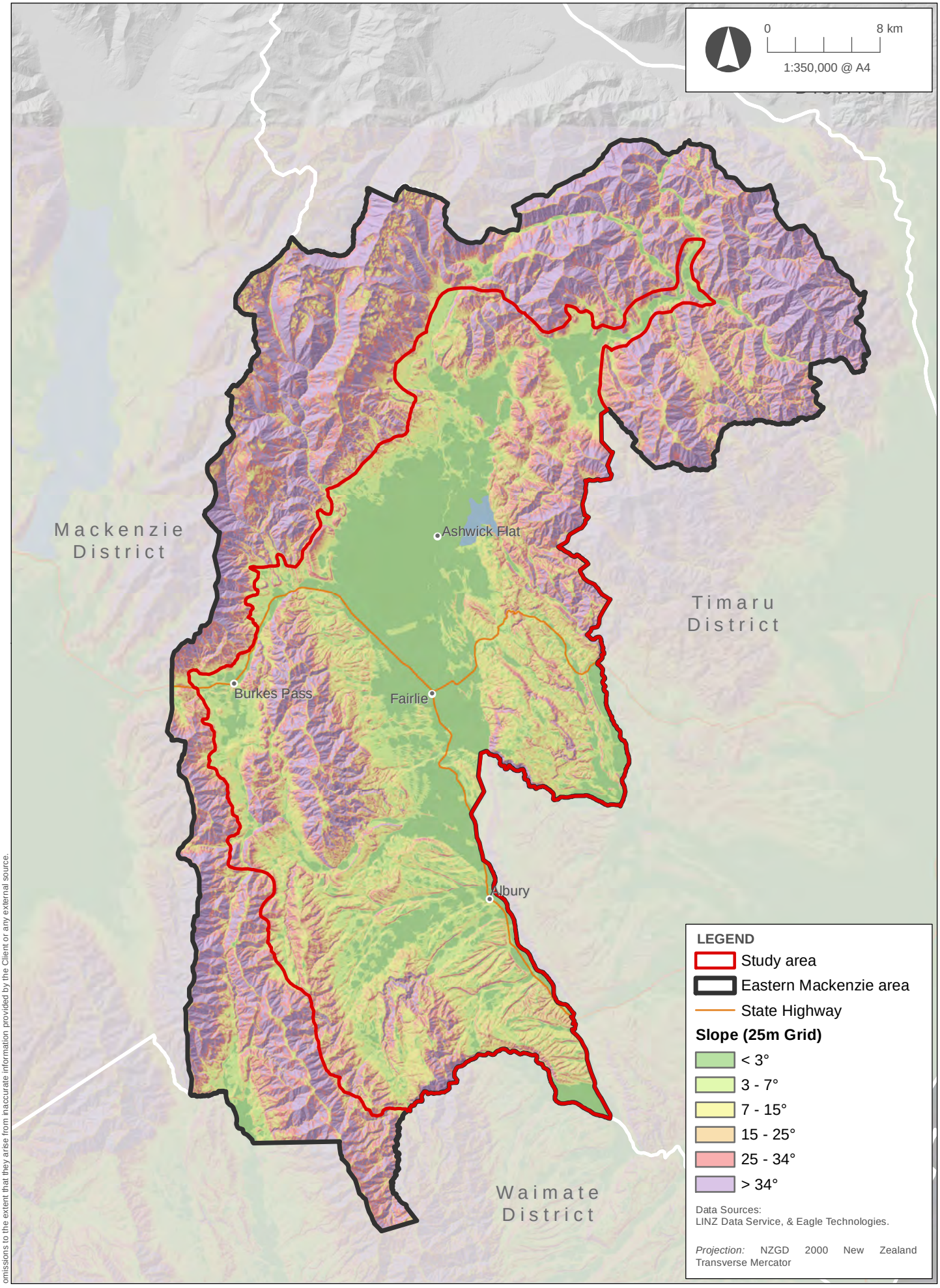
Date: 13 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure B

File Ref: BM230132_012_A4P_Slope.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Slope

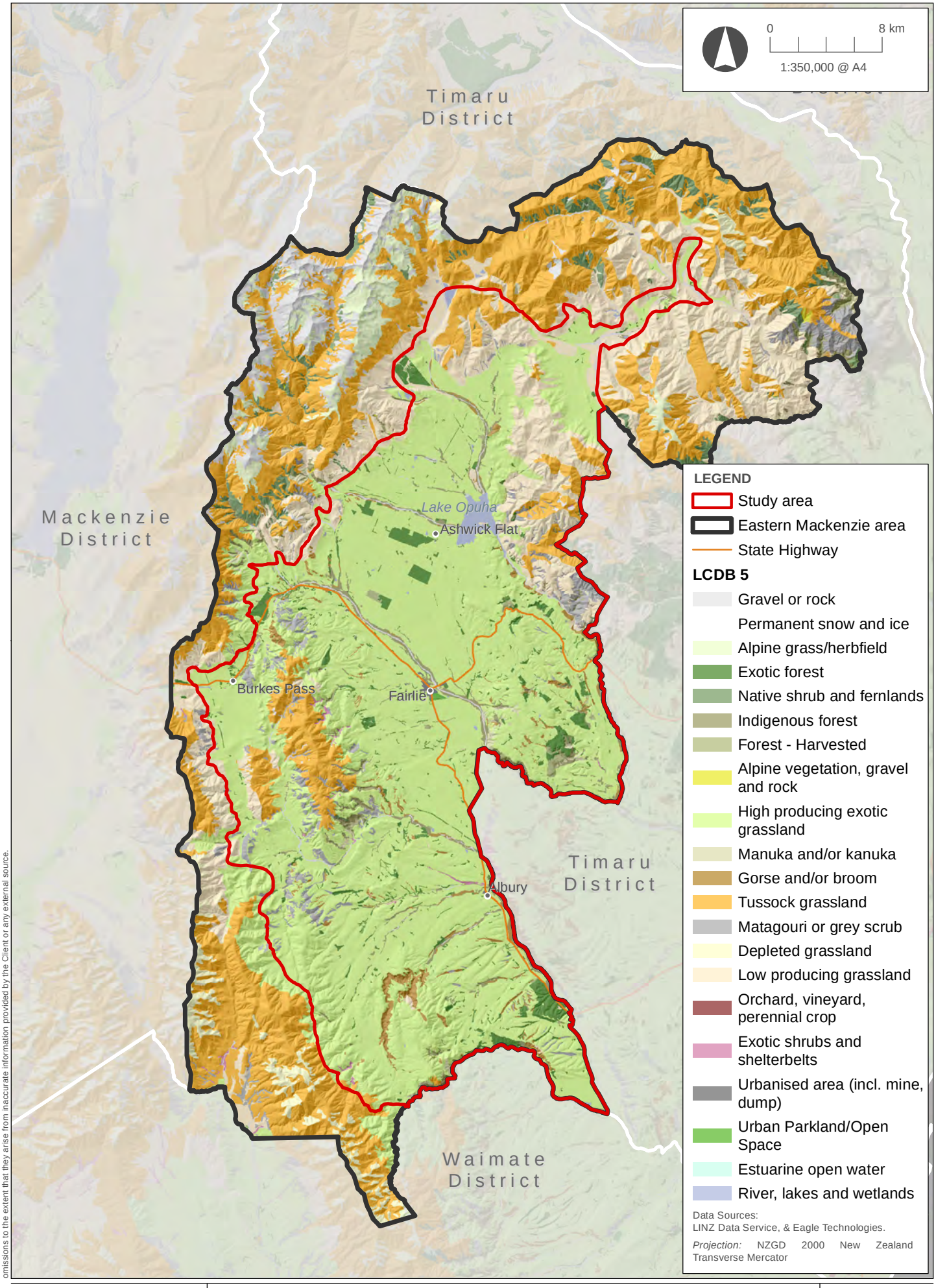
Date: 13 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure C

File Ref: BM230132_013_A4P_Landcover.mxd



Boffa Miskell

www.boffamiskell.co.nz

EASTERN MACKENZIE RURAL CHARACTER STUDY

Landcover

Date: 13 April 2023 | Revision: 0

Plan prepared for Mackenzie District Council by Boffa Miskell Limited

Project Manager: yvonne.pfuger@boffamiskell.co.nz | Drawn: HWi | Checked: YPf

Figure D

Appendix 4 – Post Harvest Wilding Conifer Management

POST HARVEST WILDING CONIFER MANAGEMENT

MACKENZIE DISTRICT PLAN

Mackenzie DISTRICT COUNCIL

Our Community. Our Place. Our Future.

TE MANAHUNA CONSULTING

An overview of the post-harvest wilding conifer issue developed for the Mackenzie District Council for future management of wilding conifer infested lands via the District Plan.

March 2023.

Attributions:

LINZ data - Property boundary and WCIS information displayed in this report sourced from the LINZ Data Service http://data.linz.govt.nz/ and licensed by LINZ for re-use under the Creative Commons Attribution 3.0 New Zealand licence.

Google Earth - Satellite images are provided by "Google Earth" and "Digital Globe". Each image displays the "Google Earth" logo and Digital Globe copyright".

First published: March 2023 by Te Manahuna Consulting.

Updated: October 2023.

Citate this document as: "Post Harvest Wilding Conifer Management – Mackenzie District Plan"; Rob Young; Te Manahuna Consulting; October 2023.

Te Manahuna Consulting

Cover Photos: Mount Cook Station - pre, during and post-harvest: R. Young and C. Miles

Contents

Figures iv

Photos iv

Maps iv

1 Executive Summary 1

2 Background 2

2.1 Introduction 2

2.2 Context - national and regional strategies and policies 3

2.3 History of wilding conifer management in the Mackenzie 4

2.4 Current wilding conifer management in the Mackenzie 4

3 Potential effects of wilding conifer invasion 6

3.1 Biodiversity values 6

3.2 Loss of productive farmland 7

3.3 Production forest 7

3.4 Landscape values 7

3.5 Water yields 7

3.6 Recreation 8

3.7 Tourism 8

3.8 Fire 8

3.9 Road icing 9

3.10 Line networks 9

4 Factors which influence the wilding conifer problem 10

5 Control methods for wildings 12

5.1 Active methods 12

5.2 Grazing 13

5.3 Resource use 13

6 Current regulatory controls for wilding conifer management in the Mackenzie District 14

6.1 Regional Pest Management Plan (RPMP) 14

6.2 Mackenzie District Plan 14

6.3 Crown Pastoral Land Act 2022 and Land Act 1948. 15

6.4 Summary of regulatory system 15

7 Removal of closed canopy wilding forests 16

8 Case study: Mount Cook Station 16
9 Global Consent 18
10 The District Plan 18
10.1 Background 18
10.1.1 Area affected by proposed provisions 18
10.2 Harvesting 20
10.3 Post management of the land after clearing dense/closed canopy forest for pastoral use 20
10.3.1 Agricultural conversion 20
10.3.2 Pastoral conversion 22
10.3.3 Fertiliser 22
10.3.4 Stocking rate 23
10.3.5 Fencing 25
10.4 Post management of the land after clearing wildings on public conservation land or Sites of Natural Significance 25
10.4.1 Topdressing 27
10.4.2 Stocking at a higher rate 27
10.4.3 Fencing 27
10.4.4 Feeding out 27
11 Conclusion 27
Maps 28
Appendices 36
Appendix 1: Conifers and spread risk 36
Appendix 2: Seed source type 36
Appendix 3: Density classes 37
Appendix 4: Control methods for wilding conifers 37
Appendix 6: Abbreviations used in this report 38
Bibliography 39

Figures

Figure 1: Wilding Conifer Management Strategic Planning 4

Photos

Photo 1: The Mackenzie Basin - the largest and least modified intermontane basin in NZ: Photo: R. Young.....1
Photo 2: Pinus contorta spread Pukaki Downs: Photo: R.Young.....3
Photo 3: Eighteen billion seeds per year - Ruataniwha Conservation Park at risk from the Pukaki seed source-. Photo: R. Young.....11
Photo 4: ABBA - Aerial basal bark application of herbicide by wand: Photo: DOC 12
Photo 5: Simons Pass conservation land which has been invaded by Pinus contorta from the Southern Ben Ohau seed source in the last 4-5 years post tenure review. 19
Photo 6: Post harvest at Mount Cook Station: Photo: C. Miles.....21
Photo 7: Rhoboro Downs and Pukaki Downs - Pinus contorta wilding forest with agricultural conversion of previous wilding conifer infested land in the foreground, and windrowed wildings behind ready for burning before conversion: Photo: R. Young. 21
Photo 8: Pastoral country after 70 years of the same OSTD regime: Photo: R. Young.....23
Photo 9: Mount Cook Station pastoral conversion post-harvest: Photo: C. Miles. 24
Photo 10: Simons Pass – pastoral land which has been direct drilled and grazed but retains the pastoral appearance with no wilding infestation: Photo: R. Young.....24
Photo 11: Pinus contorta spread from Reserve 4038 to the adjacent Pukaki Flats Conservation Area.....26

Maps

Map 1: South Island and location of MWCM Zone.....28
Map 2: Mackenzie Wilding Management Zone and MUs, (purple), and MDC boundary, (red), (MWCMS).....29
Map 3: Management Units of the NWCP and the six MUs within the Mackenzie Basin Subzone, (WCIS).....30
Map 4: Mackenzie Basin Subzone.....31
Map 5: Infestation density in 2016, (MDC boundary = red line), (MWCMS). 32
Map 6: Mackenzie Wilding Infestation in 2023 by % density, (WCIS) and remaining seed sources: (1) Southern Ben Ohau, (2) Irishman's /Wolds, (3) Mount Cook /Burnett, (4) Lake Takapō Regional Park, (5) Holbrook/Sawdon.....33
Map 7: NWCP MUs that could be used to define the consent zone in the District Plan, (WCIS).....34
Map 8: Wilding Control Overlays 35

1 Executive Summary

The Mackenzie Basin is an iconic landscape that touches the hearts of many New Zealanders and in particular the people who live amongst its “big skies” and vast landscapes. Over the last 35 years wilding conifers have come to dominate parts of these landscapes at an alarming rate.

These “space invaders” transform landscapes and have significant effects on a range of values in these high-country places which can negatively affect economic production, natural ecosystems, and recreation.

Between 2016 -2022 the National Wilding Conifer Programme had initiated management and control of wildings over more than 300,000ha in the Mackenzie. The control of these wildings has meant that in several locations there is a need for land use change.

This report backgrounds the wilding conifer issue in the Mackenzie and notes the barrier that the District Plan has become after Plan Change 13 to post wilding management.

In 2016 the Mackenzie Wilding Conifer Management Strategy noted that, *“These plans need to be enabling wherever possible to ensure post control and follow-up activities which are environmentally acceptable are not hindered by the planning framework.”*

The key issue with management of the wilding problem is the post removal control of regrowth and changing the land use in some cases to mitigate the effects and make the land productive again. The current District Plan is quite restrictive in terms of changing land use.

This report scopes the issues and suggests ways of allowing the regulatory environment to enable a smoother and less bureaucratic path for returning these lands to productive use.

Photo 1: The Mackenzie Basin - the largest and least modified intermontane basin in NZ: Photo: R. Young.

:

2 Background

2.1 Introduction

The Mackenzie Basin is an iconic landscape that touches the hearts of many New Zealanders and in particular the people who live amongst its "big skies" and vast landscapes. Over the last 35 years wilding conifers have come to dominate parts of these landscapes at an alarming rate.

Over the years the seriousness of the wilding conifer invasion in the South Island High Country has been described in many reports, but only garnered real attention at a national level in the last 15 years.

The national strategy document "The Right Tree in the Right Place - New Zealand Wilding Conifer Management Strategy", (MPI, 2014), was produced in 2014, and outlined the alarming rate at which these pest weeds are invading New Zealand's land mass – another 90,000 hectares per year or 5 per cent per annum.

By 2016 the Mackenzie had become a prime example of this rapid invasion by these "space invaders" with nearly 130,000 hectares (or 24 per cent) of the Mackenzie Wilding Conifer Management Zone affected.

The national strategy became the foundation for the National Wilding Conifer Programme and its operational plan. The National Wilding Conifer Programme, (NWCP), was established in 2016 with ongoing Crown funding for several years. This was based on a nationwide operational plan with Management Units, (MUs), across all the affected areas in New Zealand. In Canterbury the NWCP is divided into 14 MUs of which six are within or part of the Mackenzie District, (refer to Map 3: Management Units of the NWCP and the six MUs within the Mackenzie Basin Subzone, (WCIS).

Around the same time the Mackenzie Wilding Conifer Management Strategy, (MWCMS), (Young, 2016), was prepared as a basis for coordinating the removal and management of wilding conifers in the "Mackenzie Basin". The strategy was based on a series of 23 Management Units and 4 Sub Zones which were used to enable prioritisation between large but similar affected areas of land against each other. The overriding goal of this MWCMS was to remove, contain and manage the spread of wilding conifers in the Mackenzie Basin across all land tenures within this strategy area.

The area which was covered by the MWCM Strategy, (535,305 ha), is referred to as the Mackenzie Wilding Conifer Management Zone (MWCM), and is defined in Map 1 **Error! Reference source not found.**and Map 2. This overview covers most of that zone, specifically the part that lies in the Mackenzie District that is the "Mackenzie Basin". More specifically the Mackenzie Basin Subzone which is the statutory basis for the District Plan and referenced as Planning Map 61, (refer to Map 4: Mackenzie Basin Subzone).

This overview includes all wilding conifer species. It excludes any other weed tree species, that are not part of the New Zealand Wilding Conifer Management Strategy.

Photo 2: Pinus contorta spread Pukaki Downs: Photo: R.Young.

2.2 Context - national and regional strategies and policies

This overview has been prepared within the context of the New Zealand Wilding Conifer Management Strategy, (NZWCMS), (MPI, 2014), the Canterbury Regional Pest Management Plan 2018-2038, (CRPMP), the Mackenzie District Plan, the Mackenzie Wilding Conifer Management Strategy and the National Wilding Conifer Programme. The NZWCMS was produced in 2014 and contains strategic objectives to ensure clarity of roles of landholders and managers, fair and efficient funding, prioritisation of control and coordination and collaboration across organisations and landholders when implementing control. The MWCMS is a non-statutory strategy focused on the Mackenzie Basin and prepared in 2016 for ECAN and the Mackenzie District Council, (MDC). Conceptually, the hierarchy and relationship of these strategic and planning documents is illustrated in Figure 1: Wilding Conifer Management Strategic Planning.

This overview includes the mapping information from both the MWCMS, (completed in 2016), and the more recent mapping completed as part of the NWCP.

The role for the Mackenzie District Council was identified in the MWCMS as outlined below, (adapted from the NZWCMS):

i. contribute to the management of legacy infestations on the basis of the public benefit to local communities;
ii. establish appropriate rules in district plans to ensure that land occupiers are undertaking their roles as outlined below;
iii. remove wilding conifer source plantings and spread on land administered by the Council;
iv. promote awareness and support community initiatives.

This report is a part of fulfilling the role outlined in item ii.

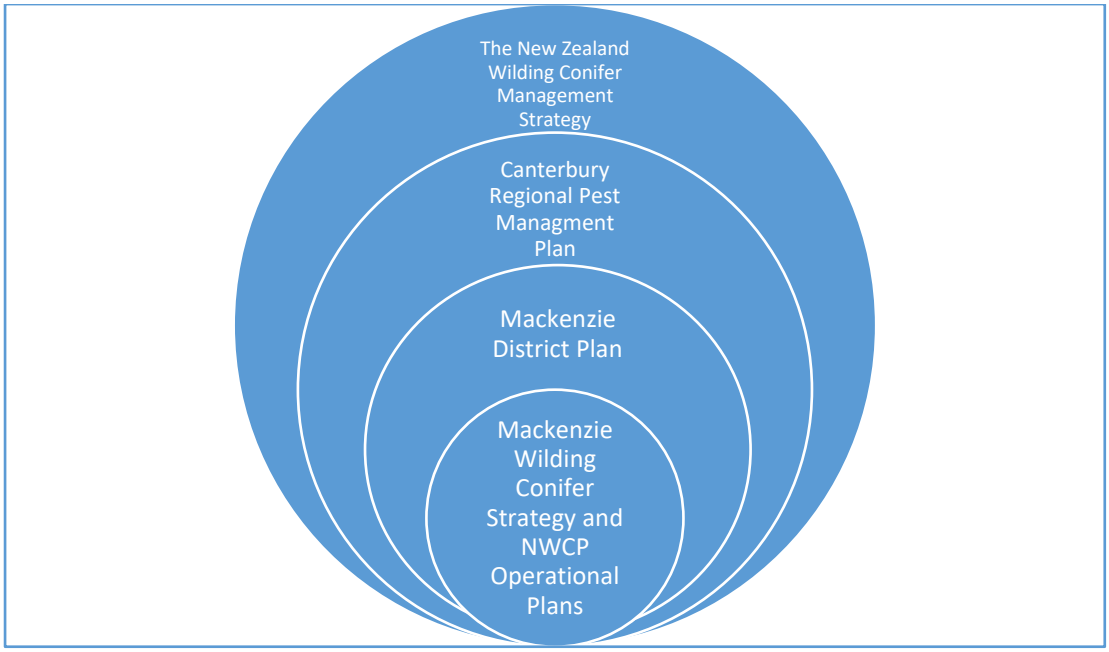


Figure 1: Wilding Conifer Management Strategic Planning

2.3 History of wilding conifer management in the Mackenzie

Most landholders in the Mackenzie have been controlling wilding conifers for at least 15-20 years and in some cases up to 50 years prior to 2016 when the NWCP started.

In 2016, 24 per cent (more than 129,000ha) of the MWCM Zone was affected by wilding conifer spread that required significant effort to control.

The Department of Conservation had been actively controlling wilding conifers since the early 1990's in places like the Kirkliston Conservation Area. With the addition of tenure review and retirement lands this DOC programme had expanded to an annual spend of $500,000 per annum in 2013/14.

In 2016, private landholders were spending over $880,000 per annum on wilding control (averaged over the previous five years) and nearly 1200 person days per annum of time to control wildings valued at $480,000, equating to a total of $1,360,000 per annum.

All agencies were committed to programmes of wilding control in 2016 and were spending around $700,000 per annum in total. This meant the combined total of the expenditure on wilding management was just over $2,000,000, prior to the NWCP being initiated.

2.4 Current wilding conifer management in the Mackenzie

Wilding management has been undertaken in the Mackenzie for the last six years with significant funding from the NWCP. Between 2016-2022 $30M[1] has been spent on wilding

[1] Source WCIS

conifer control in the six MUs that are part of the Mackenzie Basin. This has resulted in a a reduction in the scale of the wilding problem, with control occurring on over 300,000ha[2] across the Mackenzie District.

There are seven major seed sources that affect the Mackenzie Basin. Of the five within the Mackenzie Basin Subzone[3], one has been reduced in size significantly but the other four are still significant seed sources. Refer to Map 6. The five remaining in the subzone are:

- Southern Ben Ohau – this is the largest seed source in the Mackenzie and is principally *Pinus contorta*. It includes parts of Pukaki Downs, Rhoboro, Aoraki Downs, Ferintosh, Crown Land on the Lake Pukaki lakeshore, parts of Ruataniwha Conservation Park, the four lifestyle blocks at the southeast corner of Lake Pukaki, Meridian core land around the Pukaki Dam and canal and Reserve 4038, vested and managed by the Mackenzie District Council. The removal of this seed source is not likely to be completed in the short term.
- Mount Cook / Braemar – this is the second largest seed source in the Mackenzie and includes parts of Mount Cook Station and the Braemar Conservation Area. This is largely *Pinus nigra* and *Larix decidua* or larch. Again, the removal of this seed source not likely to be completed in the short term.
- Wolds/ Irishman's - this is a smaller seed source but is largely *Pinus contorta* situated between the Tekapo Canal and SH8 west of Mt. Mary. It is largely on conservation land that resulted from tenure reviews of the Wolds and Irishman's Creek stations. It has been significantly reduced in size in the last six years but is still not eliminated.
- Holbrook/ Sawdon –this seed source is in the southern Two Thumb Range on Holbrook and Sawdon stations, within the Sawdon Stream catchment. This seed source which is mostly *Pinus contorta* should be removed within a couple of years.
- Lake Takapō Regional Park – managed by Environment Canterbury this seed source is located at the southeast corner of Lake Takapō. It is mature stand of many of the high-risk spreading species including *Pinus contorta*. The progressive removal of the mature high-risk trees is currently being planned and will start in 2023.

The other two significant seed sources lie outside of the Mackenzie Basin Subzone, but seed spread from them has continued to affect the Mackenzie. One is to the north in the headwaters of the Opuha which is now removed but spread seed into the Mackenzie under easterly conditions. Legacy seed spread and seedbanks are still potential sources for surrounding lands. The other is to the south of the Ohau River and has only been partially removed and spreads seed into the Mackenzie in a southerly wind. Both seed sources included mature *Pinus contorta*.

At a wider scale both pre coning and coning wildings have been removed from many other parts of the Mackenzie Basin. But there are still many small plots and shelterbelts which probably contain mature high risk spreading species and need methodically checking.

[2] Source WCIS
[3] Mackenzie Basin Subzone is a planning zone detailed in the Mackenzie District Plan. See Map 4.

Despite this six-year programme wilding conifers continue to be problematic across the Mackenzie. As at March 2023 this programme has not achieved the level of reduction across any of the NWCP MUs to allow a 100 per cent transition back to the landholders of any of these MUs in the Mackenzie District. However, parts of the two eastern MUs, (Godley and Takapō East), may feasibly transition out of the programme in the next 12-24 months.

Now, funding has now been scaled back to a much lesser amount for the next 7 years, unless the Government increases the baseline funding for wilding control on a national basis. The result of this decreased funding is likely to see an increase in wilding spread and reinvasion across areas of the Mackenzie where maintenance programmes cannot be maintained, and removal of seeding conifers and these significant seed sources is not complete or continued at a scale that significantly reduces the problem.

The next phase of the NWCP is to identify any of the lands that have been treated to an extent where they can be handed back to landholders for ongoing management at no cost to the Crown. This "transition process" is currently being developed. This is likely to be done on a property-by-property basis but based on a series of criteria which assesses the status of the wilding conifer issue and the scale of funding required to manage it.

3 Potential effects of wilding conifer invasion

3.1 Biodiversity values

The Mackenzie Basin supports the highest density and area of naturally rare ecosystems of any region in New Zealand of a similar size. The remaining native ecosystems, all on low lying glacial landforms are almost entirely comprised of six naturally rare ecosystems including braided rivers, moraines, ephemeral wetlands, inland sand dunes, leached terraces and outwash gravels. These ecosystems are all "Threatened Naturally Uncommon Ecosystems" with threat statuses ranging from Vulnerable to Critically Endangered. They are internationally distinctive, and they support at least 6 per cent (68 species) of New Zealand's nationally threatened and at-risk plant species, threatened endemic birds (like Kakī /black stilt and wrybill), reptiles, invertebrates and freshwater fish. Many of these species are endemic to the Mackenzie[4].

Loss of these ecosystems and whole habitats, extinction of species and transformation to a dense canopy of wilding conifers is the long-term potential outcome from uncontrolled wilding conifer invasion. The paper "Wilding conifer control: how important is it relative to other conservation actions?" (Stephens, 2003) and (Science and Research Unit, Department of Conservation, 2001), noted that the importance of wilding conifer control relative to other conservation actions varies with ecological context. The report notes that "In eastern dryland environments such as occur in the Mackenzie, wilding conifers have both substantial opportunities to spread and the potential to change the natural composition, structure, and function of native communities and to alter the course of natural succession from grasslands

[4] Pers. comms. Susan Walker.

back to woody shrubland vegetation at the landscape scale." As a result, wilding conifer control was ranked as the most important conservation programme within the Twizel Area[5].

3.2 Loss of productive farmland

In the expansive dry grasslands of the eastern South Island wilding conifer spread tends to mostly affect the "unimproved" grasslands which are managed using low levels of stocking. On the intensively farmed areas of the high-country stations wilding conifer invasion is usually not a problem. On other lands particularly where there is heavy seed rain from neighbouring large seed sources the control of wilding conifers is often hard to justify on an economic basis given the marginal value of the land for grazing. This has led some landowners and occupiers to leave the wilding conifers, which then spread further affecting other adjacent farmland and public lands.

3.3 Production forest

In some situations, wilding conifer spread can affect production forests. Allowing progression of these seedlings to coning age would eventually lead to an increasing number of wildings competing with the planted trees and higher harvesting cost. Establishing a production forest on land invaded by wilding conifers is likely to be more complex as wildings must be removed before the new forest species can be established.

3.4 Landscape values

Exotic conifer spread is seen by many people as a threat to the landscape values of the Mackenzie Basin. These naturally treeless landscapes famous for their golden-brown hues, wide open spaces and views to the Southern Alps are completely altered once the spread reaches the moderate to dense canopy stages. These landscape values are recognised in the Mackenzie District Plan through zoning with the entire Mackenzie Basin being identified as an Outstanding Natural Landscape and the establishment of Lakeside Protection Areas.

3.5 Water yields

The establishment of forest species in dryland grasslands has been shown to reduce water yield and reduce surface run off and stream flow. Data from several New Zealand catchment studies where pasture has been replaced by radiata pine forest has shown there was a reduction in annual surface water yields of 30-81 per cent. The upper end of the range was observed in the dry South Island sites (Davie & Foley, 2004).

Reduction in water yields clearly reduces the availability of water for productive uses such as irrigation, stock water and hydro power and non-consumptive uses such as recreation, general amenity and ecological functioning.

[5] Twizel Area of the Department of Conservation.

The Waitaki produces 30 per cent of New Zealand's electricity. Water yield reductions due to the continued expansion of wilding trees will have a significant impact on the ability of Meridian and Genesis to maintain current capacity. Continued expansion and thickening up of wilding conifer stands if left uncontained will have a significant impact on this industry if the changes are of the order of 30-81 per cent as outlined above.

Reduction in water yields can have significant effects on wetland ecosystems such as causing the loss of plant species and on habitats for both native fish and trout.

3.6 Recreation

Recreational opportunities can both be negatively and positively affected by the presence of wilding conifers. In the treeless landscapes of the Mackenzie the shade offered by trees is often a welcome attribute in the middle of summer for active recreationalists. However, a closed canopy wilding conifer forest dramatically alters the recreation experience. Much of this closed canopy forest is impossible to walk through or access other areas with tree stems less than 20cm apart.

3.7 Tourism

Tourism is also similarly a two-edged sword. Landscapes are often perceived in different ways by different people. To some, the treeless wide-open landscapes are what attracts and brings them to this place. Others contend that they value the more North American look of the conifer forested landscape. This is an issue which is about personal perception but for many New Zealanders the golden hues and wide-open landscapes are an iconic part of the New Zealand identity.

The dry eastern South Island grassland landscapes are something that features in much of New Zealand's international tourism promotion and are a significant part of the attraction of the area for all tourists including the unobstructed views to the Southern Alps.

Many of the other values affected by wilding conifer spread are also key elements of the tourism experience for both domestic and international tourists. These values include recreational access, fishing, water quality and quantity.

3.8 Fire

Wildfires in wilding conifer forests pose a significant risk to both life and property. Conifer wildfires produce significantly more heat and can move very rapidly in the dry eastern South Island. In 2008 a fire which started in the wilding conifer forest at Mount Cook Station reached extreme fire intensities, travelled 3.5km in 12 hours, and fire embers were being carried up to 1.5km in front of the fire front. This fire exhibited extreme fire behaviour at times and threatened properties downwind of it. Since then, two significant wildfires in the Mackenzie which ended up in wilding forests have resulted in both property and biodiversity losses.

In the Pukaki wilding forest where closed canopy *Pinus contorta* forest has established and at Manuka Terrace where wildings are at moderate density there is a significant threat to both the dwellings and people in the event of a wildfire. The risks associated with fire continue to increase as the wilding spread continues to expand and thickens up and the effects of climate change become more apparent.

3.9 Road icing

Waka Kotahi is concerned about the presence of wilding conifers on the roadside berms and undertakes a control programme along the 160 km of highway system within the Mackenzie[6]. The visibility reduction for drivers and the shading effect of conifers causing icing on the highway are the main concerns.

3.10 Line networks

Wilding conifers are also a management and cost issue for transmission line companies. Wildfires often interrupt the transmission of power and from time-to-time power companies must clear the conifers from under the powerlines. As standing trees and once cleared they are a fire risk with an obvious ignition source.

[6] Pers. Comms: J. Keenan, Waka Kotahi

4 Factors which influence the wilding conifer problem

There are several factors which influence the wilding conifer problem in the Mackenzie. The main factors in the Mackenzie are:

- Wilding conifers establish easily and grow rapidly in both the natural and exotic grasslands of the Mackenzie. Prior to human occupation the ecosystems of the Mackenzie had evolved to a much woodier plant dominated vegetation cover. Wilding conifers now appear to be filling this niche. In much of their original environments' herbivores such as elk and deer control the conifer seedlings and regeneration. In some environments natural fires have also been a key part of their evolution. As well, natural pathogens can affect their survival and growth.
- There is a significant difference in the ability of different species of wilding conifer to establish and spread in this environment. They all differ in the amount of seed produced per tree, seed size and weight, ability to remain viable both in the cone and after release. These are all characteristics which give each species differing advantages in terms of seedling establishment. *Pinus contorta* is a much more evolved and aggressive species in terms of seedling establishment and spread rate[7] than the other species and can reach coning age much earlier, in many cases within 3-4 years, (Owens, 2006)
- The surrounding land management is a significant factor in determining initial seedling establishment. Natural grasslands, shrublands and mixtures of exotic and natural grasslands are all very prone to wilding conifer invasion. Intensively developed pastures and irrigated paddocks do not favour wilding conifer establishment.
- Grazing pressure both by wild animals such as hares, rabbits, thar, deer and domestic stock will reduce the establishment rates of wilding conifers. Sheep will be effective when grazed at higher stocking rates[8] and the seedlings are small. Declines in rabbit populations have been cited as one of the causes of the explosion in wilding trees since the rabbit virus was introduced in 1997. (Ledgard & Norton , 2008). Deer are very effective at controlling wilding conifers and deer paddocks are generally conifer free[9].
- Palatability of different species of wildings is another significant factor in their successful establishment and spread. *Pinus nigra* is much less palatable than other species so it will establish as a seedling even in the presence of grazing. Palatability is also influenced by the surrounding environment, for instance topdressing will increase palatability of seedlings.
- Climate influences the success of wilding conifer establishment including temperature and rainfall. The rainfall gradient across the area is significant with a range from west to east of 4000mm - 300mm per annum which affects both the ability to establish and

[7] See Appendix 1: Conifers and spread risk.
[8] At 2-3 times normal stocking rates
[9] P*ers. Comms: A. Simpson, M. Burtscher, R. Ivey*.

growth rates. For instance, Douglas fir establishes and grows more successfully in the wetter areas with more than 600mm rainfall. Temperature influences both growth rate and cone opening.

- Wind is the most significant of the climatic influences. The NW wind is the prevailing wind and results in most of the significant spread. Twizel has annual wind runs of 11,000- 15,000 kms and strong gusts of 40 - 100km/hr. The winds can be much stronger in other parts of the area so seed can spread significant distances. Seed will also spread from other directions, for instance in the prevailing easterly on the eastern side of the Basin and in southerly quarter winds. Conditions for seed germination can often be ideal in these conditions with more moisture than in the drier westerly conditions.
- Presence of mycorrhizal symbionts in the soil where the seedlings establish. This has become much more evident in recent years as the conifers establish in new zones.
- Land use change is often cited as the reason for the expansion of wilding conifer spread. The example often used is the changes resulting from tenure review particularly when land becomes public conservation land. While there are examples of this type of invasion happening there are often other factors involved such as the retired land not being clean of wilding conifers in the first place or its proximity to a major seed source on freehold or pastoral lease land.
- The nature of the coning trees and the potential quantities of seed being produced by various wilding forests. For instance, the forest on the west side of Pukaki with over 9000 ha of coning trees potentially produces somewhere between 0.5 - 18 billion seeds per annum (Lew, 2013). If the germination rate is 5 per cent, then potentially there could be somewhere between 33 -900 million seeds germinating each year.

Photo 3: Eighteen billion seeds per year - Ruataniwha Conservation Park at risk from the Pukaki seed source-. Photo: R. Young

- The density of wilding forests influences seed quantity and spread. There is a national standard for describing density - dense, moderate, and sparse (MPI, 2014). A fourth class – scattered outliers was used in the MWCMS and was purely for differentiating low spread levels for costing purposes.[10]

5 Control methods for wildings

5.1 Active methods

The current active methods[11] of control being used in the Mackenzie for wilding conifer control are:

- Ground control
- Skid hopping
- Ground basal bark
- Scrub bar
- Helicopter Boom Spray
- Helicopter Spot Spraying with wand known as ABBA, (Aerial Basal Bark Application)
- Machine removal
- Crushing and burning
- Cultivation and discing
- Burning

Photo 4: ABBA - Aerial basal bark application of herbicide by wand: Photo: DOC

[10] See Appendix 3: Density classes

[11] See Appendix 4: Control methods for wilding conifers for more detail.

5.2 Grazing

Grazing is very effective where conifers have begun to invade areas or coning conifers have been removed and high levels of regrowth can be expected. It can reduce the need for primary control and the cost and time involved in secondary control. Standard levels of grazing are less effective than higher stocking rates especially on extensive areas, (Ledgard & Norton , 2008).

Grazing at higher stocking rates, the use of fertiliser and other more favourable fodder crops are all tools that have been successfully used to mitigate the costs of secondary and ongoing control on cleared areas or areas where seed rain is a continuing problem.

5.3 Resource use

Wilding conifers are regarded by some landowners as a resource. They have been utilised as a timber resource by Land Information NZ, (LINZ), from the lakeshore plantings of the 1970s and at Mount Cook Station where both planted and wilding conifers have been commercially harvested.

However, the opportunities for realising these conifers as a timber resource are often limited by the nature of the site, accessibility, and distance to the nearest port. Even more often their value as a timber resource is negated by the poor tree form and lack of silviculture particularly with the most prevalent wilding conifer in the Mackenzie - *Pinus contorta*.

Their value as a firewood resource has also been exploited by local people and firewood merchants but on a relatively limited scale as it is also limited to accessible sites.

In the more recent past, there has been some interest and research into using the resource for biofuel but again the economics are marginal given the distance from any biofuel plant and market. A sustainable supply is also required for biofuel, but this could be an option if the spreading conifer species were replanted in a non-spreading tree species. Recently Pukaki Downs has developed a joint venture project utilising the massive remaining *Pinus contorta* forest at Pukaki Downs as a resource.

Over the last 15 years the Emissions Trading Scheme (ETS) has allowed forest owners to use trees for carbon storage and obtain revenue from this source. While the price of carbon credits has fluctuated since their initiation some landowners have utilised these credits to pay for wilding conifer control. Historically the ETS included conifer weed species such as *Pinus contorta* but revised rules around the use of carbon credits for wilding forests means this is no longer an option where wilding spread is an issue.

Unfortunately, utilising wilding conifers as a resource in the Mackenzie has only had a limited effect on the overall reduction in the problem.

6 Current regulatory controls for wilding conifer management in the Mackenzie District

While the approach to wilding management under the NWCP has been largely collaborative there is a need for regulatory controls at a regional and district level. These regulatory controls are primarily, at a regional government level, within the Canterbury Regional Pest Management Plan, (CRPMP), (Canterbury Regional Council, 2018), and secondly at a district planning level, within the Mackenzie District Plan.

The Mackenzie District is under the jurisdiction of one regional council, the Canterbury Regional Council or Environment Canterbury.

6.1 Regional Pest Management Plan (RPMP)

The current CRPMP addresses the regulatory controls of wilding spread under Plan Object 4 and the rules for Progressive Containment. It specifies controls for six species of wilding conifer including *Pinus contorta*, *Pinus sylvestris*, *Pinus mugo*, *Pinus nigra*, *Pinus uncinata* and *Larix decidua* both on seed source properties and neighbouring properties, where previous control has used public money like the NWCP funding.

This plan is the primary regulatory tool for wilding conifers and is the most significant change in regulatory tools for the management of wilding conifers in the basin since it was introduced in 2018.

6.2 Mackenzie District Plan

The Mackenzie District Plan, (MDP), contains limited reference to the issue of wilding tree management. The issue is described in Section 7 – Rural Objectives and Policies and further detail under the Policies 4A, 4B and 4C:

"The increasing spread of wilding trees is a key issue for sustainable management in the District because it is having significant adverse effects on pasture availability, the landscape values and natural conservation values. If unchecked, it is likely to preclude land use options such as ecological restoration, nature conservation, recreation and tourism from large areas of the District, and may also threaten pastoral viability and commercial forestry options over large areas. In some areas wildings are already overwhelming sites of natural significance and spreading into high altitude areas in the Mackenzie Basin. Notwithstanding that some economic benefits can be derived from mature wilding trees in a few areas of the basin, the quality of trees is likely to be variable. The often random nature of wilding forests also means that it is difficult to apply location and design conditions in order to address visual effects."

Section 7 contains standards which require the eradication of wilding conifers 500m from any established forest and specifies four *Pinus* species which cannot be planted under Rule 6.1.8.e Wilding Tree Management:

"There shall be no planting of Pinus contorta, Pinus sylvestris (Scots Pine), Pinus uncinata (Dwarf Mountain Pine) or Pinus mugo (Mountain Pine).

It shall be the responsibility of forest owners, occupiers, lessees and licensees or other persons responsible for the forestry to eliminate tree spread and growth of wilding trees emanating from that forest on all land within 500 metres of the planted forest edge."

Forestry plantings can also be restricted within the Mackenzie Basin Subzone[12] if the Council considers there is potential for "the spread and growth of wilding conifers emanating from the proposed forest".

It is also a Prohibited Activity for which no resource consent will be granted to plant the following species within a farm base area: *Pinus contorta* (Lodgepole Pine), *Pinus nigra* (Corsican Pine), *Pinus muricata* (Bishops Pine), *Pinus sylvestris* (Scots Pine), *Pseudotsuga menziesii*, (Douglas Fir).

6.3 Crown Pastoral Land Act 2022 and Land Act 1948.

The other regulatory control for wilding conifers is these two Acts contain provisions which can be utilised by LINZ, for the management of wilding conifers on pastoral leases. There are now only a few properties that remain as pastoral leases in the Mackenzie Basin. This legislation provides an avenue for more formal action if required by the Commissioner of Crown Lands.

6.4 Summary of regulatory system

The three regulatory environments outlined above provide only limited effective mechanisms for enforcing landowners to undertake control and eradication of wilding species.

The District Plans main effect is in relation to planted forests or planting of the cited wilding species. The Land Act 1948 has not yet to my knowledge been used for enforcing the provisions of these Acts for wilding trees as pest weeds. And while the new Crown Pastoral Land Act 2022 was signalled as meaning significant change for pastoral leasees who were in breach of the terms of their lease this has not occurred to date.

This leaves the RPMP rules as the only mechanism that can provide a legal enforcement channel. However, these provisions can only be used where public money such as the NWCP funds has previously been used for removing wilding trees to a satisfactory level. To be able to use the provisions the land must be transitioned out of the NWCP back to the landholder. The next step if required is taking enforcement action which can take up to two years. So, this is not a fast solution to a rapidly evolving change in wilding spread. Also, while there are six wilding species specified in the CRPMP which can be controlled under these provisions, there are other conifers which pose a significant risk such as D. fir.

[12] See Map 4: Mackenzie Basin Subzone

7 Removal of closed canopy wilding forests

There are several properties in the Mackenzie where wilding trees have formed a closed canopy forest or dense infestations that preclude any other vegetation cover or understory. Dense forests are defined as having more than 400 stems per hectare.[13] These forests have developed principally on land that was previously either lightly developed or undeveloped pastoral land. Where intense pastoral development has taken place then this kind of forest generally does not develop. Properties where these dense forests or infestations have developed include Pukaki Downs, Rhoboro, Ferintosh, Mount Cook /Coxes Downs, The Wolds and Irishman's Creek. There are other examples too including the lifestyle blocks at Lake Pukaki, Manuka Terrace, and Reserve 4038. The dense section of these forests had a total area of nearly 9000ha[14] in 2016. Today the dense wilding forest area still totals approximately 7500ha[15].

The removal of these remaining areas of wilding forest are likely to take place by one of several methods:

- Boom spraying
- Machine removal - with logging machinery
- Crushing and burning
- Cultivation and discing
- Burning

Current District Plan rules mean the removal of dense areas of wilding trees where they have formed a canopy forest and there is no understory have triggered the need for resource consents for both harvesting and future land use.

This situation is best illustrated by the following case study of Mount Cook Station.

8 Case study: Mount Cook Station

Mount Cook Station is typical pastoral "gorge run" property[16]. It is one of the most prominent stations of that type in the Mackenzie because of its location and proximity to Aoraki/ Mount Cook and its visual prominence across the Tasman River from SH80.

The station was both a pastoral lease, (Mount Cook pastoral lease), and freehold, (Coxes Downs), which under its previous owner Donald Burnett produced award winning merino fine wool. In addition to producing fine wool over many years the Burnetts planted exotic conifer forests to ensure the future sustainability of the property with a second form of income. These exotic conifers, (Corsican pine, Douglas fir and Larch), spread over much of the property

[13] See Appendix 3: Density classes
[14] Source MWCMS
[15] Source WCIS
[16] "Gorge run" refers to the fact that these stations are closer to the river source on the fringes of the Mackenzie Basin.

and became the second largest seed source in the Mackenzie Basin with seed spreading to all the adjacent properties.

The station underwent tenure review and exited that process in 2008. Following freeholding the property was eventually sold on the open market. The plantations and the wilding forests had become a significant liability rather than an asset by this stage. The new owners decided to clear the trees through logging and clearing to waste to redevelop most of the planted and wilding forests back into pasture.

The landscape of this station and the vegetation, that is the result of any development is vital to maintaining its "gorge run" character. The removal of the wilding conifers would make a significant contribution to returning the property to the "gorge run" character, provided the pasture was characteristic of the previous landscape.

This investment of capital in this clearance operation would also remove a significant proportion of the second major seed source in the Mackenzie Basin and return it to viable farmland post-harvest. Under the District Plan such a change required a resource consent despite the removal of the trees returning the land to a traditional pastoral use.

Following the removal of the wilding conifers, the future character would be influenced by the nature of the over sowing and topdressing regime but also by the cultivation method, the block size within each subdivision fence and the grazing regime.

Initially the forestry company only applied for a consent for harvest and not for any post-harvest work. Later on the consent required amending which meant that the process became elongated and more expensive .

The consent that was granted included an appropriate fertiliser application regime, fencing subdivision plan and grazing regime that would allow the land to maintain an appropriate appearance and outcome in line with its previous gorge run character. The other factor influencing the grazing regime is the continued re-emergence of wilding tree seedlings. This would continue to occur for some time from the seed bank in the ground and to a greater extent from any remaining coning wilding trees. This temporary heavy grazing regime would be the key factor in removing the emergent wilding tree seedlings.

The Mount Cook Station site also included some Sites of Natural Significance, (SONS)[17]. The effects of oversowing and topdressing of these areas would change their character and indigenous biodiversity and there may also be effects on SONS because of nutrient transfer in wetland areas. To avoid these effects the consent conditions[18] specifically state that no topdressing or oversowing can occur within 20m of a SONS.

In addition to this resource consent for land use change the clearance of the forest also required a resource consent for the harvesting operation.

[17] See the two ecological reports, (Harding, Mt Cook Station, RM190113, Ecological Assessment, 2019), (Harding, Mackenzie District Council, SONS, Site 153: Mt Cook Station Lateral Moraine, 2019).
[18] See consent condition 16.

9 Global Consent

As noted, there are numerous other properties where land use change following closed canopy wilding forest clearance will require a similar consent process to be followed by individual landowners. The requirement that such a land use change and subdivision fencing required a consent was really the unintended consequences of Plan Change 13. As a result, the concept of a global consent for undertaking such wilding clearance and returning the land to a productive use was initiated in 2021. The process of obtaining the global consent is continuing with a plan to have it completed by the spring of 2023.

10 The District Plan

10.1 Background

The key issue with management of the closed canopy / dense wilding problem is the post removal control of wilding regrowth and sustaining the conditions so that the wilding conifers do not become problematic again. This requires changing the land use in some cases to mitigate the effects and make the land productive again. The current District Plan as it applies to the Mackenzie Basin Subzone is quite restrictive in terms of changing land use following the removal of dense infestations of wilding trees. The ability to meet the objectives of the various wilding conifer Management Plans and Strategies would be assisted if the plan was more enabling in the context of removing and rehabilitating land back to traditional forms of agriculture.

The Global Consent is an interim solution to the immediate problem faced by a few landholders who have cleared closed canopy forest from their properties. A more effective solution would be to ensure that the future of wilding management is recognised in changes made to the District Planning rules.

10.1.1 Area affected by proposed provisions

There are two options for defining the area across which any new provisions need to apply. One option would be to apply them to the Mackenzie Basin as a whole and use the area defined as the Mackenzie Basin Subzone, in the operative Mackenzie District Plan, (refer to Map 4: Mackenzie Basin Subzone).

The second option would be to apply them to the three NWCP management units that are the most affected by the current seed source wilding forests and require significant work to complete the removal of the remaining wilding infestations. The units are Twizel, Pukaki and Takapō West, (see Map 7: NWCP MUs that could be used to define the consent zone in the District Plan).

The first option is a more open approach and allows this type of management to occur both as a follow up to a wilding issue and as a preventive measure on land which is prone to seed spread and wildings developing. The second option limits the area to about half of the Mackenzie Basin Subzone and focuses the availability of this technique to the land that is

currently prone to wilding conifer spread from the three seed sources[19] remaining in these units. This confines the plan to the area which is currently mostly affected.

The other aspect which the District Plan review needs to consider is the rapid changes which are occurring with wilding tree invasion. The District Plan changes are framed around where current dense /canopy forest has developed and the immediate adjacent land. It is becoming very clear that this level of invasion especially by *Pinus contorta* is rapidly developing in other locations where current pastoral or conservation land management is not controlling the invasion or reinvasion[20].

Therefore, any District Plan approach should reflect two different management approaches, dense canopy closed forest requiring removal by traditional harvest techniques, and the adjacent areas requiring on-going management control. Such areas are included in Map 8: Wilding Control Overlays .

Photo 5: Simons Pass conservation land which has been invaded by Pinus contorta from the Southern Ben Ohau seed source in the last 4-5 years post tenure review. .

The short timeframe for *Pinus contorta* to reach coning age, (now as short as 3 years), is another factor in this rapidly changing wilding environment. This leaves a very short timeframe for removal of these seedlings and young trees before they in themselves become a seed source. As with all wilding tree management the planning system needs to be able to both evolve and make the path to a viable practical solution in a timely manner.

[19] Mount Cook / Braemar complex, Southern Ben Ohau complex, and the Irishmen's Creek / Wolds complex

[20] The land which is conservation land as a result of the tenure review of Simons Pass is an example of this rapid and widespread wilding invasion over a very short timeframe.

The fact that the NWCP is going to be scaled back significantly means that to slow down this wilding invasion more areas may be requiring this treatment, especially via the pastoral option. There are still two large area seed sources, along with the smaller one at Irishman's Creek and Wolds Conservation Areas which have the potential to spread seed, (based on a 40km downwind range), over an area of nearly 300,000ha.

10.2 Harvesting

Currently, removing/ harvesting a wilding forest requires a resource consent as it is regarded as vegetation clearance.

Harvesting of dense / closed canopy wildings includes utilising any of the techniques described in Section 7, "Removal of closed canopy wilding forests". All methods of clearing dense / closed canopy wilding forests need to be recognised as valid across productive pastoral land and lifestyle blocks.

Unfortunately, all these methods cannot be applied to some public conservation land sites or SONS given the high ecological values of these sites. Some of these sites contain threatened species or ecosystem values which will be severely impacted by such techniques, (Te Manahuna Consulting, 2023). This limits clearance of these high value sites to more specific and selective methods such as ground control, (cutting), ground basal bark, aerial basal bark and skid hopping.

It has been suggested that the National Environmental Standards (NES), for harvesting of plantation forestry, (NZ Government, 2017), should be applied to dense or closed canopy wilding forests. This seems like a logical way to manage the impacts and process of harvesting such wilding forests. These regulations follow best practice forestry standards for a range of forestry activities.

10.3 Post management of the land after clearing dense/closed canopy forest for pastoral use

The plan needs to allow for two different aspects of post clearance management for pastoral use:

I. Post management of the land after clearing dense/closed canopy forest for agriculture use
II. Post management of the land after removal of scattered – moderate density wilding trees on pastoral land

10.3.1 Agricultural conversion

The conversion of land from dense/ closed canopy forest will generally require root/stump removal followed by direct drilling or cultivation, (ploughing or discing). The outcome of such conversion is going to be different than before the conifer invasion, and more typical of a highly developed paddock. There is no way of completing such a conversion that results in a

traditional high country pastoral look. It will require appropriate fertiliser applications, stocking rate and fencing to achieve both the right economics and stop any wilding conifer establishment which is dependent on the environmental factors of each site. The potential current total area where agricultural conversion might be considered is about 3500ha, however, some of this area may be considered for forestry.

Photo 6: Post harvest at Mount Cook Station: Photo: C. Miles.

Photo 7: Rhoboro Downs and Pukaki Downs - Pinus contorta wilding forest with agricultural conversion of previous wilding conifer infested land in the foreground, and windrowed wildings behind ready for burning before conversion: Photo: R. Young.

10.3.2 Pastoral conversion

The conversion of land from a wilding forest to a pastoral use and what the result will be is dependent on the environmental factors at each site and the post-harvest management. In many cases where the wildings have become a canopy forest there is usually very little or no indigenous vegetation remaining in the understory and so that agricultural conversion is the most likely option.

If there is a mix of indigenous and exotic species which is likely to be the case where there is scattered – moderate density wilding trees, then the result will most likely be an appearance and outcome in line with its previous character. Where there is a mixture of vegetation then a condition like this is required:

> *"Oversowing and topdressing shall be undertaken at a frequency and rate so as to maintain the composition of indigenous vegetation as existing on the property following the completion of the harvesting or clearing activity."*

The solution is dependent on several factors including feed type, rainfall, depth of soil, altitude, and use of fertiliser.

Most importantly, the pasture and its management need to basically halt the reinvasion of wildings either from seed in the ground or outside seed sources. To achieve this a combination of all or some of the following methods will need to be utilised for post management of the cleared land.

10.3.3 Fertiliser

The fertiliser regime required for successfully changing the land use depends on the soil condition post-harvest, along with other environmental conditions. The regime that was recommended for the Mount Cook Station was based on other regimes within the Basin. This regime was:

> Years 1 and 2: 200 - 250kg/ha. However, what I have gleaned from my discussions a rate closer to 200kg/ha may be more appropriate. However, it is going to be dependent on the soil testing results prior to the first application.
>
> Year 3 and 4: No fertiliser application.
>
> Year 5 and then every 3-5 years: 120-150kg/ha. This is a maintenance fertiliser regime but is also dependent on vegetation response and soil testing.

There are several examples where a similar regime has been carried out and the mixed native/ exotic grasslands have been maintained over a long period. In one case this type of regime has been running for 70 years and still has a traditional pastoral appearance, (see Photo 8). Matagouri may become quite prominent after 10 years, and may lead to dense scrub cover, and affect the tussock grassland vista, but will effectively still be native in character. Control of the smaller scrubby matagouri by spraying or mechanical clearance is required to both maintain sufficient pasture and ensure the stock can access young juvenile wilding trees. Removal of this scrubby matagouri needs to permitted as part of the rules or consent[21]. If the

[21] Plan Change 18 currently restricts the control and clearance of vegetation including such fertiliser induced scrubby matagouri.

regime inputs too much it will tend to favour the pasture grasses and clover to dominate the indigenous vegetation.

Photo 8: Pastoral country after 70 years of the same OSTD regime: Photo: R. Young.

Alternatively, an existing Farm Environment Plan for each property may provide appropriate specifications from similar paddocks that could be used for the proposed fertiliser regime.

There may be variations on this regime that will work, and like managing any natural system there is always going to be some adaptive management required to find the "sweet spot". While the goal is to produce a traditional pastoral appearance, this will require some flexibility. Along with the soil monitoring, some form of photo monitoring would be desirable. Through these mechanisms the result may be manipulated to get the right outcome.

It also needs to be borne in mind that fertiliser is expensive, and the landowner is generally not going to be applying it at rates heavier than required to achieve the right package of fencing, stocking rate and fertiliser that will work.

10.3.4 Stocking rate

To remove the emergent wilding seedlings a higher stocking rate than normal is required. Rates of 2.5 -5 stock units (SU)/ ha on an annualised basis are what is normally used[22]. The type of stock used will also influence the effectiveness of this grazing. For instance, the use of deer while involving the need for deer fencing is very effective in controlling wilding pine regrowth as noted in "*Factors which influence the wilding conifer problem*", (see pg. 10).

[22] This is different to mob stocking as defined In the District Plan under PC18:" **Mob stocking:** means confining livestock in an area in which there is insufficient feed and in a way that results in the removal of all or most available vegetation".

Photo 9: Mount Cook Station pastoral conversion post-harvest: Photo: C. Miles.

Photo 10: Simons Pass – pastoral land which has been direct drilled and grazed but retains the pastoral appearance with no wilding infestation: Photo: R. Young.

10.3.5 Fencing

Larger blocks may need to be subdivided into blocks ranging in size from 100 – 500ha. This will allow each block to be grazed heavily for a short period of time and on a rotation grazing regime and help to control wilding seedling reinfestation. Such fencing could either be temporary or permanent. Again, this is dependent on the local farm situation and its environment. There is no standard formula for how this should be done as it needs to be designed around the farm environment. A fencing plan could be one mechanism for managing fencing development following the completion of harvest activity.

10.4 Post management of the land after clearing wildings on public conservation land or Sites of Natural Significance

Wilding trees are a significant threat to conservation land management. The papers by Theo Stephens, (Stephens, 2003), (Science and Research Unit, Department of Conservation, 2001), noted that wilding pines are the greatest threat to biodiversity values in the Mackenzie[23]. Unfortunately, most of the wildings on public conservation land, (PCL), are the result of either legacy infestations that preceded the transfer to DOC or more recently the result of seed rain from mature coning infestations on neighbouring properties.

Conservation lands are protected for a range of values including ecological, landscape, recreation and catchment protection. This means that grazing is not always an appropriate tool in terms of conservation management but is highly effective for wilding seedling control.

Ideally the District Plan needs to allow for post clearance management on PCL and Sites of Natural Significance, (SONS), where there has been scattered – moderate density wilding trees. However, for several reasons the conservation lands where this is a practical and sustainable option are limited.

Firstly, much of the more extensive PCL like on the Ben Ōhau Range and now part of the Ruataniwha Conservation Park (RCP), has been retired from grazing when it came to DOC. This means that the only fences remaining are boundary fences, (between the freehold land and PCL), as any other fences, if they existed, were removed. However, many of these areas did not have dividing fences as this land was only extensively grazed. Most of this land which is a significant proportion of the PCL in the Mackenzie is not suitable for treatment utilising the pastoral conversion option because it is “hungry” or poor stock country, the lack of fencing to enable increased stocking rates and the cost of increasing the fertility to make it an option for sustaining stock grazing.

Secondly, there are approximately 8,000ha of PCL that is classified as Threatened Ecosystems or Ecological Management Units within the Mackenzie Basin Subzone, (Te Manahuna Consulting, 2023). These are high value ecosystems that are very significant nationally and contain many threatened species. These areas all currently have some level of wilding invasion, generally sparse to scattered. Only one of these areas[24] has areas of wildings at the dense to moderate density. It is not appropriate to use a topdressing/higher stocking rate /

[23] Refer to section 3.1 for more detail.
[24] Gladstone Flats, part of RCP and adjacent to Pukaki Downs

fencing regime, on these high value areas. Most, if not all SONS will not be suitable for this system either.

This means that the PCL that can be treated with this high stocking system and the possible addition of fertiliser is limited to a small subset of the total area of PCL within the area affected by this wilding invasion. These areas are generally on the better soils, (like moraines not outwash surfaces) where sheep grazing will work because there is enough feed for the stock, and they are contained by fencing.

The total area of PCL where once the initial control is completed where this regime would be a smart management technique is approximately 5,400ha. Some of the conservation and reserve areas where this type of post wilding clearance could be applied include Pukaki Flats Conservation Area, Simons Pass Conservation Area, Irishman's Creek Conservation Area, Wolds Conservation Area and Ohau Downs Conservation Area. It could also be applied to the Mackenzie District Council controlled Plantation Reserve 4038.

Photo 11: Pinus contorta spread from Reserve 4038 to the adjacent Pukaki Flats Conservation Area.

In cases where the trees have been allowed to reach a higher density and form a closed canopy and the native vegetation has been lost then the removal technique is likely to require boom spraying which will significantly affect any remaining native woody shrublands under the wilding canopy and seriously impact the values of the site. It is unlikely that such a site can be returned to its original composition without very extensive and expensive restoration work.

To be able to use stock to control wilding conifer seedlings will require some significant change to the management of these affected lands that goes beyond matters controlled by

the District Plan. Conservation managers will need to accept that on these areas where there are conservation values, that some of the values will have to be compromised in the short term, to ensure that this wilding invasion does not spread further and become denser. As well as preventing the complete loss of these ecosystems it is also economically much more affordable than the alternative of continual ground clearing operations[25].

10.4.1 Topdressing

Aerial topdressing with a light fertiliser regime may also be required in some of these suitable sites affected by the wilding invasion. The rate of this topdressing will need to be chosen on a site-by-site basis. The visual effect of this sort of regime will be some greening of the native tussock grasslands and potential change in species composition percentages.

10.4.2 Stocking at a higher rate

Stock grazing of the affected conservation land which is often going to be extensive and without any fences will require a higher stocking rate than normal stocking at rates of up to an annual rate of 2.5 – 5.0 stock units (SU)/ ha. Grazing of the PCL will most likely be limited to sheep as they will have a lower impact on the natural values and to areas where the stock is contained within fences. This sort of grazing only needs to be for part of the year but is often best across the spring period which is when wilding seedlings are emerging.

10.4.3 Fencing

Fencing is likely to be too expensive as an option on the suitable PCL sites. At some sites, temporary fencing may be a realistic option. This will allow each block to be grazed more intensively for a short period of time and on a rotation grazing regime and help to maintain the conservation values and assist in removal of the wilding seedlings.

10.4.4 Feeding out

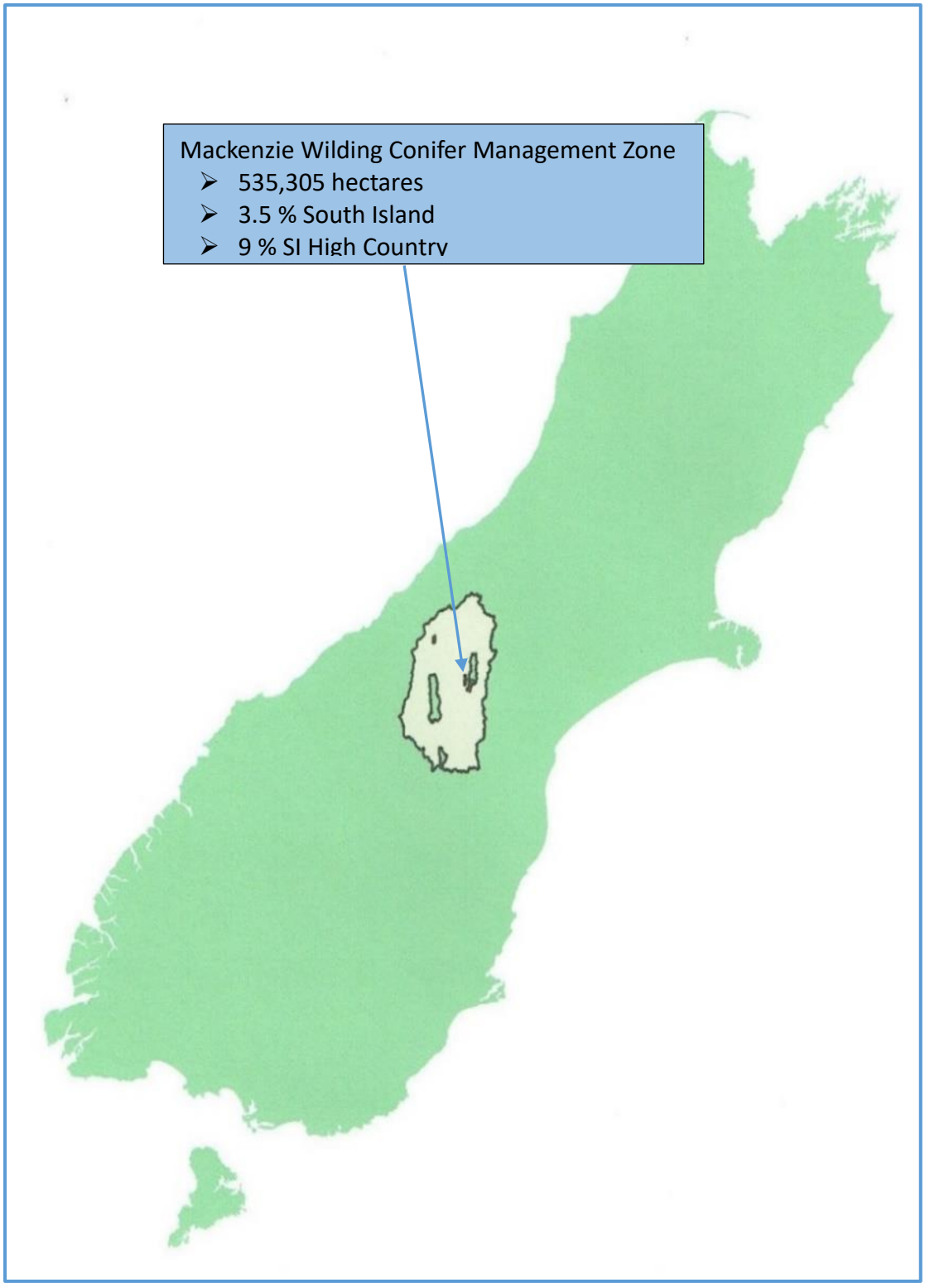
This may be an option at some sites where there is suitable access for feeding out to maintain stock condition and allow stocking at a suitable rate to manage the wilding spread. One such suitable site is Pukaki Flats Conservation Area and the adjacent Reserve 4038 managed by the MDC.

11 Conclusion

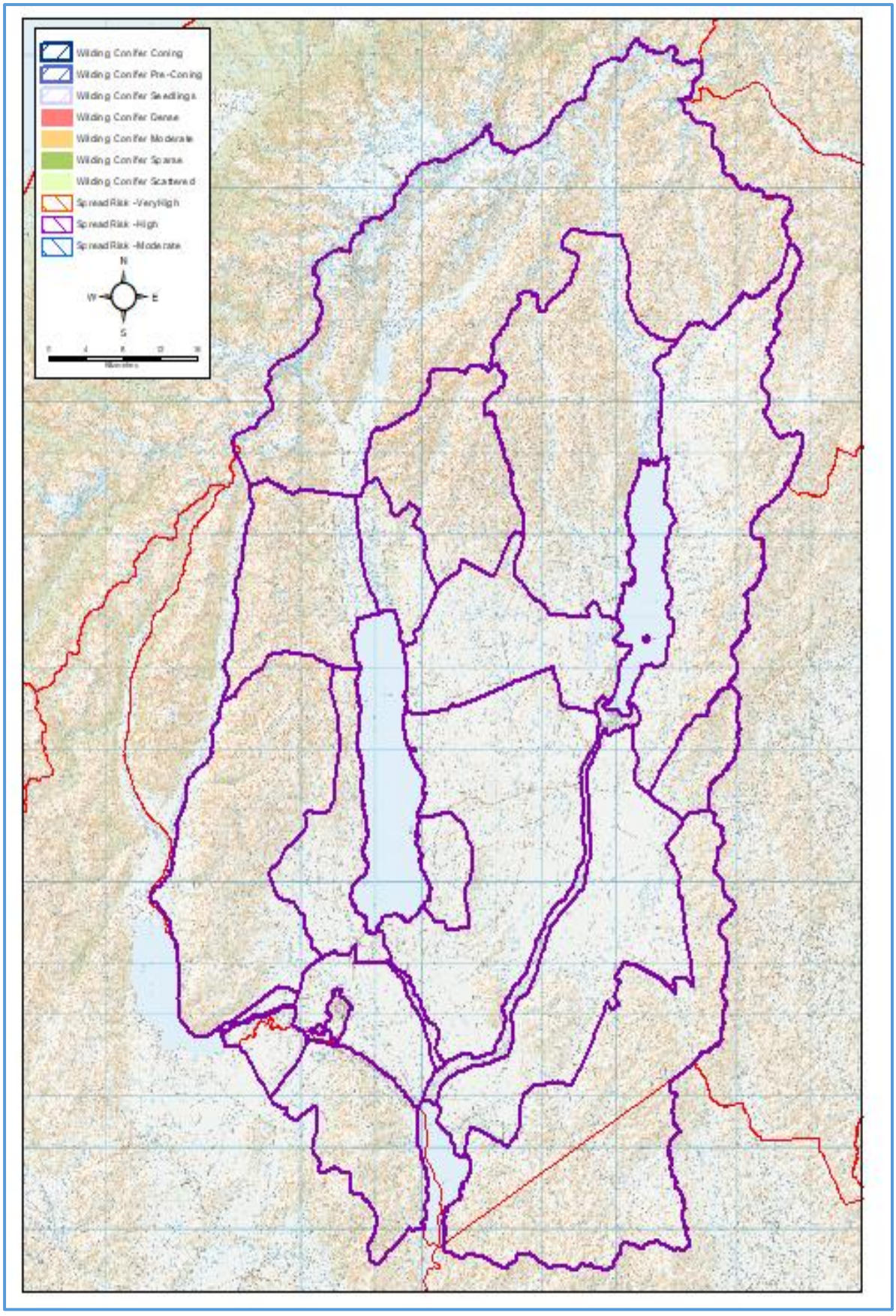
The issue of changing the District Plan to accommodate these various management options over a range of environments is complex. This is not an issue where there are straightforward options to clearly direct a consenting process. Each wilding site has its own characteristics and the environmental factors associated with farming practices differs from site to site. Providing a framework for this in the District Plan most likely needs to be accompanied by some expert review of each case for the farming and conservation aspects of the proposal.

[25] Grazing can have some benefits for conservation management at some sites. For example, where dense swards of browntop and sweet vernal have established and prevent native plant colonisation.

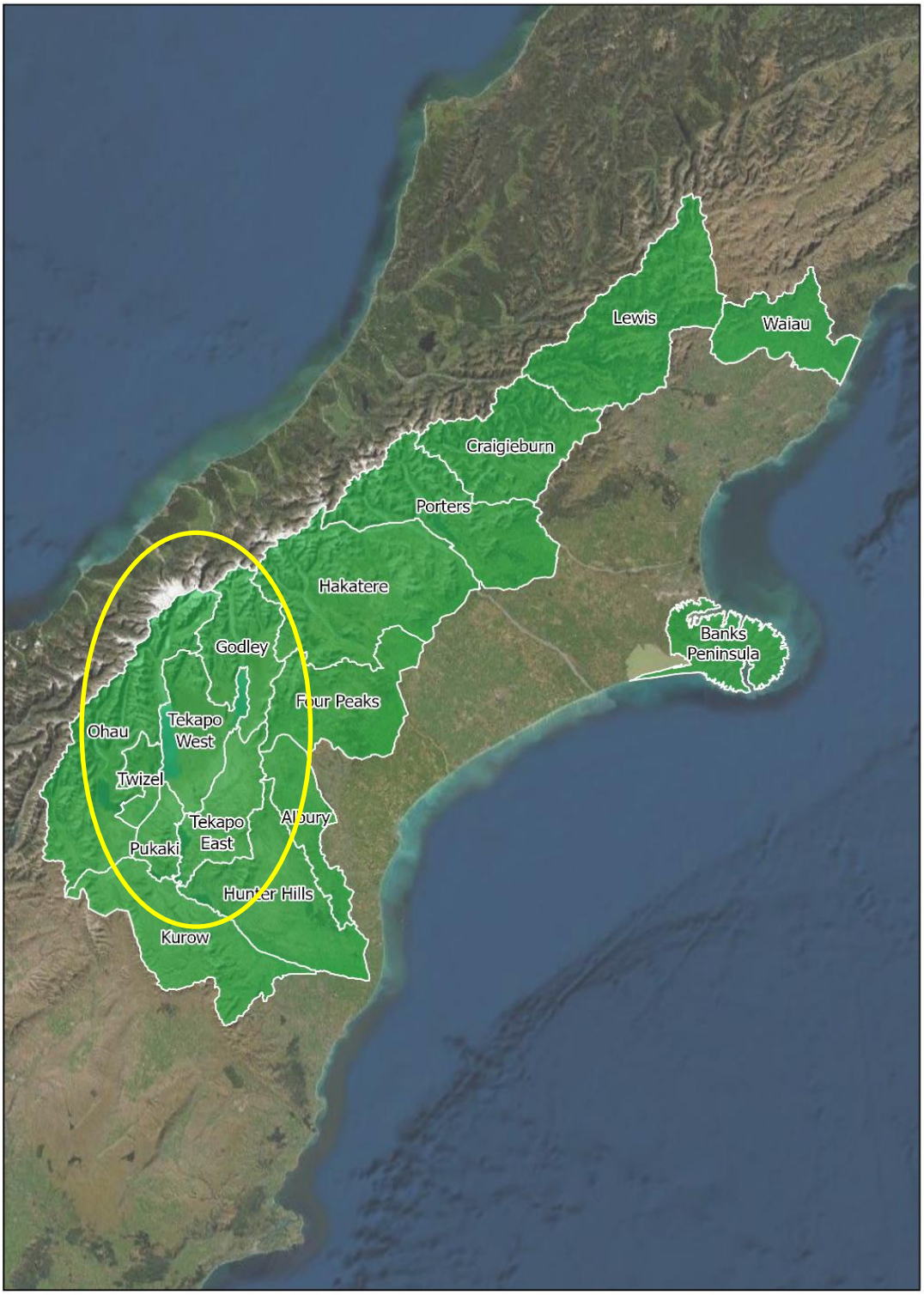
Maps



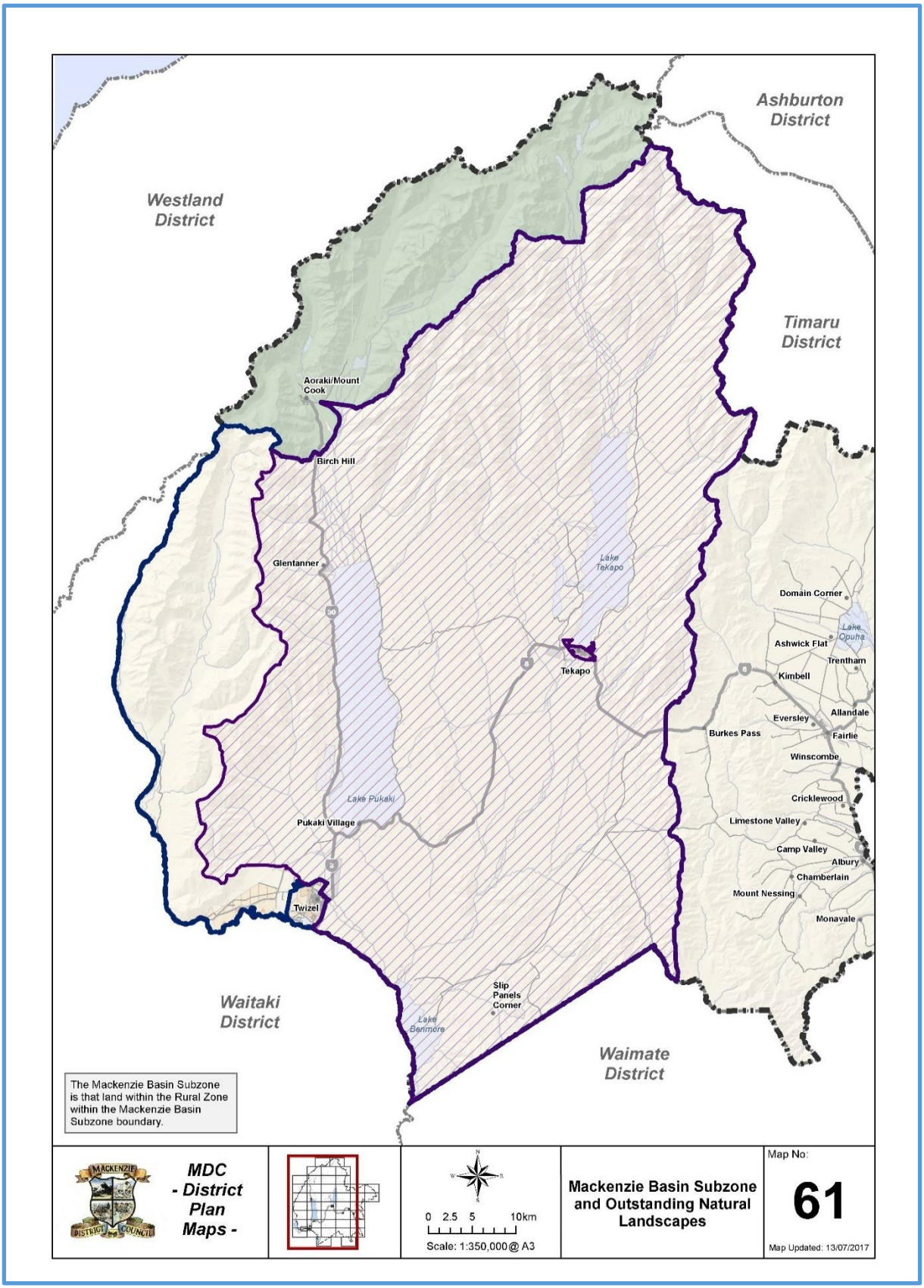
Map 1: South Island and location of MWCM Zone



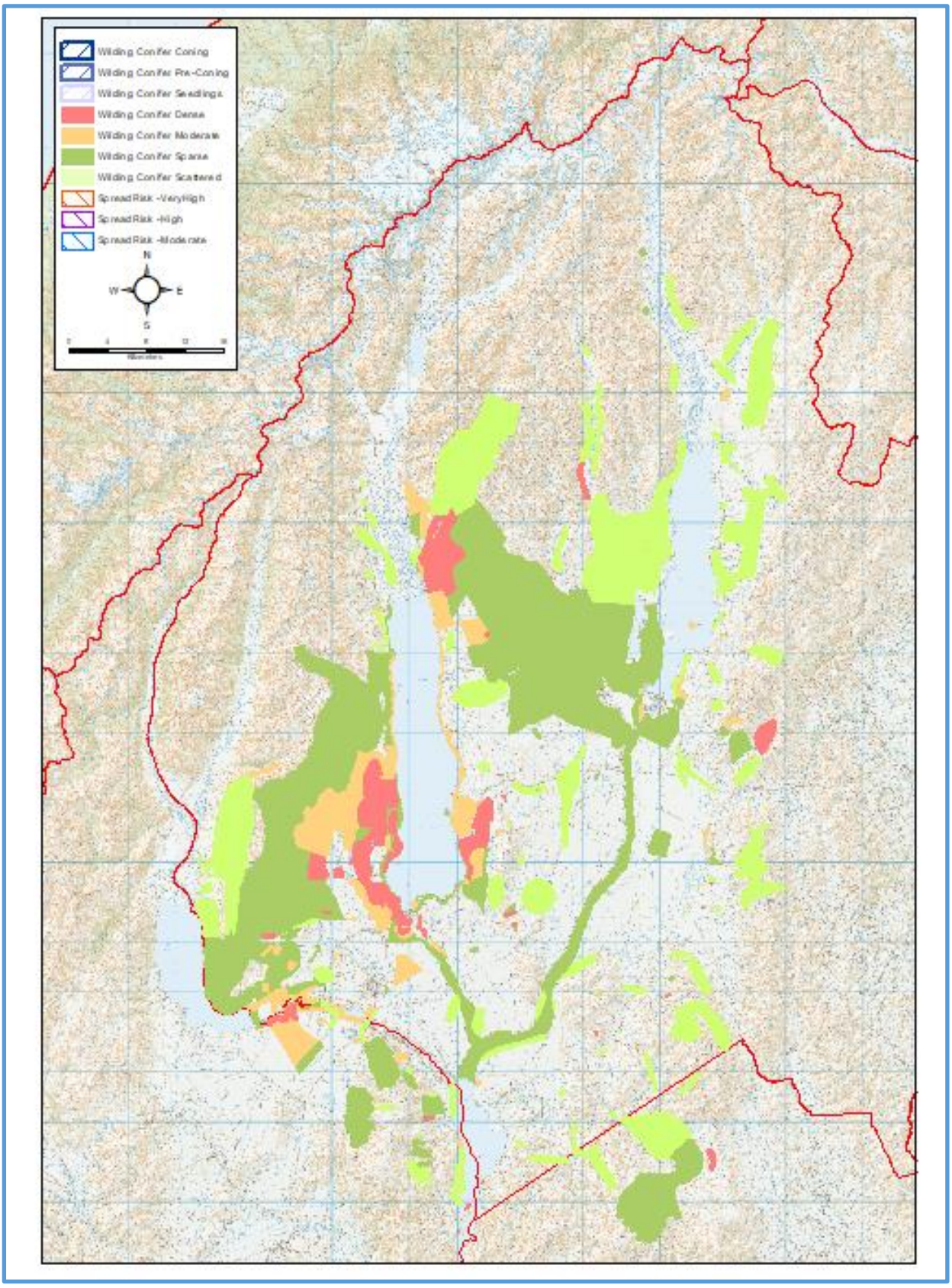
Map 2: Mackenzie Wilding Management Zone and MUs, (purple), and MDC boundary, (red), (MWCMS).



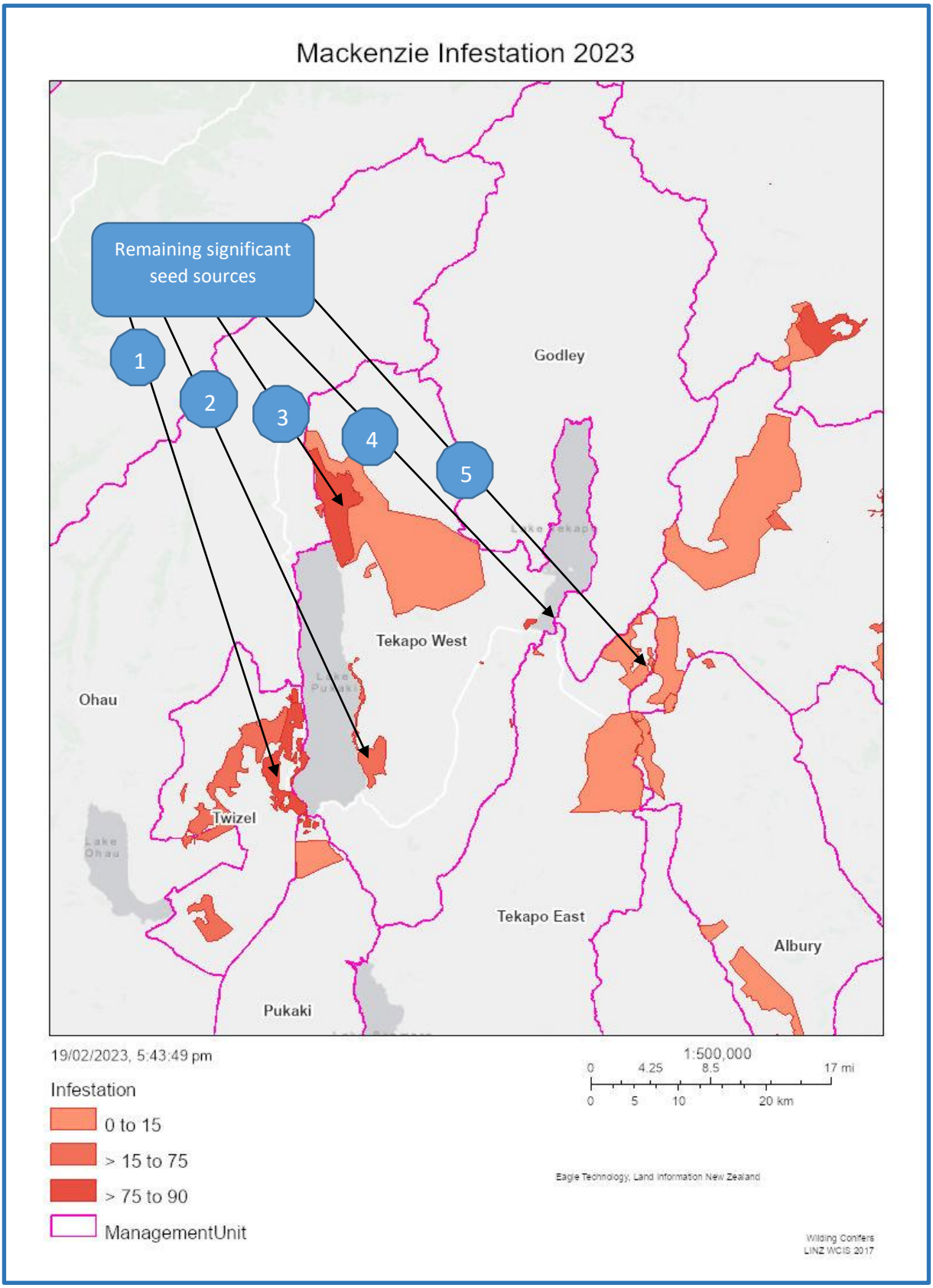
Map 3: Management Units of the NWCP and the six MUs within the Mackenzie Basin Subzone, (WCIS).



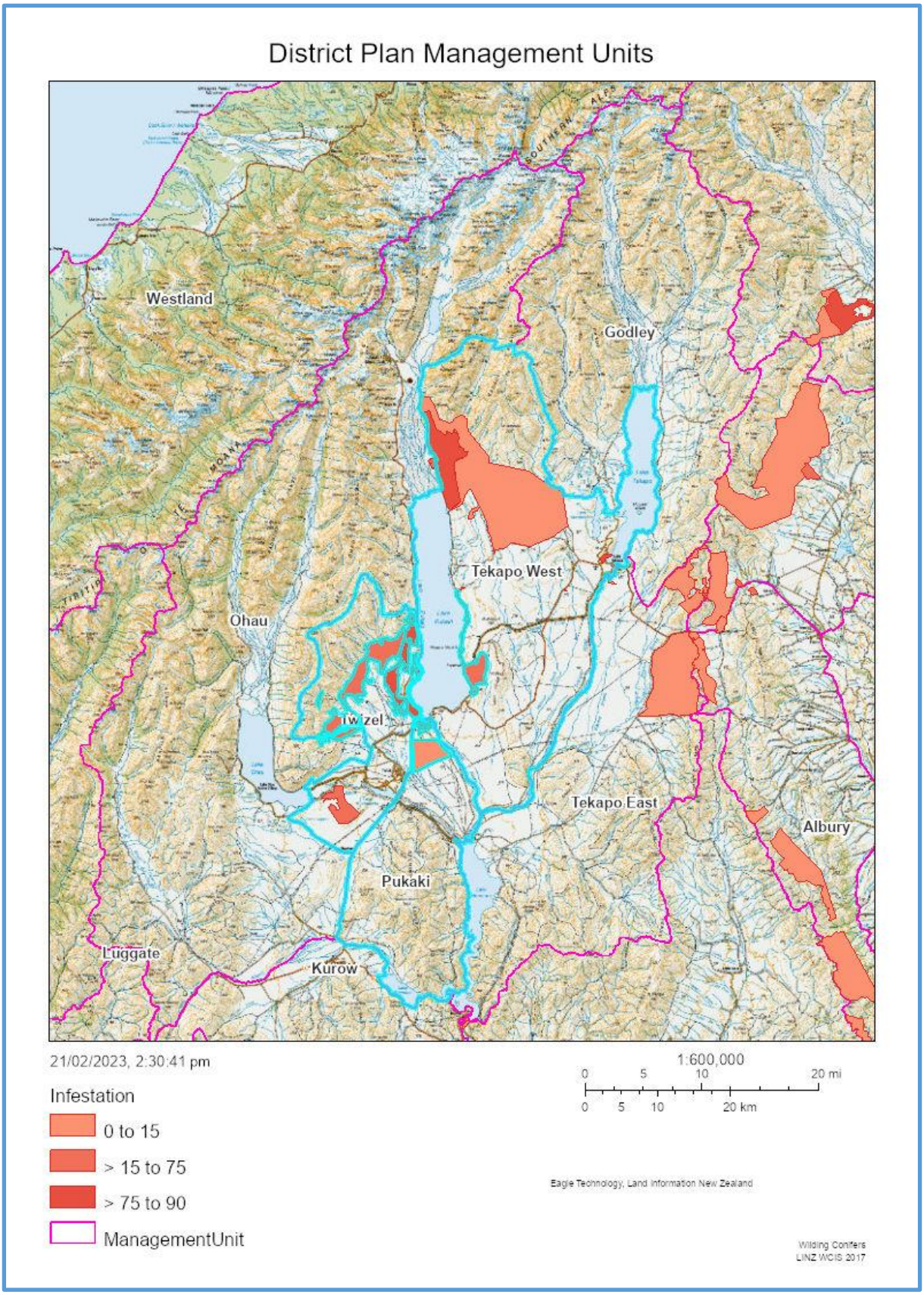
Map 4: Mackenzie Basin Subzone



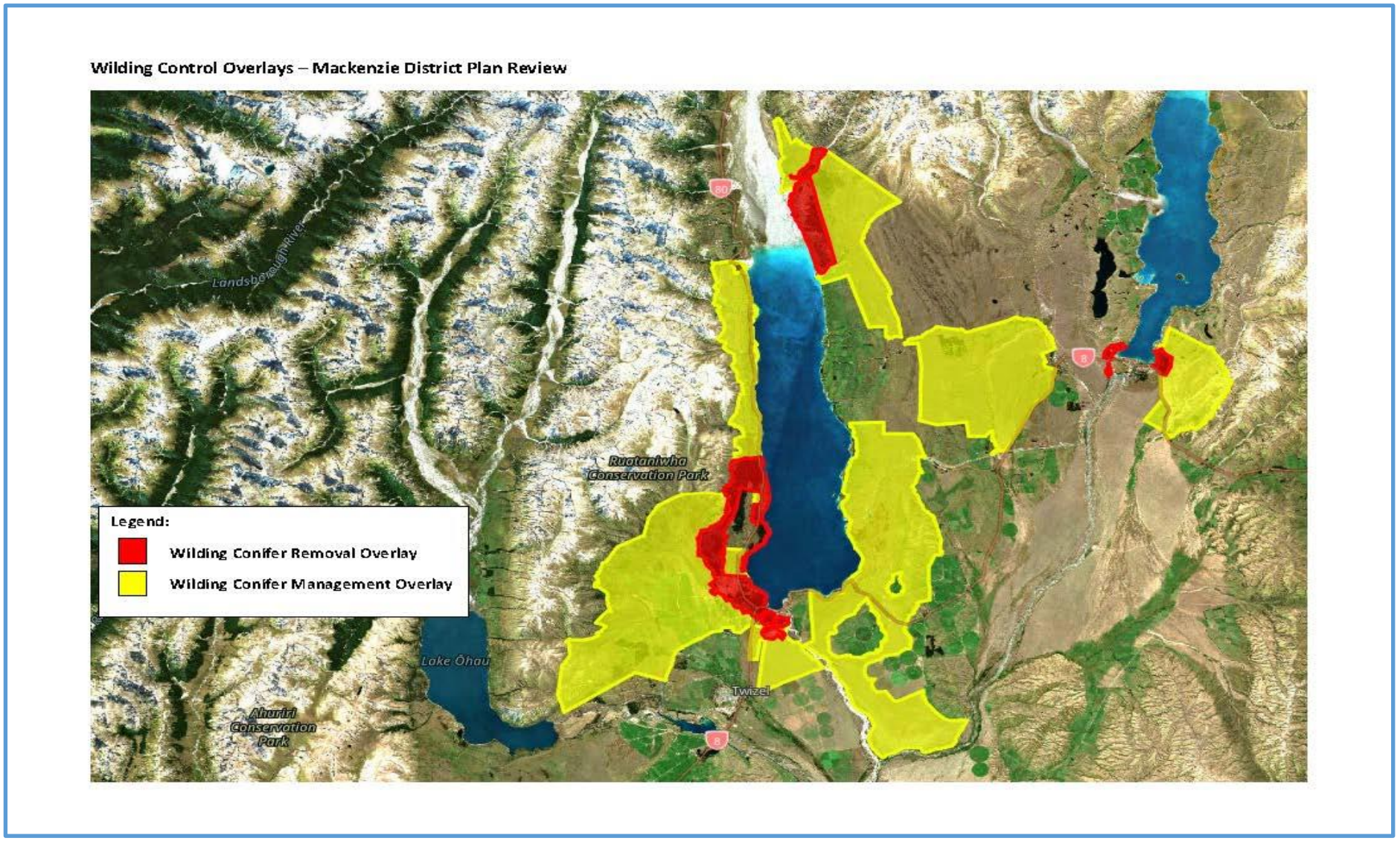
Map 5: Infestation density in 2016, (MDC boundary = red line), (MWCMS).



Map 6: Mackenzie Wilding Infestation in 2023 by % density, (WCIS) and remaining seed sources: (1) Southern Ben Ohau, (2) Irishman's /Wolds, (3) Mount Cook /Burnett, (4) Lake Takapō Regional Park, (5) Holbrook/Sawdon.



Map 7: NWCP MUs that could be used to define the consent zone in the District Plan, (WCIS).



Map 8: Wilding Control Overlays

Appendices

Appendix 1: Conifers and spread risk

Conifer species	Other Names	Spread Risk Classification
Pinus contorta	Lodgepole pine, Contorta	Very high
Pinus sylvestris Pinus nigra Pseudotsuga menziesii Pinus mugo	Scots pine, Baltic pine Corsican pine Douglas fir, Oregon Mountain pine	High
Larex decidua	Larch	Moderate
Pinus ponderosa	Ponderosa pine	Low

Appendix 2: Seed source type

Seed Source Type	Characteristics	Example
Major	Large extensive coning wilding spread producing large amounts of seed	West Pukaki
Significant	Generally, an extensive coning site but often just developing or in isolated patches but may be infilling	Manuka Terrace
Moderate	Patches of coning trees over or on parts of a unit	Braemar
Low	Very low numbers of coning conifers if any or has recently been controlled for coners.	Ben Ōhau North
Isolated	Clean or no known coning conifers	Aoraki

Appendix 3: Density classes

Density	MCWC Strategy Description	NZWCMS Description
Dense	>400 stems / ha	>400 stems / ha
Moderate	20 - 400 stems / ha	20 - 400 stems / ha
Sparse	1 - 20 stems / ha	0.01 - 20 stems / ha
Scattered outliers	< 1 stem / ha	NA

Appendix 4: Control methods for wilding conifers

Method	Description
Ground control	Trees removed using chainsaws, scrub bars hand tools, lopper and saws. All green needles need to be removed or the stump treated with herbicide.
Skid hopping	Using helicopters to move ground crew members to areas with trees, particularly where they are hard to access
Ground basal bark	Ground technique, the bottom of the tree or the cut stump is treated with herbicide – X-Tree.
Scrub bar	Scrub bar is used in conjunction with chemical application to the stump to prevent any regrowth.
Helicopter Boom Spray	Herbicide is applied via a boom from a helicopter
Helicopter Spot Spraying with wand	Herbicide is applied directly onto the tree using a lance or wand held by an operator in the aircraft.
Machine removal	Diggers, dozers, tractors and mulchers have all been used for removing dense to moderate stands of trees.
Crushing and burning	Crushing with a roller and then burning to dispose of the slash.
Cultivation and discing	Cultivation with large discs has been used on seedling and pre coning stands
Burning	Burning of standing trees or windrowed slash

Appendix 6: Abbreviations used in this report

DOC	Department of Conservation
CA	Conservation Area
ECAN	Environment Canterbury
ETS	Emissions Trading Scheme
LINZ	Land Information New Zealand
MDC	Mackenzie District Council
MPI	Ministry for Primary Industries
MU	Management Unit
MWCMS	Mackenzie Wilding Conifer Management Strategy
MWCM Zone	Mackenzie Wilding Conifer Management Zone
NWCP	National Wilding Conifer Programme
NZWCMS	New Zealand Wilding Conifer Management Strategy
OSTD	Oversown and Topdressed
PCL	Public Conservation Land
SONS	Site of Natural Significance
WCIS	Wilding Conifer Information System

Bibliography

Boyes, N. (2022). *Global Consent - Consent Structure - Discussion.*

Boyes, N. (2022). *Global Post Harvest Wilding Control Resource Consent - Consenting Framework.*

Boyes, N. (2022). *Scope of Work - Stage 3 - Wilding Trees.*

Canterbury Regional Council. (2018). *Canterbury Regional Pest Management Plan 2018-2038.* Canterbury Regional Council.

Cochrane, P., & Grove, P. (2013). *Exotic wilding conifer spread within defined areas of Canterbury high country.* Canterbury Regional Council.

Davie, T., & Foley, B. (2004). *Forestry and water yield: the New Zealand example.* Landcare Research.

Department of Conservation Science Publications. (n.d.). *The wilding conifer problem: Characteristics of Wilding conifer spread*. Retrieved from Department of Conservation: http://www.doc.govt.nz

Froude , V. (2011). *Wilding Conifers in New Zealand: Status Report.* Pacific Eco Logic Ltd & Ministry of Agriculture and Forestry.

Gallaway Cook Allan Lawyers. (2016). Affadavit of Robert Scott Barr Young for Guide Hill Station Litd. Dunedin.

Harding, M. (2019). *Mackenzie District Council, SONS, Site 153: Mt Cook Station Lateral Moraine.*

Harding, M. (2019). *Mt Cook Station, RM190113, Ecological Assessment.*

Ledgard, N. (2010). *Wilding conifer spread on Pukaki Downs station: origin, future spread risks and management options.*

Ledgard, N. (2012). *Decision Support System 1: Calculating Wilding Spread Risk from New Plantings. .*

Ledgard, N. (2015). *Wilding Conifer Experimental Burns – Pukaki Downs – Research Methods.* SCION.

Ledgard, N., & Norton , D. (2008). *The impact of browsing on wilding conifers in the South Island high country.* NZ Journal of Forestry.

Lew, A. (2013). *An assessment of Pinus contorta seed production in British Columbia: Geographic variation and dynamically-downscaled climate correlates from the Canadian Regional Climate Model.* Victoria, British Columbia: University of Victoria, School of Earth and Ocean Sciences.

Mackenzie District Council. (2015). *Mackenzie District Plan .*

Ministry of Primary Industry. (2014). *The right tree in the right place. New Zealand Wilding Conifer Management Strategy 2015-2030. .* MPI.

MPI. (2014). *New Zealand Wilding Conifer Managment Strategy 2015-2030.* N.Z. Government.

NZ Government. (2017). Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017. NZ Government. Retrieved from https://www.legislation.govt.nz/regulation/public/2017/0174/latest/whole.html

Owens, J. (2006). *The reproductive biology of Lodgepole Pine.* Forest Genectics Council of British Columbia.

Planz Consultants. (2020). *RM190114 Mt Cook Station: Volunteer Schedule of Conditions.*

Science and Research Unit, Department of Conservation. (2001). *Making The Best Choices for Conservation.* Department of Conservation.

Stephens, T. (2003). NZ Plant Protection Society Conference 2003. *Wilding conifer control: how important is it relative to other conservation actions?* Christchurch.

Te Manahuna Consulting. (2023). *Summary of final bids DOCCF - Feb 2023.* TMC.

Tibby, A., & Price, R. (n.d.). *Wilding Conifers on Pukaki Downs. The Use of the ETS by Pukaki Downs as a Tool to Control, Contain and Eliminate Wilding Spread.*

Walker, S. et al. (2007). *Guide for Users of the Threatened Environment Classification.* Landcare Research.

Young, R. (2016). *Mackenzie Wilding Conifer Management Strategy.* Te Manahuna Consulting.

Appendix 5 – Eastern Mackenzie Rural Economic Assessment

Eastern Mackenzie District Review

Rural Economic Advice – Minimum Rural Lot Size

September 2023

Jamie Gordon
Macfarlane Rural Business

Table of Contents

Contents

1.0 INTRODUCTION 4
2.0 RURAL ZONES AND LOT SIZES 5
3.0 CURRENT LAND USE AND CAPABILITY 6
3.1 Current Land Use 6
3.2 Land Capability 7
3.3 HIGHLY PRODUCTIVE LAND (HPL) 8
4.0 LAND FRAGMENTATION 10
5.0 KEY IMPACTS ON FARM TYPE & PRODUCTIVITY 11
5.1 Climate 11
5.2 Irrigation 12
5.3 Soil Type 14
5.4 Topography 15
5.5 Altitude 16
5.6 Management Expertise 17
5.7 Scale 17
5.8 Access to End Users, Markets and Labour 18
5.9 Reverse Sensitivity 19
6.0 FARM TYPE AND USE 20
6.1 Sheep and Beef 20
6.2 Dairy and Dairy Support Farming 21
6.3 Arable/Mixed Cropping 22
6.4 Forestry 23
7.0 MINIMUM LOT SIZE TO SUSTAIN RURAL PRODUCTION 26
7.1 Sheep and Beef 26
7.2 Dairy Farming 27
7.3 Dairy Support 27
7.4 Arable and Mixed Cropping 27
7.5 Forestry 27
7.6 Summary – Minimum Lot Size by Farm Type 28
8.0 ONL Zone and Rural Character Areas 29
8.1 Orari Rural Character Area 30
8.2 Opuha Rural Character Area 31
8.3 Fairlie Rural Character Area 31

8.4 Raincliff Rural Character Area 31
8.5 Albury Rural Character Area 32
8.6 Tengawai Rural Character Area 32
9.0 SUMMARY 35

1.0 INTRODUCTION

The Eastern Mackenzie District is separated from the Mackenzie Basin on the western side by the Dalgety, Rollesby and Two Thumb Range's. The district supports a range of pastoral farm systems from high country stations through to livestock finishing operations as well as dairy farming and dairy support properties. There are also small areas of mixed cropping and forestry. The introduction of irrigation through the Opuha irrigation scheme has enabled some intensification and land use change, particularly to dairy farming, however, the higher altitude and cooler climate has limited the introduction of horticultural enterprises.

Fairlie, with a population of 900 – 1000 people, is the main town in the Eastern Mackenzie District and is typically a rural service town with some tourist amenities. Given the small size of the town, urban sprawl into surrounding farmland through housing developments or the subdivision of lifestyle blocks (fragmentation) has not been as prevalent in the Eastern Mackenzie District as it has been in other districts in New Zealand. Currently the District Plan does not specify the minimum allotment sizes within the Rural Zone and subdivision is controlled through an assessment process, rather than managed through density standards. In future this could lead to increased fragmentation which could impact on the rural productivity of the district.

Macfarlane Rural Business have been engaged by the Mackenzie District Council (MDC) to undertake a rural economic assessment of different farm enterprises, with specific emphasis on the minimum rural lot size required to maintain farm productivity and profitability. A range of factors impact the farming enterprises undertaken in different regions of the district and the following are considered the main influencers on farm type and production and will be covered in this review:

- Soil type and depth.
- Land topography.
- Climate.
- Access to irrigation.
- Altitude and the impact this has on the seasonal variation and the "growing season".
- Property Size with regards to the minimum critical size for a farming system to be viable.
- Proximity to further processors and markets.
- Availability of expertise and industry infrastructure.
- Access to skilled labour.
- Reverse sensitivity restrictions.

In undertaking this report the Boffa Miskell "*DRAFT Eastern Mackenzie Rural Character Study*" has been used as a reference with regards to sub-zones and mapping, however the focus of this report is on rural production and does not give regard or provide insight into rural character. Some of the maps presented in the Boffa Miskell study will be used in this report. Whilst every endeavour has been made to provide an informed view on the effect land parcel size has on productivity and profitability, the intention is not to recommend precise land use and or zoning options.

2.0 RURAL ZONES AND LOT SIZES

Table 1 shows the proposed lot sizes of the different zones within the Eastern Mackenzie District and relates to the areas mapped in figure 1 supplied by MDC.

Table 1: Eastern Mackenzie District Lot Size by Zone.

	General Rural Zone	Eastern Plains Specific Control Area	Outstanding Natural Landscape (ONL) Overlay
Restricted Discretionary	100ha	20ha	200ha
Discretionary	N/A	4ha	N/A
Non-Complying	<100Ha	<4ha	<200ha
Reference to Figure 1	Unshaded Area	Yellow Area	Pink Area

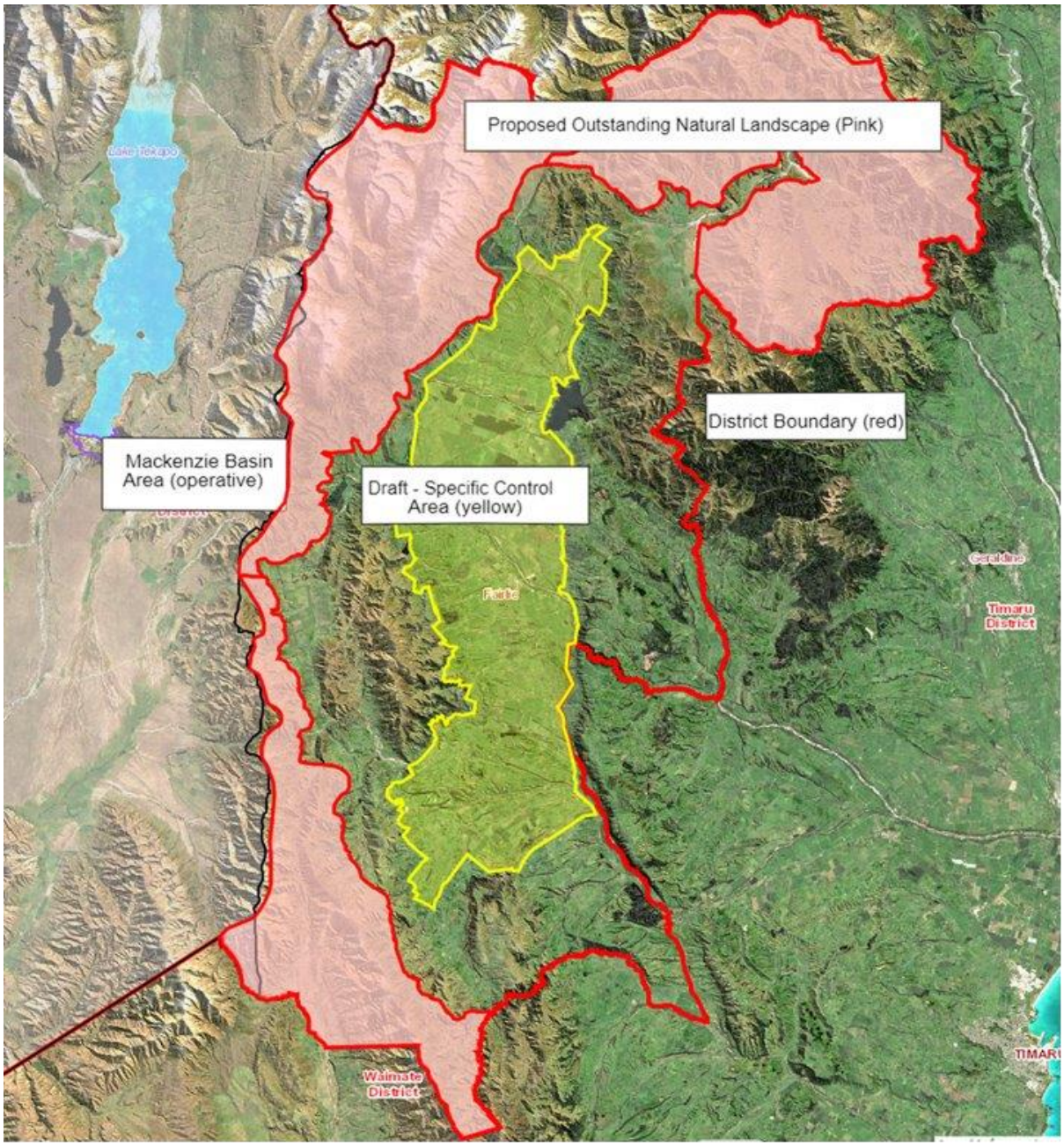


Figure1: Eastern Mackenzie District Zones
Source: MDC

3.0 CURRENT LAND USE AND CAPABILITY

3.1 Current Land Use

Figure 2 shows the current land cover in the Eastern Mackenzie and is reflective of the land use.

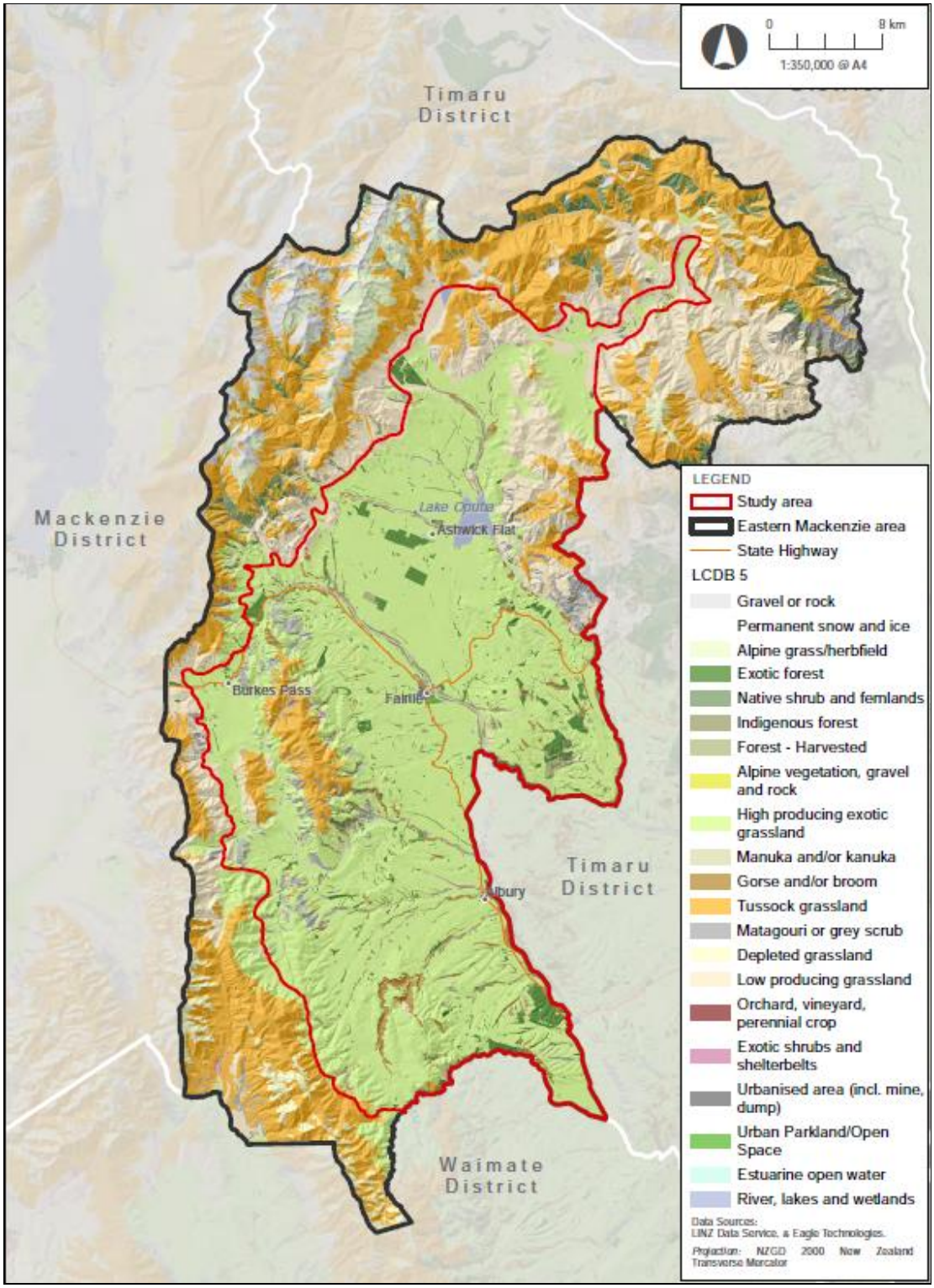


Figure 2: Landcover
Source: Boffa Miskell "DRAFT Eastern Mackenzie Rural Character Study"

The Outstanding Natural Landscape (ONL) zone shows a predominance of tussock and low producing grassland, which is reflective of the extensive high country livestock farming that takes place in parts of this zone. The General Rural Zone has large areas of high producing exotic grassland which supports a range of pastoral systems. There are also areas of cropping, that are not clearly shown on figure 1, as well as some forest areas.

3.2 Land Capability

The Land Use Capability (LUC) system was introduced to classify land in New Zealand according to it's long term capability to sustain one or more productive uses based on physical limitations and site specific needs. There are eight LUC categories with 1 being the most productive and versatile and 8 being unusable for rural productive use, including forestry, and is often conservation land.

Figure 3 displays the distribution of LUC in the Eastern Mackenzie District.

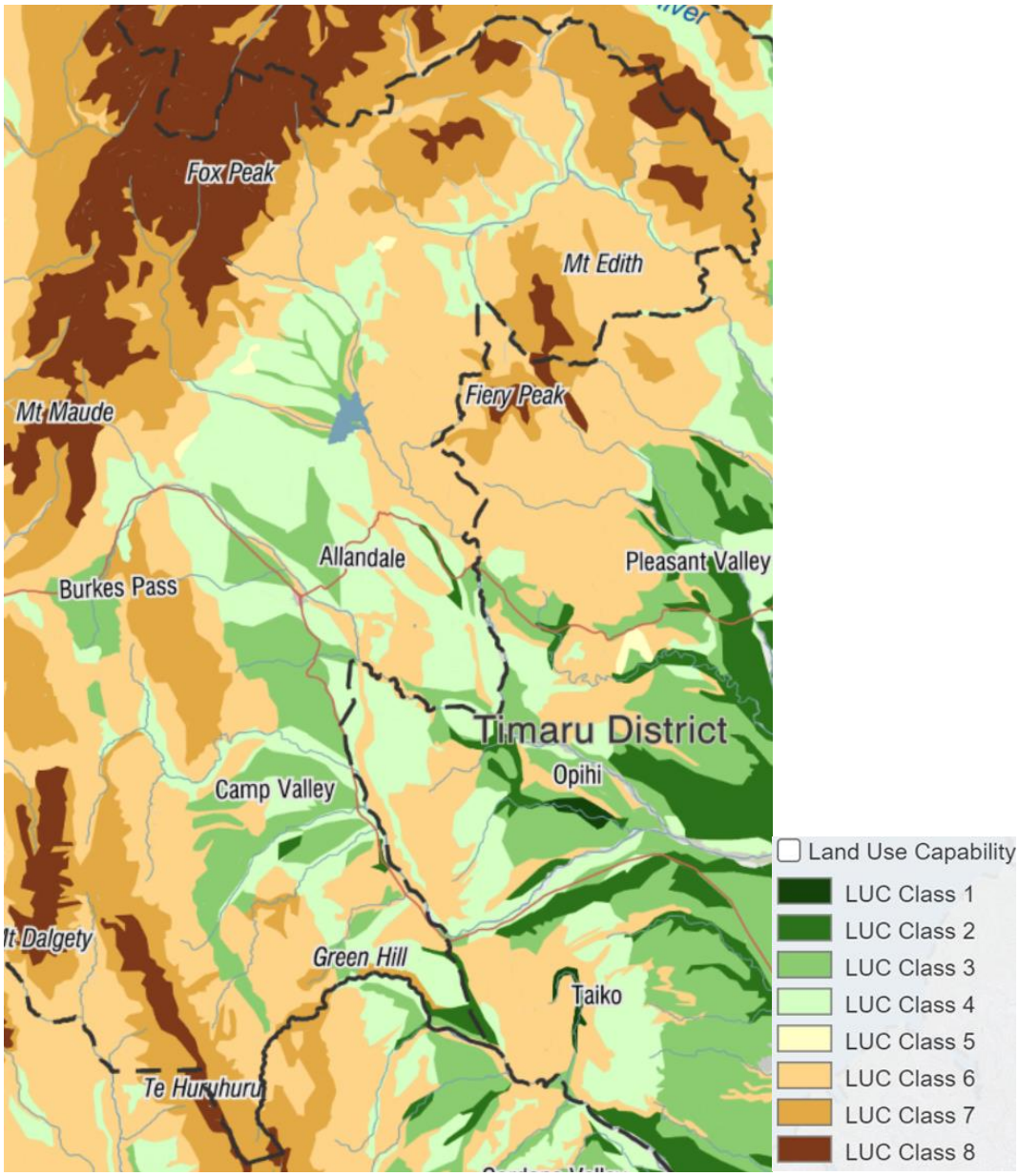


Figure 3: LUC in the Eastern Mackenzie District
Source: ourenvironment.scinfo.org.nz/maps

When comparing figures 1 and 3 it is evident that large areas of the ONL are LUC 6 - 8 which is either non suitable for rural production (LUC 8) or more suited to more extensive pastoral farm systems. The higher altitude of this zone (refer figure 10) will also limit rural production options.

The General Rural Zone has a predominance of LUC 2 – 4 land supporting the more intensive livestock and cropping systems. The main area of LUC 7 land in this zone is on the Albury Range and Hunters Hills.

3.3 HIGHLY PRODUCTIVE LAND (HPL)

The National Policy Statement for Highly Productive Land (NPS-HPL) come into effect on 17th October 2022.

The NPS-HPL aims to retain the overall productive capacity of HPL land over the long term (being 30 years), to limit the loss of this land from being used for land-based primary production. Land based production is determined as production from agriculture, pastoral, horticultural, or forestry activities, that is reliant on the soil resource of the land.

The NPS-HPL does not dictate the size of a lot that will guarantee the productive capacity of HPL will be retained. This will be dependent on a range of factors and will vary from region to region.

Highly Productive Land (HPL) is classified as LUC 1, 2 or 3, as mapped by the New Zealand Land Resource Inventory or by any more detailed mapping that uses the LUC classification. It is unknown if the MDC has undertaken specific mapping for HPL, so figure 4 has been used as a reference for the locality of HPL land.

Key policies in the NPS-HPL with regards to rural production that are considered applicable to this report include:

Policy 1: Highly productive land is recognised as a resource with finite characteristics and long-term values for land-based primary production.

Policy 4: The use of highly productive land for land-based primary production is prioritised and supported.

Policy 6: The rezoning and development of highly productive land as rural lifestyle is avoided, except as provided in this National Policy Statement.

Policy 7: The subdivision of highly productive land is avoided, except as provided in this National Policy Statement.

Policy 9: Reverse sensitivity effects are managed so as not to constrain land-based primary production activities on highly productive land.

Key clauses with regards to lot size on HPL land include 3.7, 3.8 and 3.10 and are shown in appendix I.

Figure 4 shows that the majority of HPL in the Eastern Mackenzie District is LUC 3 and is situated to the west of State Highway (SHY) 8 between Cave and Kimbell and on the flats immediately north of Fairlie. Much of this area is not irrigated (refer figure 7) and this will limit the production potential of this land. There are also other areas of HPL above lake Opuha, in the Pareora gorge below Cave and in the Rollesby Valley.

The loss of HPL through fragmentation to lifestyle properties needs to be considered with regards to subdivision rules and the loss of potential rural productivity.

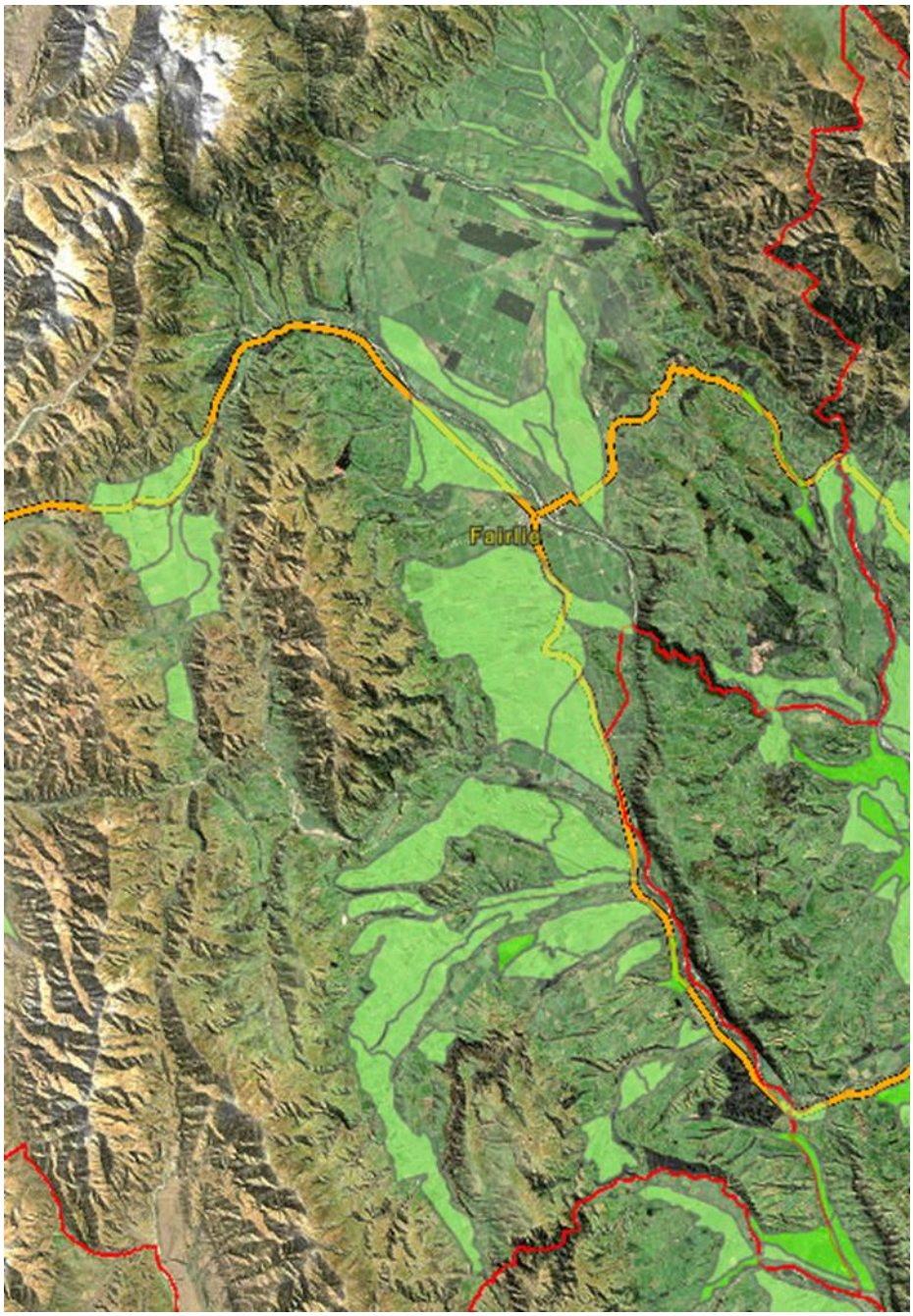


Figure 4: HPL in the Eastern Mackenzie District
Source: Canterbury Maps

4.0 LAND FRAGMENTATION

In the "Our Land 2021, New Zealand's Environmental Reporting Series", land fragmentation was referred to as the subdivision of land into smaller pieces, including subdividing agricultural land into smaller areas and building houses on agricultural land. Fragmentation of highly productive land shifts this land out of commercial production and happens particularly with the development of lifestyle properties.

Once lifestyle blocks become established in rural areas the land value of nearby farmland can escalate to a level that is no longer economic to purchase for rural production. As a result adjoining properties often themselves get split up for lifestyle properties. Once this land is subdivided and developed for lifestyle properties, the effect on productive potential is almost invariably irreversible and the land will not be available for future commercial farming. Some of the rural production systems undertaken on more productive land cannot be efficiently transferred to other land classes and, therefore, a conversion of this highly productive land to lifestyle properties would either curtail these systems or make them significantly less efficient.

The establishment of lifestyle properties in rural areas can also lead to reverse sensitivity where rural practises can be restricted on nearby properties due to complaints from owners of these residences. This is covered in more detail in section 5.9.

In general, smaller lifestyle blocks tend to be less productive than commercially farmed properties due to the following factors:

(a) Insufficient management expertise such as crop husbandry, grazing management, irrigation, soil nutrient management and agricultural business management.

(b) A significant area of lifestyle properties is used for houses, buildings, grounds and non-productive activities such as grazing horses and ponies.

(c) Insufficient business size to invest in the best infrastructure and technologies.

(d) Insufficient land size to grow the best crops and to implement a suitable cropping rotation.

(e) Reduced re-grassing resulting in poorer producing and lower quality pastures. Re-grassing is generally not undertaken as frequently on a lifestyle property due to:
   (i) lack of a cropping and re-grassing programme,
   (ii) lack of management expertise; and
   (iii) the high cost of preparing and re-grassing small paddocks.

(f) Grazing management on small lifestyle properties is often poor given the lack of paddocks, livestock numbers and management expertise.

(g) Increased costs per hectare due to the lack of scale and small paddock sizes.

5.0 KEY IMPACTS ON FARM TYPE & PRODUCTIVITY

The type of farm system that is adopted on farms, and correspondingly impacts productivity, is primarily determined by the topography, climate, soil type, altitude and access to irrigation. However, regardless of these factors, the establishment and implementation of a commercial farming business will also require a minimum land area to be economically viable. Proximity to further processors and markets and management expertise and profitability of different enterprises will also impact on the choice of farm system implemented by the landowner.

5.1 Climate

The main climatic impact on primary production is rainfall during critical growing periods. Figure 5 shows the 30 year annual rainfall from 1981 to 2010 obtained from NIWA for the Eastern Mackenzie region. This demonstrates the lower annual rainfall (under 700mm) to the west of SHY8 (lower red line) and in the Fairlie basin and the importance of irrigation (refer figure 7) in these areas with regards to farm system diversification opportunities.

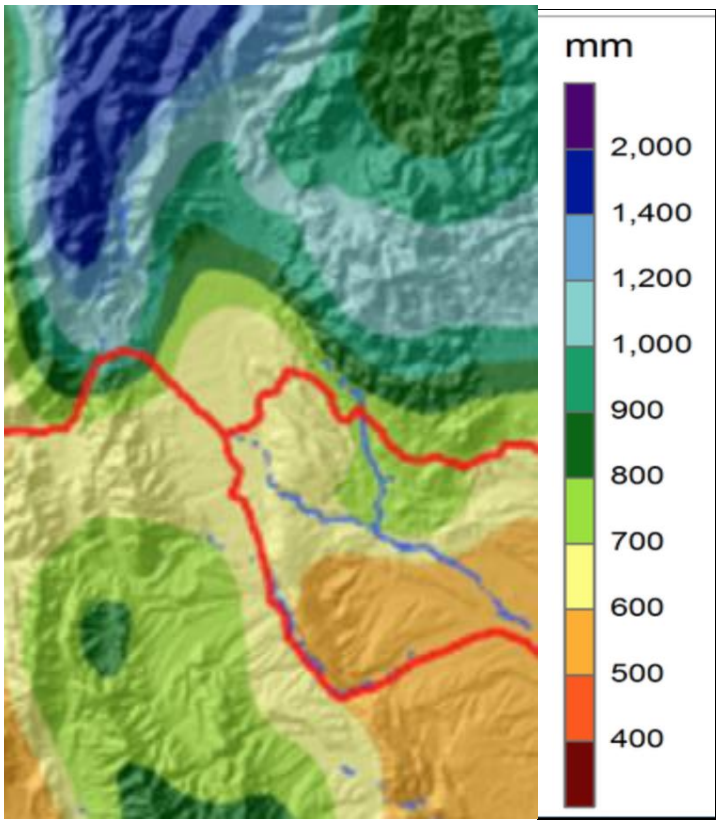


Figure 5: Annual Rainfall (1981 – 2010)
Source: NIWA
Fairlie is at the intersection of the 3 red lines.

Air temperature, and subsequent soil temperatures, at critical times of the year, primarily spring and autumn will also influence land use capability across the region. This will impact on the ability to produce some crops, generally in the higher altitude areas in the western and southern parts of the district. Figure 6 demonstrates the variance in annual average temperature across the South Canterbury region, and that the average annual temperatures in the Eastern Mackenzie District are significantly cooler than near the coast. Whilst these temperatures are suitable for pastoral, arable

cropping and forestry, they may restrict other options such as horticulture. Late frosts in Spring/Summer and early frosts in autumn can also impact what crops can be grown.

Wind speed and frequency has not been considered but this would also influence the areas suitable for horticultural establishment.

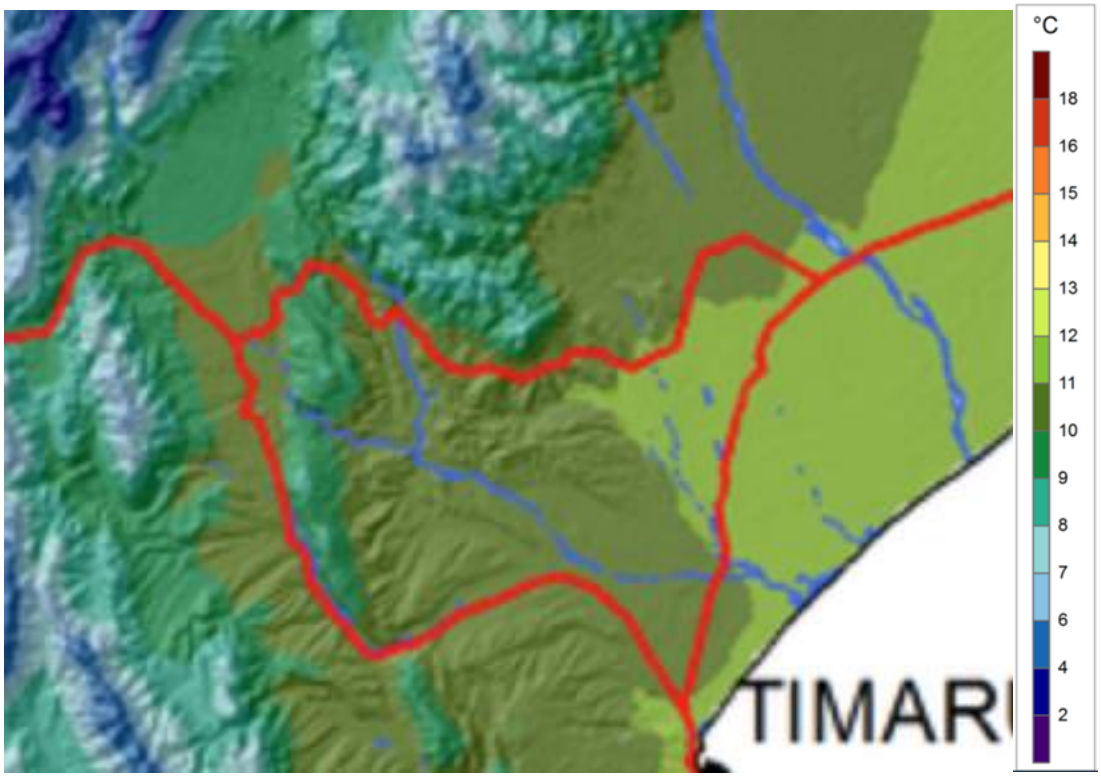


Figure 6: Annual Average Temperature (1981 – 2010)
Source: NIWA

5.2 Irrigation

Irrigation in the Eastern Mackenzie District is displayed in figure 7, with the majority of water supplied from the Ophua Irrigation Scheme. Comparing figures 3 and 7 shows that a significant amount of the irrigation takes place on LUC 4 land, further enhancing its productive potential. It should be noted that figure 7 was copied from a high level study undertaken over the whole of New Zealand and there may be some inaccuracies.

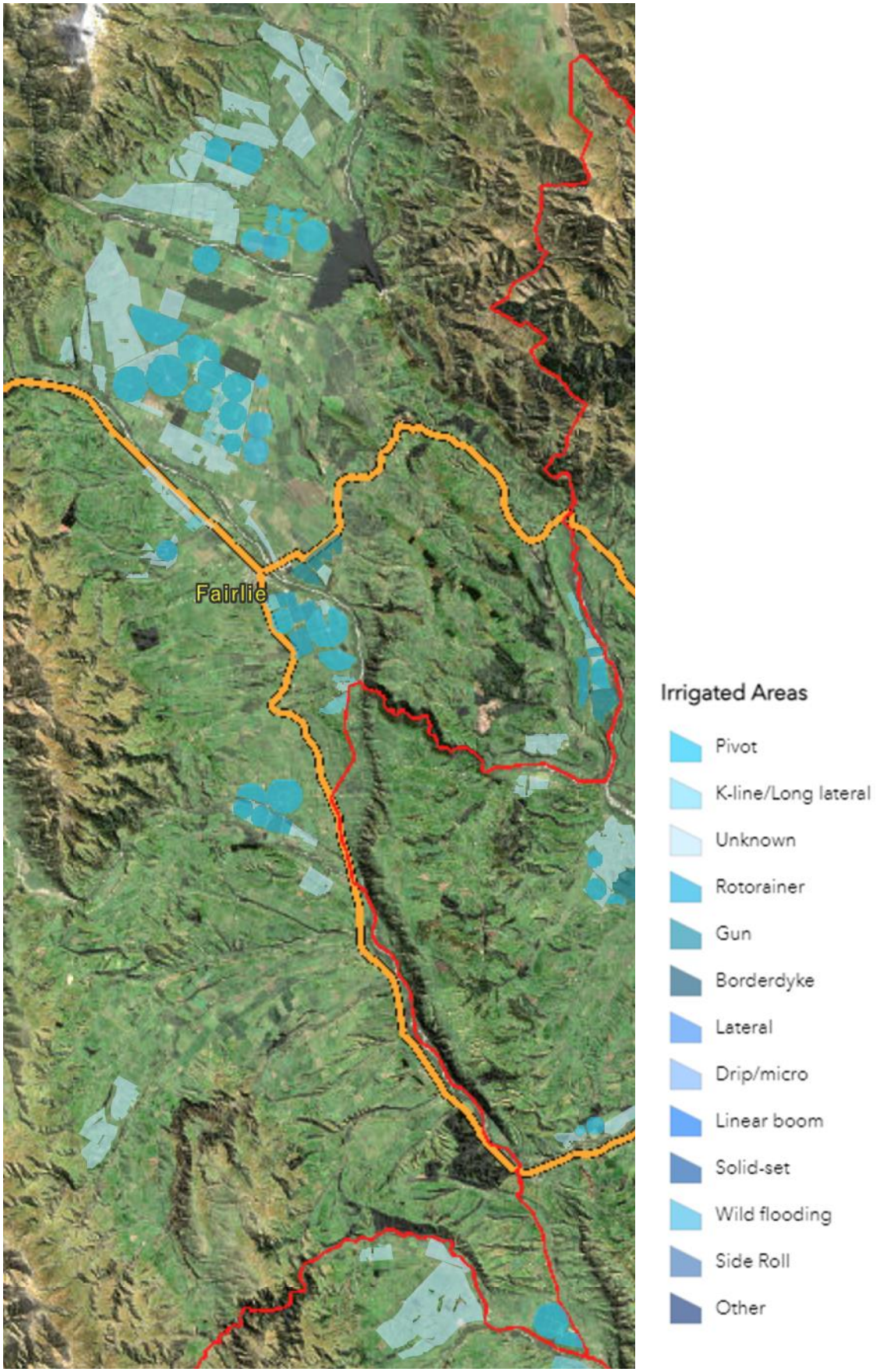


Figure 7: Irrigation in the Eastern Mackenzie District
Source: Canterbury Maps

5.3 Soil Type

Soil depth, water holding capacity, fertility and structure have a major impact on farm productivity and the type of farm system that can be implemented. Typically, a deeper soil will have better water holding capacity, organic matter and fertility. As a result, providing they do not become waterlogged, the deeper soils generally provide better structure for plant root growth, have increased nutrients available and retain more moisture within the root zone compared to lighter, more shallow soils where the moisture leaches more rapidly below the roots. Figure 8 displays the range of soil depths in the Eastern Mackenzie District as mapped by S-Maps, and in most cases the deeper soils correlate with the LUC 2 - 4 soils shown in figure 3.

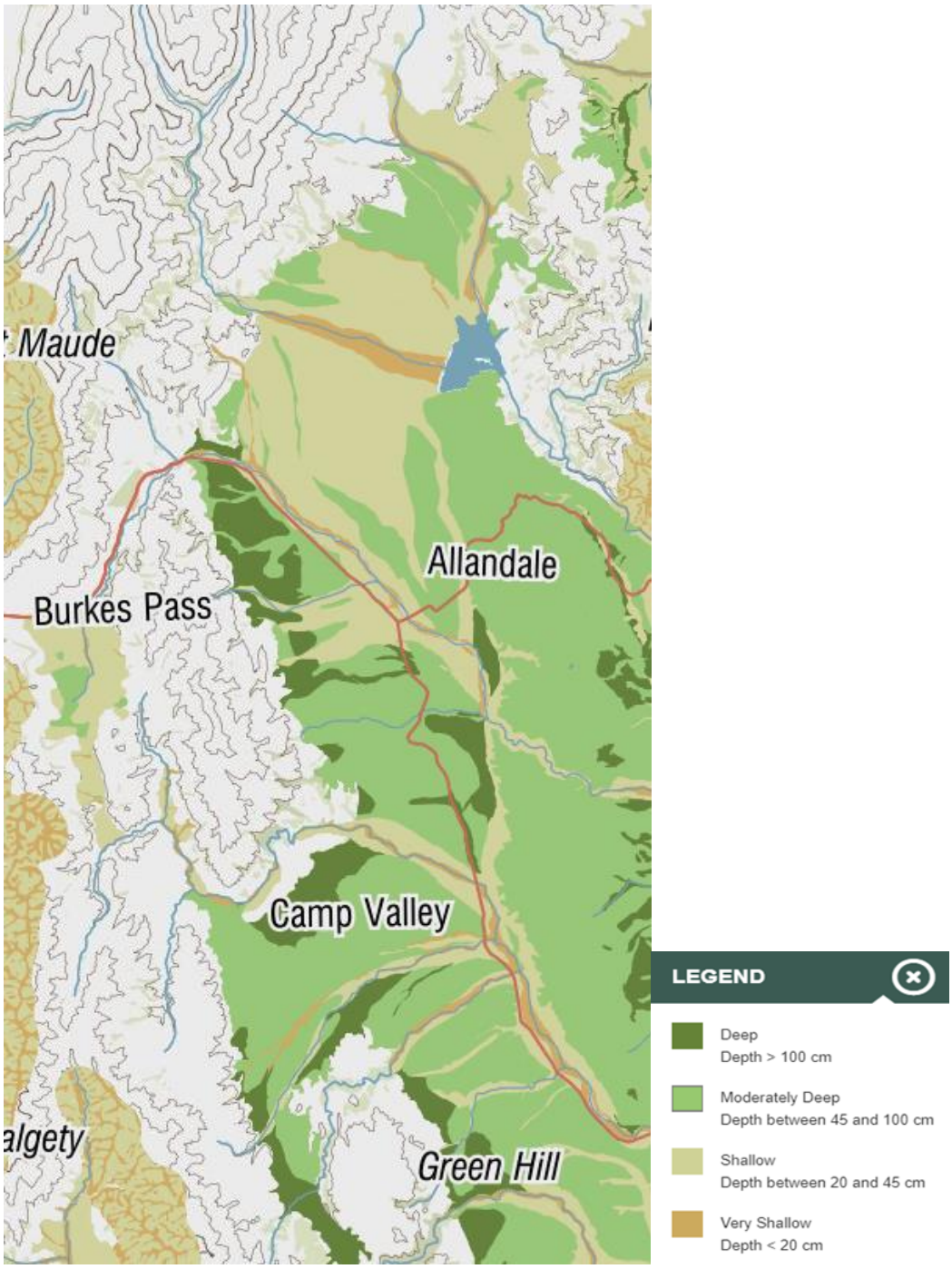


Figure 8: Soil Depth
Source: S-Maps

5.4 Topography

Topography can influence the type of farm type due to two factors:

i. Hill country is often at a higher altitude and can impact on production as discussed in section 5.5.
ii. Steeper land can limit the farm type due to the inability to install infrastructure, difficulty in manoeuvring vehicles and cultivation equipment, inability to install efficient irrigation systems and the risk of soil erosion.

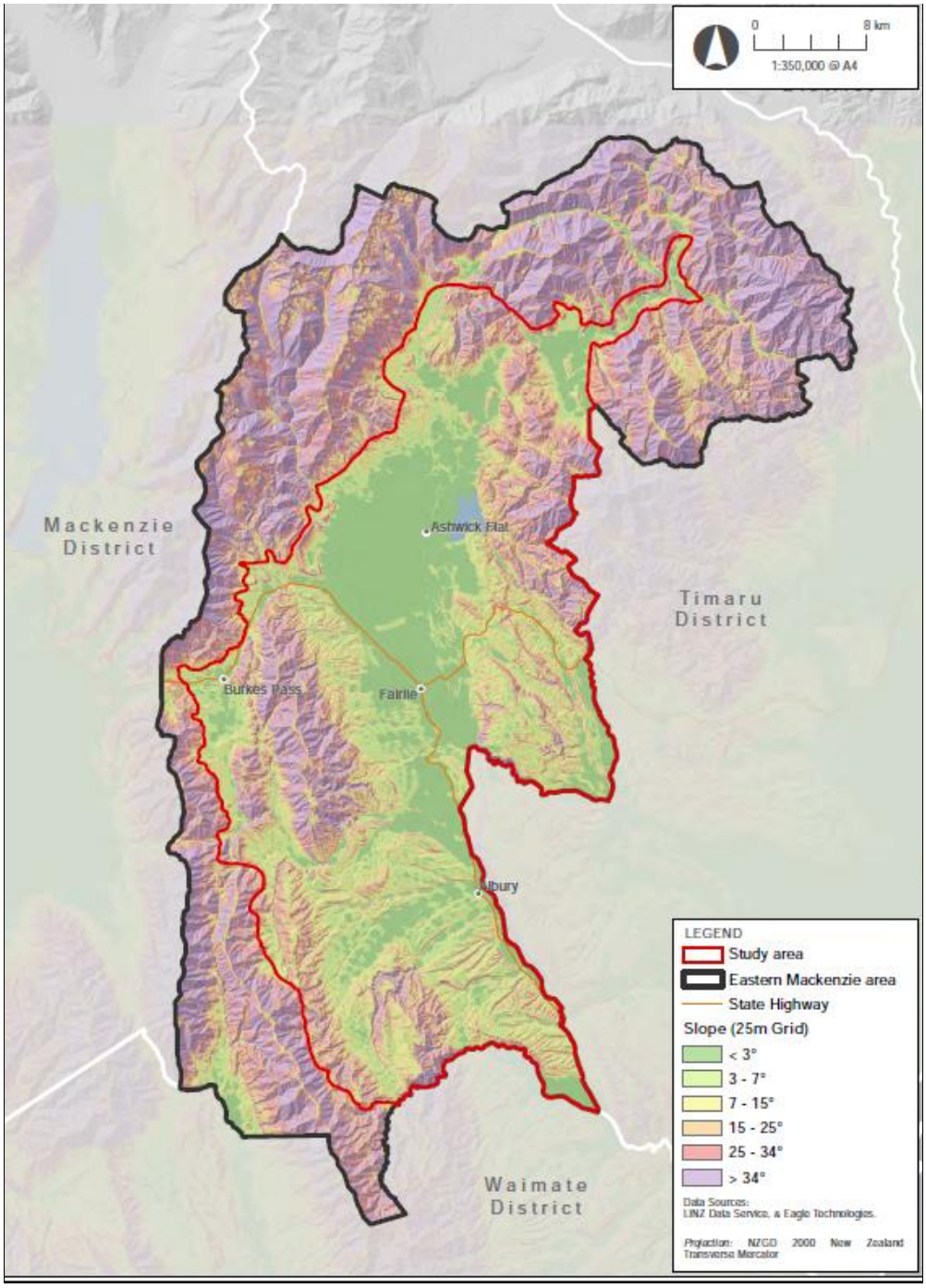


Figure 9: Slope Steepness in the Eastern Mackenzie District
Source: Boffa Miskell "DRAFT Eastern Mackenzie Rural Character Study"

Figure 9 shows that a large proportion of the Eastern Mackenzie District is flat or undulating, being less than 8^{o} slope, allowing a range of cropping and pastoral options. There is also a significant amount of rolling land (8 – 15^{0} slope) that would also allow some cropping.

5.5 Altitude

Altitude typically determines the length of the plant growing season, the risk of snow and the prevalence of late frosts. Figure 10 demonstrates that, with the exception of land west of SHY 8 between the Tengawai and Pareora rivers, south-east of Fairlie and between Raincliff and SHY 79, the remainder of the Eastern Mackenzie District is above 300m. This could impact the type of crops grown such as specialty seeds and horticultural crops.

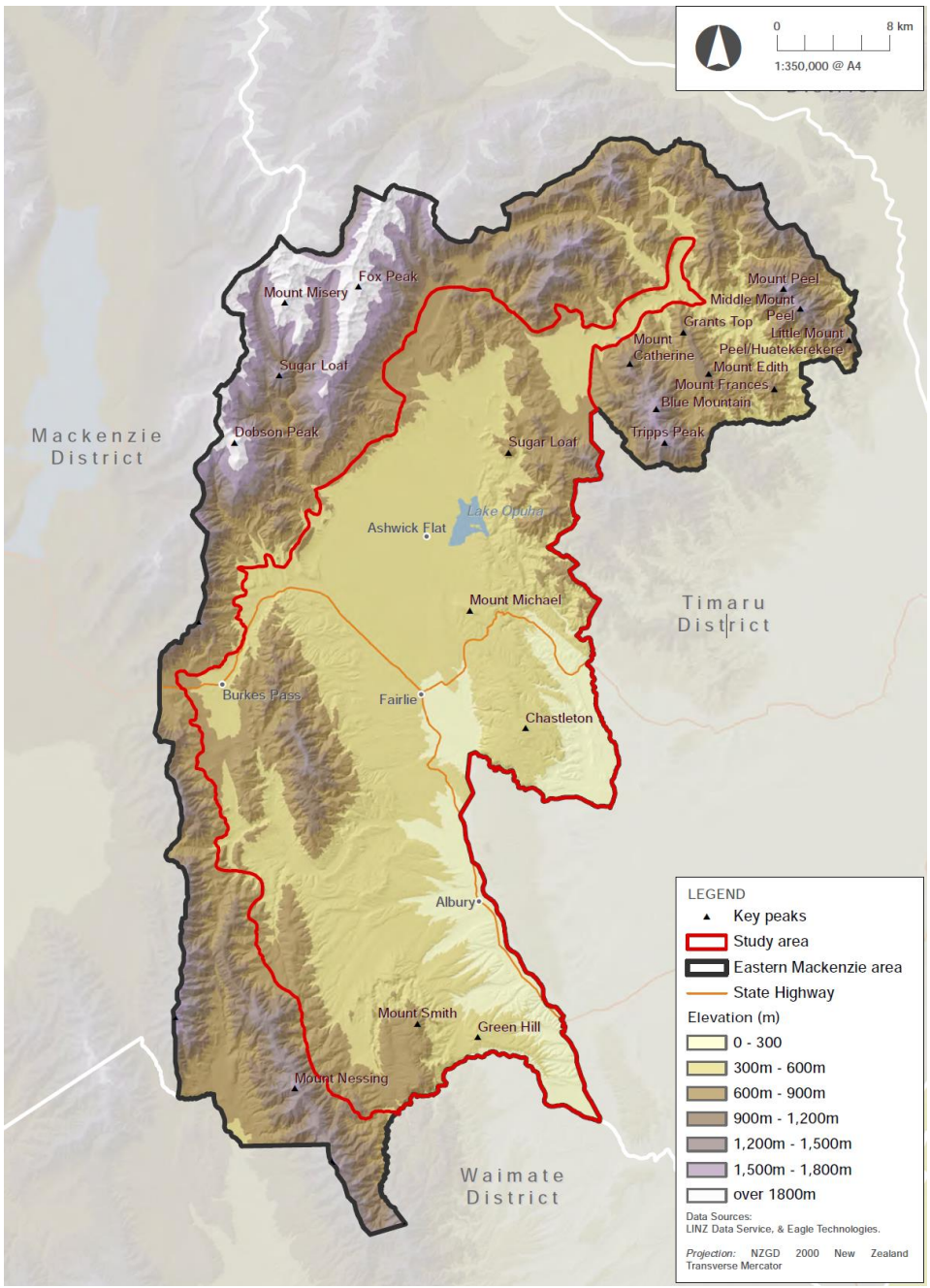


Figure 10: Elevation in the Eastern Mackenzie District
Source: Boffa Miskell "DRAFT Eastern Mackenzie Rural Character Study"

5.6 Management Expertise

Management expertise is important with regards to managing climatic variations and extremes, and in the development of intensive high performing pastoral and cropping or horticultural farm systems. The ability to manage climate extremes is particularly important in the high country where extremes of cold and dry conditions are prevalent. With regards to the higher producing areas of the district, management expertise is critical in developing farm systems that are economically viable and sustainable, given the higher value of land and the introduction of high-cost infrastructure (e.g. irrigation) and machinery and plant. These are typically more intensive specialist operations (e.g. dairy farming v's cropping) that require a unique set of management skills, usually obtained through years of experience and training. As farms become larger the standard of management and financial skills generally increases and/or there is sufficient scale to employ outside expertise. More specialist high value crops and horticulture whilst making small properties more viable, generally require a significantly higher level of expertise and management.

When reviewing the ability to efficiently farm smaller properties, the expertise level of the owner/operator is important. Many lifestyle block owners have limited agricultural knowledge with regards to simple crop husbandry, irrigation, grazing management etc., and as a result the productivity off this land is often compromised.

5.7 Scale

The minimum land size required to maintain rural productivity is not necessarily determined by the overall area required to sustain a profitable business. The critical consideration is what contiguous land area is required to implement production systems that optimise the performance per hectare. The minimum required land area will alter depending on soil type, climate, topography, access to irrigation and the type and intensity of the farm system. The following examples demonstrate the importance of economies of scale and why a minimum land area is required:

- Infrastructure Investment. A minimum level of scale is required to invest in critical infrastructure such as advanced irrigation systems, farm buildings ,crop storage and handling, machinery etc. Smaller properties including lifestyle properties can often not justify the investment required.
- Compliance: With an increasing focus on sustainability and the impact of farming on the environment, monitoring and auditing costs have increased significantly. Whilst small properties individually have minimal impact, collectively they could have a significant impact.
- Production Costs: There are a number of fixed costs associated with primary production that become excessively high per hectare when farming small areas. For example, contractors, transport companies and service people will charge at a higher rate per hectare on small properties due to travel time and the increased time per hectare required to cultivate, spray etc. small paddocks. Furthermore, agricultural equipment has increased in size to gain efficiencies and is generally not suited to small paddocks.
- Leasing of Land: Some larger cropping operators lease ground to grow annual crops. Typically, a minimum paddock size of around 20 hectares is required to maintain production and logistical efficiencies although this can be smaller if the paddock is adjoining or nearby other paddocks of the Lessor or the crop grown is of higher value. Land leased for livestock grazing (e.g. dairy support) could be smaller paddocks but an area of at least 20 ha would be required for a reasonable mob (50 – 100 head) of dairy heifers.
- Pasture Renewal and Cropping Rotations: To maintain pasture productivity, regular grass renewal needs to be undertaken. This can be difficult to achieve on smaller properties, such as lifestyle blocks, and as a result the annual herbage production is often significantly less on these properties compared to a larger commercially operated farm. Pasture renewal is also

often part of a cropping cycle, as many crops cannot be grown in successive years and land intensively cropped typically requires a break from cropping so soil structure and fertility is maintained.

- Grazing Management: It is generally difficult on small lifestyle properties to graze the properties in a manner that maximises feed utilisation. Often on lifestyle properties, longer poor-quality feed can be seen of which a significant amount is wasted and/or mown.

5.8 Access to End Users, Markets and Labour

Despite a regions ability to develop different primary production systems, access to customers and markets will have a major impact on the ability to sell the produce and the cost of getting it to market. This is particularly applicable for cropping and horticulture where there are not developed markets, or it is difficult to get perishable commodities to market. For example, cropping farmers in the Eastern Mackenzie District may not have access to growing specialty seed crops that their cohorts in Mid-Canterbury do. The Eastern Mackenzie District is a significant distance from a major city or international airport and this could also impact market access and the costs of getting product to market.

Sheep, Beef & Deer

Pastoral producers of meat and wool have access to a number of well-established buyers and processors. Market channels for sheep, beef and deer farms are well established with meat companies paying freight to a range of processing facilities depending on the company supplied. There are two main meat companies in the South Canterbury region, being the Alliance owned Smithfield and Silver Fern Farms owned Pareora, with meat plants also located in the Waitaki and Mid-Canterbury Districts. Store stock sales occur at Temuka, being one of the larger saleyards in the South Island, and a large number of livestock are also traded directly between farms.

Dairy Farming

Dairy farming is well serviced by three major dairy factories in South Canterbury with Fonterra's two facilities at Studholme and Clandeboye and the Oceania milk factory between Waimate and Glenavey.

Cropping

The main crops grown in the Mackenzie District are cereals, pulse crops, cereal and maize silage and winter feed crops. Whilst a number of farms grow crops for their own use, there is also a significant amount of crop sold to other farmers and end users. The increase in the Dairy herd (refer section 6.2) has created a higher demand for barley, feed wheat, silage and winter feed crops. Other markets for feed grain outside of farm-to-farm sales include piggeries, chicken and egg producers and cattle feedlots.

The Farmers Mill in Timaru mills wheat for biscuits and Goodman Fielder in Christchurch is the next closet wheat mill. The only large-scale producer of malt in New Zealand is Malteurop. They have a storage facility in Ashburton, before it is shipped to the North Island for processing. Oil seed grown in the Mackenzie District is transported to the Good Oil plant in Rolleston for processing.

There is a limited area of specialty and vegetable seeds grown and this is possibly due to a lack of infrastructure for the growing of these crops, the risk of out of season frosts, lack of irrigation and that growers in the more established regions such as Mid-Canterbury get preference. Based on the Stats NZ 2022 data there does not appear to be many process crops grown, such as potatoes, onions and peas.

Forestry

Forestry is well supported with log exports from the Timaru Port as well as local timber mills.

5.9 Reverse Sensitivity

Movement of urban residents into rural production areas can lead to conflict with regards to what are acceptable farming practises (reverse sensitivity). Some agricultural practises, such as operating large machinery after hours, management of farm animals, odours specific to farm operations (for example making silage), burning, spraying and fertilising paddocks, pest control, bird scaring, frost protection and movement of slow vehicles or livestock on roads could be deemed unacceptable by a neighbouring lifestyle property owner. However, curtailing these activities could impact on the farm's productivity and on operational costs.

Given there has been limited fragmentation in the Eastern Mackenzie District to date, and that the majority of rural lifestyle properties are likely to be occupied by people with a rural background, it is unlikely that there are many reverse sensitivity issues currently.

6.0 FARM TYPE AND USE

This section reviews the major land-based production systems in the Eastern Mackenzie District. High level financial analysis is based on Earnings Before Interest Tax & Rental (EBITR) per hectare, except for forestry which is analysed on an Internal Rate of Return (IRR) basis. These financial analyses have been sourced from publicly available sources, personal communication as well as some internally held information. The data presented in this report is provided to give an indication on the profitability of different farm systems, but should not be used for analysis or benchmarking of individual properties.
EBITR excludes the cost of debt servicing, debt repayment and tax, but includes depreciation. As such this does not take into account the investment required for land and infrastructure. Where considered necessary, wages of management were added to the farm expenditure.

IRR analysis is the rate of return on an investment over a period of time based on income received and inputs invested, including the cost of land.

6.1 Sheep and Beef

Sheep and Beef (including deer) properties exist on a wide range of land classes in the Eastern Mackenzie District and can be broadly segregated into the following categories to align with the farm classes used in the Beef and Lamb NZ (B&LNZ) survey data for the Marlborough/Canterbury region shown in table 2.

i. High Country

These properties are typically in ONL areas but will have some lower country in the General Rural Zone. They are characterised by merino or halfbred breeding ewes and beef cattle, although some wetter areas in the ONL may have crossbred sheep. Higher areas of the ranges and hills in the General Rural zone such as the Albury, Rollesby and Sherwood ranges, Mt Nessing, Mt Walker and the Hunter Hills could be included in this farm type. Some farms also have deer for venison and/or velvet production. Livestock are generally sold as stores, although farms with better land may finish some livestock.

Comparable to B&LNZ Class 1.

ii. Hard Hill Country

This includes the higher rainfall and lower producing hill country on the Albury, Rollesby and Sherwood ranges, Mount Nessing, Mount Walker and the Hunter Hills. These properties will typically have crossbred breeding ewes and beef cows and will predominantly sell the progeny as store livestock.

Comparable to B&LNZ Class 2

iii. Medium Hill Country

This land type includes the lower slopes and rolling downs at the bottom of the ranges and hills documented in section 6.1 ii., as well as near Mt Michael, Cattle Valley and in the Middle Valley, Spur and Tondros road areas. These properties will generally finish their livestock but some store stock will be sold on dryer properties.

Comparable to B&LNZ Class 6 & 2

iv. Flat and Rolling Downs

Located on the Ashwick Flats, west of SHY 8 from Kimbell down to Cave, in the Cannington area and adjacent to Gudex Road, these areas have the capability to finish livestock if the land is not being used for cropping, dairy or dairy support. These areas can be seen in figure 9 as flat, undulating or rolling. Some of this land will also have irrigation.

Comparable to B&LNZ Class 6, 7 and 8 (mixed finishing)

Table 2 Shows the relative scale and financial performance of the B&LNZ farm classes that would be comparable to sheep and beef farms in the Eastern Mackenzie District. The B&LNZ Data is the average for 2020.21, 2021.22 (Provisional) and 2022.23 (Forecast). The Class 1, 2 and 6 information was taken from the Marlborough/Canterbury dataset, Class 6 is an average of the Marlborough/Canterbury and Otago/Southland datasets, and the Class 7 information was derived from the Otago/Southland dataset.

Within the B&LNZ classification system there is cross over between the farm class where some farms could identify as being both Class 2 and 6, and likewise Classes 6 and 7. It should be noted that livestock finishing is also undertaken on arable cropping farms and this is captured in B&LNZ Class 8.

High Country properties (Class 1) are considered the most extensive of all the farm classes, with the lowest livestock carrying capacity per hectare (1.6 SU/Ha). However, there is a large variation in land class (refer figure 3) on these properties ranging from LUC 7 which would have a carrying capacity under 0.5 SU /Ha to LUC 4 carrying up to 10 SU per hectare.

It should be noted that deer are predominantly farmed on the Class 1, 2 and 6 properties.

Table 2: Sheep and Beef size and performance by B&LNZ Farm Class – 2021 – 2023

Farm Class	1. S.I. High Country	2. S.I. Hill Country	6. S.I. Breeding Finishing	7. S.I. Finishing
Eastern Mackenzie District Land Type	*ONL and Higher Hill*	*Higher Ranges and Hills in the General Rural Zone*	*Easier Hill Country / Rolling*	*Flat, Undulating and Rolling Downs*
Farm Area (Ha)	8096	1597	533	256
Stock Units	12745	6486	4407	2748
Revenue/Ha	198	495	1347	1796
Expenditure/Ha	154	394	1062	1313
EBITR/Ha	44	101	285	483

Source: beeflambnz.com/industry-data
**Expenditure adjusted for Wages of Management*

6.2 Dairy and Dairy Support Farming

Dairy farming is typically the highest performing pastoral farming enterprise when measured by EBITR per hectare. With the Opuha irrigation development the late 1990's the Eastern Mackenzie District has seen an increase in the number of dairy farms and associated dairy support properties.

Table 3 Shows the average production and financial performance of dairy farms in the Otago/Southland and Canterbury regions for the 2020.21 and 2021.22 years. This data has been sourced from the Dairy Economic Survey published by DairyNZ.

Table 3: Dairy Production and Financial Performance in Otago/Southland and Canterbury – Y.E. 2021 & 2022

	Canterbury	Otago - Southland	Average
Effective Area	215	204	209
Stocking Rate (Cows/Ha)	367	307	337
Milk Solids per Ha	1562	1247	1405
Payout ($/Kg MS)	8.34	8.31	8.32
Gross Farm Income ($/Ha)	13807	11020	12413
Expenditure ($/Ha)	8734	7632	8183
Calculated EBITr ($/Ha)	5,074	3,388	4,231

Source: DairyNZ Economic Survey

When comparing the relative profitability (EBITR) between dairy farming and sheep and beef (Table 2), it is easy to see why farms have been converted to dairying, despite the considerable investment required in establishing a dairy shed, fences, lanes and irrigation as well as the purchase of cows. Based on the DairyNZ Economic Survey (2021.22 table 12.7), the operating return on dairy assets in New Zealand averages 5.7% compared to between 1.8% and 1.4% for the respective Class 7 and Class 6 farms listed in Table 2.

Whilst there is limited industry data on dairy support profitability, internal data in Canterbury and Otago shows EBITR results ranging from $700 to $1,500 per hectare depending on location, farm type and system, irrigation, grazing rates and management. Dairy heifer grazing is also undertaken on sheep and beef farms as part of an integrated farm programme. Arable cropping farms often also graze winter cows as part of their cropping rotation.

The large investment in fixed infrastructure on a dairy farm that can't be moved from the farm (eg dairy shed, tracks, irrigation etc) and the fact the cows have to be milked each day and can't be grazed on isolated blocks, means that during the milking season, dairy farms have to be self-sustaining. In comparison cropping farmers can move their plant and can therefore farm blocks isolated from the base farm. Similarly, sheep and beef or dairy support animals can be shifted to other blocks for grazing. The restriction on livestock moving from a dairy farm means that the minimum block size required to sustain dairy production will invariably be higher than for other livestock and cropping systems on the same land class.

It should also be noted that in accordance with the National Policy for Freshwater (NPS-FW), it will be very difficult to change farm type to dairy farming or dairy support, unless that type of farming was undertaken during the period 1 July 2014 – 30 June 2019. This will essentially exclude subdivision of land for a change to these two farm systems.

6.3 Arable/Mixed Cropping

Cropping farmers in Canterbury grow a number of different crops including:

- Cereals and legumes for food consumption or stockfeed.
- Seeds for birds.
- Seed crops for herbage and vegetable seed.
- Broadacre vegetable crops such as process potatoes and onions.
- Crops for oil production.
- Forage crops grown for silage (e.g. maize silage, cereal silage).
- Forage crops for wintering of dairy cows.

Crops grown change from season to season according to cropping rotations. The range of crops grown in the Eastern Mackenzie District is more limited due to market access limitations, shorter growing seasons, lack of irrigation, often steeper topography and access to expertise and industry infrastructure. Table 4 displays the area of crops grown (for own use or sale) in the whole Mackenzie District, excluding lucerne and pasture hay and silage crops, as recorded by Statistics NZ in 2022. The actual area of crop grown could be higher than that shown in table 4, but it does demonstrate that cereals are the predominant crop harvested.

Table 4: Crops grown for sale or own use in the Mackenzie District.

Crop	Hectares
Milling Wheat	793
Feed Wheat	790
Barley	1120
Oats	184
Other Cereal	267
Peas (Seed)	109
Other Pulses	305
Vegetable Seed	253
Forage Brassicas	4066
Other Feed Crops	1511
Cereal Silage/Baleage	1080
Maize Silage	98

Source: Statistics NZ 2022

Financial performance on cropping farms vary significantly depending on location, soil type and topography, access to irrigation, access to different crop options, distance to market and management.

For B&LNZ Class 8 Mixed Finishing Farms the average EBITR calculated for the 200.21, 2021.22 and forecast 2022.23 years was $762/Ha. On the farms in this database, crop revenue contributed to 67% of total income. Other Canterbury and Otago results from internal data and information supplied from other sources showed a range of EBITR from $860 to $1,780 per hectare. Given the limitations in growing higher value small seeds and process vegetables, and that a lot of crops are grown without irrigation it is expected the EBITR of cropping properties in the Eastern Mackenzie District would be lower on average than their counterparts in Canterbury. It is also probable that a significant area of crops grown are part of an integrated sheep and beef or dairy support farm system.

Typically, the number of cropping/arable enterprises are decreasing but increasing in scale. Increasing scale allows investment in larger more efficient vehicles and plant, saving costs, including labour. It also enables the management expertise to be utilised over a greater area. As a result, most specialist cropping farms are owner-operator businesses.

6.4 Forestry

Figure 2 shows that there is already significant exotic forestry across the district with larger forest blocks located in the following areas:

- Between SHY8 and Burnetts Road.
- Raincliff and Middle Valley.
- Mt Michael.

- Ashwick Flat below the South Opuha River.
- Between Stoney Creek and the North Opuha River.
- Adjacent to SHY8 between Mt Dobson and Burkes Pass.
- On the East of the Albury Range near Fairlie and Kimbell.

When comparing figures 2 and 3 it can be seen that, with the exception of the forests on the Ashwick Flat, the majority of the larger forestry blocks are situated on LUC 6 land. The Ashwick Flat forests are situated on LUC 4 land.

There are also smaller areas of forestry integrated with other farm systems.

The major factors impacting the ability to plant a forest and the sustainability and profitability of it are:

- Altitude – Typically forests aren't planted above 850m above sea level, with pinus radiata limited to 600 – 650m above sea level.
- Snow risk.
- Rainfall.
- Land Class and value.
- Temperature.
- Wind.
- Risk of Wilding Pines to the surrounding environment.
- Land accessibility.
- Log price.
- Carbon price.
- Distance to port for logging.

The Timaru Port is 62km from Fairlie and the furthest forests listed above are 80km from the port.

To register a forest in the New Zealand emission trading scheme the following criteria apply:

- Area greater than 1 hectare.
- No greater than 15m between potential canopy edge (mapping standard).
- Minimum 30m potential average width of the canopy.
- Minimum 30% potential canopy cover within the designated area.
- No more than a 1 ha gap within the canopy.

Production forestry income is based on logging and the sequestration of carbon. For any new production forest carbon sequestration must be accounted for under the averaging system, meaning that for pinus radiata, carbon units can only be collected for the first 16 years in the first forest rotation. If the forest is under 100 hectares carbon sequestration is calculated using the MPI carbon tables. If the forest is over 100 hectares the carbon sequestration is measured.

If pinus radiata trees are planted as a permanent carbon forest (no harvest) then the carbon is accumulated over 50 years.

An example of the IRR of a production forest (logs + carbon) is shown below:

- Land Value $4,000/ha.
- Time to Harvest 30 years.
- Trees Pinus Radiata.
- Average of Canterbury & Otago Regions MPI Look up tables used to calculate carbon sequestration.
- Carbon Units received for first 16 year.

- Log return net of costs and freight - $17,000/ha.
- Carbon Price $70 ($/NZU).
- Calculated IRR 10.0 %

If the forest is over 100 hectares and carbon sequestration is measured, it is likely that the carbon accumulated will be higher than calculated by using the MPI lookup tables.

If the forest was planted as a permanent carbon forest the IRR over 50 years would increase by approximately 2% using the same parameters listed above.

7.0 MINIMUM LOT SIZE TO SUSTAIN RURAL PRODUCTION

The minimum lot sizes proposed in the Eastern Mackenzie District review is documented in table 1, section 2. Section 7.0 reviews the potential minimum rural lot size to maintain rural production and profitability for different farm systems, using information presented in section 6, and is summarised in table 5.

As previously stated, the minimum lot size assessment is not based on the land area required to sustain a profitable business, but the area of contiguous land needed to optimise performance per hectare. The minimum lot size to sustain rural production documented in this section is the view of the author based on previous experience, knowledge and training, literature review and data collection and discussion with other experts and farmers. However, this information should not be considered advise to farmers or growers on what is the minimum area to sustain a profitable business, and this should be analysed on a case-by-case basis with a suitably qualified expert.

It should also be noted that when considering the minimum lot size, the effective average lot size will be higher. For example, if there is a predominance of existing properties in the 20 to 40 hectare range, a minimum lot size of 20 hectares will mean that properties of 39 hectares will not be able to be subdivided, and that the median size of these could be 30 hectares or higher.

7.1 Sheep and Beef

The assessment of the minimum rural lot size to maintain rural production is based on the information provided in section 6.1. The locality of the farm type is also considered, as this could impact the ability of a farmer to farm other small properties to create scale and/or have off-farm income if farming a smaller property.

i. High Country

Very extensive farms with low stocking density. Typically large properties, as low productivity per hectare, relatively high costs per stock unit and isolation requires scale. It is also difficult to move livestock to other blocks that are not part of the base farm, so the base farm must be self-sufficient. Some areas within the farm can be high producing and could support a lower lot size but overall the minimum lot size needs to be larger.

Minimum lot size of 200 hectares but could be in excess of 500 hectares in some more extensive areas.

ii. Hard Hill Country.

Relatively extensive with stocking rate below 5 SU/ha. Generally not as isolated as High Country properties. Minimum lot size required to maintain rural production will range depending on location and productivity of the property.

Minimum Lot size of 100 hectares but could be over 200 hectares.

iii. Medium Hill Country.

This farm type can cross over between Hard Hill and Rolling Downs and therefore the minimum lot size to maintain rural production could vary significantly between farms depending on their location, stocking rate and ability to finish livestock.

Minimum Lot size 40 hectares but could range from 20 – 100 hectares.

iv. Flat and rolling downs.
This is the most productive sheep and beef land class and will compete with dairying, dairy support and cropping.

Minimum Lot size 20 hectares.

7.2 Dairy Farming

Dairying is primarily located on better pastoral land and is often irrigated. Whilst this enterprise has the highest EBITR of all pastoral farm types (refer section 6.2), the minimum lot size required to sustain this system is assessed at 40 hectares. The large investment required in fixed plant (dairy shed) and the requirement to milk each day, means the cows cannot be transferred to different isolated blocks.

7.3 Dairy Support

These properties are located in a similar area to dairy farms but will include a higher proportion of dryland. They are farmed in a similar manner to Sheep and Beef finishing and require sufficient scale to enable grazing rotations. A minimum lot size of 20 hectares is considered appropriate.

7.4 Arable and Mixed Cropping

Cropping farms will compete for land use with dairying, dairy support and livestock finishing. However, due to the ability to rotate crops, cropping can easily integrate into other farm systems and can be part of a pasture renovation programme. Cropping farmers can more easily farm blocks isolated from the main property by taking vehicles and plant to that block or utilising contractors. However, to justify the time and cost in moving plant to a block or paddock, it needs to be of suitable scale. A minimum block size of 20 hectares is considered necessary to provide efficiencies of scale but this will increase as the distance from the main farm increases. Conversely a paddock of uniform shape near the main property could be smaller (down to 10 hectares). Another consideration with some grain and seed crops is bird damage, and a larger area of crop in the one location will dilute the impact of this.

7.5 Forestry

With the increased value of carbon ($/NZU), the higher profitability and the improved ability to cashflow forestry developments has resulted in a significant increase in the area of trees planted in New Zealand.

For production forestry (carbon + logs) it is the authors view that, depending on the location, topography and accessibility, it is desirable from an efficiency perspective to have a minimum planted area of 20 hectares to cover the cost of accessibility and skid sites and the cost of relocating the equipment to the site. A number of farms that have smaller sites will typically be utilising poorer quality land classes that are not productive in their pastoral or cropping operations.

Given the high IRR for carbon forestry (depending on the carbon price) it is conceivable that a small block (greater than 1 hectare) could be planted into trees and be profitable. However, this would typically only be applicable for lower value LUC 6 and 7 land. Most investors who purchase a block of land with intention of establishing a carbon forest would typically want a larger area.

7.6 Summary – Minimum Lot Size by Farm Type

Based on the commentary in sections 7.1 to 7.5, table 5 summaries the assessed minimum lot size to sustain rural production by farm production type.

Table 5: Minimum Lot Size to Sustain Rural Production for different Farm Types

Farm Type	Minimum Lot Size	Comments
High Country	200 - 500 Ha	Most extensive farm type. 1 – 3 SU/Ha.
Hard Hill Country	100 Ha	Typically higher rainfall, steeper farms at higher altitude . 4 – 7 SU/Ha.
Medium Hill Country	40 Ha	Lower hill and downland country. 8 – 12 SU/Ha.
Flat and Rolling Downs	20 Ha	Mixed livestock + some cropping. Compete with dairy support and cropping.
Dairy Farming	40 Ha	Increase area to support capital investment in dairy sheds etc. Inability to milk in other locations.
Dairy Support Farms	20 Ha	Similar to intensive Beef systems.
Arable and Mixed Cropping	20 Ha	Ability to crop isolated blocks. Some scale needed to cover cost of moving vehicles and plant.
Forestry – Production and Carbon Forests	20 Ha	Carbon forests could be less, but investors will typically want larger areas.

The minimum lot size in table 5 is 20 hectares, however it is acknowledged that there will be specific examples where rural production can be maintained on blocks below 20 hectares and the Proposed Eastern Plains Specific Control Area allows for discretionary subdivision down to 4 hectares. However, as discussed in section 4.0, it is difficult to maintain rural production below 10 hectares, particularly if it is used for lifestyle residential purposes. This is particularly relevant when considering the NPS-HPL (refer section 3.3) or any other irrigated land. When assessing the impact of subdivision on rural production the following factors should be considered:

- The area of unproductive land (e.g. area required for housing and non-productive domestic/lifestyle activities).
- Impact on the productive potential of the remaining farm area that land has been subdivided from.
- The true productive potential of the area with regard to soils, climate, altitude, topography and irrigation for the chosen enterprise.
- The profitability and sustainability of the business. Does the business provide sufficient return on capital and have the scale to generate enough cashflow to remunerate the owners and invest in infrastructure and technology.
- The industry outlook and projections to provide confidence of longevity.
- Realistic access to markets and the cost of getting produce to market.
- Size of the market and is there enough room for new entrants.
- Current industry scale and infrastructure.
- Access to industry expertise and services.
- Access to suitably skilled labour when required.

Consideration should also be given to Clause 3.10 (2) in the NPS-HPL (refer appendix I) if an applicant considers there are permanent or long-term constraints on the HPL, therefore justifying subdivision.

8.0 ONL Zone and Rural Character Areas

The ONL overlay (refer table 1) has a minimum lot size of 200 hectares. The majority of land within this zone would be considered High Country farm land or conservation land and therefore the minimum lot size required to maintain rural production of 200 – 500 hectares presented in table 5 correlates or exceeds the proposed minimum lot size.

The Boffa Miskell report identified six Rural Character Areas (RCA) within the General Rural zone and these are displayed in figure 11.

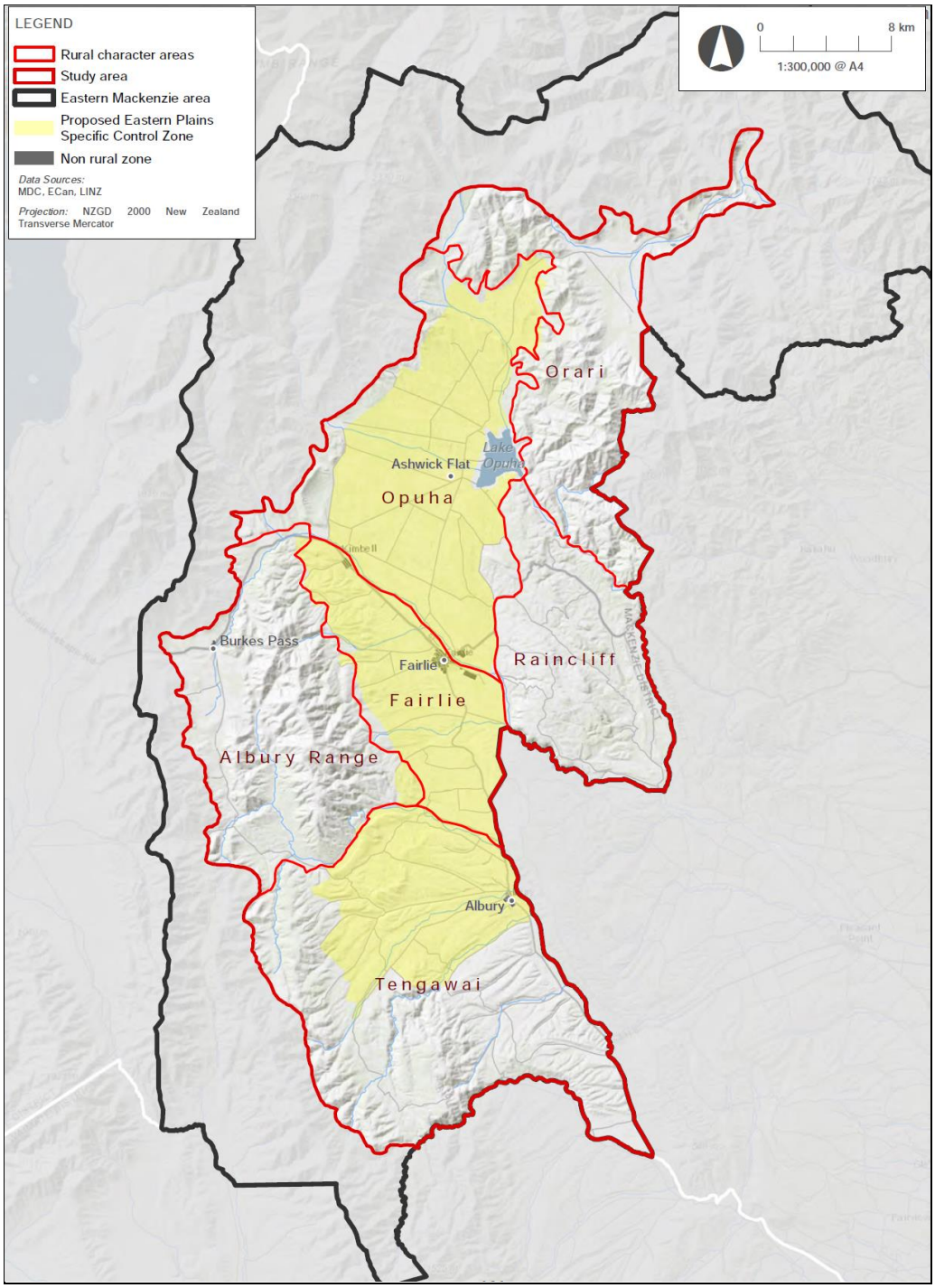


Figure 11: Rural Character Study Areas
Source: Boffa Miskell "DRAFT Eastern Mackenzie Rural Character Study"

8.1 Orari Rural Character Area

None of the Orari RCA is within the Proposed Eastern Plains Specific Control Area and therefore the minimum lot size is 100 hectares. The majority of this RCA would be classified as harder hill country which, in reference to table 5, requires a minimum lot size of 100 hectares to maintain rural production.

The area around Mowbray Road and to the north of Lochaber road is a better class of country with flat topography (refer figures 3 & 9) and could potentially farm productively at a lower lot size. However, given the land is above 550m, is prone to snowfalls and is relatively isolated, land use options are restricted. This land is also likely to be part of a larger property and would provide support to less productive country.

A large proportion of the Orari RCA is also within the Significant Natural Landscape (SNL) overlay as shown in figure 12.

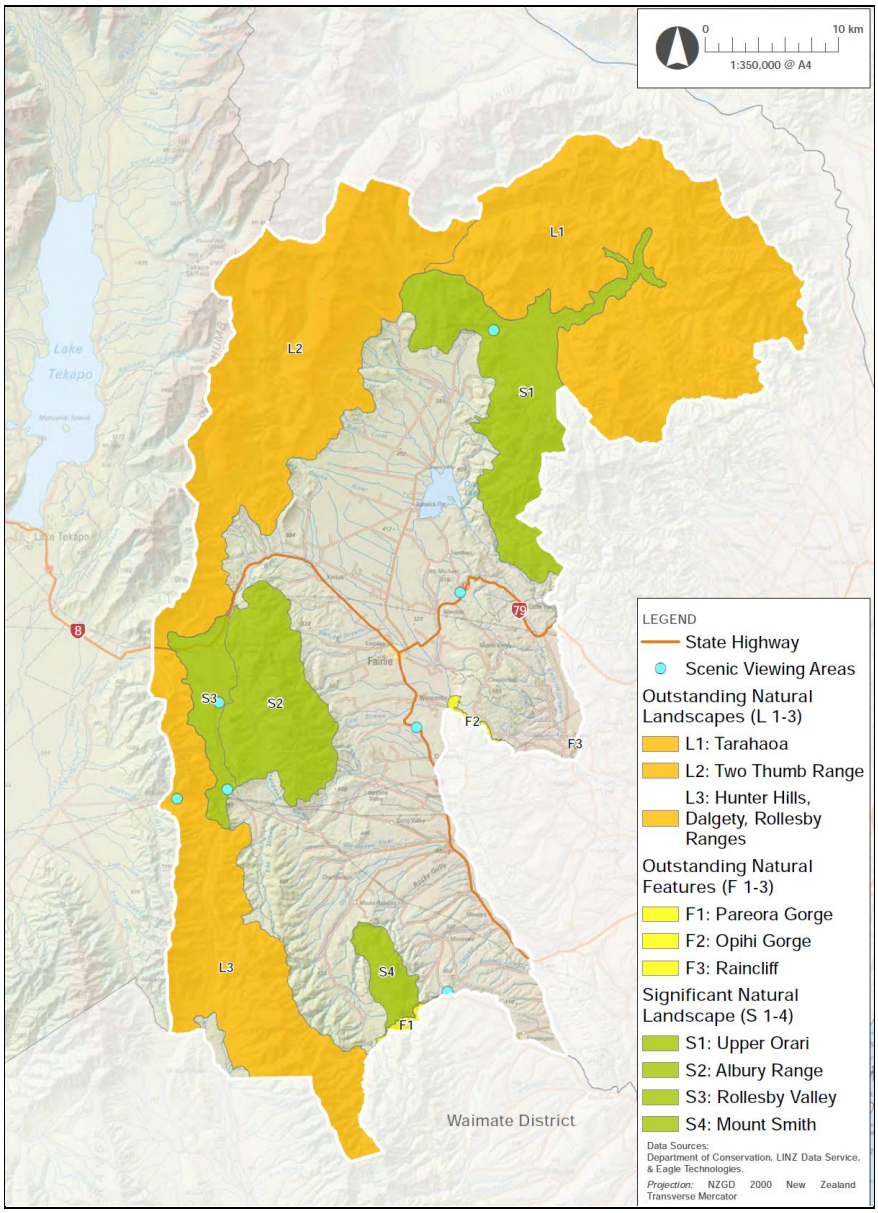


Figure 12: ONFL and SNL Overlay
Source: Boffa Miskell "DRAFT Eastern Mackenzie Rural Character Study"

8.2 Opuha Rural Character Area

Most of the Opuha RCA is included in the Proposed Eastern Plains Specific Control Area, which is appropriate given the high prevalence of LUC 3 and 4 land, the flat topography and access to irrigation (refer tables 3, 7 & 9). Given there is a high prevalence of dairy farming, dairy support, livestock finishing and cropping the minimum lot size of 20 hectares aligns with table 5.

Parts of the narrow strip of land under the Two Thumb and Sherwood Ranges outside of the Proposed Eastern Plains Specific Control Area, could be considered medium hill or rolling and could support a minimum lot size down to 40 hectares. Therefore, the minimum lot size of 100 hectares will protect the rural production capability in these areas.

With the presence of Lake Opuha and the close proximity to Fairlie, this RCA could be a desirable location for lifestyle blocks if subdivision to 4 hectares is allowed. This could impact future rural production.

8.3 Fairlie Rural Character Area

With the exception of small areas at the foot of the Albury range, the Fairlie RCA falls within the Proposed Eastern Plains Specific Control Area. The majority of this area is LUC 3 and 4 land and there is some irrigation at Cricklewood in the south of the area (refer figures 3 & 7). The altitude ranges from approximately 270masl at the Tengawai river to 450masl at the north of the RCA.

Most of this RCA is less than 7° slope but there is some steeper land above Three Springs Road. The higher altitude and steeper land in the north of this RCA will limit some land use options, although a minimum lot size of 20 hectares should still be sufficient to maintain rural production.

Given Fairlie is in this RCA, there is a higher chance of fragmentation if subdivision to 4 hectares is allowed, and this could impact future rural production.

8.4 Raincliff Rural Character Area

The whole of the Raincliff RCA is zoned as General Rural, meaning that the minimum lot size is 100 hectares.

Whilst this area has steep ridgelines between the valleys running from east to west (Opihi river, Spur Road, Middle Road and Cattle Flat) and on the top country around Pioneer Park, much of this country is rolling land that could be considered high to moderately productive and is not significantly different to other parts of the Proposed Eastern Plains Specific Control Area. Much of middle and higher part of this RCA could maintain rural production at a minimum lot size of 40 hectares.

The eastern side of the Raincliff RCA adjacent to Gudex road is a highly productive rural area, given the better soils, a relatively flat topography, access to irrigation and an altitude below 300masl (refer figures 3,7,9 & 10). Based on these parameters, and in reference to table 5, this region is highly productive and rural production could be maintained at a minimum lot size of 20 hectares.

Areas on the eastern side of SHY 79 around Allandale, whilst rolling, have some good soils where arable cropping and intensive livestock production is undertaken, as demonstrated in figure 13. Based on table 5, this more intensively farmed area could maintain rural production down to 20 hectares. Given the higher rural productivity of this area, the Proposed Eastern Plains Specific Control Area could

be extended into this RCA from the adjacent Opuha RCA and potentially over the whole of the Raincliff RCA.

Figure 13: Cropping activity and LUC 4 land in the Allandale region
Source: Google Maps and Figure 3.

8.5 Albury Rural Character Area

The Albury RCA is dominated by the Albury Range, Single Hill Range and the Rollesby Valley, with the majority of the RCA being over 500masl, including large areas of LUC 7 land (refer figure 3). The Albury and Single Hill ranges change from medium hill country at the base to high country at the top of the range. Therefore, a minimum lot size to maintain rural production is assessed at 100 hectares and over 200 hectares on the more extensive parts.

There is some flat to rolling country with good soils in the Rollesby Valley and at the southern end of the Single Hill Range. However much of this RCA is over 500masl which limits land use options, and this more productive land is often part of a larger property, providing support to the more extensive parts of the farm. Therefore, the proposed 100 hectare minimum lot size is appropriate for this RCA.

8.6 Tengawai Rural Character Area

Much of the Tengawai RCA is made of flat to rolling downs intersected by a number of river gullies running from the Hunter Hills and Mount Smith in the south-west to SHY 8 in the north-east.

The Hunters Hills is the main hill area and ranges from medium hill country at the bottom to high country at the top, with the highest elevation being 1,600masl at Mt Nessing. There is also a significant amount of LUC 7 and 8 land in the Hunter Hills (refer figure 3). Therefore, a minimum lot size to maintain rural production is assessed at 100 hectares and over 200 hectares on the more extensive LUC 7 and 8 land.

The lower Mt Smith (837masl) is a mixture of medium to hard hill country and is predominantly LUC 6 land (refer figure 3). Therefore, the minimum lot size of 100 hectares for this land is appropriate. East of the Hunters Hills and north of Rocky Gully road is the Proposed Eastern Plains Specific Control Area which has a minimum lot size of 20 hectares. This minimum lot size is appropriate given the relatively flat to undulating topography, and high prevalence of LUC 3 and 4 land (refer figures 3 & 9).

The area east of Mount Smith and south of Rock Gully Road is zoned as General Rural, meaning a minimum lot size of 100 hectares. However, despite a number of small gullies running south-west to north-east, much of this area has flat to undulating country that can be cropped and therefore could maintain rural productivity at a lot size smaller than 100 hectares and in many parts down to 20 hectares. Figures 14 and 15 show the "patchwork" of cultivated and re-grassed land south of the Rocky Gully Road.

Figure 14: Land between Rocky Gully Road and Nelsons Stream
Source: Canterbury Maps

Figure 15: Land between Burnetts Road and the Pareora Gorge Road
Source: Canterbury Maps

9.0 SUMMARY

In summary, the minimum lot sizes to maintain rural production documented in section 6 and summarised in table 5, in most cases correlate well with the proposed minimum rural lot sizes within the ONL, General Rural Zone and the Eastern Plains Specific Control Area. The notable exceptions were:

- The higher altitude LUC 7 land on the Hunters Hills and Albury Range would require a minimum lot size of over 200 hectares to maintain rural production compared to the proposed minimum size of 100 hectares. However, it is unlikely that land at this altitude and with limited accessibility would be subdivided.
- The western and eastern sides of the Raincliff RCA is productive land and could sustain a lower minimum lot size than the 100 hectare minimum for this RCA. Therefore, based on rural production, the Proposed Eastern Plains Specific Control Area could be expanded into this area.
- The southern part of the Tengawai RCA could sustain a lower minimum lot size than the 100 hectare minimum for this area. Therefore, based on rural production, the Proposed Eastern Plains Specific Control Area could potentially be expanded into this area.

Whilst the Proposed Eastern Plains Specific Control Area minimum lot size of 20 hectares will in most cases maintain rural productivity, the discretionary ability to subdivide to 4 hectares needs to be tightly controlled so that there is not a proliferation of lifestyle residential properties in the future, particularly on highly productive land. There are very few agricultural or horticultural farming practises that would justify a land-based farming business of 4ha, even if they are operated to the highest level, and particularly if part of the property is used for housing and other lifestyle activities. The reality is that most properties under 10ha have been purchased for lifestyle residential purposes and the majority of the household income is derived off farm. Furthermore, once the house and amenities are deducted from the total area, the effective farming area on a 4ha property could be as low as 3 hectares. Whilst in theory a group of 4 hectare properties could be operated in conjunction to achieve scale, this is unlikely to be successful given owners will often have differing priorities and the fact that the small paddock sizes will limit operational efficiency.

When reviewing the impact of any Plan changes on farm profitability, consideration should be given to the fact that some farming systems have relatively low rates of return on capital and a significant amount of the medium to long term financial viability has been based on increased land values over time. It is possible in some areas, increasing the minimum lot size will raise the operational productivity and profitability per hectare, however given a premium is often paid for smaller lifestyle properties, the inability to subdivide could reduce the land value and therefore lower the landowners potential longer term financial return. This will only affect those landowners who have purchased land with a view to future subdivision and not those that are maximising operational performance and this is less likely in the Mackenzie District than in other Districts where land is in closer proximity to a major town or city.

Appendix I: NPS HPL Clauses Applicable to Rural Subdivision and Production

Clause 3.7 (1) states that "*territorial authorities must avoid rezoning of highly productive land as rural lifestyle, except as provided in clause 3.10."*

Clause 3.8 (1a) & (2) states that:

(1) Territorial authorities must avoid the subdivision of highly productive land unless one of the following applies to the subdivision, and the measures in subclause (2) are applied:

(a) the applicant demonstrates that the proposed lots will retain the overall productive capacity of the subject land over the long term:

(2) Territorial authorities must take measures to ensure that any subdivision of highly productive land:

(a) avoids if possible, or otherwise mitigates, any potential cumulative loss of the availability and productive capacity of highly productive land in their district; and

(b avoids if possible, or otherwise mitigates, any actual or potential reverse sensitivity effects on surrounding land-based primary production activities.

Clause 3.10 *"Exemption for highly productive land subject to permanent or long-term constraints"* and its relation to clause 3.7 and 3.8 is shown below:

(1) Territorial authorities may only allow highly productive land to be subdivided, used, or developed for activities not otherwise enabled under clauses 3.7, 3.8, or 3.9 if satisfied that:

(a) there are permanent or long-term constraints on the land that mean the use of the highly productive land for land-based primary production is not able to be economically viable for at least 30 years; and

(b) the subdivision, use, or development: (i) avoids any significant loss (either individually or cumulatively) of productive capacity of highly productive land in the district; and

(ii) avoids the fragmentation of large and geographically cohesive areas of highly productive land; and

(iii) avoids if possible, or otherwise mitigates, any potential reverse sensitivity effects on surrounding land-based primary production from the subdivision, use, or development; and

(c) the environmental, social, cultural and economic benefits of the subdivision, use, or development outweigh the long-term environmental, social, cultural and economic costs associated with the loss of highly productive land for land-based primary production, taking into account both tangible and intangible values.

(2) In order to satisfy a territorial authority as required by subclause (1)(a), an applicant must demonstrate that the permanent or long-term constraints on economic viability cannot be addressed through any reasonably practicable options that would retain the productive capacity of the highly productive land, by evaluating options such as (without limitation):

(a) alternate forms of land-based primary production:

(b) improved land-management strategies:

(c) alternative production strategies:

(d) water efficiency or storage methods:

(e) reallocation or transfer of water and nutrient allocations:

(f) boundary adjustments (including amalgamations):

(g) lease arrangements.

(3) Any evaluation under subclause (2) of reasonably practicable options:

(a) must not take into account the potential economic benefit of using the highly productive land for purposes other than land-based primary production; and

(b) must consider the impact that the loss of the highly productive land would have on the landholding in which the highly productive land occurs; and

(c) must consider the future productive potential of land-based primary production on the highly productive land, not limited by its past or present uses.

(4) The size of a landholding in which the highly productive land occurs is not of itself a determinant of a permanent or long-term constraint.

(5) In this clause:

***landholding** has the meaning in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020*

***long-term constraint** means a constraint that is likely to last for at least 30 years.*