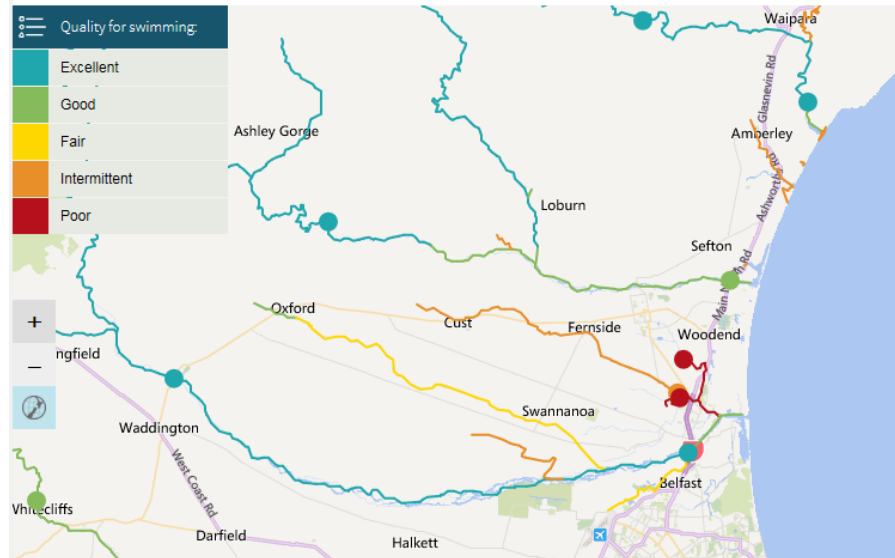


District Development Strategy: Our Environment Situation Analysis Report

Topic	Information Sources	Comment	Response
Water Quality and Ecology	<ul style="list-style-type: none"> • ECan Monitoring Reports for Waimakariri Canterbury Water Management Strategy Zone – various reports by area • 2008 Canterbury Regional Environment Report • WDC Report Progress Towards Community Outcomes 2009 	Good current technical information exists.	
	<p><i>Conclusions from the information sources</i></p> <p>The Waimakariri zone has a long history of farming land uses. Some farming activities have released nitrogen to the environment which has leached into groundwater as nitrate. Where groundwater is dominantly recharged by seepage from hill-fed rivers or water races, the nitrate concentrations are typically low. Some nitrate is also assumed to be removed naturally by denitrification (a biogeochemical process that may occur in reduced groundwater). However, in areas where there is neither surface water recharge nor denitrification, there are elevated nitrate concentrations in the groundwater. Intensification of land use in the Eyre River subzone may be imparting a slight increase in nitrate in some wells and springs in the Kaiapoi River catchment. Some of the nitrate load from the current land use may also still be moving through the groundwater to the surface waterways.</p> <p>Many of the rivers in the Waimakariri CWMS Zone, particularly the spring-fed streams, exhibit unhealthy ecological communities, poor habitat conditions and degraded water quality, reflecting the high intensity land use in many parts of the zone. However, from a recreational perspective the water quality in the District’s rivers varies from excellent to poor by – see the map below.</p>		

Rivers and lakes in Canterbury Region



Groundwater quality is generally very good and mostly meets drinking-water standards without any treatment. Poorer quality groundwater occurs naturally in some areas, often linked to organic-rich coastal soils and sediments in old swamp areas. Most of the wells in the Waimakariri zone are shallow and screened near the water table where unconfined groundwater is prone to contamination. Users of shallow private wells are most at risk from pathogens, especially near effluent disposal or animal grazing. Nitrate concentrations in groundwater could pose a health risk to a small number of users of shallow domestic wells.

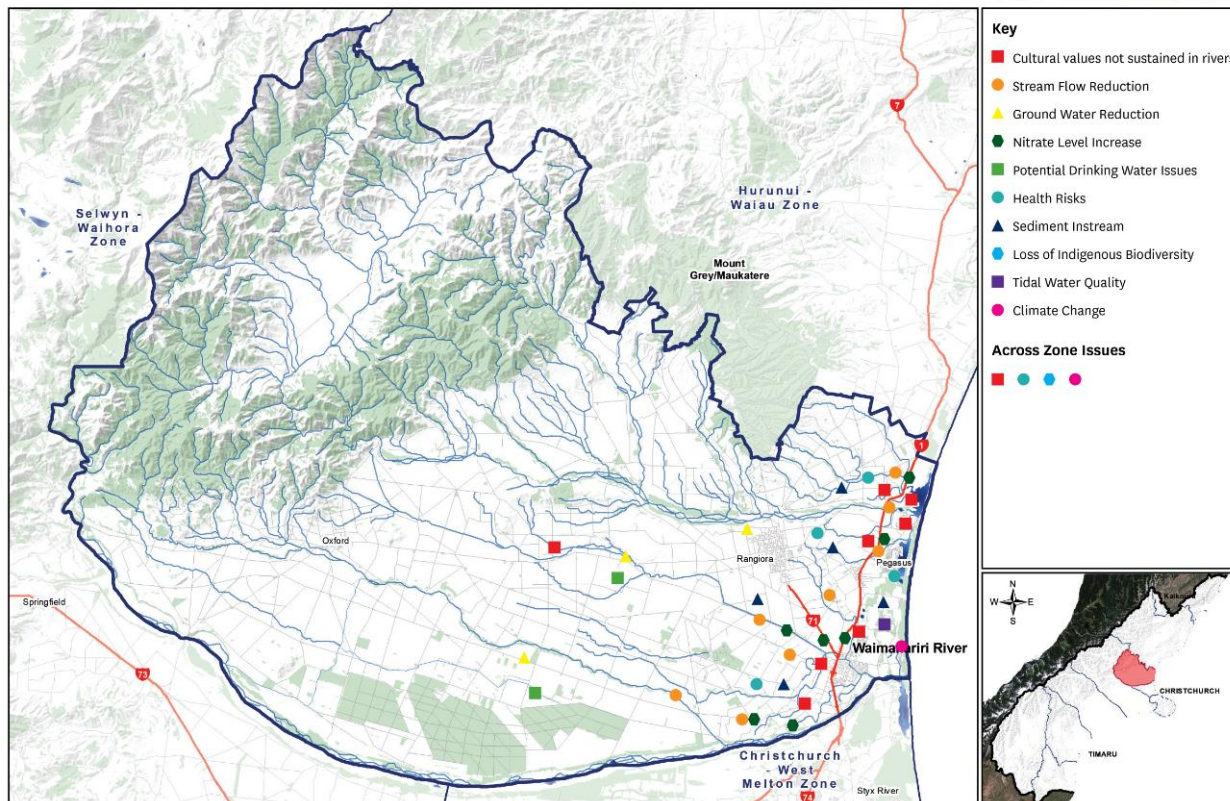
Groundwater allocation in the Waimakariri CWMS Zone has increased significantly over the last decade. Allocation in the Eyre River and Ashley Groundwater Allocation Zones (GAZs) is at or close to the plan limits, with about 70% of allocable water having been allocated for the Waimakariri CWMS Zone as a whole. Roughly, 70% of the consented groundwater use is for agriculture, with approximately 25% used for community water supply (ECan 2016 report on Groundwater Quantity in the Waimakariri CWMS Zone). The results of ECan's long term groundwater level record analysis indicate that groundwater levels have not declined significantly for most of the zone since 1999, and have increased in some areas. This is likely to be due to the mitigating effects of water losses from the race network and increased groundwater recharge due to irrigation.

Groundwater levels have declined in some of ECan's monitoring wells in the Ashley GAZ, and flows in some of the spring-fed streams are

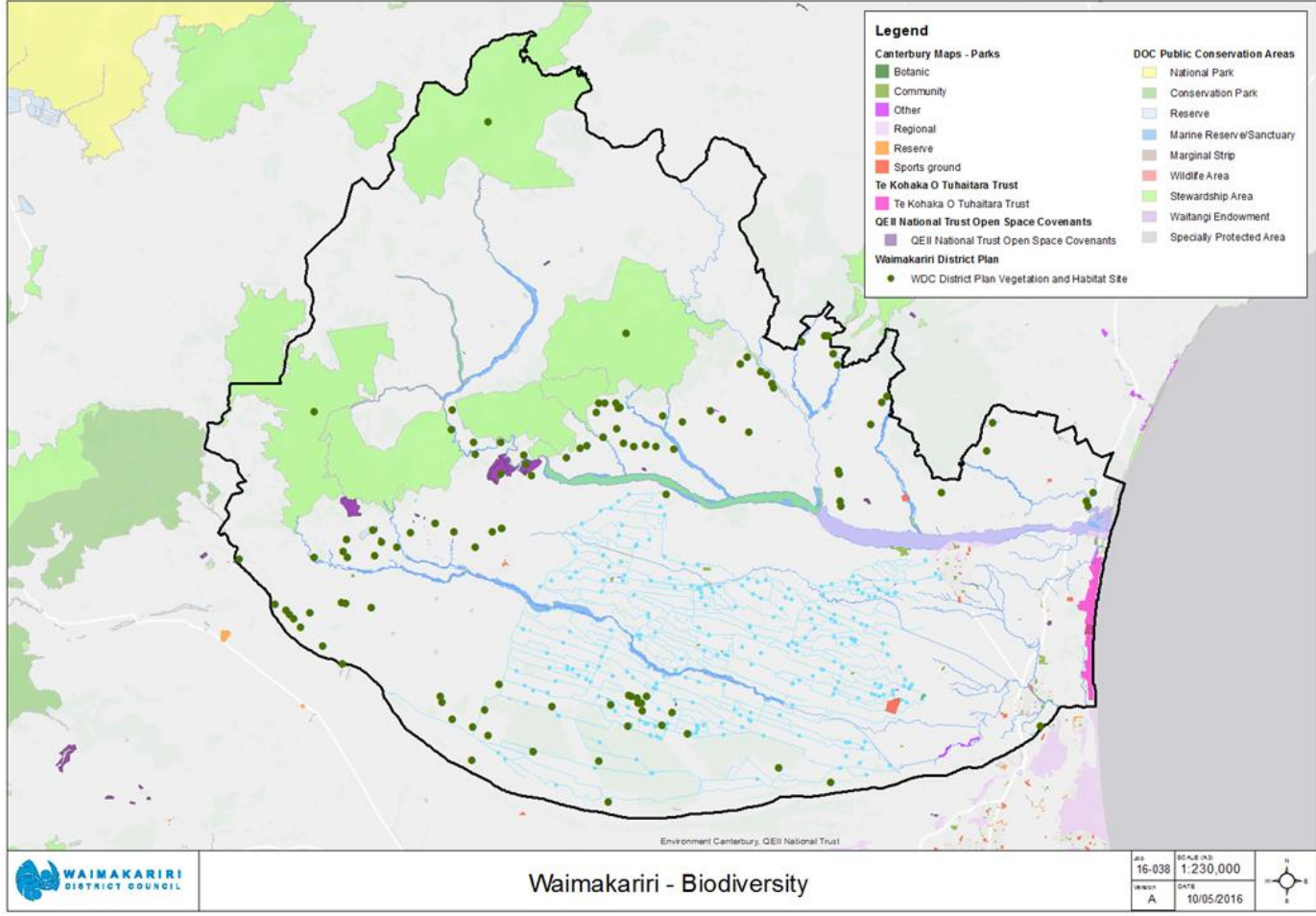
likely to have reduced too. Declining groundwater levels may also have affected well reliability. Groundwater levels have also declined in two of ECan’s monitoring wells in the broader spring-fed streams area, and this could mean that flows have reduced in Silverstream. This is likely to reflect increased groundwater abstraction in this area and conversion from border-dyke to spray irrigation in the Silverstream area.

The map below identifies a number of critical water issues in the District.

DRAFT - Waimakariri Water Zone - Critical Issues



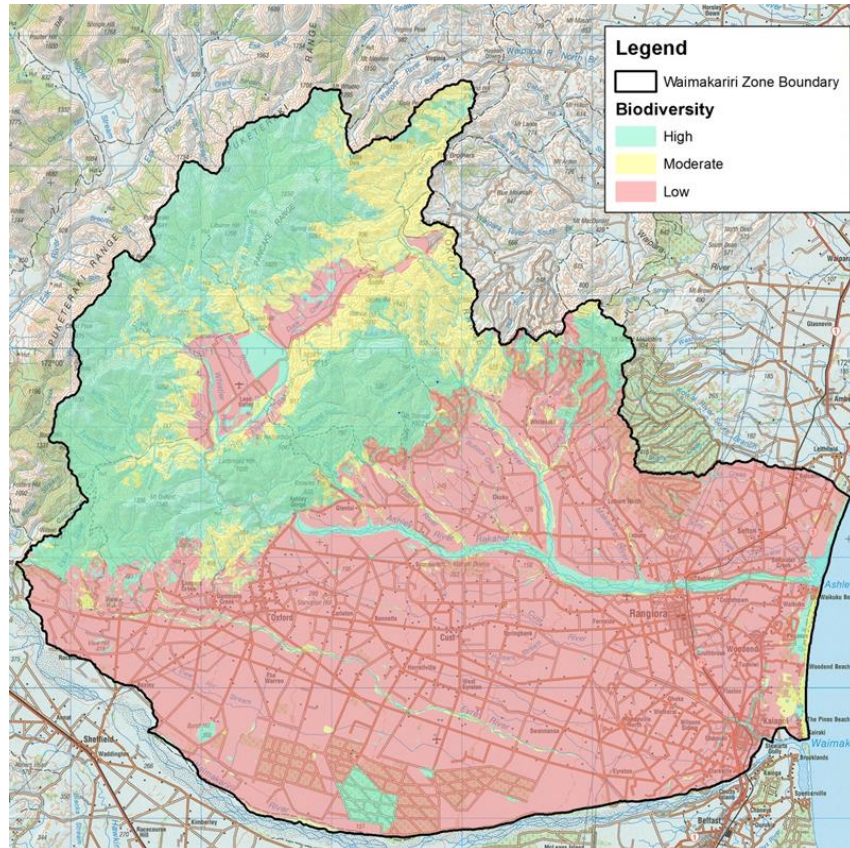
Topic	Information Sources	Comment		
Significant Natural Areas and Indigenous Biodiversity	<ul style="list-style-type: none"> • ECan Monitoring Reports for the Waimakariri Canterbury Water Management Strategy Zone (includes a map showing high, moderate and low biodiversity value areas) • 2008 Canterbury Regional Environment Report • District Plan • Land changes over time (GIS info) • WDC report Progress Towards Community Outcomes 2009 • SOE reports? • Te Kohaka o Tuhaitara Trust works • 2008 Canterbury Regional Biodiversity Strategy 	Good current technical info exists. ECan report draws on multiple sources such as: <ul style="list-style-type: none"> • Land Cover Database (LCDB) version 4.1 • Department of Conservation reserves (public conservation land) • QEII National Trust covenant areas • Threatened plant records (DOC GIS layer) • Regional Wetlands (ECan GIS layer) • Mudfish Habitat (ECan GIS layer) 		
	<p><i>Conclusions from the information sources</i></p> <p>Special features of Waimakariri Zone are the numerous remnants of dry plains kanuka woodland, and the network of lowland-coastal wetlands along Pegasus Bay. The braided Waimakariri and Ashley Rivers are both internationally significant habitats; they form an ecological link between mountains and sea and support breeding populations of a range of characteristic but threatened birds – wrybill, banded dotterel, black-fronted tern and black-billed gulls. Lees Valley inland basin contains regionally-significant wetlands supporting red tussock and sedge-rush vegetation, and dry shrubland-grassland communities on a naturally rare and threatened inland alluvial fan ecosystem. Extensive mountain beech forests remain on the frontal ranges and in the headwaters of the Ashley and Townshend Rivers further inland.</p> <p>As has happened for the rest of Canterbury, there has been substantial loss of indigenous biodiversity from Waimakariri Zone since human settlement. Comparison of Freshwater Ecosystems of New Zealand (FENZ) historic and current freshwater wetland layer for Waimakariri Zone show and 95% reduction in wetland extent, from 22,164 ha c. 1840 to 1,026 ha in 2000. A comparison of area of Land Cover Database (LCDB) classes across the Zone classes over the period 1996-2012 shows net reduction in extent of a number of 'high biodiversity value' habitats: Indigenous forest (reduced by 78 ha); Broadleaved Indigenous hardwood scrub (reduced by 115 ha); kanuka (reduced by 87 ha); herbaceous freshwater wetland vegetation (reduced by 32 ha). There was also substantial reduction in extent of 'moderate biodiversity value' habitats especially gorse and/or broom (down by 836 ha) and 'low producing grassland' (down by 2077 ha). The 1996-2012 LCDB showed a corresponding increase in 'low biodiversity value' habitats: high producing exotic grassland (up 1762 ha); orchard, vineyard, crop (up 300 ha); built-up area (389 ha).</p> <p>The figure below identifies key features in the District, including the listed District Plan Vegetation and Habitat Sites (RMA 6c sites), QEII covenanted sites and DOC public conservation areas. According to the Community Outcomes 2009 report, monitoring of these listed Vegetation and Habitat sites in 2006 showed that a majority of the sites (61%) and most of the area involved (81%) were in good health, and most of the remainder were in moderate health. There is increasing Council support for vegetation sites, with 3 sites receiving grants from its Contestable Fund for protection work in 2005 and eight sites receiving grants from this fund in 2008.</p>			



As can be seen on the map, unsurprisingly (given the significant modifications identified earlier), the majority of Plains area (almost all of the lowland areas) has few remaining significant natural areas and areas of high biodiversity values. The map below grades the District for biodiversity values. The land areas are set out in the table, arranged by biodiversity value and elevation.

High biodiversity value habitats > 1000 m elevation	15,585 ha
High biodiversity value habitats < 1000 m	48,756 ha

Moderate biodiversity value habitats > 1000m	1,502 ha
Moderate biodiversity value habitats < 1000 m	26,025 ha
Low biodiversity value habitats	135,784 ha
	Total 226,652 ha



Other matters to note:

- Members of the Ashley River/Rakahuri Rivercare Group continue to monitor and provide protection for rare birds nesting in the Ashley Riverbed at Rangiora. Monitoring of the Ashley estuary in 2006 showed the density and diversity of invertebrates were similar to those

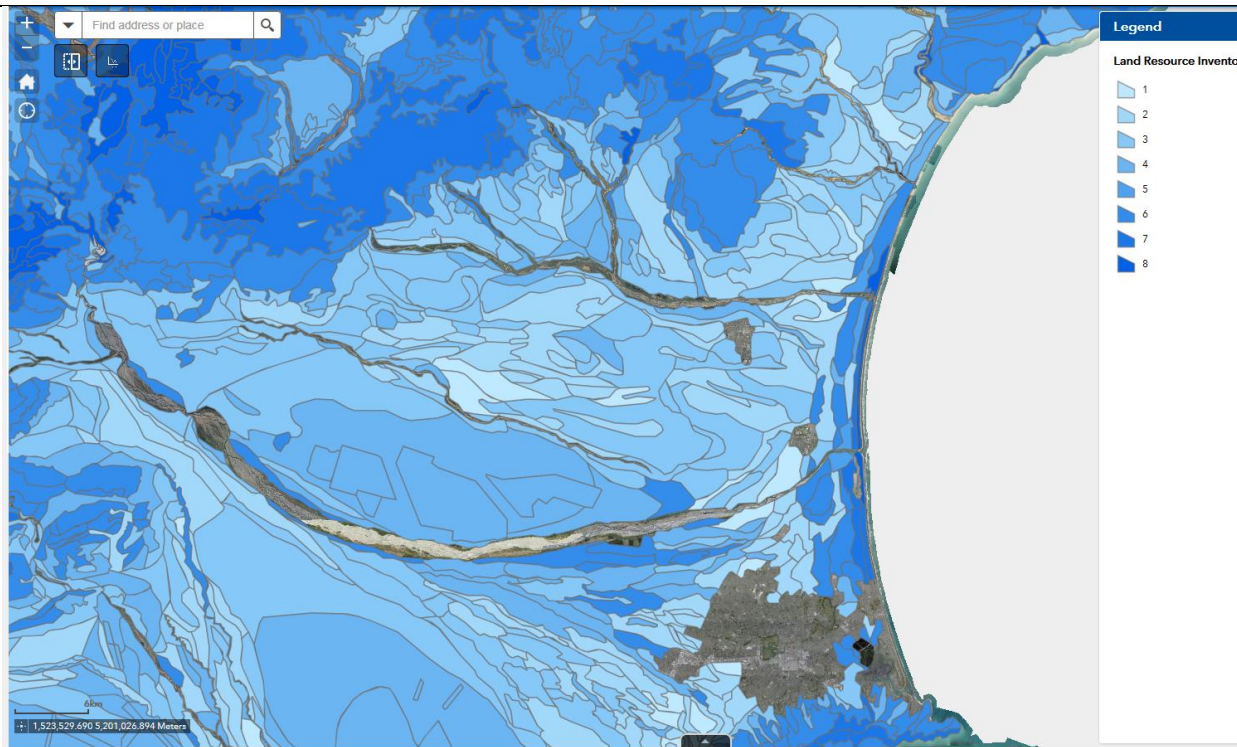
	<p>of other relatively uncontaminated estuaries in the South Island, generally low organic content of the sediments, and sediment metal concentrations similar to those reported in 1982.</p> <ul style="list-style-type: none"> • The continuing development of Matawai Park, an area of 4.4 hectares in Rangiora, featuring native flora mainly endemic to Canterbury. • Three new areas totalling 19 hectares in 2006/7 and a further two new areas totalling 188 hectares in 2007/8 were covenanted with the Queen Elizabeth II National Trust. • The District's land area committed to urban uses increased substantially when re-zoning decisions were released in 2001 and the rate of development of these areas since then has varied. A significant number of small rural lots have been created since 1 July 2003 (see below). 	
Topic	Information Sources	Comment
Air Quality	<ul style="list-style-type: none"> • ECan 2014 Air quality Status Reports for Kaiapoi and Rangiora • 2008 Canterbury Regional Environment Report 	Good current technical info exists
	<p><i>Conclusions from the information sources</i></p> <p>PM₁₀ is the only contaminant monitored in Rangiora that exceeds its guideline concentration, which is 50 µg m⁻³ (24-hour average). The main sources of PM₁₀ identified in the Rangiora airshed are home heating, motor vehicles and industrial sources. According to 2014 estimates, 70% of the PM₁₀ came from home heating, 4% from motor vehicles and 26% from industrial sources. Between 1999 and 2014, total estimated emissions decreased by 29%, home heating emissions by 46%, motor vehicles emissions by 26%, and industrial emissions decreased by 10%. Most of the estimated reduction in home heating emissions is from changes to lower-emitting burners, as the number of households reporting that they use wood in 2013 was only slightly lower than in the 1999 census.</p> <p>Since 1999 there have been between four and 13 days per year when the PM₁₀ guideline was exceeded, and these are mainly in winter. The annual average PM₁₀ concentration has varied from 15 µg m⁻³ to 18 µg m⁻³, and has not exceeded its guideline value of 20 µg m⁻³. Estimated emissions of PM₁₀ from home heating have fallen significantly since 1999, but they still contribute the majority of overall PM₁₀ emissions. They are emitted mainly at night, when there tends to be less dispersion than during the day, due to lower wind speeds and temperature inversions.</p> <p>Of the contaminants monitored in Kaiapoi, PM₁₀ is the only one that exceeds its guideline value (50 µg m⁻³, 24-hour average). The main sources of PM₁₀ identified in the Kaiapoi airshed are home heating, motor vehicles, and industrial sources. According to the 2014 estimates 88% of the PM₁₀ came from home heating, 5% from motor vehicles and 7% from industrial sources. Between 1999 and 2014, total estimated emissions decreased by an estimated 50%, mainly due to decreases in the number of woodburners and the emissions per burner.</p> <p>Since 2001 the number of days per year when the PM₁₀ guideline is exceeded has decreased from 48 to 11, and these are mainly in winter. The annual average PM₁₀ concentration has decreased from 32 µg m⁻³ in 2001 to 18 µg m⁻³ in 2013, which is less than the guideline value of 20 µg m⁻³. Estimated emissions of PM₁₀ from home heating have fallen significantly since 1999, but they still contribute the majority of overall</p>	

	PM ₁₀ emissions. Like Rangiora, they are emitted mainly at night.		
Topic	Information Sources	Comment	
Landscapes and Natural Features	<ul style="list-style-type: none"> District Plan 	Little technical information exists	
	<p><i>Conclusions from the information sources</i></p> <p>The District contains areas of outstanding landscape that include the Puketeraki Mountains, Lees Valley and the front ranges including Mount Oxford through to Mount Thomas, These areas generally have a high natural character, being important for the District in terms of landscape values, vegetation cover and type, and as a source of many of the District's waterways.</p> <p>These areas are protected from inappropriate development by District Plan provisions and also through Crown ownership.</p>		
Topic	Information Sources	Comment	
Coastal Environment	<ul style="list-style-type: none"> 2008 Canterbury Regional Environment Report Te Kohaka o Tuhaitara Coastal Park reports WDC GIS data on coastal developments WDC Report Progress Towards Community Outcomes 2009 	<p>Broad information on water quality, coastal development, erosion in Ecan report. While some is specific to Waimakariri (erosion and water quality), much is general. Specific data on Coastal Park area but is geographically limited. Additional identified gaps:</p> <ul style="list-style-type: none"> There is no definition or mapped area of the Coastal Environment There are no identified or mapped coastal environment values 	
	<p><i>Conclusions from the information sources</i></p> <p>The water quality at the District's beaches from a recreational perspective is consistently assessed as "very good" or "good" by Environment Canterbury. Specifically, the enterococci concentrations at Leithfield Beach and Woodend Beach were within acceptable guidelines (i.e. below or equal to 140/100 mL, above this level faecal contamination is considered to be of public health significance) over some or all of the last six summers. Copper, zinc and lead concentrations have been measured in the soft sediments of Ashley Saltwater Creek Estuary and found to be low.</p> <p>In terms of development within the coastal environment the coastal environment generally comprises rural and Residential 3 zones (small settlement and beach settlements). Building consent data indicates that there have been 100 dwelling consents issued in the period 2006 to 2014 for the Residential 3 zone. This averages as 11 per annum and is not considered significant in terms of scale of impact on the natural coastal environment and anticipated coastal amenity.</p>		
Topic	Information Sources	Comment	
Natural	<ul style="list-style-type: none"> 2008 Canterbury Regional Environment Report 	Comprehensive information exists on hazard risks for the District.	

Hazards	<ul style="list-style-type: none"> • District Plan Change 27 - s32 background info (May 2016) – status, risks 	Information relating to flood risk, location of fault lines, areas that are susceptible to liquefaction, and coastal erosion have been factored into draft proposed Plan Change 27 – Natural Hazards Management	
	<p><i>Conclusions from the information sources</i></p> <p>Natural hazard risk in Canterbury is increasing – the frequency and magnitude of some natural hazards are likely to increase in future – and the potential consequences of natural hazards are increasing with population, more intensive land use, and reliance on infrastructure. People’s choices – for example, where to develop land, where to build infrastructure – determine natural hazard risk. Natural hazard risk increases with population growth and development, as the potential consequences of natural hazards grow. It is noted that Waimakariri District’s population is projected to continue to increase. Modification of the natural environment can also increase the likelihood of some natural hazards, such as landslides, flooding and tsunami inundation.</p> <p>The population of Waimakariri District is located predominantly on a plains area. Within the plains area, flooding and active fault lines (including the Lees Valley area), along with ground instability resulting from ground shaking, are the main damaging effects (see the map below). It is therefore important to ensure that structures, buildings and infrastructure are located where the risk from natural hazards are minimised.</p>		

	<p>northern floodplain nestles against the Ashley fan. Settlements have been established on the Ashley and Waimakariri floodplains and consequently are at risk from flooding. The early response to this threat was to construct stopbanks to contain the flood waters within the river system. Encouraged by the protection provided, the level of development on the floodplain increased, providing the stimulus to increase the capacity and strength of the protection works, and renewing the cycle.</p> <p>A floodplain management strategy has been adopted by Environment Canterbury and the Waimakariri District Council. It was prepared during the early 2000s. For the Ashley, in the reach from the Gorge to the Okuku confluence, flooding problems could be exacerbated by trees impeding the floodway. In addition to the large-scale flooding caused by the breakout of waters from either the Ashley or Waimakariri, local surface flooding can fill the area of land covered by the old Mandeville-Flaxton swamp, and similar areas to the east of Kaiapoi. Many of the floods affecting Kaiapoi are the result of surface flooding from heavy rain, rather than by breaching of the stopbanks along the major rivers.</p> <p>Six significant earthquakes caused over \$1.1 million worth of damage in Canterbury over the reporting period. The 2010 and 2011 earthquakes have been well reported. The likelihood of a major earthquake in or near Canterbury over the next 50 years is high. The 2001 Peru and 2004 Indian Ocean tsunamis were recorded along the Canterbury coast but there was no reported damage. A significant tsunami hazard exists along the Canterbury coast, particularly around Kaikoura and Banks Peninsula.</p> <p>There were no significant hydrological droughts between 2001 and 2006, although there was a dry spell during the 2002/03 summer. There is currently a drought occurring in north Canterbury. The frequency of droughts is likely to increase as a result of climate change. Almost 5700 separate wildfires were attended in Canterbury during the reporting period, which burnt just over 4500 hectares of land.</p> <p>Draft Proposed District Plan Change 27 – Natural Hazards</p> <p>Risk can be minimised and community resilience can be increased by facilitating sensible development (avoiding the highest hazard areas), retaining natural defences, using sound engineering in design and construction, and being prepared for natural hazard events.</p> <p>Draft proposed Plan Change 27 reviews parts of the Waimakariri District Plan so that the impact of natural hazards on people, property and the environment can be assessed and managed. This is particularly important in relation to the use of land in those areas that have been identified as being especially vulnerable to the impact of natural hazards. It includes provisions on buildings, infrastructure and subdivision.</p> <p>Flooding, fault lines, liquefaction and coastal hazard areas have been mapped. These areas are subject to draft changes to the District Plan. The areas featuring identified fault lines, and areas now known to be vulnerable to liquefaction, now require a different - and more appropriate - design for building and development to be considered. For flood hazard areas, new requirements for building and development such as minimum floor heights are proposed. Within flood areas now considered to be 'high hazard', additional requirements are proposed as the potential impacts from flooding are greater within these areas. Specific considerations around the hazard risks relating to the district's coastal areas, on the exposed seaward side of the coastal dune system, have also been factored into the plan change proposal.</p>		
Topic	Information Sources	Comment	

<p>Land Resources and Contaminated soil</p>	<ul style="list-style-type: none"> • 2008 Canterbury Regional Environment Report • Activities in rural areas - WDC Occasional Paper No. 5 and 10 • WDC report Progress Towards Community Outcomes 2009 • TAP Report for Red Zone areas of Kaiapoi 	<ul style="list-style-type: none"> • General overview information available in ECan monitoring report. More district specific information is available in the Community Outcomes report. • Specific detail on activities in rural areas is contained in Occasional Papers – covered in the rural section • Site by site information exists on the HAIL register. Area wide reporting exists for the residential red zone areas. 	<ul style="list-style-type: none"> •
<p><i>Conclusions from the information sources</i></p> <p>Land and soil resources in the Canterbury region are characterised by a wide diversity of landforms, soil types and land uses. Of particular significance in the context of this report is the need to farm land for food and fibre. In many areas, this is leading to an intensification of land use, and to the possibility of inappropriate land management practices.</p> <p>Land resources are also closely interrelated with population dynamics and socio-demographic features in the region. According to the Community Outcomes report the District’s land area committed to urban uses increased substantially when re-zoning decisions released in 2001 and the rate of development of these areas since then has varied. The period covered by the ECan report (2001 – 2006) has seen a sustained and substantial demand for small rural lots (lifestyle blocks) in the district. <i>(For changes in activities in rural areas see the section on the rural environment.)</i></p> <p>Land use practices can lead to degradation of land and soil resources over time. Activities such as grazing, burning and cultivation increase the risk of loss of soil quality, diminishing the life-supporting capacity of soils and their value in primary production. As soils lose their ability to support vegetation cover, there is an increased risk of soil erosion and slope destabilisation. Intensification of land use can have positive impacts. Irrigated systems reduce erosion risk, and in some situations increase soil carbon. Irreversible changes in land use activities reduce the availability of versatile soils, thus foreclosing future land use options that would otherwise benefit from being located on such soils. The development of land for urban subdivision, the proliferation of lifestyle blocks, and zoning changes can contribute to such change.</p> <p>The land cover database 2 (LCDB2) shows a substantial proportion of the indigenous vegetation in the District is forest, i.e. Nothofagus spp., Dacrydium cupressinum spp Kahikatea • Pine forests comprise a high proportion of the District’s exotic production forests • High producing exotic grassland comprise a substantial proportion of the District’s agricultural land cover.</p> <p>Soil versatility has been mapped across the District (see map below), with Class 1 and 2 soils considered the most versatile for primary production. As can be seen on the map the District has significant areas of high quality versatile soils.</p>			



Soil quality, as assessed by key indicators, is generally at acceptable levels. Total organic carbon measures tend to decrease with more intensive land uses (apart from dairying) but are above the minimum desirable levels, although values for arable land uses are close to minimum desirable values. Anaerobic mineralisable nitrogen values are variable across a wide range of land uses, with arable land use tending to have the lowest values. Aggregate stability tends to be highest on the more intensive pastoral farms and lowest on arable farms with natural systems in between. Soil cadmium has a background level of about 0.05 parts per million (ppm) and is raised to about 0.2 ppm with more intensive land use (arable and pastoral). Based on the results of region-wide monitoring of selected soil quality indicators the District's farm land can be viewed as being relatively healthy.

In Canterbury, as in other regions of New Zealand, contamination of land has arisen through leaks, spills, inappropriate disposal and intentional application of hazardous substances to soil. The extent of the problem is difficult to determine: more than 3000 sites are currently registered on the Listed Land Use Register (LLUR), but this represents an incomplete picture. Ongoing efforts are focusing on identification of sites, management systems to make this information available and policy to promote appropriate management action at these sites.

	<p>Trends in the amount of arable land protected by shelterbelts are not yet available. Subdivision monitoring indicates a rise in activity in Canterbury in recent years. Dairy farming is the most notable change in rural land use in the region, and has almost tripled in area since monitoring began in 1995.</p>	
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