

## SECTION 2 : THE RESOURCES AND SIGNIFICANT RESOURCE MANAGEMENT ISSUES OF THE DISTRICT

### 2.1 INTRODUCTION

The Council is charged with the function of achieving the integrated management of the effects of the use, development or protection of land and associated natural and physical resources of the District. Section 2 of the Act defines natural and physical resources as being *“land, water, air, soil, minerals and energy, all forms of plants and animals (whether native to New Zealand or introduced) and all structures.”* Structures are defined as *“any building, equipment, device or other facility made by people and which is fixed to land and includes any raft.”* (See Note at Section 1.2.1 page 1:7) While not defined as a natural and physical resource, the unique, semi-arid climate of the District exerts a significant influence on the natural and physical resources of the District, and their management.

The Central Otago District has a unique rural landscape resource, some of it outstanding. In recent years this has been affected by developments with the potential to adversely effect its value as a resource. It is for this reason that in 2005 the Council commissioned a Rural Study for the whole of the District. The provisions in the District Plan and in particular those that apply in the Rural Resource Area result from the consideration of the findings of this Study and the plan change process.

The use, development and protection of the districts resources must be managed in a way or at a rate that enables people and communities to provide for their social, economic and cultural wellbeing and their health and safety, while sustaining the potential of these resources (except for mineral resources) to meet the foreseeable needs of future generations; safeguarding the life-supporting capacity of air, water, soil and ecosystems; and avoiding, remedying or mitigating adverse effects on the environment (see definition of “sustainable management” at page 1:7). The management of individual resources is clearly interconnected not only with one another but also with the development of the communities that utilise and depend upon them. Sustainable management must be undertaken on an integrated basis.

The following sections briefly outline the resources of the District, the social factors and community resources dependent upon them, and the significant resource management issues that are to be addressed in the context of the District Plan.

## 2.2 KAI TAHU KI OTAGO'S HISTORICAL LINKS WITH THE CENTRAL OTAGO DISTRICT

### 2.2.1 The Origins of Kai Tahu Whanui

Kai Tahu whanui can lay claim to three major streams of whakapapa (descent). These three streams are Waitaha, Kati Mamoe and Kai Tahu. It is this whakapapa coupled with the concept of ahi kaa (traditional rights of occupation) that allows Kai Tahu whanui to claim their tangata whenua status over the greater part of Te Wai Pounamu (the South Island).

The northern boundary of Kai Tahu extends from the east coast at Te Parinui o Whiti (White Cliffs, south of Blenheim) to Kahurangi Point on the west coast (north of Karamea). All the land south of this point is known as the rohe (area) of Kai Tahu.

#### Waitaha

The origins of Waitaha are derived from a group of people who came to Te Wai Pounamu under the leadership of Rakaihautu who is also named in Rarotongan traditions. It was Waitaha who established the basis of South Island whakapapa.

Waitaha are largely responsible for many of the Maori place names that exist today. These names were put on the landscape as they explored the region. Waitaha also created a distinct Southern creation mythology centred within the Whakatipu region.

#### Kati Mamoe

The second stream of descent was Kati Mamoe whose whakapapa was linked with the Hawkes Bay region of the North Island. Sometime after the sixteenth century Kati Mamoe began their migration and settled amongst the Waitaha in the Wairau District. Although their numbers were small in comparison with Waitaha, the mana of Kati Mamoe became established over the mana of Waitaha through alliances brought about by marriage, conquest and long-term occupation.

#### Kai Tahu

The third stream of descent also has its origins in the East Coast of the North Island. Tahu Potiki, (an Uncle of Porourangi - eponymous ancestor of Ngati Porou), was the tipuna of the Kai Tahu iwi. Tahu Potiki was also the instigator of the first movement of Kai Tahu into and through Hawkes Bay, gradually moving southward over a number of generations and crossing Raukawa Moana (Cook Strait) around the mid to late seventeenth century. Kai Tahu in turn gradually placed their ascendancy over Kati Mamoe through the same processes of marriage, conquest and long-term occupation.

### 2.2.2 The Historic Link with Central Otago

#### Trails

The major valley systems that lead into the interior known as Central Otago were natural pathways enabling exploration and discovery. Many trails were established by tipuna who followed the natural valley systems of the Waitaki, Waihemo, Taieri and the Mataau (Clutha) to the plains and valleys of Central Otago.

Other subsidiary trails from the coast joined the main valley systems following other awa (river) such as the Waikouaiti. The Waikouaiti trail provided access to the upper Taieri into the Maniatoto and then on to the Manuherekia. Travellers knew the junction of the Manuherekia and the Mataau at Alexandra as Ka Moana Haehae (The Split Waters). The Thomson Gorge was also well known and used as an alternative to the Cromwell Gorge when travelling to the Wanaka region.

#### Kaika nohoaka

Along the trails the takata whenua established kaika nohoaka (semi-permanent campsites). These sites were carefully placed to maximise use of locally available food sources, shelter and cooking materials such as a supply of fuel.

The name Manuherekia implies the catching of birds. It is traditionally known that moa were hunted in the many subsidiary valleys and catchments by Waitaha. The later arrivals Kati Mamoe and Kai Tahu are known to have hunted weka and many other waterfowl on the Maniatoto and other Central Otago catchments. They also spent much time fishing for tuna (eel).

Sun drying or cooking and placing in poha (kelp bags) often preserved these food items. Large amounts were often transported on mokihi (a raft made from raupo leaves or korari stems) down the Mataau and to the coastal settlements.

#### Mahika kai rights

The right to gather mahika kai from a certain area was derived from whakapapa. Any transgression or violation of the principles, which governed access to the mahika kai, was a serious matter, which could lead to a conflict situation. Figure 2.1 illustrates the seasonal nature of mahika kai resources and the locations within the District from where it is gathered.

Pa whawhai (fortified sites) became a feature of the social organisation as Kati Mamoe and Kai Tahu in turn sought mana over the land. Pa whawhai were almost always established to protect major access routes and valued resources. Pa whawhai or well established kaika nohoaka, were instrumental in ensuring that travellers that passed through the rohe were obliged to provide information to the tangata whenua about any recent event occurring in the area the visitors had recently travelled from.

#### Political alliances were formed and strengthened

Besides gathering mahika kai from Central Otago, iwi and hapu had other reasons for visiting and staying in the interior. The hinterland was regarded as a place to regenerate the iwi or hapu as the name Whakatipu indicates (to nurture/grow on). This was necessary after battles to strengthen political ties, increase numbers and it also allowed the iwi or hapu to regroup in the relative safety afforded in the expanses of the inland region.

From these central settlements ceremonies such as kai hau kai (the trading of goods between hapu) were organised and entered into with hapu from Te Tai Poutini (West Coast), Murihiku (Southland) and South Canterbury for the purpose of strengthening alliances through arranged marriages and the reciprocal exchanges of taoka. Such practises strengthened identity and links to the whanau.

#### The landscape

The high country mountains, valleys and plains were places of spiritual significance where Waitaha established a relationship with the environment through observance of certain natural and celestial occurrences throughout the Maori calendar year.

#### The naming of the landscape

As a result of centuries of exploration, travel and use of local resources almost all the major ranges, prominent landscape features and, rivers and creeks have Maori names and associated legends or traditions.

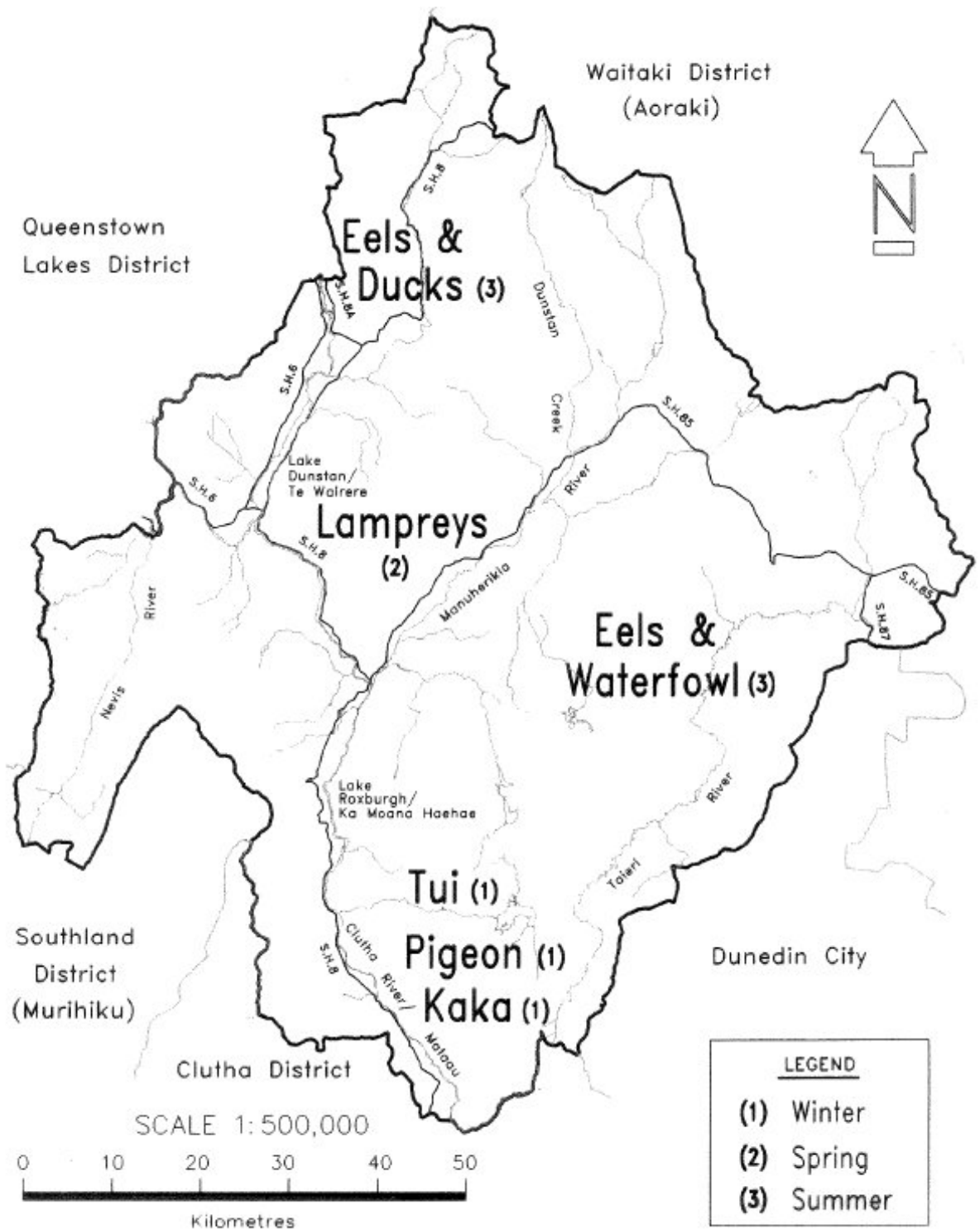
#### Te Kopuwai

One such legend relates to Kopuwai (the Old Man Range). It was the people known as Rapuwai who were associated with the Kopuwai tradition. Rapuwai were a hapu of Waitaha who hunted the moa in the hinterland. They were situated at Kaitangata near the mouth of the Mataau. Rapuwai often ventured into the domain of Maeroero and Tipua to gather the mahika kai resources of the area.

Kopuwai, who hunted with the assistance of a pack of two headed hunting dogs had his kaika on the Old Man Range where he was said to have scanned the valley below for victims. He eventually met his end at the hands of the people he had preyed upon. A large pinnacle rock on the summit of the range, also known as the Obelisk, is the physical manifestation of Kopuwai.

It is through such traditions that Kai Tahu place their mana on the land.

**Figure 2.1 – Seasonal Mahika Kai in Central Otago District**



### Settlements

Two decades before the signing of the Treaty of Waitangi, the major permanent settlements of Otago were positioned mainly around the coastal rivermouths and on or near strategically defensible positions. In 1840 the major settlements were at Moeraki, Old Waikouaiti (now Karitane), Purakaunui, Taiaroa Head and the immediately adjacent bays of the inner Otago harbour, at Maitapapa (near Henley on the Taieri Plain) and at Karoro (near Kaka Point).

The hapu and whanau who had previously lived in the inland settlements of the Whakatipu, Wanaka and Hawea areas had earlier temporarily vacated those regions following the 1836 raid of Te Puoho and his Ngati Tama taua (war party) through the area. There was concern that the defeat of Te Puoho, which occurred at Tukurau in Eastern Southland, would invite attempts by his whanau to gain utu for the demise of his taua.

However after a period of time, whanau returned to their old inland settlements and practises of gathering mahika kai. This occurred right into the 1860s until Kai Tahu were slowly edged out of the high country by the advent of pastoral farming. The growing conflict between Kai Tahu and the pastoral lessees over competing land use reached a climax with the eviction of Te Maiharoa and his followers from Te Ao Marama in the upper Waitaki. This action among other factors almost completely undermined attempts by Kai Tahu to retain their old settlements in the interior.

Only at the 'neck' on Lake Hawea was a small area of land gazetted as a Maori reserve in the 1860s. It was an area of around 100 acres where the ancient kaika of Manuhaea was situated. Several other areas were earmarked as reserves but not gazetted, subsequently being incorporated in pastoral leases as time faded the issue.

With access to trails and land becoming difficult or impossible, coupled with population decline due to introduced diseases, traditional heke ki uta (travel to and occupation of Central Otago nohoaka) declined and eventually stopped altogether.

### Conclusion

Kai Tahu has a rich and varied history in the Central Otago area. The traditions, archaeological evidence and continued associations with this area confirms the existence and continuation of the tangata whenua status of Kai Tahu whanui.

RESOURCE MANAGEMENT ISSUES OF SIGNIFICANCE TO KAI TAHU KI OTAGO ARE IDENTIFIED AND ADDRESSED IN SECTION 3 MANUWHENUA OF THIS PLAN.

The settlement of the Ngai Tahu claim has made provision for a number of joint Maori and English place names. Sites affected in Central Otago are the following;

Old Man Range	-	Kopuwai
Leaning Rock	-	Haehaeata
Clutha River	-	Mataau
Lake Roxburgh	-	Kā Moana Haehae
Lake Dunstan	-	Te Wairere

These Maori and English place names are recorded on the planning maps. Nohoanga at Lake Dunstan, upstream of Lake Dunstan and on the Upper Taieri River are also shown on the planning maps.

Note: Information relating to statutory acknowledgements in terms of the Ngai Tahu Claims Settlement Act 1998 is presented on page 1:6 of this Plan.

## 2.3 LAND

Covering an area of approximately 11,000km<sup>2</sup>, the Central Otago District extends from Raes Junction in the south to the Lindis Pass in the north. Central Otago is dominated by parallel mountain ranges formed of schist separating a number of enclosed broad valley basins containing soft tertiary sedimentary rocks. The valley basins range in altitude from 80 metres at Ettrick to 430 metres at Ranfurly, with Alexandra being approximately 140 metres and Cromwell being 213 metres above sea level. The Remarkables, Hector, Garvie, Pisa and St Bathans mountain ranges reach altitudes in excess of 2000 metres above sea level. Ben Nevis stands at 2234 metres.

The District lies in the rain shadow of the Southern Alps resulting in the driest conditions of New Zealand with a semi-arid climate and extreme variations in temperature.

The land resource is made up of the following components;

- soil, with its variety of quality
- landforms and geology
- landscapes

The distinctiveness and uniqueness of each of these components has largely been shaped, and in the case of soil versatility, continues to be determined by the climate of the District, which in turn has greatly influenced the use to which the land has been put. The resultant land use pattern impacts upon and creates a variety of distinctive landscapes.

### **2.3.1 Landscape**

The Central Otago landscape is nationally (and internationally) renowned for its scenic quality. The physical landscape of the district is very much a product of geology, climate, and the early removal of forest on the mid slopes. More recent human activities have added an overlay at lower altitudes.

The predominantly Haast schist rock has been block faulted to produce northeast to southwest trending ranges, rising to well over 1000 metres. Their relatively gentle slopes overlook broad, shallow valleys filled with glacial outwash gravels, forming terraces whose steep edges are a significant feature. Further east, tertiary sediments have been preserved in the valley floors, including seams of lignite and oil shale. Erosion has left bare rock outcrops with vast numbers of rock tors whose unusual shapes and prominence make them highly distinctive features. The climate is sub-continental with very cold winters, hot summers and wide ranges of daily temperatures. Snow lies during several months above 1000 metres. Being far from the sea and in the lee of the Southern Alps precipitation is very low in the valleys, eg, Alexandra 344mm, increasing with height to 2000mm on the tops of the higher ranges.

Vegetation at the time of European settlement was dense shrublands and tussock grassland which has been modified by burning, grazing, oversowing and topdressing to produce predominantly exotic grassland. The Upper Manuherikia Valley and Maniototo Plain are irrigated to provide grass for pastoral production. In the Clutha and Lower Manuherikia Valleys, irrigation supplies pastoral production, orchards and vineyards.

To the west, on the slopes of the Old Man and Pisa Ranges, remnant shrublands provide a contrast to the predominant grassland. On the tops of these western ranges, extensive wetlands and bogs have formed in hollows among largely induced cushionfields and herbfields. The range tops, under severe periglacial climatic conditions, have developed distinctive forms of patterned grounds (solifluction terraces, soil stripes, soil hummocks, stone nets and stone drains) much of which is still active.

Distinctive characteristics of Central Otago landscapes are the rock tors or outcrops at all altitudes, often providing very recognisable skyline features, the subtleties of the rippling ground contours revealed under a veneer of tussock grassland, and the bold patterning of beech forest or shrubland remnants along some water courses.

The results of human endeavour are highly visible aspects of the landscape because of the open nature of the country. Most noticeable are the homesteads, accompanied by stands of trees, usually poplar. These trees provide a spectacular display during the autumn months. Water races and small dams formerly used for gold sluicing and now for irrigation and isolated remnants of old stone cottages; and shelter belts of trees, especially in the Upper Clutha and Manuherikia Valleys, also give a sense of history. Remnant structures such as stone walls and associated decaying cottages are small in scale and add to rather than dominate the landscape. Former mining sites are now an integral and distinctive part of the District's landscape, particularly in places such as St Bathans, Bannockburn and the herring bone tailings at Northburn.

In the Clutha Valley the Earnsclough tailings are a notable mining feature covering hundreds of hectares, produced by gold dredges that operated from the 1870s to the 1960s. The heritage values of Bendigo are also a result of the District's mining history.

Despite the large distances, the area is covered by a relatively close network of public roads and the Otago Central Rail Trail which follows a low-gradient route from Middlemarch to Clyde.

The irrigated pasture, orchards and vineyards give an oasis character to this predominantly dry landscape, especially in spring when trees are in blossom. Vineyards are increasingly adding variety to the landscape. On the outskirts of Alexandra and at Naseby there are exotic conifer forest plantations. Elsewhere isolated wilding conifers dot the hillsides.

The Clyde Dam at the mouth of Cromwell Gorge has added Lake Dunstan as a new feature to the landscape.

Over the past few years Central Otago's landscape has become very popular with film makers. Its stunning rolling ranges, tors and tussock grass forms the backdrop and even the key ingredient in films of international repute.

Council's background work and consultation during the 1990s, including submissions in response to the operative district plan and a report prepared for the Otago Regional Council by Boffa Miskell Limited entitled "Investigations into Otago's Natural Character, Landscape and Significant Natural Areas" has resulted in the identification of a number of outstanding natural features and outstanding natural landscapes within the District.

Further work and considerable consultation on the Rural Study in 2005 and 2006 and a report prepared by Robson Garland, Ian Brown Consultants and LA4 Landscape Architects entitled Central Otago District Rural Review and the plan change process has assisted in the identification of:

- Outstanding Natural Features and Outstanding Natural Landscapes
- Significant Amenity Landscapes
- Other Rural Landscapes

Outstanding Natural Features and Outstanding Natural Landscapes are those subject to section 6(b) of the Resource Management Act 1991. Significant Amenity Landscapes are subject to section 7(c), albeit that Other Rural Landscapes in the District also have amenity values including those associated with the results of human endeavour as discussed above.

### **1. Outstanding Natural Features and Outstanding Natural Landscapes**

Outstanding Natural Features include:

- Sugar Loaf and Bendigo (above Loop Road) glacial river terraces
- Rocky backdrop to Alexandra
- Flat Top Hill
- Upper Taieri Scroll Plain
- Poolburn Gorge
- Tiger Hill and Ophir Gorge

Outstanding Natural Landscapes include:

- Kawarau Gorge
- Butchers Dam locality
- Cromwell Gorge
- Elevated areas providing visual backdrop to Lake Dunstan near Bendigo
- Blue Lake/St Bathans backdrop
- Old Man/Obelisk Range complex including rangelands above Roxburgh and Dumbarton
- Upper Manorburn/Poolburn/Serpentine
- Lindis Pass
  - Pisa Range and Dunstan Mountains
  - Hector, Garvie and Old Woman Ranges and Nevis Valley
  - Hawkdun, Ida and St Bathans Ranges
  - Kakanui Mountains
  - Carrick Range
  - Horn Range
  - Rock and Pillar, Lammermoor and Lammerlaw Ranges
  - Rough Ridge and North Rough Ridge
  - Upper Manuherikia & Dunstan Creek

## **2. Significant Amenity Landscapes**

Significant Amenity Landscapes include:

- Cairnmuir Range
- Northern Knobby Range
- Lowburn, Bendigo and Clyde Terraces
- Terrace between the Dunstan Mountains and Waikerikeri Valley
- Raggedy Range
- Blackstone Hills
- Magdalen Hills
- Crawford Hills

## **3. Other Rural Landscapes**

Those landscapes in the Rural Resource Area that are not identified as being in any other landscape category, as listed above or in the Upper Manorburn/Lake Onslow Landscape Management Area.

The Outstanding Natural Landscapes (ONL), Outstanding Natural Features (ONF) and Significant Amenity Landscapes (SAL) are identified by notations on the planning maps. Other Rural Landscapes (ORL) include land in the Rural Resource Area not identified as ONL, ONF or SAL or in the Upper Manorburn/Lake Onslow Landscape Management Area.

In terms of section 6(b) Council must recognise and provide for the protection of outstanding natural features and outstanding natural landscapes from inappropriate subdivision, use and development as a matter of national importance. It should be noted that some sites and natural features within the identified outstanding natural features and outstanding natural landscapes have been modified by human activity (for example, farming, cultivation of tussock grasslands, mining, tracks, hydro development etc) which has affected their natural character values. In some instances it is acknowledged that outstanding natural landscapes incorporate outstanding natural features which are discussed in Section 2.3.2 of this plan.



<p><b><u>Significant Issue - Outstanding Natural Landscapes and Outstanding Natural Features</u></b>  <i>The District contains a number of outstanding natural landscapes and outstanding natural features that require identification and protection from inappropriate subdivision, use and development. In determining what is inappropriate subdivision, use and development in these landscapes it must be recognised that these landscapes are often utilised by people and communities to provide for their social, economic and cultural wellbeing.</i></p>	<p><u>Cross Reference:</u>  Issue 4.2.1 (pg 4:2)  Objective 4.3.2  (pg 4:7)</p>
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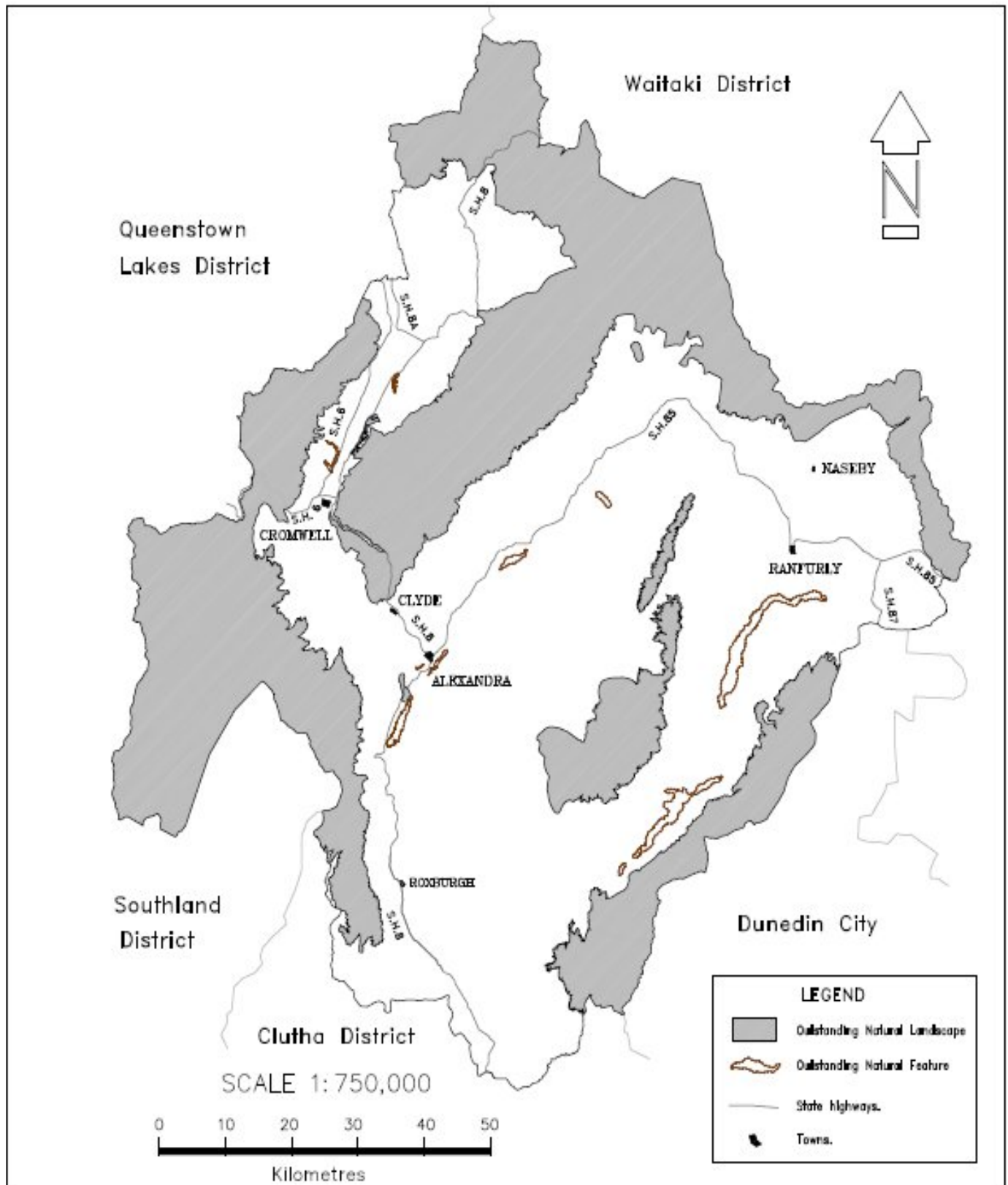
While the landscape is constantly evolving, care must be taken with respect to a number of activities that could potentially have an adverse impact on landscape values. Such activities can include development of new roads and tracks on elevated land, establishing woodlots, production forestry or shelter belts on elevated land, wilding tree spread, and the establishment of wind farms, transmission lines, telecommunications, and other structures on skylines.

Because Central Otago is dominated by parallel mountain ranges separated by broad valley basins, the elevated areas of the district are highly visible and prominent features of the landscape.

Outstanding natural landscapes, outstanding natural features, significant amenity landscapes and land in the Upper Manorburn/Lake Onslow Management Area have been shown on the planning maps. The management of effects on the general landscape values of the District is provided for in terms of the Act.

<p><b><u>Significant Issue - Central Otago's Unique and Distinctive Landscape</u></b>  <i>The Central Otago District contains many unique and distinctive landscapes. While those landscapes are constantly evolving through natural processes, farming and other land use activities the semi-arid, rocky nature of the landscape means it can be vulnerable to visual effects of new structures (including telecommunication masts, wind farms, transmission line pylons, and other large structures), cultivation of tussock grasslands, large scale earthworks, new roads, residential built development on elevated land, establishing woodlots, production forestry or shelter belts on elevated land and wilding tree spread. Subdivision is often the precursor of land use activities such as those listed above. The District's built heritage, particularly in the form of cottages and ruins, and remnants of the early goldmining era, has also made a significant contribution to the landscape values of Central Otago.</i></p>	<p><u>Cross Reference:</u>  Issue 4.2.2 (pg 4:2)  Objective 4.3.3  (pg 4:7)</p>
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**Figure 2.2 – Areas of Outstanding Natural Landscape and Outstanding Natural Features**



### 2.3.2 Landforms and Geology

#### (i) Landforms

Central Otago has a relatively unique and extremely diverse natural landform and geological heritage. The New Zealand Geological Society has compiled a comprehensive inventory of significant geological sites and landforms within the Otago region, including the Central Otago District (Inventory of Important Geological Sites and Landforms in the Otago Region, J A Kenny and B W Hayward, Geological Society of New Zealand, 1993)

The inventory identifies 63 geological sites, landforms and other items (including a number of former gold mining areas) in the Central Otago District as being of either regional, national or international significance. Examples include the following;

- **Cromwell Gorge** which comprises a number of landslide scars, lobes, rock falls and rock topples. The Gorge also displays some of the best examples of schist rocks in New Zealand. The dramatic appearance of these features is enhanced by Lake Dunstan.
- **The Old Man, Obelisk Range and Dunstan Mountain summit tors**  
These ranges contain some of the best and most accessible exposures of sheath folds in schist and rocky outcrops in New Zealand.
- **Lowburn glacial outwash terraces (Sugarloaf)** comprises a sequence of widely spaced terraces and are the best example of fluvio glacial outwash terraces in New Zealand.
- **Old Man Range Peneplain** which comprises a sequence of lowland, mid-altitude and summit peneplain landforms on downwarped peneplain.
- **The Taieri River meanders** are the best examples of a meandering river in New Zealand. The meanders have a high degree of curvature and show all stages of ox-bow formation.

These landforms assist in developing an understanding of the unique geological history of New Zealand, development of its landform, and evolution of its biota. Preservation of these natural features contributes to the continual progress of earth science education and research both now and in the future. It should be noted, however, that a number of these landforms have been modified by human activity which has affected their natural character values. The prime example of this is the Cromwell Gorge and the creation of Lake Dunstan within it.

<p><b>Significant Issue - Natural Features</b> <i>Major development work has potential to damage or destroy outstanding natural features. It is also acknowledged that major development work if properly managed can enhance natural features. This plan seeks to manage the use, development and protection of outstanding natural features to ensure protection in terms of section 6(b) of the Act.</i></p>	<p><u>Cross Reference:</u> Issue 4.2.3 (pg 4:2) Objective 4.3.2 (pg 4:7)</p>
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#### (ii) Mineral Deposits

For the purpose of Act, the term “mineral” has the same meaning as in section 2(1) of the Crown Minerals Act 1991, which is:

*“A naturally occurring inorganic substance beneath or at the surface of the earth, whether or not under water; and includes all metallic minerals, non-metallic minerals, fuel minerals, precious stones, industrial rocks and building stones, and a prescribed substance within the meaning of the Atomic Energy Act 1945.”*

[See Note at Section 1.2.1 page 1:7]

A range of mineral resources are present throughout the Central Otago District. These are primarily metallic and energy minerals. Extractive activities are at present confined to coal mining, quarrying and alluvial gold mining. However, potential exists for future development of lignite coal in the Hawkdun and Home Hills areas and hard-rock gold at Carrick, Oturehua and other locations.

Extractive activities have different characteristics in terms of the area subject to extraction and the duration of that activity. For example, alluvial gold mining may occur over a wide area, but generally for short duration (typically 2-5 years). This contrasts with the quarrying of gravel, stone and sand which occurs in generally a smaller area (typically 2-20 hectares) and which continues for a much greater length of time.

*(iii) Gold*

The gold rushes of the 1860's laid the foundations for settlement, community infrastructure (including irrigation) and a network of road communications in Central Otago. Most settlements owe their origins to the goldrush and later dredging activities. The riverside settlements of Cromwell, Clyde, Alexandra, Roxburgh and Millers Flat were all mining towns based around the Clutha River and its rich alluvial gravels. Other towns around the rims of the inland basins (such as St Bathans, Naseby, Hyde, Matakau and Bannockburn) were all situated where gold had collected at the bottom of sloping river channels.

The four types of mining employed were alluvial, sluicing, dredging and quartz rock gold mining. Distinctive landscapes in the area have been formed by mining activities such as the dredge tailings at Earnsclough and the Blue Lake at St Bathans which was the result of sluicing. Dredging activities were to continue on into the early 1960's when the last dredge was disassembled. Alluvial goldmining has continued in the District in recent decades. Quartz rock gold mining occurred at Carrick range, Bendigo, Conroys, Old Man Range and Serpentine (Long Valley). The early 1990's has seen large scale mining activities at Island Block. Intensive exploration activity continues to be associated with alluvial gold deposits on the Earnsclough Flat and at St Bathans, and at hard rock deposits near Carrick and Oturehua.

The past and present goldmining in the District presents significant opportunities for the visitor and tourist industry in terms of heritage, demonstrating goldmining methods and interpretation.

*(iv) Lignite*

In the mid to late 1980's investigations were undertaken with respect to the potential development of lignite resources in the Hawkdun and Home Hills areas. It was considered that lignite could become the transport fuel of the future following conversion into petrol, diesel or methanol. It was also considered to have potential as an energy source for the generation of electricity.

The following table indicates the approximate amount of lignite reserves present at the Home Hills and Hawkdun sites and other Central Otago areas.

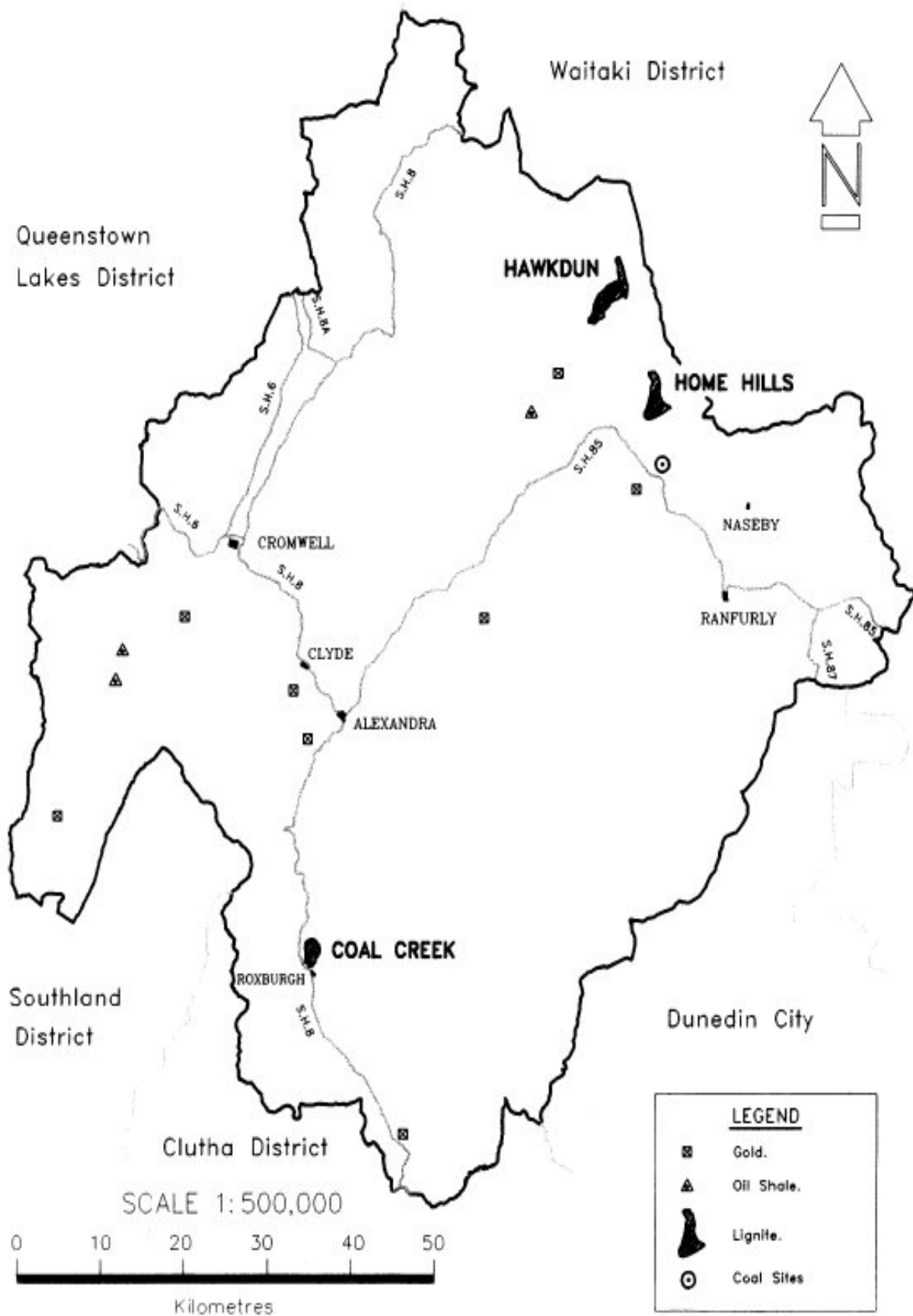
*Reserve Estimates (million tonnes) for Central Otago District*

	<b>Measured</b>	<b>Indicated</b>	<b>Inferred</b>
Home Hills	-	289.00	64.00
Hawkdun	649.00	-	25.00
Roxburgh East		197.00	48.00
Other			123.70
<i>Total</i>	<i>649.00</i>	<i>486.00</i>	<i>260.70</i>

*(Source : Ministry of Commerce, Coal Resources of New Zealand, 1994)*

Lignite is currently mined at Coal Creek and the Ida Valley. (see Figure 2.3)

**Figure 2.3 – Significant Mineral Deposits in Central Otago District**



(v) Gravel, Stone & Sand

Gravel is extracted from sites throughout the district for construction purposes, including roading. Gravel resources are important to the maintenance and development of infrastructure that serves the district. Gravel is taken from river beds and alluvial terraces.

In recent years schist has increased in popularity as a building stone and is quarried in the district. Schist is used for decorative cladding. Schist was a popular building material in the 19th Century and several excellent examples of schist buildings are present in the district.

Sand is also excavated in the district for use as a building material.

(vi) Other Minerals

Copper, mercury, tungsten and zinc have also been found in the District but generally in small uneconomic deposits. Quartz and Quartz sands can be readily found and in the late 1800's were mined in such areas as Quartzville near Cromwell.

Oil shale, a solid which contains oil, is known to exist in the Nevis Valley. The Nevis shales are capable of yielding millions of barrels of oil but the oil yield per ton is predicted to be low and extraction costs too high to be commercially viable.

(vii) Crown Minerals Act 1991

The Crown Minerals Act 1991 regulates the allocation and pricing of, and access to, Crown owned minerals. The Minister of Energy is responsible for the allocation and pricing of Crown owned minerals and the preparation of minerals programmes. Mineral permits are issued by the Ministry of Commerce in terms of the appropriate minerals programme. Access to Crown owned minerals is determined by private negotiations between the permit holder and the landowner. This Act, however, does not deal with the effects of prospecting, exploration and mining activities.

The Resource Management Act deals with the effects of activities associated with the development of mineral resources, whether privately or Crown owned.

Section 5 of the Act excludes minerals from the definition of "sustainable management" as it relates to sustaining their potential to meet the reasonably foreseeable needs of future generations. This is because of their finite nature.

**Significant Issue - Development of Mineral Resources**

***The Central Otago District contains mineral deposits that may be of considerable social and economic importance to the district and the nation generally. Mineral development and associated land restoration can provide an opportunity to enhance the land resource and landscape values and has done so in the past. However, the development of these resources has the potential to have significant adverse effects upon soil, water and air resources of the District, and landscape and heritage values if not appropriately controlled. The ability to extract mineral resources can adversely affect or be adversely affected by land use, including development of other resources above or in close proximity to mineral deposits.***

Cross Reference:  
Issue 4.2.4 (pg 4:2)  
Objectives 4.3.2,  
4.3.5, 4.3.7  
(pg 4:7, 4:8)

**2.3.3 Soils**

(i) General Soil Structure

The semi arid soils of Central Otago (predominantly brown-grey earths) have been formed primarily by erosion of the schist mountains in the area and the subsequent deposition by fluvial (of rivers) and aeolian (wind-borne) means.

The soils found in the river valleys generally have a cover of silt loam material that varies in depth from a few centimetres in some areas to 50-60 centimetres in others. This usually covers a bed constructed of terrace gravels that come to the surface in many areas. Soils of this kind include Manuherikia soils, Molyneux soils, and Waenga soils. Cromwell soils have been formed by the wind depositing material in the valley. These comprise very sandy but well draining topsoils.

The soils found in the river valleys are some of the most fertile soils in New Zealand being naturally very high in pH, phosphate, potassium and magnesium. They are, however, generally deficient in sulphur and boron.

The valley floor soils with good water holding capacity can produce as much grass as higher rainfall areas of New Zealand provided they are irrigated and topdressed with sulphur fortified fertiliser.

The valley floor soils with lower water holding capacity have proven to be very suited to the growing of lucerne with its deep rooting characteristics.

The Yellow Grey Earth (YGE) hill country soils range from 550 to 1,000 metres above sea level and generally receive 500 to 900 mm of rainfall per annum. These soils have been developed for pastoral farming using oversowing and topdressing with some cultivation. They require regular applications of phosphate, sulphur and molybdenum.

The sunny aspect YGE hill soils are naturally high in pH and phosphate compared to the shady aspects.

High country soils, known as Yellow Brown Earths (YBE), are found above 900 metres with over 900 mm of rainfall. These upland areas of Central Otago have low natural fertility.

Hawkesburn and Bannockburn soils contain fine deep sandy loams and these can occur on shady slopes where there is less evaporation and more moisture. These soils can often be affected by waterlogging and tunnel erosion which can be a problem on rolling land.

Some valley floor areas of Central Otago are not well suited to physical and chemical modification such as cultivation, irrigation and fertilisation. These are areas where alluvial deposits have been made via rivers or are outwash of shingle fans from mountain sites. These areas make up less than 20% of the valley floor soils. Management of the soil resource on these areas must recognise their fragile nature.

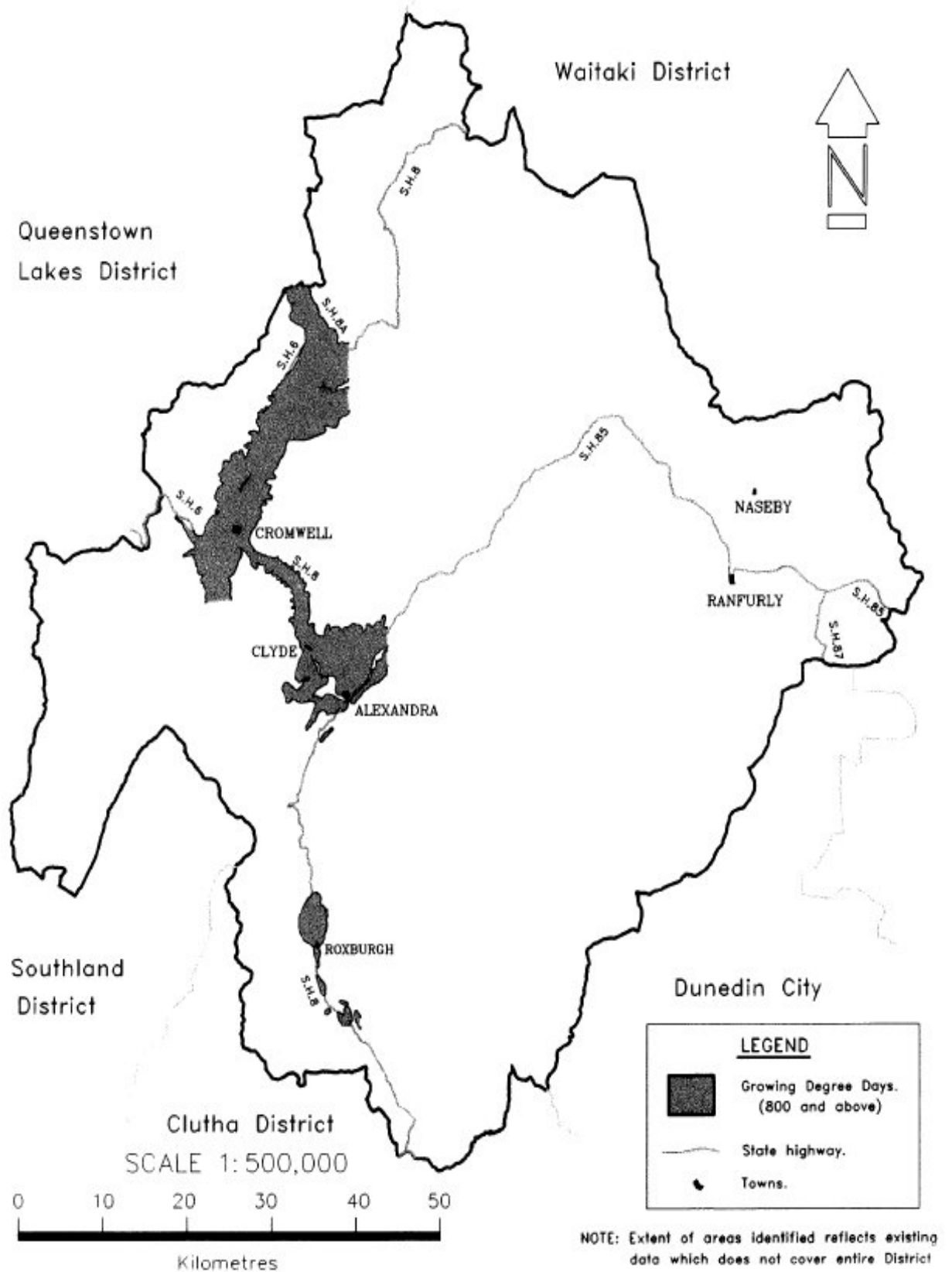
Problems of soil loss through wind and water erosion can be increased by excessive vegetation burning and by cultivation. Where cultivation is required modern minimum tillage techniques can reduce soil loss risks substantially. Of greater significance is the loss of vegetation cover due to rabbits. Removal of vegetation cover and burrowing activities can cause severe soil loss from wind and water erosion over widespread areas.

<p><b>Significant Issue - Soil Resources</b>  <i>Some of Central Otago's soils are readily susceptible to damage from physical causes and lack of adequate care. Unimproved areas require care and management, and effective rabbit control, while areas which have been modified by cultivation, oversowing, topdressing and irrigation may require ongoing fertiliser inputs as well as effective rabbit control if soil degradation is to be prevented. All soils are vulnerable to activities that can cause erosion, compaction or contamination, or to loss of nutrients or loss of water-holding capacity.</i></p>	<p><u>Cross Reference:</u>  Issue 4.2.5 (pg 4:3)  Objective 4.3.7  (pg 4:8)</p>
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*(ii) Special Land Resources*

There are areas of land that, as a result of Central Otago's unique climate (in the New Zealand context) and the latitude of the District, have special qualities. While the predominant brown-grey earth soils generally have many limitations for intensive use, the latitude and inland nature of the District has created a climate (in terms of number of growing degree days, number and timing of frosts etc) which, in combination with certain soils in certain locations and the availability of water through numerous irrigation schemes, has given some areas of land these special qualities in the Central Otago context and perhaps also in the national context.

**Figure 2.4 – Areas Known to have 800 and above Growing Degree Days**



NOTE: Extent of areas identified reflects existing data which does not cover entire District



The Central Otago District also contains some unique salt pans. In very dry areas of the Earnsclough and Pisa Flats, Manuherikia, Ida and Upper Taieri areas of saline soils occur which support rare plants specifically adapted to saline conditions in an inland setting. Patrick (1989) described and mapped the key sites for conservation of these soils in Central Otago and the flora and insect life associated with them. Many of these sites have been subsequently protected by the Department of Conservation.

<p><b>Significant Issue - Special Land Resources</b>  <i>There are some areas of land in the District that because of particular soil characteristics and quality that in combination with the local climate and irrigation are considered to be a special resource. The potential of this resource to meet the reasonably foreseeable needs of future generations should be sustained. This potential is capable of being compromised by activities which have the effect of reducing the life supporting capacity of these soils.</i></p>	<p><u>Cross Reference:</u>          Issue 4.2.6 (pg 4:3)          Objective 4.3.7 (pg 4:8)</p>
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### 2.3.4 Land Use

The land resource provides the basis for the social, economic and cultural well being of Central Otago's people and communities. Land use in Central Otago in the 19th Century was dominated by pastoral farming and gold mining. While these land uses are still significant (particularly pastoralism) the change in physical, economic and social conditions has led to an increasing diversification and intensification of land use activities. The emergence of life style trends with the preference for the rural environment, viticulture, new horticultural and tree crops (eg. olives), new forms of pastoral production and high country recreational activities are adding to the variety of rural land uses.

The following provides a brief overview of the predominant land use activities that occur in the District at the present time. The figures quoted are sourced from MAF Policy Agricultural Database for Central Otago and were correct at October 1996 unless explicitly stated to the contrary.

#### •Sheep Farming

There are approximately 730 farms in the District with an approximate total of 2 million sheep. The area in pasture in 1996 was approximately 860,000 hectares. Sheep numbers peaked in 1986 with approximately 2,250,000 and have reduced to under 2,000,000 in 1996. This change can be attributed to a number of factors such as dry climatic conditions; the effects of rabbits, Hieracium and other pests and hazards; changing trends in farming and changing economic and social conditions resulting in alternative land uses.

#### •Horticulture

Horticulture is confined to land below 300 metres except in small areas with favourable micro climates. Principal localities of horticulture are the southern end of the Upper Clutha and Manuherikia Valleys; Ripponvale, Bannockburn, Lowburn, Earnsclough, Clyde and north of Alexandra; and in the Teviot area from Coal Creek to Island Block. Some of the horticultural crops grown (as listed in MAF Policy Agricultural Database For Central Otago : October 1996) include:

Apples	761 hectares
Peaches	74 hectares
Apricots	485 hectares
Plums	66 hectares
Nectarines	254 hectares
Cherries	183 hectares

Apricot production requires a minimum of 800 growing degree days. See Figure 2.4.

•**Beef Production**

There are approximately 61,000 beef cattle in Central Otago as recorded in the October 1996 MAF Policy Database.

•**Dairy Production**

Dairy cattle numbered 2,474 in 1994, and no 1996 Figures are available.

•**Deer Farming**

Approximately 14,000 deer were recorded by MAF Policy in 1996. While deer farming is still a minor aspect of most farm units, the rate of expansion of deer numbers is likely to lead to this being an important land use on many farms in the next few years.

•**Plantation Forestry**

Central Otago has only one significant plantation forest - the Naseby Forest. It was established in 1900 and has an area of approximately 2400 hectares. Low rainfall over most of Central Otago, and cold winters limits the potential for commercial forestry. Reflecting this Central Otago forests are small in area (4134 hectares as at 1 April 1997, Ministry of Forestry) and are dominantly composed of hardier and slower growing species, Douglas fir, Corsican pine, European larch, and Ponderosa pine account for 60 percent of the existing forest estate in Central Otago.

•**Farm Woodlots**

The establishment of farm woodlots is steadily increasing. Tree planting for fuel is occurring due to decreasing supplies of firewood in the District, and woodlots are viewed as a land use option for areas of land that are generally unsuitable for more traditional pastoral and horticultural activities. Woodlots are, however, viable land uses in their own right.

•**Viticulture**

Viticulture has become an increasingly popular land use activity in Central Otago. The climate of the District is semi-Mediterranean and is suitable to grape growing, subject to the selection of a site that minimises the impact of spring frost, and has a minimum of at least 900 Growing Degree Days.

Vineyards are being established primarily in the Kawarau Gorge/Bannockburn area, Cairnmuir, the Ripponvale area, the Wanaka Road (State Highway 6) and around Alexandra.

Figures taken in 1994 indicate that there were approximately 400-500 hectares of grapes planted in Central Otago.

•**Recreation**

Recreation, particularly activities based on the outdoors, is becoming an increasingly significant land use in the District. The popularity of activities such as cross country skiing, mountain biking, motorised snow activities, tramping, boating, game bird hunting, and fishing is increasing. Passive recreation activities such as picnicking and sightseeing are also popular activities for both locals and visitors alike. Development of the Otago Central Rail Trail, will further enhance recreation opportunities. Section 2.4.3 demonstrates that water based recreation in the District is significant.

•**Conservation**

The conservation of the Districts natural and physical resources is also a significant land use in the District. There is currently 40,000 (approx) hectares of land within the District that is administered by the Department of Conservation for conservation purposes. The majority of this land is elevated and is being protected through the tenure review process of pastoral leases. The Department is also responsible for administering a number of Goldfields park sites which conserve the District's mining history.

- **Tourism**

Tourism, which relies to a large degree on a number of the land uses listed above (eg. viticulture, recreation, conservation) is an increasingly important component in the Central Otago economy. The development of the Otago Central Rail Trail, improved public access to back country areas through the tenure review process; conservation and promotion of heritage values including those associated with the Otago Goldfields Park as promoted by the Otago Conservation Management Strategy, the burgeoning viticulture industry, and the comprehensive integrated golf course, travellers accommodation, viticultural and residential development at McArthur Ridge are likely to strengthen Central Otago's tourist industry.

- **Film Industry**

In recent years, the film industry has begun to use locations within the District and there is a prospect of this type of activity increasing.

The land resource is essential to the social, economic and cultural well being of the Central Otago community, and must therefore be managed in a way that provides for such well being. Management of the use, development and protection of natural and physical resources must recognise community needs and be flexible enough to accommodate market changes. This is particularly important given the potential trends in land use. Future land uses anticipated in the District include new horticulture and tree crop developments, increased viticulture, increasing diversification and participation in recreation and tourist orientated activities, and an upsurge in mining due to advances in technology that enables more efficient extraction of minerals with less adverse environmental effects.

## 2.4 WATER RESOURCES

Despite a relatively dry climate, the Central Otago District contains significant water resources. Part of two major catchment systems, the Clutha, and the Taieri, are located within the District. There are numerous lakes and reservoirs associated with these catchments. (See Figure 2.5)

Council has responsibility for controlling the actual or potential effects of activities on the water surface and maintaining and enhancing access to and along water bodies. It also has a role to play in terms of the effects of land use on water bodies.

The Otago Regional Council has primary responsibility for the maintenance and enhancement of the quality and quantity of water in water bodies. That Council also has responsibility for the control of the taking, use, damming or diversion of water; for the control of discharges to water; discharges to land in circumstances where discharges can enter water; land use as it may affect water quality or quantity; and activities in relation to the beds of lakes and rivers including the erection of structures, the deposition of substances, bed disturbance, reclamations, crossings and vegetation or habitat disturbance. The Regional Council's functions are listed in section 30 of the Resource Management Act, which is set out in part at Schedule 19.5 page 19:40.

The Department of Conservation has responsibilities in terms of Part VI of the Freshwater Fisheries Regulations 1983. Consent is required from the Department for the installation of culverts, dams and other structures that would impede fish passage.

A number of Central Otago's boundaries follow the centrelines of water bodies. Part of Central Otago's boundary with the Queenstown Lakes District follows the centreline of the Kawarau River and the Roaring Meg, while part of the boundary with Clutha District follows the centreline of the Pomahaka, Clutha and Beaumont Rivers. The management of these areas of water surface may involve joint initiatives with the relevant adjoining territorial authority.

Central Otago's rivers have played a major role in both the pre European and European history of the area. Rivers were the main transport system used by iwi to access the interior, and to travel across to the West Coast in search of pounamu. Early European settlement also followed the river systems into Central Otago, and the Clutha River in particular was used extensively in the early settlement of Otago. Even today, the major roads into the interior mainly follow rivers, such as the Clutha and the Kawarau. Central Otago's rivers have been significant in the history of both Otago and of New Zealand in terms of the discovery and mining of gold, the development of major hydro electric power schemes and of irrigation. These rivers and their environs, such as the Clutha, the Kawarau and the Taieri, contain a rich heritage and archaeological and heritage sites, artefacts and structures. The interaction of cultural and historic elements with the natural landscape contribute significantly to Central Otago's distinct character.

### 2.4.1 Description of Resource

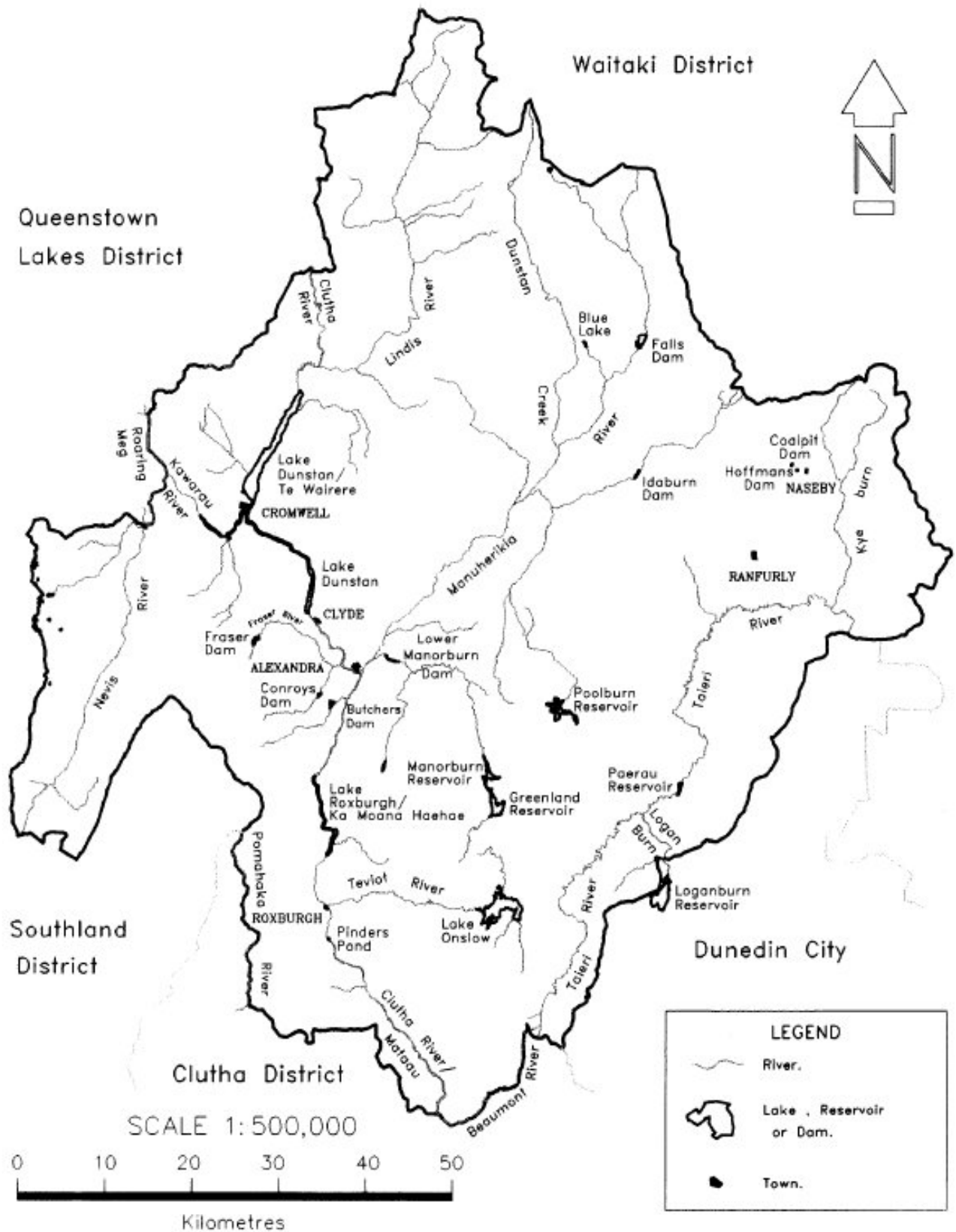
The major catchment system within the District is the Clutha River (Mataau) system. The Clutha River (which originates from Lake Wanaka), has the largest flow of any river in New Zealand. Hydro development on the river has created two large reservoirs within the District being Lakes Dunstan and Roxburgh (Te Wairere and Kā Moana Haehae).

Lake Dunstan, formed by the development of the Clyde Dam in 1992/93, is a 26 square kilometre water body with a shoreline of 107 kilometres. It extends from the Clyde Dam to Cromwell and then widens to form the Clutha Arm which extends to the Clutha River entering the lake at Bendigo. A smaller arm extends up the Kawarau River to the mouth of the Kawarau Gorge.

Lake Roxburgh was formed by the development of the Roxburgh Hydro Dam in 1956. It is a long, narrow lake, extending for 28 kilometres upstream from the Roxburgh Dam to Alexandra.

There are a number of significant tributaries of the Clutha River. The Lindis River joins the Clutha at Lindis Crossing, just south of Queensberry.

**Figure 2.5 – Significant Water Bodies in Central Otago District**



The Kawarau River which, prior to the creation of Lake Dunstan, joined the Clutha at Cromwell, now flows into the Kawarau Arm of Lake Dunstan. The source of the Kawarau River is Lake Wakatipu with the Shotover River being a major tributary that, although located outside the District, has a significant influence on Lake Dunstan. The Nevis River is a major tributary within the District. The Kawarau River and its tributaries are subject to a Water Conservation Order.

Both the Fraser and Manuherikia Rivers join the Clutha at or near Alexandra. The Manuherikia is fed by a number of streams including the Manorburn, with associated reservoirs (the Falls Dam, the Upper and Lower Manorburn), and the Poolburn with its associated Poolburn reservoir.

The Teviot River joins the Clutha at Roxburgh and is fed by Lake Onslow, a man made reservoir originally created to provide water storage for gold sluicing activities but now an integral part of an irrigation and hydro scheme.

The Beaumont River joins the Clutha at Beaumont. Central Otago shares a boundary with Clutha District that follows the centreline of this river.

Central Otago also shares a common boundary with the Clutha District that follows the centreline of the Pomahaka River. Approximately half of the Pomahaka headwaters catchment is located in the Central Otago District. The Pomahaka and its tributaries are subject to a rule in the Transitional Otago Regional Council Regional Plan (the former Local Water Conservation Order, Pomahaka River and Tributaries and Lower Clutha River Notice 1989). This rule has been included within the Regional Plan : Water for Otago. These waters are regionally significant recreational trout fisheries and fish habitats.

The other significant water catchment system in the District is the top portion of the Taieri River system. The Taieri headwaters begin in the Lammerlaw Range before the river drops down across the Maniototo Plains, where it flows into the Dunedin City just south of Kokonga. A diversion from the Upper Taieri occurs at Paerau and provides for water to be diverted by the Taieri weir into the combined Maniototo Irrigation and Power Scheme. The wetlands of the Upper Taieri are a nationally significant landform and wildlife habitat.

There are also a large number of smaller reservoirs and wetlands within the District. The wetlands at higher altitudes are especially significant due to their rarity in the Southern Hemisphere.

#### **2.4.2 Water Quality and Quantity**

Water quality in the Upper Clutha, Kawarau, Taieri Catchments is generally of a high standard. Major factors influencing water quality in the Clutha and Kawarau Rivers are the relatively high flows the rivers carry and contributions from tributaries (particularly silt) and the regulation of flows from the feeder lakes, Wakatipu, Wanaka and Hawea. Waste water discharges into the Clutha occur at Cromwell, Alexandra and Roxburgh and also further up the river catchment in the Queenstown-Lakes District.

The general water quality of the district can be adversely affected by non-point source pollution such as sediment from rivers in flood, stormwater runoff from the roading network, agricultural runoff, and so on. The community's level of awareness regarding the impact that their activities can have on water quality must be increased so that the effects of this type of pollution can be mitigated.

High water quality allows for a greater range of water use than does water with a lower quality. The variety of ways in which quality can change is virtually limitless. Sources of a decrease in water quality include:

- Sewage effluent.
- Animal excrement.
- The spread of invasive weed, particularly Lagarosiphon.
- Metals entering water systems either by natural processes or human introduction.
- Oxygen depletion.
- Nutrient enrichment.
- Temperature changes.
- Increases in suspended particles (siltation).

- Decrease in light penetration.
- Water abstraction.
- Discharge of wastes.
- River control drainage works.

Activities that abstract water or inhibit the natural flow regime of water bodies or have the effect of creating fluctuation in the flow of a river can have an impact on the water quality of a water body, in terms of its ability to sustain ecosystems reliant upon the natural flow regime. For example, the construction of a dam may block the migratory path of fish species and may also impact on ecosystems by causing daily fluctuations in water level. Urbanisation and land clearance may lead to flooding effects and afforestation may decrease the summer water yield of a catchment.

### **2.4.3 Use of Water Resources**

The use of the District's water resources is extremely varied. Uses include water based recreation (in its various forms); hydro electric power generation; irrigation; domestic and industrial consumption; as a receiving body for wastes; and as an aquatic ecosystem. The surface area of some of the District's water bodies are also utilised by structures associated with recreation (eg. jetties, wharfs, navigational aids) and mining activities. The rivers, lakes and wetlands of the District are also significant components of the landscape and natural character of the District.

A brief overview of the major water uses follows.

#### *(i) Recreation*

Recreation is a significant use of the District's water resources and one which is likely to increase particularly during vacation periods. The recently created hydro lake, Lake Dunstan is proving to be a popular recreational resource. While the creation of the lake has resulted in the preclusion of recreational pursuits that relied on swift currents and rapids it has made other forms of recreation for which still water is needed or preferable (eg. swimming, sailing, water skiing, rowing) more accessible to a greater number of people.

The majority of recreational pursuits on the lake revolve around boating and fishing. Boating activities predominantly occur in the vicinity of the Cromwell boat ramp, Lowburn boat harbour, the Burton Creek and Dairy Creek recreation areas and at Bannockburn Inlet, while fishing is concentrated at the Clyde Dam end of the lake and in the vicinity of Bendigo Wildlife Area. The Alexandra Rowing Club uses the area around the Burton Creek recreation area extensively during the rowing season and this part of the lakeshore is also used by passive recreationalists.

Fast water recreation such as jet boating and kayaking are available in the Kawarau River and the Clutha River between Millers Flat and Beaumont. The Beaumont Gorge offers a number of sections of white water rapids offering some challenge. This section of the river is used for the kayak section of the Beaumont triathlon. Most parts of the Clutha River are used for kayaking instruction, racing and cruising, and low impact rafting. The Kawarau River offers excellent fast water for jet boating, kayaking and rafting. A kayak course has been established in the vicinity of the Roaring Meg. The Roaring Meg section of the river contains the premier white water rapids in the Central Otago District.

Boating activities also occur on Lake Roxburgh, the Manuherikia River and at Blue Lake. The Blue Lake is also the site of the annual triathlon event, "The Ghost to Ghost." The gorge on the Manuherikia River between Ophir and Galloway is a classic white water kayaking run which is periodically paddled when higher water flows allow.

Small lakes and ponds at Naseby, Oturehua, Becks, Manorburn and Ida Burn are used for curling and ice skating in winter.

Fishing is possibly the most popular recreational activity involving the Districts water bodies. Most of the Districts water bodies have significance for fishing in particular Lake Dunstan, the salmon fishing of the Clutha River below the Roxburgh Dam, Lake Onslow and the Pomahaka, Taieri and Teviot Rivers. The Poolburn, Manorburn, Falls and Frasers reservoirs and a number of smaller

irrigation reservoirs (such as Rutherfords Dam) and rivers such as the Manuherikia and Nevis are also popular and productive fishing spots.

The productive nature of the Lake Dunstan fishery has been due initially to the increased availability of food submerged by the reservoir. This is likely to be only temporary. The Clutha Sports Fisheries Trust has been established to manage the fish stocks of the lake.

*(ii) Hydro Electric Power Generation*

A number of hydro electric power developments have occurred within the District. The use of water for the generation of electricity is a non-consumptive use of the renewable water resource. Two large hydro stations have been established on the Clutha River.

Roxburgh power station built during the 1950's has a capacity of 320 megawatts. More recently the Clyde power station was established with a generation capacity of 432 megawatts. Together, both of these power stations generate approximately 11% of New Zealand's electrical energy.

There are also a number of smaller hydro power stations within the Central Otago District. A small combined hydro and irrigation scheme operates on the Teviot River with a new station being installed at Horseshoe Bend on this river. A hydro station is also operating on the Roaring Meg and on the Fraser River. The Maniototo Combined Irrigation and Power Scheme incorporates two power houses with a combined generating capacity of 12.25 MW at Paerau.

Of the rivers in the District, the lower Clutha has the most significant potential for further hydro-development and has been subject to recent investigations based on a power station located at Tuapeka Mouth with a nominal generation capacity of 350 MW. While the dam site identified in that investigation is located in the Clutha District the 69 metre reservoir level subject to the investigation would cause the inundation of land in the Central Otago District and a significant increase in groundwater levels. This would result in the loss of some agricultural land and a change from a river environment to a lake setting. The potential benefits would include new lake recreation opportunities and the improvement of community infrastructure at Millers Flat.

Further hydro-electric potential in the upper Clutha is also under investigation. Most of the investigation area in the vicinity of Queensberry lies within Central Otago District, while part of the land subject to investigations at Luggate lies within the District.

The Nevis Valley, Falls Dam, Manuherikia and some of its tributaries have also been identified as having potential for future hydro-electric power development.

*(iii) Consumptive Uses*

There are numerous consumptive uses of water in the District, such as water supply for urban areas, domestic and farming use. Not only are the Districts main urban centres reticulated with water services, but much of the rural area is also serviced by a variety of irrigation schemes that are generally operated by irrigation companies.

The location of these schemes are shown on Figure 2.6 and are as follows;



<b><u>Scheme</u></b>	<b><u>Year Irrigation Commenced</u></b>	<b><u>Area (hectares)</u></b>	<b><u>No. of Irrigators (Approx 1986)</u></b>
Ardgour/Beggs/Tarras	1923	1628	23
Bannockburn	1922	330	27
Burn Cottage	1994	109	9
Earnsclough	1922	1146	64
Galloway	1920	1067	25
Hawkdun	1929	3580	62
Idaburn	1931	230	7
Ida Valley	1917	5045	52
Last Chance	1923	1026	44
Maniototo	1985	9300	70
Manuherikia	1922	1910	170
Omakau	1935	5770	79
Pisa Flats	1955	1030	14
Ripponvale	1956	377	33
Teviot	1924	1464	53
<b>Total</b>		<b><u>34012</u></b>	<b><u>732</u></b>

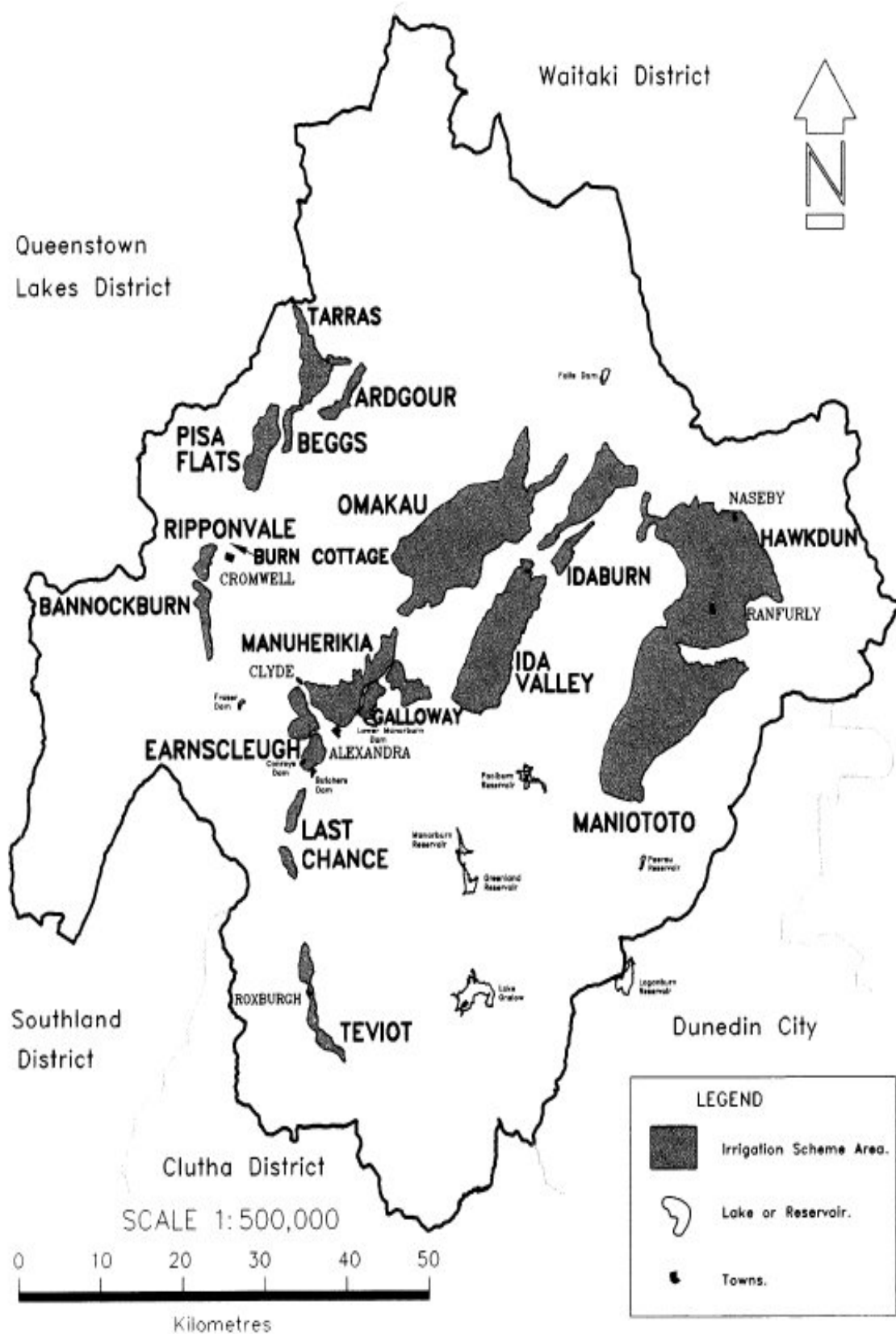
In addition, substantial areas are irrigated by private individuals and groups of irrigators. Irrigation schemes are of vital importance to pastoral farming and horticulture in Central Otago as low rainfall areas of Central Otago are heavily dependent on irrigation. As well as a direct increase in productivity on river flats and terraces, irrigation provides complementary benefits to dry land and high country farming, which are considerable and difficult to quantify. Similarly, water for irrigation and frost protection is of crucial importance to horticultural production. Availability of an adequate and reliable water supply, rather than the inherent physical soil characteristics, is the major limiting factor on land potential in the District.

The Timber Creek catchment area of the Pomahaka River supplies the Clutha District Council's Moa Flat Rural Water Scheme.

*(iv) Instream Uses*

As is evident from (i) *Recreation*, the District contains a number of significant habitats for introduced fish species. Significant native freshwater fisheries are also present in water bodies of the District. Principal native fish species in Central Otago are galaxiids such as koaro, roundhead galaxias, long finned eel, lamprey and bullies.

**Figure 2.6 – Irrigation Schemes in Central Otago District**



Threats to native fisheries predominantly relate to habitat modification and destruction which can include land development, predation by introduced species, construction of barriers, water abstraction, wetland drainage, and riparian vegetation damage and removal.

The native Galaxiids, *Galaxias anomalus*, and some closely related recently discovered species *G. depressicieps* and *G. brevipinnis* are fish species which are considered to warrant special protection on account of their rarity with further investigation needed into their species distribution and habitat requirements. It is believed that feeding competition from brown trout is responsible for restriction of these rare species to rivers and streams lacking trout. Long-finned eels have also been identified as requiring protection from over-exploitation.

The valley wetlands are especially valuable as habitat for a large proportion of the region's water fowl and as storage for water which assists in evening out river flows.

Of special significance is the Upper Taieri wetlands. These wetlands are at least of national importance for wildlife values (ranked as national and regional importance in the Wetlands of Ecological and Representative Importance database). Fifty-two species of birds have been recorded there. The former Wildlife Service rated the wetlands as being internationally important as waterfowl habitat, as one of the three most valuable freshwater wildlife habitats in Otago, and one of the 10 most valuable in New Zealand (National Water and Soil Conservation Authority 1983).

The wetlands are important for their diversity and uniqueness; as a wildlife habitat; for their hydrological values; as a recreational fishery; for their mahinga kai values; and for their landscape value.

Extensive wetlands, some internationally significant, are also found on the relatively flat summits of the block mountains. Their varied plant life is adapted to wet conditions with relatively low temperatures. They also provide habitat for banded dotterel, black-fronted tern South Island pied oystercatcher, and black-backed gulls.

Waterfowl hunting is a popular recreational activity throughout the District. The Upper Taieri wetlands are a regionally significant waterfowl hunting area used by over 300 hunters annually.

Many of the District's waterways also retain significant natural character values. These include the Kawarau, the Nevis, the Clutha (particularly the Millers Flat to Beaumont section), the Pomahaka and the Taieri (including the wetlands) Rivers.

<p><b>Significant Issue - Effects on Water bodies</b>  <i>Many of the District's water bodies are significant recreational, ecological and economic resources. These values are capable of being compromised by land use (including water surface activities) which may have the following adverse effects</i></p> <ul style="list-style-type: none"> <li>(a) <i>a decrease in the stability of the beds and banks of water bodies,</i></li> <li>(b) <i>degradation of plant and animal habitats within or adjacent to water bodies,</i></li> <li>(c) <i>a decrease in the stability of structures located in or near water bodies,</i></li> <li>(d) <i>degradation of amenity, natural character landscape and historic values of water bodies and their margins,</i></li> <li>(e) <i>an increase in the incidence of plant and animal pests,</i></li> <li>(f) <i>threats to the safety of other users,</i></li> <li>(g) <i>adverse noise effects, and</i></li> <li>(h) <i>restrictions on public access to and along the margins of lakes and rivers.</i></li> </ul> <p><i>These effects can also lead to a reduction in water quality, water quantity and cultural values.</i></p>	<p><u>Cross Reference:</u>  Issues 4.2.7 (pg 4:3) 5.2.1 (pg 5:2)  Objectives: 4.3.1, 4.3.3, 4.3.5, 4.3.6 (pg 4:7 and 4:8) 5.3.1 to 5.3.5 (pg 5:4)</p>
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**2.4.4 Public Access to Lakes and Rivers**

The District's water resources are a well used recreational asset and access to and along lakes and rivers is very important to the public at large. Section 6 of the Act requires that public access to and along lakes and rivers be maintained and enhanced as a matter of national importance.

There are areas in the District, however, where access to and along the margins of the District's lakes and rivers is restricted, where the public doesn't have a right of legal access due to public health and safety reasons, operational requirements associated with hydro schemes or where topography precludes such access. Maintaining and enhancing public access to and along lakes and rivers of the District can be made more difficult when land use intensifies. This is because people accessing these resources generally have less effect in terms of impacting on property management practices and the privacy of the occupants of large properties, than on more intensively used properties. Furthermore, negotiating public access is an easier task when dealing with a small number of landowners.

<p><b>Significant Issue – Access to Lakes and Rivers</b>  <i>Public access to and along the margins of the District's lakes and rivers is important to existing and future residents and visitors to the District. Riparian access is not always available for public health and safety or operational reasons and is capable of being obstructed by development adjacent to lakes and rivers.</i></p>	<p><u>Cross Reference:</u>          Issues 4.2.8 (pg 4:3), 5.2.2 (pg 5:2), 15.2.1 (pg 15:2), 16.2.1 (pg 16:2)          Objectives: 4.3.4 (pg 4:7), 5.3.3 (pg 5:4), 15.3.3 (pg 15:3), 16.3.8 (pg 16:3)</p>
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## 2.5 FLORA AND FAUNA

### 2.5.1 Indigenous Flora and Fauna

Prior to early burning, Central Otago was more heavily vegetated than it is today in terms of taller grassland, mixed with dense shrubland and forests on the flanks of the mountains. Native vegetation today generally comprises of shrub and tussockland, open rocky areas and salt-pans, and isolated stands of bush.

Stands of Kanuka/manuka are scattered across Central Otago in gullies and fire protected areas. They are especially prevalent on the Pisa Range and are also present on the Dunstan Mountains. Remnants of the high altitude mixed Podocarp broad leaf forests that existed 1000 years ago are also present on the Pisa Range, and on some of the other ranges of the District.

The dry land areas centred around Alexandra support a wide range of distinctive habitats (eg. schist tors, salt-pans) containing a large number of vulnerable native plants and a wide range of invertebrates including a chafer beetle.

With respect to the tussock grasslands of the Central Otago District, the dominant *Chionochloa* tussocks have been gradually restricted in range and are being replaced by subordinant species particularly fescue tussocks. Tussock grasslands support a number of native invertebrates and their predators including moths, grasshoppers, beetles, spiders, skinks, geckos, falcons and hawks.

Terrain above the alpine grassland is predominantly cushionfield, fellfield, snowbanks and sparsely vegetated rock fields and tors. These cushion and fellfields are extensive on the Pisa, Old Woman/Old Man, Rock & Pillar, Hawkdun and St Bathans Ranges. Many of Central Otago's endemic plants and insects are found in this high alpine zone.

Saline soil areas of the Maniototo, Ida and Manuherikia valleys support highly specialised vegetation and insects that are either endemic to these sites or closely related to species from coastal sites.

Distinctive vegetation that grows in tarns, bogs, alpine swamps and low altitude wetlands includes cushion plants, sedges, mosses and a large variety of herbs. These are extensive throughout the District. Further information about the District's wetland habitats and the species associated with these areas is provided in section 2.4.3(iv) of the plan.

Collectively the ecosystems of Central Otago support a substantial number of indigenous fauna and flora species which are unique to Otago or require special protection. Examples of these are as follows:

- The giant lizards, Grand skink (*Oligosoma grande*) and Otago skink (*O. otagense*) are found in the Lindis area. The scree skink inhabits the scree slopes of the Hawkdun and Ida Ranges. Otago and Grand skink are two of New Zealand's largest and rarest lizards. They are both considered to be threatened.
- The threatened eastern falcon (*Falco novaezeelandiae*) is widespread and a feature of Central Otago at all altitudes.
- Invertebrates of note are the Cromwell and Alexandra chafer beetle which are confined to very small areas. The Cromwell chafer beetle has formal protection. Insects confined to the saline soils of the District are also significant including two moths. Several large carabid beetles, a grasshopper, and several moth species are also threatened.
- Of a range of plant species confined to Central Otago which are rare and vulnerable, three species of *Lepidium* (*L. kirkii*, *L. matau* and *L. sisymbrioides*) are found only on saline soils. These small herbs are particularly vulnerable to soil disturbance.
- Other rare plants, some reduced in number to individual plants, include *Myosotis albosericea*, *M. oreophila*, *Simplicia laxa* and *Carex inopinata*.

Details of indigenous flora and fauna in Central Otago are contained in the Approved Otago Conservation Management Strategy (August 1998) prepared by the Department of Conservation.

- Native freshwater fish species including *Galaxias anomalus*, and some closely related recently discovered species *G. depressiceps*, are only found in tributaries that salmonids cannot access. The non-migratory nature of these species makes them particularly prone to extinction. More information about water habitats (including wetlands) and native freshwater fish species is provided in section 2.4.3(iv) of the plan.

Section 6(c) of the Act requires Council to recognise and provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna as a matter of national importance.

Activities that can threaten such areas include:-

- Infestation by weeds and pests such as Heiracium, thyme, wilding trees, stone crop and sweet briar, rabbits, possums, hares and goats.
- Land development practices such as burning, ploughing, oversowing and topdressing.
- Mining activities.
- Damming and flow fluctuation for hydro-electricity generation.
- Drainage of wetlands.
- Reduction in river and stream flow due to water abstraction for irrigation.
- Intensive use of riparian margins and/or removal of riparian vegetation.
- Predation by introduced predators such as mustelids (stoats, ferrets and weasels), feral cats, rats and hedgehogs.
- Structures that impede the movement of freshwater fish in watercourses.

Introduced predators such as feral cats, mustelids and rats can impact severely on indigenous fauna. Protecting habitat of indigenous fauna will not necessarily protect indigenous fauna from introduced predators. There is potential for conflict between Council's duty under section 6(c) of the Act and people using and developing resources.

<p><b><u>Significant Issue - Significant Indigenous Vegetation and Significant Habitats of Indigenous Fauna</u></b>  <i>The Central Otago District contains a number of areas of significant indigenous vegetation and significant habitats of indigenous fauna which have their own intrinsic values that are not always recognised. Some of these areas can also have value for activities enabling people and communities to provide for their social, economic and cultural well-being and for their health and safety. The potential for conflict in protecting these intrinsic values and utilising them is a significant issue facing the community in the sustainable management of the natural and physical resources of the District.</i></p>	<p><u>Cross Reference:</u>  Issue 4.2.9 (pg 4:4)  Objective 4.3.8  (pg 4:8)</p>
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### **2.5.2 Statutorily Managed Sports Fish and Game**

The Central Otago District has a number of high quality trout and salmon fisheries and game bird populations which, for the most part, are self-sustaining. These populations provide high quality recreational opportunities for anglers and hunters resident in the District as well as visitors to the District. The later group provide an additional benefit in terms of economic activity associated with regional tourism.

Significant trout and salmon fisheries include the Clutha (below the Roxburgh Dam), Pomahaka and Taieri Rivers and Lakes Dunstan and Onslow. Significant game bird populations exist at the Upper Taieri wetlands.

Trout and salmon fisheries and game bird resources and access to them are under continuing pressure from the external effects of other resource uses. The quality of fish and game and recreational angling and hunting is dictated by the quality and extent of freshwater habitats. Equally important is the quality and extent of access to those habitats.

<p><b>Significant Issue – Statutorily Managed Sports Fish and Game Resources</b></p> <p><i>The District contains a number of trout, salmon and game bird habitats which are a valuable recreational resource of the District. Some forms of land development are capable of having a detrimental effect on the quality of these habitats and access to them.</i></p>	<p><u>Cross Reference:</u> Issue: 4.2.10 (pg 4:4) Objectives: 4.3.4, 4.3.5 (pg 4:7), 4.3.6 (pg 4:8)</p>
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## 2.6 BUILT ENVIRONMENT

The social, economic, and cultural wellbeing, and the health and safety of Central Otago's people and communities is closely linked to the built environment. These areas meet basic human needs such as shelter and warmth, provide a system of mobility and access to services, provide infrastructure for activities and contribute to quality of life. The character of rural and urban areas differ greatly. The Resource Area approach implemented in Sections 4 to 10 of the Plan recognises the differing amenities of these areas.

The major components of the built environment are the District's towns and associated services and the transportation and public utility infrastructure.

### **2.6.1 Towns and Settlements**

A brief description of the District's major towns and settlements follows. Where population figures are quoted they relate to the usually resident population as recorded at the 1996 Census.

#### **Alexandra**

The town of Alexandra (4617) is situated at the confluence of the Clutha and Manuherikia Rivers. It is the administrative, professional and business centre in Central Otago. Council's principal office, the District Court, sub-district Police Headquarters for Central Otago, and Central Government offices are all located at Alexandra. Educational facilities include Dunstan High School and three primary schools. Alexandra has excellent recreational facilities including Molyneux Park (including a skating rink) and Stadium, Pioneer Park, the swimming pool complex, and an 18 hole golf course. Other facilities include two large motor camps, motels, medical and dental surgeries and shopping areas.

#### **Cromwell**

Cromwell (2613) is located at what was originally the confluence of the Clutha and Kawarau Rivers and is now Lake Dunstan. The town is strategically located on State Highway 8B which links State Highway 8 to State Highway 6.

Cromwell offers a wide range of administrative, professional, retail, educational and recreational facilities to the surrounding area. Services and facilities include a District Council service centre, a police station, medical facilities, Andersons Park (including an artificial turf) and Stadium, swimming pool, a golf course, Polytechnic campus, the Cromwell College and aquatic centre and two primary schools. Cromwell's growth as the Districts primary tourist centre will continue to evolve following the formation of Lake Dunstan and its strategic location on main tourist routes. A wide variety of visitor accommodation is offered ranging from camping ground facilities to a substantial hotel and conference centre.

Areas in the vicinity of Cromwell have potential for further subdivision and development.

#### **Ranfurly**

Ranfurly (846) acts as the servicing centre for the Maniototo and provides professional, retail, recreational, medical, and educational services. These facilities include a Council service centre, a police station, the Maniototo Area School, a primary school and the Maniototo Park and Stadium.

#### **Clyde**

Situated 10 kilometres north of Alexandra the historic township of Clyde (849) is a popular holiday destination and provides alternate residential accommodation for those employed in Alexandra. Considerable heritage values exist in the old town centre. A primary school, various recreational facilities, museums, general shops and the Dunstan Hospital are located at Clyde. Other facilities include a camping ground and a golf course. Clyde is not serviced with a reticulated sewerage system and this is a constraint to closer subdivision and development.

#### **Naseby**



Naseby (108) is primarily a holiday centre, with 49% of ratepayers living permanently in Dunedin and its environs. Naseby originally acted as the rural service centre for the Maniototo prior to the establishment of Ranfurly adjacent to the Central Otago Railway. The presence of Naseby forest adjacent to the town itself gives Naseby a unique character and coupled with its built heritage makes the town an attractive holiday and visitor centre. The central part of the town has been registered as an historic area by the New Zealand Historic Places Trust. The town has limited facilities with a few retail outlets, two hotels, a camping ground and general recreational facilities (including a skating rink).

### **Roxburgh**

Roxburgh (741) acts as a service centre for the surrounding rural area. Facilities include an Area School, Medical Centre, recreation facilities (including a golf course and racecourse), Council Service Centre, professional offices, and other day to day shopping facilities.

### **Lake Roxburgh**

The Roxburgh hydro settlement was constructed to house the staff of the Roxburgh Hydro Electric Power Station. The settlement now consists of housing, an accommodation lodge and a large central recreational area. The settlement is renowned for excellent salmon fishing available below the dam.

### **Omakau**

Located on State Highway 85, Omakau acts as the servicing centre for the local community. Facilities include a primary school, hotel, police station, sports ground and golf course, a general store and two churches. The annual race meeting is a popular attraction.

### **Patearoa**

Patearoa performs a dual function as a servicing centre for the surrounding rural community and as a holiday home settlement. The township has a primary school, a range of recreational facilities, hotel, and transport yard. The township has a limited reticulated water supply taken from the Patearoa Rural Water Supply Scheme.

### **Oturehua**

Oturehua provides a range of community services to the residents of the Ida Valley. Oturehua contains the historic Hayes Engineering Works and an historic store building.

### **Ettrick**

Ettrick is located on State Highway 8 approximately 20 kilometres north of Raes Junction. The township provides for the day to day needs of the surrounding orcharding area. Facilities located within the township include a large cool store, large pack houses, a hotel, and a dairy. The former Ettrick Primary School has been converted into a camping ground.

### **Millers Flat**

Millers Flat was originally developed as a river punt crossing point. The township is located on State Highway 8 on the east bank of the Clutha River and serves the needs of the local orcharding and farming community and is also a popular holiday spot. The township has a general store, primary school, a number of churches, a motor camp, hotel, service stations and a number of recreational facilities. The annual Boxing Day rodeo is a popular attraction.

### **Lauder**

Lauder is a small service centre on State Highway 85 between Omakau and Becks. A local garage and hotel are present. An Atmospheric Research Centre operated by the National Institute of Water and Atmospheric Research is located nearby.

### **Becks**

Becks provides a focus for the surrounding rural community. A primary school and hotel are present.

### **Tarras**

Tarras has a small shopping area, a garage and primary school.

### **Bannockburn**

Bannockburn was established as the result of the discovery of gold in the area in 1862. Once a bustling gold town, Bannockburn continues to maintain its distinctive identity through the presence of several historic buildings and the Bannockburn sluicings (part of the Goldfields Park). The area is becoming increasingly sought after for its climate and lifestyle and now accommodates several new subdivisions. Facilities here include a hotel, camping ground, various recreation facilities and an outdoor education centre based at the former primary school site. The Bannockburn area is becoming an increasing popular location for the establishment of vineyards and wineries.

### **Ophir**

Gold was discovered in Ophir in 1863. In its early years the town had a population around 1000. Ophir possesses considerable historical significance as a typical Central Otago gold mining township and several historic buildings remain. Because of these significant heritage values, Ophir has been registered as an historic area by the New Zealand Historic Places Trust.

### **St Bathans**

The historical character of St Bathans is a source of considerable interest to visitors. The Vulcan Hotel, old post office, hall and gold office are buildings of historic and landmark significance to the town. Department of Conservation administered reserve land centred on the Blue Lake is a source of visitor interest. The "Ghost to Ghost" triathlon operates out of St Bathans and is a popular community event.

### **Other Townships**

There are a number of small settlements in Central Otago that provide a focus for surrounding rural localities. These include Gimmerburn, Kokonga, Kyeburn, Paerau, Wedderburn, Waipiata and Poolburn. Services and facilities include primary schools at Paerau and Poolburn; halls, hotels, churches, general stores, petrol pumps and recreation facilities.

The character of towns and settlements varies, but they can be grouped into three broad categories.

- Substantial towns with a strong commercial core that act as the District's major servicing, distribution and administration centres. These towns are fully serviced and have a relatively large population and contain a number of distinct environments within their boundaries. These towns include Alexandra, Cromwell, Ranfurly and Roxburgh.
- Towns that contain limited commercial centres but are important residential and local servicing towns. In some instances retrenchment of businesses has resulted in these communities having vacant commercial buildings that are suitable for alternative use. A mixture of land uses means that the clear division of functional areas within the boundaries of these towns is not as evident as it is in the substantial towns referred to above. The majority of these towns are fully reticulated with water and sewerage, however not all have such facilities (eg Clyde). Examples of such towns include Clyde, Omakau, Naseby, Bannockburn and Millers Flat.
- Rural settlements that have a low density of development with minimal commercial activities. These rural settlements may contain a number of community facilities such as primary schools, halls, hotels and recreation facilities. The principal amenity value of these areas is the low density of development, which creates a quiet, peaceful and semi-rural character. A number of these settlements are also popular holiday retreats. Examples of these towns include Ettrick, Oturehua, Patearoa and Tarras.

<p><b><u>Significant Issue - Management of The District's Towns and Associated Services</u></b></p> <p><i>The District's towns and their associated services are a significant resource of the District. Sustainable management of these resources must recognise that development patterns and amenity standards vary throughout the District's towns and settlements and therefore the acceptability of effects within certain categories of towns and settlements will be different.</i></p> <p><i>The managed development of the District's towns and settlements, and associated services, enables people and communities to provide for their social, economic and cultural wellbeing and their health and safety whilst ensuring potential adverse effects are avoided, remedied or mitigated.</i></p>	<p><u>Cross Reference:</u> Issue 6.2.1 (pg 6:2) Objectives 6.3.1 to 6.3.6 (pg 6:6)</p>
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## **2.6.2 Transportation and Utility Infrastructure**

### **(i) State Highway Network**

Three principal State highways traverse the District. State Highway 6 enters the District at the Central Otago – Queenstown-Lakes District boundary south of Luggate. It follows the Clutha River and Lake Dunstan, travelling past Cromwell and leaves the District in the Kawarau Gorge. State Highway 8 connects the District with coastal Otago travelling from the Lindis Pass via Tarras past Cromwell and through Alexandra to Raes Junction where it leaves the District. State Highway 85 (partially known as the Pigroot) travels from Alexandra through the Manuherikia Valley then on through the Maniototo Plains leaving the District beyond Kyeburn.

The complete State highway network (a total of 377.33km) is as follows;

<b><u>SH</u></b>	<b><u>Approximate Length (km)</u></b>	<b><u>Route</u></b>
6	48.07	Near Sheepskin Creek No 2 to Roaring Meg
8	178.37	Lindis Pass to Raes Junction
8A	21.00	Tarras to Luggate
8B	2.61	SH6 Junction to SH8 Junction at Deadmans Point
85	115.22	Shag River to Alexandra
87	10.36	Careys Crossing to Kyeburn
90	1.70	Raes Junction to district boundary

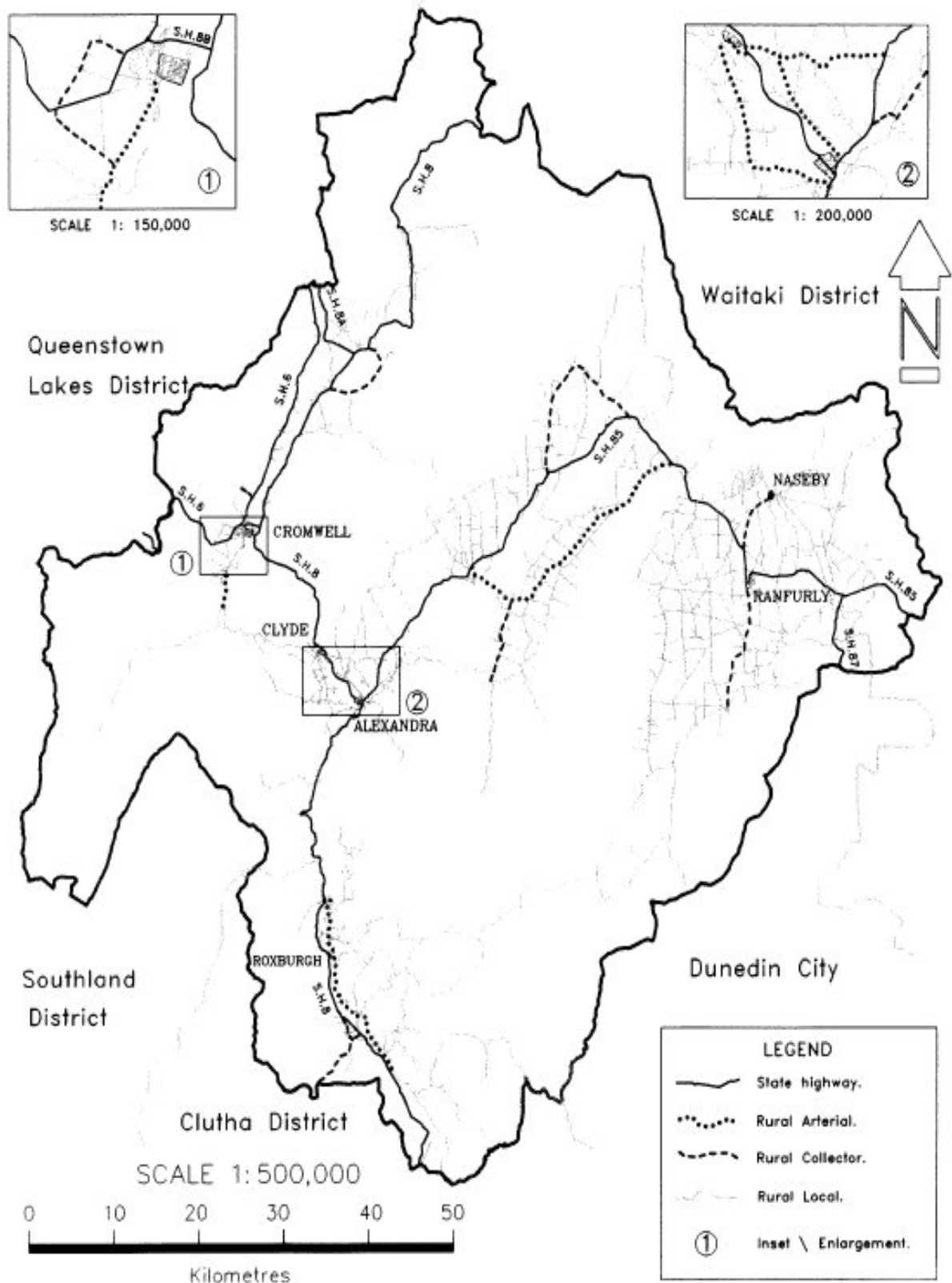
### **(ii) Other Roads**

Council's road network (excluding State highways) is the ninth longest roading network of the 73 Territorial Local authorities in New Zealand. The total road length that is maintained by Council is 1,839.7km.

<b><u>Roads</u></b>	<b><u>Urban</u></b>	<b><u>Rural</u></b>	<b><u>Total</u></b>
Maintained	107.5	1,732.2	1,839.7
Sealed	98.7	281.2	379.9
Unsealed	8.8	1,451.0	1,459.8

Some of the District's unsealed roads have historical significance such as the Old Dunstan Road, Thomsons Gorge Road, Waikaia Bush Road, and Symes Road. Backcountry roads sometimes provide access to heritage sites, conservation land and other areas that provide recreational opportunities and the Council supports the maintenance of such roads to a suitable standard as assessed by the Council within the constraints imposed by available resources. The classification of the District's roads is shown on Figure 2.7 - See also Schedule 19.7.

**Figure 2.7 – Roading Classification in Central Otago District**



(iii) Airfields

A sealed surface airport is located in the District at Alexandra/Clyde, and grass surface public airfields are at Cromwell and Roxburgh. None of these facilities currently operate as commercial airports although the Alexandra/Clyde airport provides an alternate to the Queenstown Airport at Frankton when that airport is closed due to poor weather.

There are also a number of private airfields located within the District which meet the needs of topdressing and aerial spray operators engaged in servicing the rural community. Helicopters are also used for agricultural, recreation and tourism purposes. There is also an increasing use of aviation sports aircraft in the district, including gliders, home built and microlight aircraft, both for recreation and competition flying.

(iv) The Resource Management Act

In terms of the Act, the transportation network impacts on the management of the District's resources in two ways. Firstly, transport infrastructure is deemed to be part of the environment by virtue of the definition of natural and physical resources which includes all structures. Secondly, the actual operation of the transport systems is defined as a land use activity by virtue of section 9(4) of the Act.

<p><b>Significant Issue - Transportation Network</b>  <i>The Central Otago District is dependent on an efficient transport network to utilise and develop its resources and to provide mobility and access for it's people and communities. The development of transportation networks and the forms of transport themselves can have significant adverse environmental effects particularly in terms of introducing noise, visual intrusion, vibration, glare, discharges, and impacts on watercourses and upon the efficient use of energy. Conversely land use activities can greatly affect the safe and efficient operation of the transportation network and its sustainable management. This can occur through poorly located and designed access points, a lack of adequate parking facilities, the visual distraction of signs, and glare from buildings and activities.</i></p>	<p><b>Cross Reference:</b>          Issues: 12.2.1 (pg 12:2),          13.2.1 (pg 13:2)          Objectives: 12.3.1 (pg 12:4)          13.3.1 (pg 13:4)</p>
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(vi) Energy Distribution and Reticulation

Transpower manages the transmission of electricity through the transmission network and owns and operates a number of high voltage transmission lines throughout the District which form part of the transmission network. Transpower is responsible for the transmission of electricity from a power station to a sub station where a local power company assumes control of electricity distribution. The provision of electricity to the people of the District is undertaken by local lines companies. Power companies also operate small generating plants in the District. Contact Energy is responsible for the Clyde and Roxburgh hydro dams. The operation of hydro dams is not a network utility as defined by the Resource Management Act 1991 and this Plan.

(vii) Telecommunication

Communication systems in the District form an integral role in the continued functioning of the District. Telecommunications have become an important medium and have made the rapid transfer of information significantly easier than in the past. The use of cellphones, faxes and computer technology allows people to operate businesses throughout the District. Telecommunication systems within the District are being continually upgraded.

(viii) Water and Sewerage Services

The Council operates and maintains a number of water supplies within the District. Alexandra, Clyde, Cromwell, Naseby, Omakau, Patearoa, Ranfurly, Roxburgh and Roxburgh Hydro are all reticulated with water. A fire fighting supply is maintained at St Bathans.

The Council also operates and maintains a number of wastewater treatment and disposal sites throughout the District. Sewerage reticulation services are available in Alexandra, Cromwell, Naseby, Omakau, Ranfurly, Bannockburn, Roxburgh Hydro and Roxburgh. The role of the Council is to maintain these services and to introduce such services in areas where an identifiable and measurable health risk exists and where a communal system is the most cost efficient solution.

*(ix) The Resource Management Act*

Under previous legislation, public works and works of network utility operators were generally permitted as of right. Such works now have to be provided for within the District Plan and are to be considered along with all other types of landuses on the basis of the effects they may have on the environment. Provision can also be made for these works by the designation procedure where the utility operator has requiring authority status.

<p><b>Significant Issue - Public Works and Network Utilities</b>  <i>The development and continued operation and maintenance of public works and network utilities is a vital component in providing for the social, economic and cultural wellbeing and health and safety of the people of the District. However, the construction and operation of such works can have significant adverse environmental effects particularly in terms of visual impact.</i></p>	<p><u>Cross Reference:</u>  Issue: 13.2.2  (pg 13:2)  Objective: 13.3.2  (pg 13:4)</p>
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**2.6.3 Organised Recreation and Sports Facilities**

Recreation and sports facilities are found throughout the District. Molyneux Park (Alexandra), Anderson Park (Cromwell), the Maniototo Sports Complex (Ranfurly) and the Roxburgh Showgrounds are the major focus for organised sport in the District.

## 2.7 HERITAGE RESOURCES

### 2.7.1 Built Heritage

The Central Otago District contains a rich and varied array of built heritage which makes a significant contribution to the amenity values of the District and act as an important tourist attraction. Of particular significance is the historic township of St Bathans, older parts of Naseby, Clyde and Ophir, and Old Cromwell (situated at Melmore Terrace). The history and characteristics of these areas are briefly discussed below.

#### **St Bathans**

St Bathans began as a boom town known as 'Dunstan Creek' in 1863. The township features a mixture of historic buildings, cottages and open spaces that provide a unique heritage atmosphere. That part of the township visible from St Bathans Loop Road in the vicinity of the Vulcan Hotel is particularly significant and the township has features of compactness, smallness of scale and historic authenticity. The popularity of St Bathans as a focus for visitor interest will continue to increase following the completion of sealed road access from Becks.

#### **Clyde**

Formerly known as 'Dunstan', Clyde was the dominant settlement in this part of the district during the gold rushes of the 1860's. Many buildings from last century have been retained at Sunderland Street and on neighbouring streets that together form a heritage precinct. Churches, hotels, cottages, the former post office and dry stone walls are significant heritage townscape elements at Clyde that also contains significant museums which complement the built heritage of the town.

#### **Ophir**

Gold was discovered at Black diggings, later shortened to 'Blacks' in 1863. In 1875 the town was officially renamed Ophir and several substantial buildings were erected in the late 19th Century. Many of these remain and much of Ophir township forms part of the Ophir Historic Area that has been registered by the New Zealand Historic Places Trust. This recognises the heritage value of Ophir and its surrounds, that include several archaeological sites associated with goldmining. Building styles in the township vary from small colonial cottages and huts to substantial Victorian public buildings such as the Post Office and Courthouse.

#### **Old Cromwell**

Cromwell was originally known as 'the Junction' in recognition of the meeting of the Clutha and Kawarau Rivers which provided a focus for the gold rush which followed the discovery of 87lbs of gold by Hartley and Reilly in 1862. The commercial area of Cromwell which contained many examples of permanent buildings from the gold rush era and the later 19th Century was inundated by the filling of Lake Dunstan. From 1985 a group of local residents began work to relocate several heritage buildings in the Old Cromwell precinct. This work has continued progressively in recent years and has resulted in the reconstruction of heritage buildings from the former commercial area and other structures that are evocative of the heritage of Cromwell. Dry stone walls and stone ruins are also visible on neighbouring land, including the foreshore of Lake Dunstan.

#### **Naseby**

The township of Naseby grew rapidly as a result of the discovery of gold in 1863. Following the gold rush period the town provided a focus as the servicing centre for the Maniototo and a large number of public and commercial buildings were established in Naseby's town centre at Derwent, Earne and Leven Streets. Many of these buildings remain as commercial development this century has occurred at Ranfurly in close proximity to the former Central Otago Railway and State Highway 85. As a result Naseby contains a unique collection of 19th Century heritage buildings and trees. The significance of Naseby has been recognised by the New Zealand Historic Places Trust that has registered the historic town centre as the Naseby Historic Area.

There are other clusters of buildings (such as those at Fruitlands, Nevis, Bannockburn, Cambrians and Matakanui) and individual buildings, objects, places and sites throughout the District that act as reminders of the early mining and farming origins of the District. For example, irrigation race building was a major industry in the 19<sup>th</sup> Century. By 1903 there were 15,790 kilometres of race in use throughout New Zealand, much of which was in Central Otago. In many instances relics are protected as archaeological sites under the Historic Places Act 1993 and some are located on land administered by the Department of Conservation. A full list of the District's built heritage is contained in the Register of Heritage Buildings, Places, Sites and Objects presented in Schedule 19.4.

In achieving the purpose of the Act, Council is required to have particular regard to the recognition and protection of the heritage values of buildings, and the maintenance and enhancement of amenity values and quality of the environment.

Part II of the Second Schedule of the Act also identifies the control of effects on natural, physical and cultural heritage sites and values (including landscapes, landforms, historic places and waahi tapu) as a matter that may be provided for in the District Plan.

<p><b>Significant Issue – Heritage Resources</b>  <i>The Central Otago District contains a significant number of heritage buildings and some towns contain precincts that have a distinct historical character. The District also contains a large number of archaeological and historic sites, particularly sites associated with early Maori and goldmining activities. These buildings, precincts and sites contribute to community wellbeing through their historical and cultural values, and also economically in terms of their worth to the tourism industry. However, modification and loss of significant historic buildings, sites, structures, precincts and streetscapes can occur due to a general lack of awareness and appreciation of historic values or the financial inability to maintain such resources.</i></p>	<p><u>Cross Reference:</u>          Issues: 6.2.3          (pg 6:2), 14.2.2 &amp;          14.2.3 (pg 14:3)          Objective: 6.3.5          (pg 6:6)          11.2.1, 11.2.2          (pg 11:3)          14.3.1 (pg 14:5)</p>
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## 2.8 DEMOGRAPHY

### 2.8.1 Population

While people are not included in the definition of “natural and physical resources” under the Act, resources are managed for people and communities. Demographic information can provide an insight into what the likely demand on natural and physical resources will be.

All figures quoted in this section are taken from the Statistics New Zealand Census Information, 1996.

The 1996 Census revealed that the total population of the Central Otago District was 15,263. This was a decrease of 2.8% on the 1991 total population figure of 15,696. Of the 1996 census total, 14,955 comprised the usually resident population with the other 308 persons being visitors.

The Central Otago District usually resident population of 14,955 in 1996 was a decrease of 0.08% on the 1991 usually resident population of 14,967.

#### **Usually Resident Population**

(Source : Statistics New Zealand).

<i>Year</i>	<i>Usual Resident Population</i>	<i>% Change per year</i>
1981	14,646	
1986	16,188	2%
1991	14,967	-1.6%
1996	14,955	-0.016%

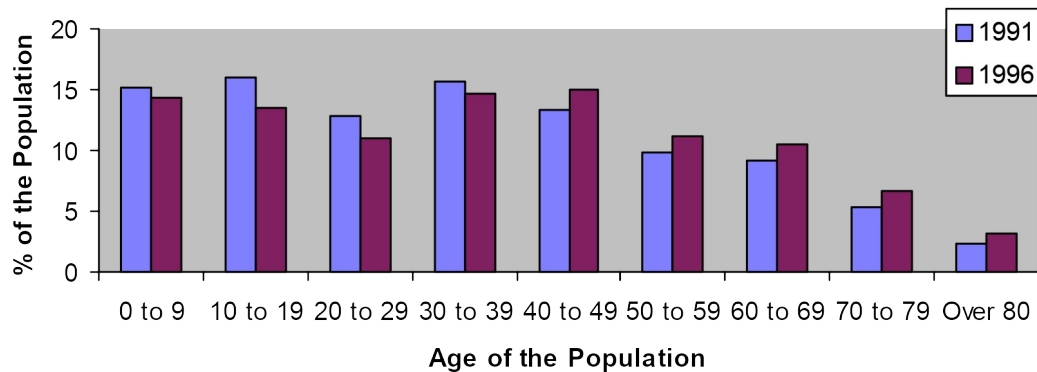
It should be noted that the overall growth rate for Central Otago usually resident population from 1981 to 1996 has been 2.06% despite the negative growth rate experienced between 1986 and 1996. The negative growth rate between 1986 and 1996 is the product of the Clyde Dam wind down and a reduction in services and population in rural areas.

### 2.8.2 Age Structure

The Central Otago population differs greatly from the New Zealand resident population with regard to age distribution. The Central Otago District has a greater proportion of older people, with 20% of the population above 60 years of age that contrasts with the national average of 15%. There are also proportionally fewer children in the District with less than 22% of Central Otago's population being less than 15 years of age compared with the national average of 23%. Just over 40% of the population is not in active employment and a positive result of this is that a large proportion of the population have time and resources available for recreation and community based activities.

As the graph below indicates, the Central Otago District's population is ageing. This can have implications for the demand on public services, such as health and education.

### Distribution of Resident Population for the Central Otago District 1991 and 1996.



(Source: Statistics New Zealand)

The aging population of Central Otago has significant ramifications for the sustainable management of the District's natural and physical resources. This could result in trends towards smaller residential units, a greater number of multi-unit developments, less demand for education services but higher demand for health and recreation facilities.

#### 2.8.3 Household Numbers

At the time of the 1996 Census, there were 5,736 occupied permanent private dwellings in the Central Otago District. This represents a 4.9% increase during the 1991-1996 period.

Year	Number of Occupied Dwellings.	% Change per year.
1981	4,500	
1986	5,274	3.4%
1991	5,454	0.5%
1996	5,736	1.0%

The total number of dwellings in the District is approximately 20% greater than this figure. This confirms that there are a large number of holiday homes in the District.

Although the number of households has increased since 1991 the permanent usual resident population has decreased slightly. Regardless of population growth or decline, the number of households tends to increase due to a decrease in the number of persons per dwelling. This reflects the increase in single elderly people and single adult families. This has implications for the sustainable management of basic community resources, such as sewerage and water reticulation and the roading network.

**2.8.4 Employment by Industry** (For the usual resident population aged 15+ years in 1996)

**Employment by Industry for Central Otago and New Zealand, 1996**



Type of Employment 1996.	Central Otago District	New Zealand
Agriculture, Fishing, Hunting	29.2%	9.7%
Mining	0.5%	-
Manufacturing	5.1%	17.8%
Electricity, Gas and Water	1.8%	0.8%
Building and Construction	9.2%	6.2%
Wholesale, Retail and Restaurant	20.9%	21.3%
Transport, Storage, Communication	3.8%	5.9%
Business and Financial Services	8.6%	10.7%
Community, Social, Personal Services	16.0%	27.0%
Not Adequately Specified.	4.7%	-

(Source: Statistics New Zealand)

The breakdown of employment by industry for the Central Otago District exhibits a marked contrast to the national average. The Central Otago District's figures reflect the reliance on primary production and industry with agriculture accounting for approximately 30% of employment in the region. This is in direct contrast to the national average where primary production accounts for only 9.7% of employment in the labour force. By contrast manufacturing accounts for only 5% of employment in Central Otago compared to the national average of 18%, while the field of community, social and personal services accounts for 16% in Central Otago compared to 27% in New Zealand as a whole.

The figures clearly indicate that primary production will continue to be a significant source of employment in the Central Otago District. This activity is clearly dependent upon the natural and physical resources of the District.

**2.8.5 Temporary and Visitor Population**

At the 1996 Census, the visitor population in the Central Otago District accounted for 2% of the total population compared to 4.6% of the total population for Central Otago recorded at the 1991 Census. While this appears to represent a significant drop, it is unlikely to reflect the actual reality of visitor numbers to the District. Furthermore, these figures were taken in March, while peak visitor numbers actually occur during the summer vacation period.

With the New Zealand Tourism Board's goal of increasing the number of international visitors to New Zealand, visitor population is likely to increase in the Central Otago District. The main attractions of Central Otago are its landscape amenities, opportunities for sporting activities, climate and heritage. New attractions are developing including, a number of vineyards that have been or are currently being established in the Alexandra and Cromwell area, the recently created Lake Dunstan, the Otago Central Rail Trail and Otago Goldfields Park sites.

<p><b>Significant Issue – Increasing Visitor Numbers</b>  <i>The increase in visitor numbers to the District provides opportunities for economic and social benefits that are to be recognised in the management of the District's natural and physical resources.</i></p>	<p><u>Cross Reference:</u>  Issue: 4.2.13  (pg 4:4)  Objectives: 4.3.2  to 4.3.6 (pg 4:7,  4:8)  15.3.2 to 15.3.4  (pg 15:3)</p>
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