PART B: DESCRIPTION OF THE ENVIRONMENT

3. EXISTING ENVIRONMENT

Overview

The Project is located on the southwestern outskirts of Christchurch, within the Canterbury Region. There is a diversity of urban and rural land use within the Project area, ranging from open farmland, rural lifestyle blocks and urban areas. The residential communities in proximity to the alignment extend from the town of Rolleston to south west Christchurch, where Hornby is the dominant commercial and industrial centre, and include the towns of Templeton and Prebbleton. In the area close to the alignment, there is the rural area of Weedons and recent rural-residential subdivisions at Aberdeen (which adjoins Prebbleton) and Claremont.

This chapter contains a description of the existing natural and human environment within which the Project is proposed to be constructed and operated.

3.1. Introduction

This chapter contains a description and broad overview of the existing environment. It is based on information from a number of sources, including design and technical reports that comprise Volume 3 of this application. These reports should be referred to in relation to more detailed information about specific aspects of the existing environment.

3.2. Land use, topography and landscape

3.2.1. Overview

This section contains a description of the land use, topography and landscape of the area, which is set out under the following sections:

- the existing SH1 Corridor (MSRFL);
- Robinsons Road to Waterholes Road (CSM2);
- Waterholes Road to Marshs Road (CSM2); and
- Marshs Road to Halswell Junction Road (CSM2).

The landscape along the proposed alignment is characterised by flat alluvial plains, and the overall setting is rural characterised by open space and dominated by pasture and shelterbelt vegetation.

The corridor for the Project is generally flat with no significant undulations or depressions and a gradual increase in elevation towards Rolleston. Topographical relief is measured as 18.8m above sea level at the CSM1/2 junction and 55.5m at Rolleston.

The plains are bordered by the Port Hills to the East and the Southern Alps further afield to the West. Land use in the surrounding area is predominantly rural and semi-rural, with a mixture of

dairy farming, horticulture, cropping, lifestyle blocks and agricultural activities. The exception to this is the eastern end of the alignment and the northern side of Main South Road, where some industrial land use exists. The landscape is organised around geometric patterns – roads, farm tracks, field patterns, shelter belts and woodlots, with these cultural elements contributing to a highly modified landscape. The built form consists mainly of scattered residential dwellings and associated buildings, horse training tracks and stables, and agricultural commercial buildings, often surrounded by well-established native and exotic plantings. There are also several townships in the wider surrounding area, including Prebbleton, Templeton and Rolleston.

The dominant vegetative cover in the wider Project area is pasture, along with many shelterbelts and the occasional grouping of trees (typically exotic), and amenity planting in associated with dwellings and buildings. The landscape is highly modified overall, with few remaining natural features such as wetlands, shrubland and grassland pockets within the Project area. There is no significant remnant indigenous vegetation within the Project area.

There are no identified natural watercourses directly affected by the Project, and the only water features in the Project area are water races which flow adjacent to parts of the MSRFL alignment and intersect CSM2 at various points along the proposed alignment.

In relation to the proposal to discharge treated stormwater to land for this Project, it is noted that the existing land is not particularly sensitive to stormwater discharges. The areas of land where discharges will occur are within the Project footprint and the land will be modified for the treatment and disposal of stormwater and suitable grass grown for that purpose.

3.2.2. MSRFL alignment

The existing SH1 corridor, travelling in a south-west to north-east direction, dominates this section and gives this area a specific character, which differs to the rest of the Project area. The land use either side of SH1 is predominantly rural interspersed with residential properties and agricultural related businesses. The South Island Main Trunk Line ("SIMT") runs adjacent to SH1, located within a corridor between the western side of the State highway and Jones Road.

Vegetation consists of shelterbelts, comprising predominantly mature exotic conifers, gorse hedges, some small groupings of exotic trees and amenity planting in association with dwellings and businesses. A semi-mature double line of oak trees lines the eastern side of the SH1 from Rolleston to Weedons Road.

3.2.3. CSM2 alignment

Robinsons Road to Waterholes Road

This area is characterised by rural land use activities interspersed with rural-residential and agricultural related businesses and land uses, although the predominant character is still rural.

Waterholes Road to Marshs Road

The open semi-rural area between Waterholes Road and Marshs Road features rural and rural-residential activities. The rural character is open and expansive pasture for the most part, with some land divided into small holdings with shelterbelts of willow, macrocarpa and pine trees. A number of horse training tracks have also been established within the area, which typically retain the open rural character. The Islington-Springston (ISL-SPN A) 66kV transmission line continues through the area in a north-west direction.

There are a number of lifestyle blocks as well as two recent subdivisions (Claremont and Aberdeen, the latter being an extension to the Prebbleton township) near to the alignment area. These are the only examples of a regular residential layout amongst the rural-residential blocks typical of the area. The Aberdeen Subdivision lies directly south of the Project area, with the northernmost property located approximately 160m from the proposed alignment. The Claremont subdivision lies to the north of the Project area with the southernmost property located 180m from the proposed alignment. The Claremont subdivision is in close proximity to the Templeton township, near the intersection of SH1 and Waterholes/Dawsons Road.

Marshs Road to Halswell Junction Road

Several agricultural related uses are located to the south of the CSM2 corridor, including horticultural suppliers and meat poultry processing plants. The presence of these businesses, as well as the existence of transmission line pylons along Marshs Road, further characterise this area as a highly modified semi-rural setting.

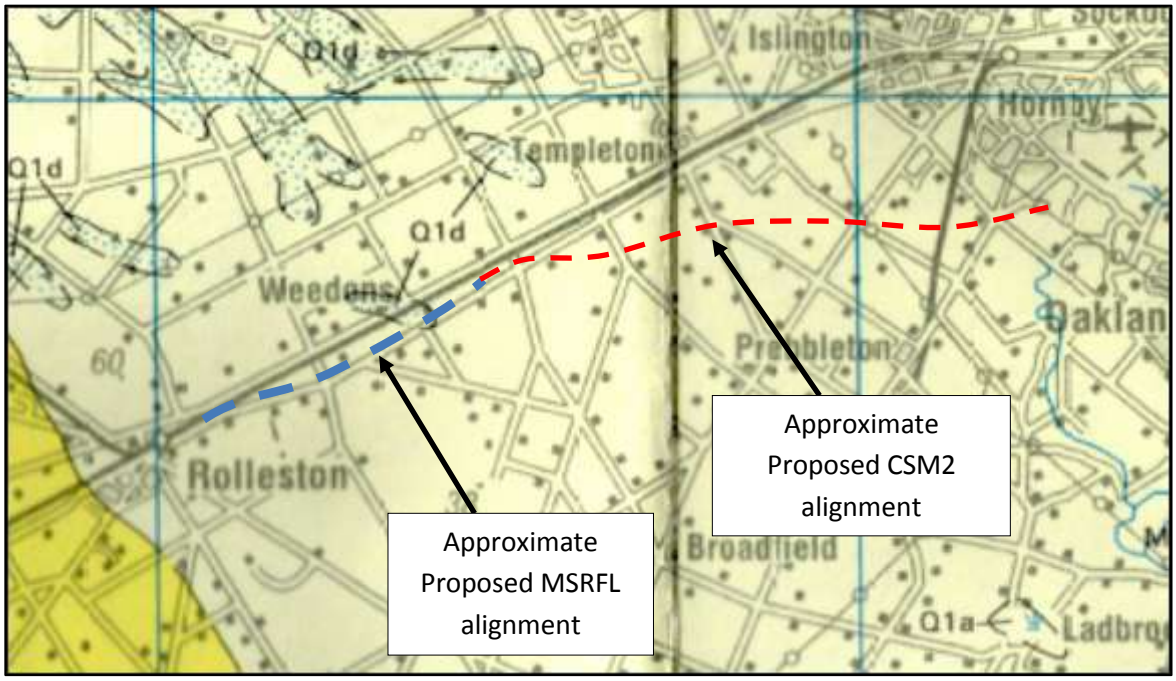
The industrial area of southern Hornby is located to the north of this section of the CSM2 alignment; from Marshs Road and through to where CSM2 joins with CSM1. The proximity of this industrial area gives this section a different character. Though the land use is still predominantly rural, the presence of industrial buildings contributes to a mixed character, typical of an urban edge semi-rural setting. The industrial area is defined by the presence of irregularly distributed workshops and large-floor plate industrial buildings.

3.3. Geology

The general geology of the Project alignment is characterised by flat alluvial plains (Q1a) (Figure 5). The Project area is covered by river alluvium soils of the Yaldhurst and Halkett Members in the Springston Formation of the Holocene age (less than 11.5 thousand years ago). The Halkett member of the Springston Formation is more coarse in nature and underlies the Yaldhurst Member. The composition of the river alluvium soils is typically moderately to well sorted, sandy, rounded gravel with varying proportions and layers of silt.

The Yaldhurst member soils are described on the 1:25,000 map as, “dominantly alluvial sand and silt overbank deposits”, whilst Halkett soils are described as “older alluvial gravel, sand and silt”. Historical use of underlying loess soils in the CSM2 section for horticulture and agricultural activities have potentially influenced the composition of these soils.

Figure 5: River alluvium beneath Canterbury Plains



3.3.1. Active and known faulting

Before recent earthquake events commencing in September 2010, most ground shaking events were related to active faults situated in west and north Canterbury with few known faults within the Project area.

A summary of the active faults and their distances to the Project area is presented in Table 2.

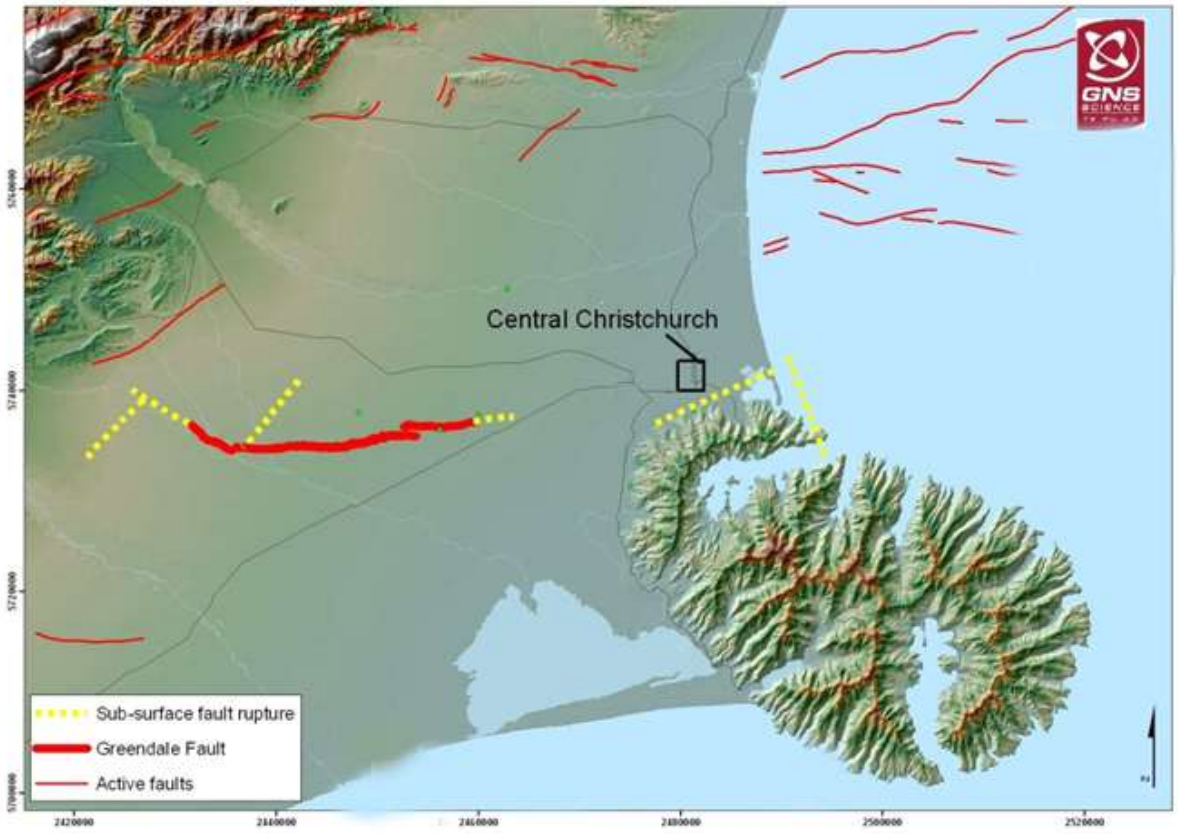
Table 2: Known active faults in the north South Island

Known Active Fault	Distance from Site (km)	Max Likely Magnitude	Average Recurrence Interval
Alpine Fault	144	8.3	~300 years
Greendale (2010) Fault	28	7.1	~15,000 years
Ashley Fault	30	7.0	~3.500 years
Hope Fault	121	7.2~7.5	120~200 years
Kelly Fault	127	7.2	~150 years
Porters Pass Fault	101	7.0	~1100 years

Following the rupture of the Greendale Fault in September 2010, GNS has subsequently published new data identifying active faults within the proximity of Christchurch. Current mapping is

presented as Figure 6. The Greendale Fault has been mapped with its eastern end terminating approximately 1km north of Rolleston.

Figure 6: Current GNS Mapping of the Greendale Fault



3.3.2. Ground settlement

Static settlement is due to the consolidation of the foundation soil in response to loading and dissipation of pore pressures. Settlement of a structural foundation comprises three parts, namely 'immediate', 'consolidation' and 'secondary'. The materials on site generally comprise cohesive silts and granular sands and gravels. The latter soils experience relatively small volumes of settlement which is immediate during the application of loading. For design purposes, sands and gravels are anticipated to have static settlement of 0-25 mm. The cohesive silt materials, where used as founding strata, will experience both immediate and consolidated static settlement of magnitude 25-50 mm.

3.3.3. Slope stability

With the relatively flat topographical relief of the Project area and natural slope stability, general land instability does not pose a significant issue.

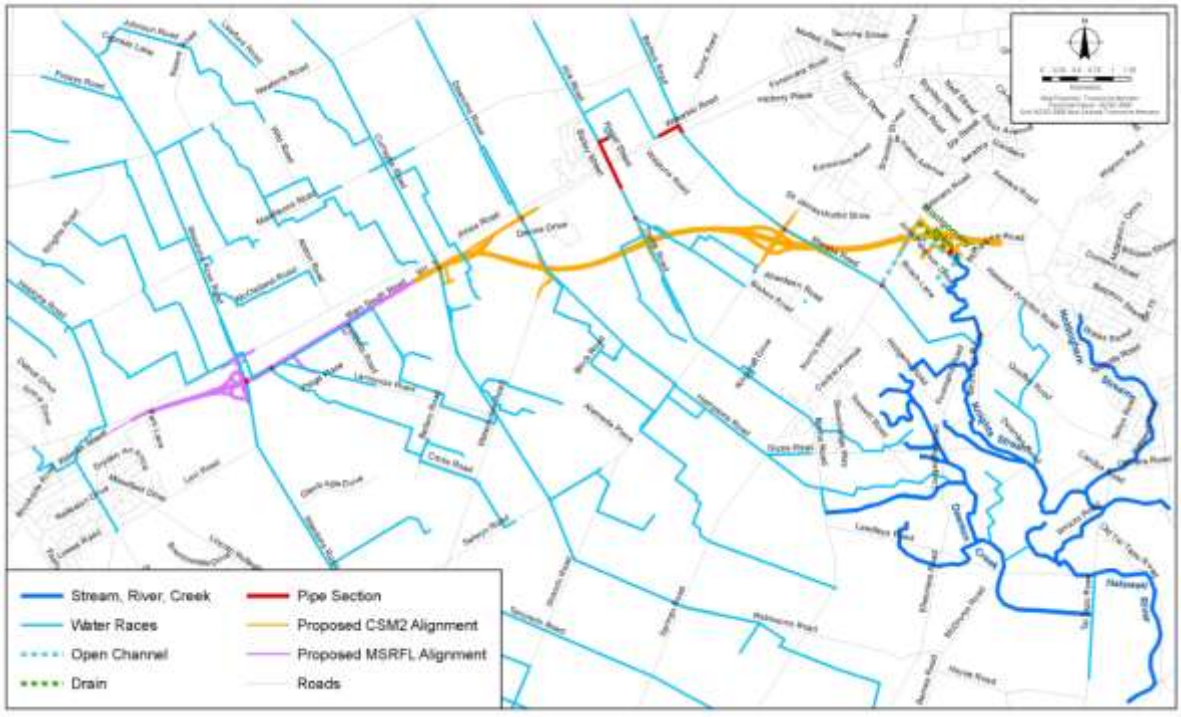
3.4. Climate

The Project area has a dry, temperate climate typical of the wider Canterbury Plains, with mean daily maximum air temperatures of 22.5 °C in January and 11.3°C in July. The climate is broadly defined as oceanic. The summer climate is often moderated by a sea breeze from the Northeast. A notable feature of the weather is the north-westerly wind in summer; a hot föhn wind[31] that occasionally reaches storm force. In winter, it is common for the temperature to fall below 0 °C at night. There are on average 70 days of ground frost per year, and snow fall occurs about once or twice every two years on the wider plains area.

3.5. Hydrology

Natural watercourses and man-made water races relevant to the Project area are illustrated in the figure below.

Figure 7: Study area, showing the existing water races and downstream receiving environment



3.5.1. Natural watercourses

The majority of the catchment subject to the proposed MSRFL and CSM2 alignment does not directly contribute to any natural watercourse (stream). Rather, surface water typically ponds in local depressions and then soaks away to ground. In larger events, overland flows are likely to occur along old (filled in) river channels. The overland flow paths are often intercepted by field drains, irrigation channels and the stockwater race network. There is little anecdotal information on flooding available but surface water ponding is frequently observed within the catchment.

[31] A dry down-slope wind that occurs in the lee (downwind side) of a mountain range.

The natural catchment upstream of the proposed MSRFL alignment is intercepted by SH1 and the railway embankment. Both of these physical features form significant impediments to overland flows and there is little stormwater infrastructure to allow the passage of flood flows.

Figure 8: Overland flowpaths and depressions

The most northern section of CSM2 is part of the Halswell River Catchment. This area drains to the Halswell River via Montgomery's Drain and Upper Knights Stream.

3.5.2. Water races

The network of water races within the Project area are owned and operated by SDC, with some discharging to urban watercourses in Prebbleton approximately 3km south east of the proposed alignment. The larger races discharge to streams in the Upper Halswell River catchment while the smaller races drain to soak pits. The water races are used for stockwater and irrigation and are an important local resource. Several races continue downstream from the motorway footprint and flow through the town of Prebbleton.

The proposed route crosses nine existing water races (two along MSRFL and seven along CSM2 - noting that a stockwater race runs parallel to MSRFL on the South Eastern side within the road reserve for approximately 2100m which currently collects road run off). Of note, the Marshs Road race system flows into the Quaifes Road drain which eventually flows into Upper Knights Stream.

As such, the water races within the proposed alignment impact on natural watercourses. Several races running along Waterholes Road and Trents Road continue downstream from the motorway footprint and flow through the town of Prebbleton, where they have been landscaped and form a waterway feature through the town. They are an important aesthetic element for the residents of the town.

In response to large rainfall events, SDC typically closes the inlet to the stockwater race network to increase the network capacity available to carry flood flows. This helps to reduce flooding of the race network and highlights the land drainage function of the network.

Figure 9: Marshs Road water race

3.5.3. Stormwater systems

The Project area features few dedicated stormwater systems, with the exception of isolated soak pits along Main South Road. The stockwater race network within the Project area, while it is not part of the existing stormwater system, assists with land drainage, particularly in winter months.

Figure 10: Stormwater channel, SH1 Main South Road

3.5.4. Groundwater

Overview

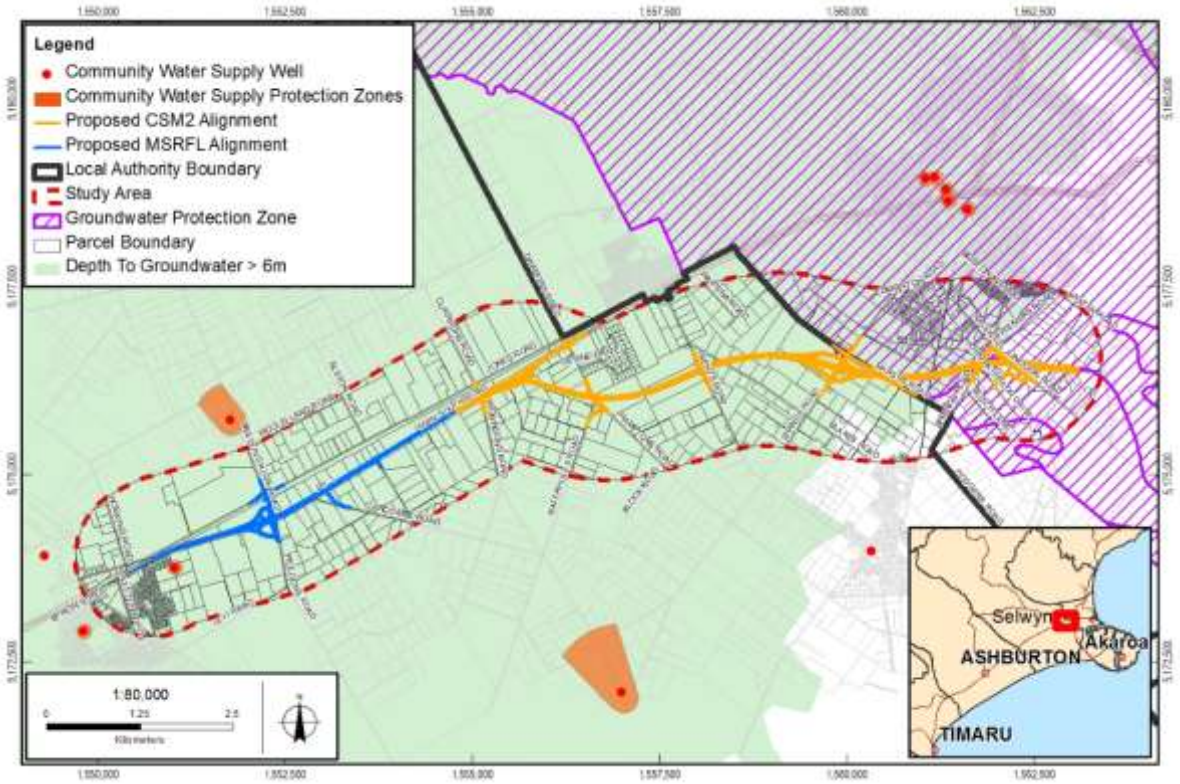
The groundwater of the Quaternary alluvial gravels of the Canterbury Plains typically extend within shallow (<20 m depth) unconfined aquifers with hydraulic connection with any nearby surface water courses. Groundwater yields tend to vary laterally over short distances indicating that more permeable gravel horizons heavily influence the groundwater flow. Groundwater movement below the plains and the Project site is generally downward and towards the coast. Shallow groundwater levels vary seasonally and respond to winter recharge and summer irrigation use.

Based on the information from ECan, there are a several wells in the Project area, and the water is largely used for irrigating crops. The Project is located in the Selwyn / Waimakariri and Christchurch / West Melton Groundwater Allocation Zones. These zones were established by ECan to assist with the monitoring and the setting of groundwater allocation limits. The zones have been given the Inland Zone IB, medium demand category.

In accordance with the NRRP and the PLWRP all of the MSRFL alignment and most of the CSM2[32] overlay an unconfined / semi-confined aquifer system. The NRRP confirms there is a water depth of greater than 6m in most of the area of the Project and the upper soil layers showed that there are no confined aquifer layers[33]. Geotechnical investigations undertaken as part of the Project have found no evidence of aquifer confinement. The proposed alteration to John Paterson Drive will be located above the Coastal Confined Gravel Aquifer System. The eastern end of the CSM2 alignment overlies the Christchurch Groundwater Protection Zone 2. There are no Community Water Supply Wells or Water Supply Protection Zones within the Project designation footprint, however in the wider area the Project is within 250m of the protection zone surrounding the Community Water Supply Well at Rolleston (site number 189 – Kairangi/Rolleston).

In addition to local and seasonal variations, the Central Plains Water Enhancement Scheme (CPWES) has now been consented and is part of the planning environment. As a result of the CPWES there are groundwater mounding effects predicted within the Project area. This has been assessed as being 4 m at the southern end of the alignment, reducing to around 1 m at the northern end of the Project adjacent to CSM1.

Figure 11: Identified groundwater features



[32] The John Paterson Drive area overlays the coastal confined aquifer.

[33] An unconfined aquifer is one that has a water table, i.e. a free water surface above which the rock is unsaturated. Water can reach the aquifer by vertical percolation down from the land surface. A confined aquifer does not have a free water surface. Such aquifers are overlain and underlain by geological formations which effectively will not transmit water. They are completely full of water under pressure.

Groundwater investigations

Groundwater investigations were carried out at various points along the proposed CSM2 alignment and also along Main South Road to establish groundwater levels. The investigations carried out are summarised below and more detail of these investigations can be found in Technical Report 11, Section 6.2.

Existing groundwater levels

Groundwater in the region varies, generally sloping from North-West to South-East, draining to Lake Ellesmere/Te Waihora (Golder Associates 2011). Typically the local groundwater along the alignment is in the order of 12 – 15 m below ground at the Rolleston end and gradually rising to 5 – 7 m nearer Halswell Junction Road. Geotechnical investigations undertaken as part of the Project have not found any evidence of significant long term effects on groundwater levels due to the Canterbury earthquakes.

The following summary of the groundwater environment has been divided into the following sections from South to North:

- Park Lane to Weedons Ross Road;
- Weedons Ross Road to MSRFL/CSM2;
- MSRFL/CSM2 to Blakes Road;
- Blakes Road to Springs Road; and
- Springs Road to CSM1.

Park Lane to Weedons Ross Road

The groundwater level at the Weedons Ross Road intersection is RL 36m, approximately 14 to 15m below existing ground level. An allowance for historical maxima (approximately 7 m) and the groundwater mounding effects (potential raising of groundwater levels) of the CPWES of approximately 4 m has established the design groundwater level of approximately RL 46m or 5m below ground in this location.

Weedons Ross Road to MSRFL/CSM2

The groundwater level at the CSM2 connection / Robinsons Road has been measured at RL 31 - 32m (approximately 13 – 14m below existing ground level). An allowance for historical maxima (approximately 6 m) and CPWES (approximately 3m) established the design groundwater level of approximately RL 41m or 5m below ground here.

MSRFL/CSM2 to Blakes Road

The following groundwater levels were measured at proposed local road crossings of CSM2:

- Waterholes and Hamptons Road Intersection – The groundwater levels were measured at between RL 26 – 27 m (approximately 13 to 14 m below existing ground

level) at the proposed location of the Waterholes Road structure during 2010 and 2011; and

- Trents and Blakes Road Intersection - The groundwater levels were measured at between RL 23 - 24 m during 2010 and 2011 (approximately 12 to 13 m below existing ground level) at the proposed location of the Trents Road underpass.

Blakes Road to Springs Road

For the Marshs and Shands Road intersections the historic groundwater levels were measured at between RL 17m and RL 20m during 2010 and 2011. Groundwater is approximately 7 to 8.5m below existing ground level at the proposed location of the Marshs Road Structure, and 9 to 11m below existing ground level at the proposed location of the Shands Road. An allowance for historical maxima (approximately 3 - 4m) and CPWES (approximately 1 - 2m) established the design groundwater level of approximately 21 – 24m or 4 - 5m below ground here.

Springs Road to CSM1

At the Springs Road and Halswell Junction Road end of the alignment, groundwater depths were measured at 5 m to 7 m below ground during 2010 and 2011. Groundwater is approximately 6 to 12m below existing ground level at the proposed location of the Springs Road structure.

An allowance for historical maxima at Springs Road (approximately 2m) and CPWES (approximately 1 m) established the design groundwater level of approximately 20m or 3m below ground. This compares to what is shown in the ECan well records (M36 – 4018) of between 3 - 6m deep near Wigram with a historical maxima of 17m.

Sensitivity of groundwater to discharges

Groundwater at the Rolleston end of the alignment is less sensitive to discharges as the depth to groundwater is in the order of 12-15 m below ground. At the Halswell end of the catchment the groundwater is more sensitive as groundwater is shallower at this end of the alignment (5-7 m below ground). The 3 km section of the alignment within the CCC boundary is also located within the Christchurch Groundwater Protection Zone identified in the relevant regional plans. This zone is established to protect high quality, untreated groundwater sources available to Christchurch City as a potable supply. Approximately 160 wells supply Christchurch City's drinking water supply.

3.6. Ecology

3.6.1. Terrestrial ecology

The Project area is a highly modified landscape comprising predominantly farmed grasslands (pasture) interspersed with exotic plant species for shelter and amenity purposes, and features no noted areas of indigenous vegetation. Areas of ecological value are confined to highly localised areas colonised by individual specimens or small groups of naturally occurring indigenous plants. These include kohuhu (*Pittosporum tenfolium*), ferns such as *Blechnum minus* and sedges (*Carex*

spp.) growing along the edge of water races overtopped by coniferous shelterbelts. In these areas, the favourable microclimate afforded by overhead shelterbelt cover in combination with favourable soil moisture levels allows this vegetation to exist (albeit to a limited extent) in the absence of grazing.

The area adjacent to the existing SH1 corridor is predominantly existing grass verge featuring no obvious native vegetation. There are several pockets of mature exotic trees including pines near Weedons Road, Berketts Road and Robinsons Road, gum trees near Larcombs Road and willow trees along Weedons Road. A small wetland area associated with a stockwater race is located near Robinsons Road adjacent to the railway line although is outside the proposed MSRFL corridor.

A range of indigenous trees and shrubs are present along parts of the MSRFL and CSM2 alignments as amenity plantings in garden settings and within some shelterbelts bordering roads. The numerous shelter belts and gardens provide feeding, nesting and shelter habitat for avifauna, including indigenous species such as silvereyes, fantails and grey warblers, and introduced species including magpies, blackbirds and house sparrows. The paradise shelduck and the spur winged plover have been observed several times during the site investigation as the extensive pasture area provides good feeding habitat for these species. The harrier hawk, black-billed gull, black backed gull and South Island oyster catcher are also frequent visitors to the area. No wetland birds have been observed, and there are no habitat areas to suggest wetland bird species would be present.

Native lizard species (Common skink and McCann's skink) are thought to be present within stockwater race riparian vegetation, gorse shelterbelts and rank exotic grassland within the Project footprint.

3.6.2. Aquatic ecology

There are no natural water courses or sites of aquatic ecological significance noted within the Project area. Although, as previously noted, there is a network of water races with several races running along parts of Main South Road and adjacent to the existing roads that intersect with the CSM2 alignment.

Stockwater races

The water races have poor overall riparian vegetation characteristics, with silt and fine sediment dominating the in-stream habitat. Pollutant tolerant species of Macro-invertebrates are mostly found here, such as snails. Macrophytes are also present with pondweed (*Elodea Canadensis*) and watercress (*Nasturtium*) being the dominant observed species and the pondweed (*Potamogeton ochreatus*) is dominant in some races. The slow flow at all sites is also a likely contributor to the growth of macrophytes. The overall in-stream habitat value of the water races is classified as poor.

Three species of fish have been observed at five sample sites within the Project area; the native common and upland bullies (*Gobiomorphus cotidianus* and *Gobiomorphus breviceps*) and brown trout (*Salmo trutta*). Both common and upland bullies are common throughout New Zealand waterways. Upland bullies (along with shortfin eels) were found to be the most common and abundant species in a survey of the waterways associated with CSM1[34] and within the SWAP ecology study[35]. In addition, the waterways, wetland and drainage guide developed by CCC, identifies these species as being common in Christchurch waterways. Overall, the fish communities observed within the water races situated within the Project area are lacking in diversity and reflect the poor quality riparian environment and in-stream habitat values.

Knights Stream

The Knights Stream headwaters are situated to the south of Halswell Junction Road, just downstream of Springs Road. The Knights Stream is a spring fed stream, which is notionally dry. The river is a residual channel that is permanently dry, and in parts appears that it has been in-filled and re-graded by farming. Periodic flow does not occur until approximately 2.3 km downstream of Halswell Junction Road (at Marshs Road), where flow is supplemented by drains. Permanent flow (sourced from springs) does not occur for a further 450 m downstream.

The upper reaches of Knights Stream have been previously assessed as having low value for both fish and invertebrates. The waterway has been modified and the removal of riparian vegetation has reduced bank stability, causing bank erosion and sediment inputs into the waterway[36].

Based on the River Environment Classification (REC) classes[37], Upper Knights Stream is classified as having urban land cover and the following parameters:

- Climate: cool-dry;
- Geology: alluvium;
- Valley-landform: low-gradient; and
- Source of flow: low-elevation.

In a survey carried out by EOS Ecology et al.38, pollutant tolerant macro-invertebrate taxa (e.g. snails) tended to dominate with more sensitive species such as mayflies, caddisflies and stoneflies only recorded in very low numbers. Upland bullies were recorded as being present in the stream. The stream in its upper reaches has large amounts of aquatic macrophytes, mainly Elodea, with some watercress at the margins. In the downstream reaches, the Elodea is covered in long

[34] EOS Ecology, 2008, Assessment of Environmental Effects: Christchurch Southern Motorway: Aquatic Ecology
[35] EOS Ecology et al., 2005, Appendix 4: Aquatic Values and Management. South-west Christchurch Integrated Catchment Management Plan. Technical Series. Report Number 3.
[36] EDS Ecology, CSM1 Assessment of Environmental Effects.
[37] The NZ River Environment Classification system (REC) groups rivers into classes at a variety of levels of detail and scales. Rivers with the same class are expected to have similar physical environments and ecosystems, similar environmental and economic values and similar responses to human disturbance despite the possibility that they are geographically separated.
[38] EOS Ecology et al. 3 July 2005. Appendix 4: Aquatic Values & Management. South-west Christchurch Integrated Catchment Management Plan Technical Series. Report No. 3.

strands of filamentous algae and at the confluence with the Halswell River, emergent watercress dominates.

Halswell River

The Integrated Catchment Management Plan [39] states that riparian vegetation within the Halswell River catchment has been reduced and highly modified. Overall it is of poor quality. Flow in the Halswell River is derived from springs sourced within Knights Stream and Marshs Road Drain. From the confluence with Knights Stream, the channel is quite uniform (about 5 – 6 m wide) and choked with aquatic macrophytes. In a survey carried out by EOS Ecology et al, over 80% of the invertebrate abundance in the Halswell catchment was represented by three pollutant tolerant species and only one EPT taxa was found (caddisfly species). However, despite this low EPT abundance, average taxa richness was present. In addition, freshwater crayfish have been caught in the middle reaches of the river[40].

Fish species diversity declined significantly with distance upstream from Lake Ellesmere. Short and long-fin eels, upland bully (*Gobiomorphus breviceps*) and inanga were recorded. Eels, upland bully (*Gobiomorphus breviceps*) and brown trout (*Salmo trutta*) have been recorded in the upper reaches and eels, common bully, inanga and brown trout recorded in the lower reaches.[41]

Sensitivity of surface watercourses to discharges

Watercourses in the catchment are not particularly sensitive to discharges of stormwater. The aquatic species present in these watercourses are pollution-tolerant and the watercourses are not protected for human consumption.

3.7. Air quality

The easternmost end of CSM2 between Halswell Junction Road and Springs Road is situated within the Christchurch Clean Air Zone 2 as identified in the Canterbury NRRP, although this is not a gazetted airshed[42], in terms of the National Environmental Standards for Air Quality. The remainder of the Project is outside of the Clean Air Zones. ECan operates three air quality monitoring sites near the Project area, and of these, the monitoring site at Lincoln is considered the most representative of ambient air quality within the Project area. An air quality assessment has been prepared as part of the application and the area is considered to have good overall background air quality. Sites on the urban fringe of Christchurch (such as Papanui) experience

[39] Golders Associates (NZ) Limited on behalf of Christchurch City Council. May 2008. Integrated Catchment Management Plan for South-West Christchurch

[40] EOS Ecology et al. 3 July 2005. Appendix 4: Aquatic Values & Management. South-west Christchurch Integrated Catchment Management Plan Technical Series. Report No. 3.

[41] EOS Ecology et al. 3 July 2005. Appendix 4: Aquatic Values & Management. South-west Christchurch Integrated Catchment Management Plan Technical Series. Report No. 3.

[42] A gazetted airshed is an area where air quality could reach levels higher than the national air quality standards. The Christchurch Clean Air Zone 1 encompasses the Christchurch Airshed gazetted under the National Environmental Standards for Air Quality. This zone commences immediately east of the project area, at Halswell Junction Road. Christchurch Clean Air Zone 2 is a buffer area to the gazetted air shed.

elevated levels of PM10 (particulates) in winter, symptomatic of a wider air quality issue in Christchurch.

There are a number of sensitive receptors within the Project area, namely residential houses within 200m of the proposed MSRFL and CSM2 alignments, however it is considered the airshed is not a highly sensitive receiving environment.

3.8. Noise

The existing noise environment within and adjacent to the Project area has been investigated extensively. Noise level surveys have been undertaken within the Project area and have been used to calibrate the computer traffic noise modelling of the existing environment. Currently, the dominant noise source affecting the ambient noise environment at dwellings close to roads is traffic. The further a dwelling is located from a road, the greater the influence of other environmental sounds, such as birdsong and rustling leaves, becomes.

Noise measurements were taken from positions that were representative of the facades of dwellings. Existing noise levels have been measured through attended and un-attended measurements. Ambient noise measurements show a range of noise levels from 47 dB to 74 dB $L_{Aeq(24h)}$ demonstrating the varying effect of relative proximity to busy roads (noise levels at the lower end represent positions located away from existing roads and at the higher end represent positions close to existing major roads).

The majority of dwellings within the noise assessment area for the Project are accessed directly from, or are in close proximity to existing roads, namely Main South Road, Shands Road and Springs Road. Ambient noise levels at these locations are primarily affected by traffic flow and by local obstacles, such as perimeter fences and other dwellings.

3.9. Transport networks

3.9.1. Existing road network

Main South Road

Main South Road is a two lane undivided major arterial road and forms part of SH1 south of Christchurch. It is a key part of the strategic road network within the Canterbury region with a primary function to carry through traffic to Christchurch City Centre, Lyttelton Port of Christchurch, and industrial areas in the south and east of the city. In addition to functioning as an inter-regional link, Main South Road is a strategic component of the Christchurch City and Selwyn District road networks currently providing access to various townships including Templeton, Rolleston and further south to Burnham and beyond. It also passes through the major residential, retail and industrial hub at Hornby where it connects with SH73A.

Halswell Junction Road intersects with Main South Road at Islington, just south of Hornby. The 2.5 km section of road from Main South Road to Springs Road is currently being upgraded as part of

the CSM1 Project. Upon completion, the improved route will provide a dual function as an arterial link to the motorway extension as well as servicing the industrial and commercial development that fronts onto Halswell Junction Road. The upgraded Halswell Junction Road will become part of the State highway under the management of the NZTA. When CSM2 is completed, the NZTA will consider seeking for the State highway status of Halswell Junction Road to be revoked and for it to revert to a local road managed by CCC.

The NZTA divides State highways into four categories including National strategic (with a high volume subset), Regional strategic, Regional connector and Regional distributor[43]. Main South Road lies within the SH1 Hornby to Dunedin section, connecting to SH73 heading to Lyttelton Port of Christchurch and is classified as a national strategic high volume highway by meeting the following criteria:

- carries more than 1,200 heavy commercial vehicles per day;
- connected to a major city with population >100,000; and
- provides freight access to a port handling more than 1 million tonnes annually.

[43] NZTA State highway classification, Consultation draft, February 2011, p.3.

Figure 12: State Highway Average Annual Daily Traffic (AADT) volumes

Table 3 below also provides a summary of 2011 traffic volumes and assessed annual traffic growth rates (based on the last 10 years) at the NZTA's count stations on Main South Road.

Table 3: Assessed 2011 traffic volumes and growth rates – Main South Road

Count site	2011 AADT	% heavy	Assessed traffic growth	Annual AADT increase
South of Halswell Junction Road	22,550	8.5%	2.8%	650
South of Templeton	20,020	11.2%	2.6%	550
South of Weedons Ross Road	19,930	10.0%	3.4%	680

Table 3 indicates a current Annual Average Daily Traffic ("AADT") of around 20,000 vehicles per day along the MSRFL corridor, increasing at an annual growth rate of approximately 3%. North of Templeton, which will be bypassed by CSM2, the AADT increases to over 22,500 vehicles per day. The estimated proportion of heavy vehicles in 2011 was approximately 10% along the MSRFL corridor. CCC count data from 2008 indicates traffic volumes on Halswell Junction Road of approximately 6,000 vehicles per day south of SH1, increasing to around 14,000 vehicles per day between the Shands and Springs Road roundabouts.

Main South Road has also been declared a Limited Access Road ("LAR") along the entire Project corridor. LARs are sections of the State highway that can only be accessed from authorised crossing places, which are specified in relation to property titles. There are a number of existing authorised crossing places on Main South Road, with many located on the MSRFL section between Robinsons Road and Weedons Road. The accesses serve a variety of land uses including farms and agricultural uses, rural-residential dwellings and commercial businesses.

Local road network

The surrounding local road network is comprised of numerous rural, local authority controlled roads classified as major arterial, minor arterial, collector, local access and private right-of-way. Table 4 identifies those roads that intersect with Main South Road situated within both Selwyn District and Christchurch City, along with approximate traffic volumes and road classification.

Table 4: Local roads intersecting with Main South Road[44]

Side Road	Territorial Authority	Traffic Volume	Road Classification
Hoskyns Road	SDC	3,890	Local
Park Lane	SDC	70*	Private ROW
Weedons Ross Road	SDC	1,290	Local
Weedons Road	SDC	1,130	Local
Larcombs Road	SDC	490	Local
Berketts Road	SDC	90	Local
Curraghs Road	SDC	330	Local
Robinsons Road	SDC	70	Local

[44] These classifications have been taken from the Selwyn District and Christchurch City Plans. It is noted that the Selwyn District Plan and Christchurch City Plan use different classifications in their road hierarchy, so the classifications are not consistent between the territorial authority areas.

Side Road	Territorial Authority	Traffic Volume	Road Classification
Waterholes Rd	SDC	750	Local
Dawsons Rd	SDC	320	Local
Kirk Rd	CCC	6,000	Collector
Trents Rd	CCC	500	Collector
Marshs Rd	SDC	1,100	Local
Barters Rd	CCC	1,300	Minor arterial
Foremans Rd	CCC	Unknown	Local
Halswell Junction Rd	CCC	6,000	Major arterial

Other key local roads and routes in close proximity that will be directly affected by the Project include:

- Jones Road: This road runs parallel to the western side of the Main South Road alignment (immediately west of the railway line) between Templeton and Rolleston. The southern end of Jones Road is an alternative access to the Rolleston Izone;
- Levi Road: This road intersects with Weedons Road approximately 800 m east of Main South Road and provides a link into the east side of Rolleston Township;
- Lincoln Rolleston Road: This road connects Rolleston to Lincoln, turning into Boundary Road east of Waterholes Road. It provides an alternative route to Main South Road for vehicles heading north towards Hornby and Christchurch, joining on to Selwyn Road, and then on to Shands Road.
- Weedons Road: This road links Main South Road just north of Rolleston with the eastern edge of Lincoln. It also provides an alternative route into the eastern side of Rolleston via Levi Road.
- Weedons Ross Road: This road, which is a continuation of Weedons Road on the western side of Main South Road, connects Main South Road with West Melton and SH73 through to the west coast.
- Selwyn Road: This road continues the alternative route to Main South Road provided by Lincoln Rolleston Road. It also carries on southwards, parallel to Main South Road, crossing Ellesmere Junction Road.
- Shands Road: This is a key arterial road in the Selwyn District. Together with Selwyn Road and Lincoln Rolleston Road, it forms a key secondary route between Christchurch and Rolleston. It is also an alternative route to Springs Road between Christchurch and Lincoln;
- Springs Road: This is a strategic road between Lincoln and Hornby travelling through the Prebbleton Village;

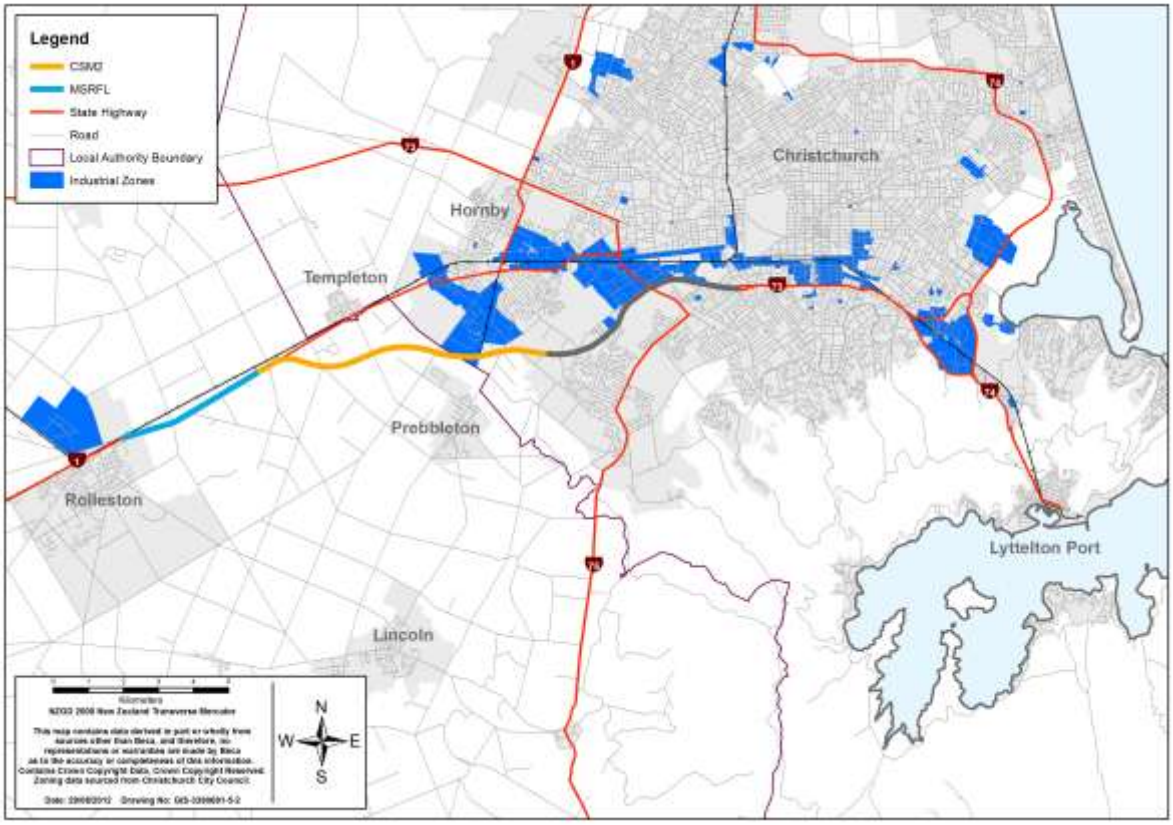
- Kirk Road: This road, connecting Main South Road with SH73, provides the main access to Main South Road for Templeton. It intersections with Main South Road at a priority intersection;
- Trents Road: This road is the continuation of Kirk Road on the eastern side of Main South Road. It crosses Shands Road before terminating at Springs Road at the southern end of Prebbleton;
- Blakes Road: This road connects Trents Road directly through to the northern end of Prebbleton, crossing Shands Road on the way; and
- Marshs Road: This road forms the boundary between Selwyn District and Christchurch City.

3.9.2. Road based freight

Within Canterbury, the majority of freight is moved on the road network. SH1, running north and south through the region, is the spine on which most of this freight travels. Connections from SH1 through to the Port of Lyttelton from the south are provided by SH73A, SH73 and SH74, the first two of which are on the RoNS southern corridor.

Significant industrial activity also occurs along this corridor; in Rolleston, around Halswell Junction Road, Sockburn and Woolston. These are shown in Figure 13, along with the routing of CSM1 and this Project.

Figure 13: Industrial zoned land along RoNS southern corridor route



3.9.3. Public transport

Public transport services in the area are currently provided via the Metro bus service. This service runs several routes connecting Christchurch to Lincoln and Rolleston. There is also a route that connects Lincoln, Springston, Rolleston and Burnham that makes use of Jones and Waterloo Road that run beside Main South Road, along with Birchs / Springs Road.

ECan runs 'Selwyn Star' services as part of Metro's bus services, with the following three services operating within the Project area:

- 81 Lincoln service to the city generally every 20 minutes five days a week, every 30 minutes on Saturdays and hourly on Sundays;
- 88 Rolleston service to the city every 30 minutes six days a week and hourly on Sundays; and
- 820 Burnham to Lincoln service that connects Burnham, Rolleston, Springston and Lincoln, running every hour six days a week, and every two hours on Sundays.

The services do not use the Main South Road corridor along the study area. The 88 to Rolleston uses the adjacent Jones / Waterloo Road and the 81 to Lincoln travels along the Birchs / Springs Road route. Red Bus Ltd also provides school bus services with the following dedicated ride on services operating in the study area:

- S15 Lincoln Schools to City via Prebbleton and Hornby on the Birchs / Springs Road route.

3.9.4. Cycle and pedestrian routes

A shared use cycle / pedestrian route has been developed as part of the CSM1 Project. This route extends from Annex Road (to the east) and currently terminates at the Halswell Junction Road / Main South Road intersection. The first part of the route uses existing local roads and shared use paths to provide a link from Annex Road to the A&P show grounds (in future the route is expected to be accessed by the Wigram Magdala Bridge once constructed). The route is predominantly serviced by a 3m shared use path which extends from the A&P show grounds to the Halswell Junction Road / Springs Road roundabout. The final section of the route is a 2m shared use footpath, which creates the final link between Springs Road and Main South Road.

The proposed CSM2 alignment crosses underneath Marshs Road and the Little River Trail, which when completed, will provide a cycle route from Hornby to Little River. The 3.5 km section of the Little River Trail between Shands Road and Lincoln was opened in 2009 and the 7km section from Lincoln to Prebbleton was opened in 2006. The rail trail is typically 3m wide and provides a shared use commuter and leisure facility for pedestrians and cyclists.

3.9.5. Railway infrastructure

The South Island Main Trunk Line runs adjacent to SH1, located within a corridor between the western side of the highway and Jones Road. There are two level crossings close to the MSRFL Project corridor located at Curraghs Road and Weedons Ross Road. The level crossings are in close proximity to intersections on Jones Road, which runs parallel to the railway between Templeton and Rolleston.

The Hornby Industrial Line branches off the main line at the Carmen Road intersection heading in a southerly direction across Halswell Junction Road to just north of Marshs Road. The line includes several private sidings to industrial land uses in this area. The formed rail line terminates north of Springs Road.

3.10. Network utilities

Network utility service providers within the Project area have been identified as follows:

Table 5: Main South Road existing utility services

Network Utility Service Providers			
Location	Orion (overhead)	TelstraClear	Water Races (SDC)
Main South Rd	Eastern side crossing the road periodically	Western side	Eastern side (from Weedons Road)

Network Utility Service Providers			
Location	Orion (overhead)	TelstraClear	Water Races (SDC)
Jones Rd	Eastern side	Eastern side (south of Weedons Ross Rd)	
Weedons Ross Rd	Both sides	Southern side (south of Jones Rd)	Eastern side
Weedons Rd	Western side	Southern side (does not extend to Levi Rd)	Eastern side
Levi Rd	Shown on the plans but not observed on site	-	-

Table 6: CSM2 existing utility services

Network Utility Service Providers				
Location	Orion (overhead)	Chorus	Water Supply	Water Races (SDC)
Robinsons / Curraghs Rd	Western side and an additional line crossing CSM2 east of Robinsons Rd	North of Robinsons Rd	-	Western side and north of Robinsons Rd
Waterholes / Hamptons Rd	Both sides	-	-	Eastern side
Trents Rd	Western side	West of Trents Rd and crosses Trents Rd to the north of CSM2	-	Eastern side and west of Trents Rd
Blakes Rd	Eastern side	-	-	Western side
Shands Rd	Western side	-	-	-

Network Utility Service Providers				
Location	Orion (overhead)	Chorus	Water Supply	Water Races (SDC)
Marshs Rd	Northern side	South of Marshs Rd through the CSM2/Shands interchange. Crosses Marshs Rd and CSM2 east of their intersection.	Runs around the NW corner of Marshs/ Shands intersection	Northern side
Railway Corridor	Eastern side	-	-	-
Springs Rd	Western side	-	Both sides	Western side
John Paterson Drive	Northern side	-	Northern side	-
Halswell Junction Rd	Eastern side	-	Western side	Western side

In addition to the above, two lines of Transpower pylons intersect just north of the proposed Marshs / Shands interchange. Sewer pipes run along the eastern side of Shands Road and the western side of Springs Road.

3.11. Social context

The social environment surrounding the Project area is highly varied, reflecting the differing land use ranging from the dense urban and peri-urban residential, industrial and commercial areas of Hornby and Halswell to the rural and rural-residential areas extending south toward Rolleston. The main townships in the vicinity of the Project area have been assessed, and the key features of each area have been noted in Table 7 below:

Table 7: Social context

	Prebbleton	Rolleston	Templeton	Hornby
Population[45]	3,000	3,800	2,500	8,000

[45] 2006 census but there has been reasonable growth since that time.

	Prebbleton	Rolleston	Templeton	Hornby
Dwellings	1,000	1,250	700	3,200
Ethnicity	Mainly European population	More diverse population with higher proportion of Maori	Mainly European population	More diverse population with higher proportion of Maori and Pacific Peoples
Age	Similar age breakdown to the region as a whole though with slightly younger population	Younger population than region as a whole	More working age people with less children and older people	Similar age breakdown to the region as a whole though with slightly younger population
Household compositon	Higher proportion of married couples and families than the region	Higher proportion of married couples and families than the region	Fewer married couples, though higher proportion of families	Fewer married couples and more single person households with fewer families
Economic indicators	High levels of educational attainment, more people in higher skilled professions and higher median income than region ($31,600)	Education levels similar to the rest of Canterbury, more mid skill level jobs and higher median income than the region ($31,900)	Lower levels of qualifications, more lower skilled jobs and lower median income ($22,200)	Lower educational attainment and more lower skilled jobs with lower median income ($22,600 to $23,800)
Travel	High proportion of 2 and 3 car households	High proportion of 2 and 3 car households	High proportion of 2 and 3 car households	High proportion of 2 and 3 car households
Property ownership	More owner occupied households	More owner occupied households	More owner occupied households	More owner occupied households

The majority of community facilities near the Project area are located in the existing settlements of Templeton, Hornby, Prebbleton and Rolleston. Schools are located in all of these townships with other community facilities such as community halls, health facilities and leisure facilities

generally found in the larger centres at Hornby and Rolleston. Table 8 below sets out the community facilities found in the surrounding area:

Table 8: Community facilities

Templeton	Prebbleton	Hornby	Rolleston	Rural Areas
Golf club Primary school Community centre	Primary school Kindergarten Cafes Recreational facilities Community hall	Community centre Primary schools Kindergartens/ Early childhood High school Health facilities Recreational facilities	Community centre Primary schools Kindergartens/ Early childhood High school Health facilities Cafes Recreational facillities	Serviced by community facilities in other townships

3.12. Archaeology, culture and heritage

There are two recorded archaeological sites of Māori origin in the general vicinity of the Project area, both of which were middens/ovens. These indicate that Māori people were passing through this area, possibly on their way to Banks Peninsula or Lake Ellesmere where important resources were present. There is little evidence to suggest there were any settlements in the area. The waterholes at Templeton are marked on an early European map as Ruapuna, indicating that Māori knew of the existence of these waterholes.

The Trents Chicory Kiln is located on Trents Road adjacent to the CSM2 alignment (i.e. outside of the Project designation boundaries). This site is listed in the Selwyn District Plan and is registered as a Category II Historic Place with the Historic Places Trust. No historic sites noted in the Christchurch City Plan or the Selwyn District Plan has been identified as being affected by the Project.