NZ TRANSPORT AGENCY
WAKA KOTAHI

Christchurch Southern Motorway Stage 2 and Main South Road Four Laning

Assessment of Environmental Effects

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Introduction

The NZ Transport Agency ("the NZTA") is lodging Notices of Requirement ("NoR") and resource consent applications to widen and upgrade Main South Road to provide for a four-lane median separated expressway from Rolleston in the Selwyn District to Robinsons Road ("MSRFL"). The Project also includes the construction, operation and maintenance of a motorway[1] between Robinsons Road to the end of the Christchurch Southern Motorway Stage 1 ("CSM1") at Halswell Junction Road in Christchurch ("CSM2"). The proposed MSRFL and CSM2, together with the ancillary local road improvements are referred to hereafter as 'the Project'.

The Project is part of the Southern Corridor of the Christchurch Motorways 'Roads of National Significance' ("RoNS"), one of three state highway 'corridors' around Christchurch which are identified as RoNS in terms of both the 2009 and 2012 Government Policy Statements on Land Transport Funding ("GPS"). This Project will provide more efficient and safer access between the Port of Lyttelton, the city centre and the south of Christchurch for people and freight.

The NZTA's Requiring Authority objectives for the Project are:

- to contribute to the region's critical transport infrastructure and it's land use and transport strategies[2] by providing more predictable travel times and connections between the first stage of the CSM and Rolleston for people and freight;
- to improve accessibility from Christchurch and the Port of Lyttelton to the south and west for individuals and businesses while improving local access to work, shops and social amenity in Templeton and Hornby;
- to align traffic types and movements with the most appropriate routes by separating through traffic from local traffic to the south west of Christchurch and promoting other routes for passenger transport;
- to improve network resilience and safety by providing a route with enhanced safety standards and capacity; and
- to manage the social, cultural, land use and other environmental impacts of the Project in the Project area and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, design and conditions.

This Assessment of Environmental Effects ("AEE") assesses the potential effects of the construction, operation and maintenance of the Project, as required, to support the Notices of Requirement and resource consent applications for this Project being lodged with the Environmental Protection Authority ("EPA").

[1] CSM2 will not become a motorway until the Governor-General declares it to be a motorway upon request from the NZTA under section 71 of the Government Roading Powers Act 1989 (GRPA). However, for the purposes of this report, the term "motorway" may be used to describe the CSM2 section of the Project.

[2] Land Use and Transport Strategies include the Greater Christchurch Urban Development Strategy, the Canterbury Regional Land Transport Strategy, the Christchurch to Rolleston and Environs Transportation Study and other strategies and plans prepared by relevant statutory agencies for future land use and transport development and management within Canterbury.

Strategic context

The Project is proposed within the context of a national, regional and local policy framework comprising the:

- Government Policy Statement on Land Transport Funding 2012/13 – 2018/19 ("GPS");
- National Infrastructure Plan 2011 ("NIP");
- Connecting New Zealand 2011 (the primary long-term government transport strategy);
- Canterbury Regional Land Transport Strategy 2012 – 2042 ("RLTS");
- Canterbury Regional Policy Statement 1998 ("RPS") and Proposed RPS 2011;
- Recovery Strategy for Greater Christchurch 2012;
- Greater Christchurch Urban Development Strategy and Action Plan 2007 ("UDS");
- Selwyn District Plan ("SDP");
- Christchurch City Plan ("CCP");
- Draft Christchurch Transport Plan 2012-2042;
- Christchurch Rolleston and Environs Transportation Study 2007 (CRETS); and
- South-West Christchurch Area Plan 2009 ("SWAP").

Other strategic considerations include the impact of the Canterbury earthquakes on land use in the Greater Christchurch area and the need to integrate the transport network with current and planned land development.

Existing environment

The Project is located south west of Christchurch within the Canterbury Region. The Project area is predominantly flat and highly modified from its natural state and features a diverse range of land uses including farmland, rural lifestyle blocks, rural industries, and urban (industrial) areas. There are no natural watercourses or prominent stands of indigenous vegetation within the Project area. The Project extends from the town of Rolleston through predominantly farmland to south west Christchurch where Hornby is the dominant commercial centre where the area is largely urban. The towns of Templeton and Prebbleton are in close proximity. The new CSM2 alignment is situated within the rural locality known as Weedons and near the recent residential subdivisions at Aberdeen and Claremont.

Description of the Project

Main South Road will be four-laned from just north of the intersection of SH1 and Park Lane, in Rolleston. This section of the Project continues north on Main South Road for approximately 4.5km to the connection with CSM2 located between Robinsons and Waterholes road. MSRFL will consist of a four lane expressway with two lanes in each direction, separated by a median strip and barrier. An interchange at Weedons Road will provide access to Main South Road and will feed into the Rolleston Izone industrial area. On the west side of Main South Road a new local road running to the immediate east of the rail corridor between Weedons Ross Road and Curraghs

Road and a short road north of Curraghs Road will be constructed. These through roads will provide rear access for properties fronting onto Main South Road, to enable the removal of private property access onto Main South Road in this location. A rear access road for private access is also included for properties on the east side of Main South Road.

The CSM2 part of the Project will leave Main South Road near Robinsons Road and extend for 8.4km linking to the end of CSM1 (which is currently under construction) at Halswell Junction Road. The road will comprise a four lane motorway with two lanes in each direction, separated by a median strip and barrier. Access to CSM2 from the surrounding area will be via two interchanges. Three underpasses and one overpass will also be constructed to ensure the connectivity of the local road network is maintained. Several local roads will be realigned for safety and to minimise impacts on private property and access. This includes the realignment of John Paterson Drive to connect with the CSM2 westbound off-ramp and Halswell Junction Road roundabout (east of CSM2).

The local road changes have a combined length of approximately 16 km.

Construction of the Project

Construction of the Project has the potential to cause adverse environmental effects, and information about key construction activities has been provided as a basis for the AEE. A number of construction and staging strategies have been identified to minimise the disruption caused during construction.

The construction effects requiring mitigation relate to earthworks, stormwater discharge, traffic management and circulation, the continued operation of SH1, noise, the operational impact on existing farms and businesses and general amenity effects on nearby residents (noise, dust and access).

Statutory context

The key statutory matters under the Resource Management Act 1991 ("RMA") relevant to the Project are:

- the purpose and principles of the RMA;
- the RMA provisions relating to proposals of national significance and the national consenting process;
- Part 8 concerning Designations; and
- the Canterbury Regional Policy Statements (Operative and Proposed), along with the regional plans applying within the Canterbury Region, and the district plans of Selwyn District and Christchurch City.

Two new designations and one alteration to a designation are sought for the Project. The documentation provided in support of the NoRs for the designations contains all the information that would be required to be provided with an outline plan under section 176A RMA, therefore

that information has been incorporated into the designations for the purposes of section 176A(2)(b) RMA. An outline plan will therefore not be required.

A series of regional resource consents are also sought for the Project, along with land use consents under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

The consenting authority (which may be a Board of Inquiry pursuant to the national consenting process) who considers the NoRs and applications for resource consent must have regard to various matters, including the relevant provisions of national, regional and district level planning documents, consideration of the Project alternatives, reasonable necessity, as well as other matters identified as being relevant to the Project and its effects.

Consideration of alternatives

Under the RMA, the NZTA needs to consider alternative sites, routes and methods for undertaking a work. The alternatives that were identified and assessed to determine the selected alignment and design for the Project have occurred over a number of years. Consultation has been integral in determining the selected alignment. The assessment of alternative options has considered:

- alternative routes (as appropriate);
- alternative alignments and interchanges/connections to the transport network;
- alternative designs and measures to avoid, remedy and mitigate identified actual or potential adverse effects on the environment; and
- the wishes of the community through regular consultation.

The assessment process applied was iterative, and involved on-going refinement of the Project on the basis of information derived from desk top studies, field work, community and stakeholder consultation and detailed technical investigations. The process was also informed by the requirements of Part 2 of the RMA, the objectives of the Project and relevant national and regional policy directives.

Consultation and engagement

Consultation and engagement has been undertaken in accordance with recognised good practice as well as statutory requirements, and has involved engagement with local, regional and national stakeholders. Consultation was undertaken during the initial and scoping investigations and more recently as part of the Scheme Assessment phase. For the Scheme Assessment phase, a number of consultation methods were used including one-on-one meetings, group meetings, public open days, newsletters and online material. On-going consultation and communication with the relevant regulatory agencies has also been undertaken.

Assessment methodology

The environmental assessment undertaken for the Project involved the collaborative input of a broad range of engineering, environmental, social and cultural specialists. The Project team worked together to identify the potential adverse and positive environmental effects of the construction, operation and maintenance of the Project. This included developing measures to ensure that any adverse effects are appropriately avoided, remedied or mitigated. RMA, regional and district plan considerations have also been a fundamental consideration in the assessment methodology.

Traffic and transport

The transportation assessment has found that the Project achieves the stated Project objectives well. It will have significant positive traffic effects (i.e. benefits) for the region including:

- reduced travel times - the Project is predicted to result in travel time savings of up to 12 minutes along the Southern Corridor;
- improvement in reliability of these travel times - the improved level of service provided by the Project and the routing away from at-grade intersections will reduce the likelihood of unexpected delays;
- safety improvements - the Project will be significantly safer than the current route with a predicted 40% reduction in fatal and serious injury crashes;
- provision of additional road capacity between Christchurch and the Port of Lyttelton to the south and west;
- the re-routing of traffic onto the new motorway is expected to reduce traffic volumes through Templeton and Hornby by over 17,000 vehicles per day, with over 2,000 fewer trucks travelling through Templeton daily; and
- improvement in level of service on the State highway is expected to lead to a decrease in traffic on Jones Road and Springs Road, which carry passenger transport between Selwyn and Christchurch. This will benefit public transport.

There are some potential adverse traffic effects relating to restrictions in access to properties, primarily along Main South Road, which will be mitigated by the provision of alternative rear access routes on both sides of Main South Road.

Property and land use

The main property effects of the Project are:

- properties with land that is required for the proposed State highway works; and
- land that is required to implement rear access roads or ancillary local road improvements.

Affected land holdings range from land already acquired by the Crown, Council owned land, including roads and private land holdings. Private land is by far the largest land requirement, with outright purchase of some properties required and partial acquisition of others. All property

owners whose land is directly affected have been consulted and are aware of the property required.

Specific site mitigation measures are proposed for some properties within close proximity to the Project that will potentially be subject to adverse effects, as identified through the technical studies.

Actual and potential effects (including perceived) on property values are not considered to be a relevant consideration under the RMA. Effects on amenity values are a relevant consideration. These relate primarily to noise, landscape, visual and access, and a range of mitigation measures are proposed.

The Project will permanently take high fertility soils that might otherwise be available for farming purposes. The amount of land to be taken has been minimised as far as possible, and topsoil will be re-used within the Project area.

Network utilities

The Project directly affects a number of network utilities, including electricity transmission and distribution lines, telecommunications, water supply, wastewater and stormwater disposal utilities, stockwater races and also the rail network. The NZTA has consulted with network utility operators to identify network utilities that will be directly affected and how they can be protected and / or how relocation can be appropriately undertaken. The outcomes of these initial discussions concluded that all adverse effects on network utilities directly affected by the Project will be able to be appropriately avoided, remedied or mitigated.

Urban form and function

Key urban form and urban design considerations for the Project have been set out, along with the way in which the design has responded to its context, and how the detailed design for the Project seeks to secure an appropriate urban form and urban design outcome. An Urban and Landscape Design Framework has been prepared for the Project.

The process of assessing the effects on urban form and function was carried out during the development of the Project and has influenced decisions on design. The assessment was also informed by the feedback from consultation undertaken by the NZTA on urban planning and design issues.

Landscape and visual

The scale of the landscape and visual effects of the Project ranges from slight through to substantial, depending on the viewing audience and position. The potential landscape and visual effects will result from changes to the local rural landscape due to removal of existing pastoral land use and vegetation, the introduction of manmade structures (roads and bridges) and an increase in traffic movement. For local residents, the landscape and visual amenity concerns may be perceived as adverse depending on individual perspectives. In comparison, road users are

more likely to show a high degree of acceptance and will experience positive effects including panoramic views obtained from interchanges and overbridges that are likely to contribute to a positive travel experience by increasing awareness of the Canterbury Plain landscape and distant landforms of Banks Peninsula and the Canterbury foothills.

Effects on landscape and visual amenity will be mitigated through Project design. The landscape design approach includes a range of measures to limit effects and integrate the Project into the surrounding environment. This is achieved by constructing the motorway at grade, limiting the bridge structures to those local roads which cross the alignment, limiting vegetation removal where practicable, providing significant areas of additional planting along the route, minimising the extent of earthworks and designing structures that can be more easily integrated into the landscape. In addition, a Landscape Management Plan will be developed for the Project to ensure these effects are managed.

Lighting

Some lighting is required for the Project to provide for the safety of road users. Since the Project is located within a rural and semi-rural environment it is not necessary to fully illuminate the alignment. Rather, it is proposed to install carefully designed lighting at intersections, interchanges and on/off ramps to meet compliance with the relevant New Zealand lighting standard ("AS/NZS 1158"). The overall level of illumination will be similar to predicted levels for CSM1, in terms of effects on nearby property owners.

There will be some visual differences to nearby residents as a result of increased light levels. The lighting has been designed to balance the need to ensure road safety, as well as effective mitigation of light pollution in the immediate surrounds.

Construction lighting effects will be temporary in nature and mitigated through measures outlined in the Construction Environmental Management Plan ("CEMP").

Noise and vibration

An assessment of predicted traffic noise level generation has been conducted in accordance with the requirements of the relevant New Zealand Standard NZS 6806:2010 Acoustics – Road Traffic Noise – New and Altered Roads ("NZS 6806") which requires that the Project design and mitigation measures results in reasonable noise levels for all affected residents in the vicinity of the Project. A number of noise mitigation measures have been considered for this Project in line with the best practicable option ("BPO") approach outlined in the RMA. This assessment process has resulted in proposed mitigation options, including the provision of relatively small sections of acoustic barriers and extending the use of low noise road surface (Open Graded Porous Asphalt – "OGPA") to the southern approach to the local road overbridge at Springs Road. OGPA will be used across the majority of the mainline (State highway) carriageway for maintenance purposes. Comprehensive design of these noise control measures will be completed during the detailed design phase of the Project.

General construction noise management and mitigation measures are proposed to be implemented throughout the construction period as a BPO, in that they have to be effective in noise attenuation while being the best fit for local environment insofar as being practicable, and will be outlined within the Construction Noise and Vibration Management Plan ("CNVMP"). Construction noise is generally to be within the limits of the construction noise standard (NZS 6803:1999). Where there is a risk that construction noise standards will be exceeded, management schedules outlining site specific noise mitigation and management will be prepared.

Predictions of construction vibration levels indicate there is a degree of risk for dwellings within 20m of Main South Road however it is unlikely for there to be any buildings along the CSM2 alignment with a high vibration risk. The effects of construction vibration will require active management through the implementation of the CNVMP.

Air quality

Construction of the Project has the potential to generate dust, particularly as a result of earthworks, which could have an adverse effect on air quality for sensitive receptors (mainly residential dwellings) within close proximity to the Project area. This will be managed through the Air Quality Management Plan which identifies management measures during construction to ensure that adverse air quality effects will be avoided or mitigated.

Once the Project is operational, there is the potential for adverse air quality impacts from vehicle exhaust pollutants. Results of the dispersion modelling indicate that pollutant concentrations are unlikely to exceed the relevant National Environmental Standards for Air Quality ("NES AQ") and New Zealand Ambient Air Quality Guidelines ("NZAAQG") thresholds.

Stormwater and groundwater

Existing groundwater levels have been a key influence in the design of the Project, as it has dictated the vertical level for the road and prevented the placement of the Project into a cutting. Designing the road at grade allows the disposal of stormwater to ground, above normal groundwater levels.

The proposed collection and disposal systems typically consist of roadside swales and stormwater disposal points to land at regular intervals along the Project. Additional first flush basins and detention ponds are proposed in the Halswell Junction Road area, which is identified as requiring treatment in the Canterbury Natural Resources Regional Plan ("NRRP"). The design standard for the Project drainage system is the 100 year Annual Recurrence Interval ("ARI") rainfall event including an allowance for climate change. Minimal discharge of stormwater to water is envisaged, only when this design standard is exceeded.

The proposal to dispose of stormwater to land has the potential to reduce downstream flooding due to the improved management and control of drainage in the contributing area, which currently overflows to the stockwater races in heavy rain. This will have a positive effect by

diminishing the potential for flooding the surrounding area. The proposed stormwater treatment process is also expected to improve the receiving environment water quality.

It is noted that the design includes groundwater intervention in two specific locations. For the Robinsons Road overpass (where the local road passes under the highway), pumping of groundwater from the local road is proposed in some groundwater conditions. Also, where the Project connects with CSM1, in extreme groundwater and/or rainfall events (i.e. greater than a 1 in 100 year rain event) dewatering may be required in future years depending on future predicted changes to groundwater levels. The design allows for these dewatering requirements.

Stockwater races will be diverted beneath the Project. The design of these diversions will ensure that the functions of the stockwater races in relation to water supply for stock and irrigation and as land drainage during extreme weather conditions will be maintained.

Stormwater discharges throughout the construction of the Project will be managed by a comprehensive Erosion and Sediment Control Plan ("ESCP") which will detail measures to avoid, remedy and mitigate the effects of stormwater discharge during construction. The ESCP will be prepared in accordance with Environment Canterbury's Erosion and Sediment Control Guideline 2007.

The proposed stormwater treatment measures and implementation of the proposed CEMP and ESCP will avoid contamination of the Christchurch Groundwater Protection Zone[3].

Terrestrial and freshwater ecology

Within the Project area, there are limited areas of naturally occurring indigenous vegetation reflecting the highly modified environment and extensive tracts of pasture within the Project area. Pasture, shelterbelts, woodlots, orchards and gardens within the Project area associated with rural-residential dwellings provide feeding, nesting and shelter habitat for commonly occurring indigenous and exotic birds with wide habitat preferences. Grassland verges, especially along shelterbelt and road margins, provide suitable habitat for lizards such as the common skink and McCann's skink. The study area contains no natural waterways or wetlands but does contain a number of manmade water races of limited ecological value. There are no sites of conservation significance such as ecological heritage sites, recommended areas of protection ("RAPs") or significant natural areas within the Project area.

The effect of vegetation removal required to allow for the construction of the Project on indigenous fauna arising from the loss of those habitats is considered to be no more than minor, given the similarity of nearby habitats and wide ecological tolerances and adaptability of the affected indigenous bird species. The proposed planting in combination with suitable ground surfacing measures will enhance habitat quality for indigenous birds, lizards, invertebrates, fish and aquatic life and assist in mitigating the loss of habitat.

[3] As mapped in the Canterbury Natural Resources Regional Plan (NRRP) and Proposed Canterbury Land and Water Regional Plan (PLWRP).

Potential adverse effects on aquatic ecology during construction relate to potential sedimentation and contamination of water races and habitat disturbance. Long term effects on aquatic ecology are minor and include habitat modification associated with the closure, piping and realignment of water races. There is the potential for long term positive effects to be realised through riparian enhancement of realigned and other existing water races within the Project area and improved water quality through stormwater treatment. In addition, culverts will be designed to ensure the provision of fish passage or where the proposal involves long sections of piping, inclusion of light wells, resting areas and baffles to assist with fish passage.

Natural hazards

Seismic activity, including ground shaking and liquefaction is a significant geological hazard in the Christchurch area. Ground movement associated with the recent earthquake events commencing in September 2010 have recorded horizontal movement up to 900 mm and vertical movement of up to 320 mm in the Project area. No liquefaction was recorded within the Project area during any of the recent earthquake events, however, geological investigations have proven that liquefiable soils do exist at depth. While seismic risk exists, this will be satisfactorily addressed through the adoption of suitable design standards for embankments, bridges and foundations.

In relation to flood risk, the design standard for the highway drainage system is the 100 year ARI rainfall event including an allowance for climate change. It has been assessed that disposal to land has the potential to reduce downstream flooding due to the reduction in contributing area (i.e. the area draining to the highway drainage system). This has the potential to have a positive effect in terms of reducing the risk of flooding.

Utilisation of total stormwater detention in the 100 year 24 hour rainfall event will ensure that spilling to Upper Knights Stream in the Halswell River catchment via Montgomery's Drain will only occur in extreme rainfall and/or groundwater events in a staged manner, after flood peaks, where flood risk can be appropriately managed.

Contamination

Several locations along the Project route are identified as Hazardous Activities and Industries List ("HAIL") sites. Concentrations of contaminants in all soil samples collected within the designated route were less than the Rural Residential $SCS_{(health)}$ of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. Therefore, contaminations arising from historic land use activities along the Project designated route are not likely to have a measurable effect on human health or the environment. Disturbance of HAIL sites will be managed through the implementation of the CEMP.

Cultural impacts

The relationship between tangata whenua (Ngāi Tahu) and South-West Christchurch is culturally and historically significant.

The NZTA has sought to engage with Te Runanga o Ngāi Tahu, the principal iwi group with mana whenua over the South-West area of Christchurch. As the Project area lies within the boundaries of the Taumutu Runanga and Ngāi Tuahuriri Runanga, engagement has also been sought with these Runanga via Mahaanui Kurataiao Ltd ("MKT").

A draft Cultural Impact Assessment ("CIA") has been prepared and is currently being reviewed by MKT on behalf of Ngāi Tuahuriri as mana whenua. This has been informed by the process of engagement with iwi.

Archaeology and built heritage

The Project area is known to have been occupied by both Māori and Pākehā prior to 1900. There are several archaeological sites (including two recorded middens, three historic houses, a religious institution and an agricultural/pastoral site of undefined type) located within the wider area. Trents Chicory Kiln is also located in the wider area. This is a New Zealand Historic Places Trust Category II historic place (Reg. No. 1793) and listed as a heritage item in the Selwyn District Plan. However, as these sites are not located within the proposed designation boundaries (and all construction works will be taking place within the designation) these sites will not be affected by the Project. An accidental discovery protocol will be in place to provide guidance on the steps to be taken if an archaeological site is found during earthworks. As a precaution, an archaeological authority to destroy, damage or modify an archaeological site will be sought from NZ Historic Places Trust prior to earthworks.

Economic

The Project will have potentially far reaching economic benefits in terms of providing for the efficient movement of goods and people, and will help facilitate economic growth. The Project will also have local economic impacts and these are assessed as being broadly positive, recognising that there will be some individual adverse economic impacts, specifically businesses which have frontage to Main South Road that will be either bypassed by CSM2 or have their highway frontage access relocated.

It has been assessed that although there may be some adverse impact on individual businesses, the overall economic benefits to the region outweigh these individual business impacts.

Social

From a social perspective, the communities within and surrounding the Project area are experiencing population growth which is being increased as a result of the post-earthquake displacement of residents from Christchurch City. This has led to increased demand for housing in nearby towns and allotments in rural and peri-urban areas. The Project will reflect and facilitate this peri-urban growth in Templeton, Prebbleton, Lincoln and more particularly Rolleston. The growth of these peri-urban areas is promoted through the regional and local RMA planning documents.

The Project is likely to bring significant social benefits to surrounding communities, including reduced congestion, improved travel times, improved access to services, and greatly enhanced road safety along Main South Road (where it will be four laned).

The Project design sought to mitigate a number of potentially negative social effects including property access and displacement effects on individuals. Adverse social effects are likely to occur during construction and involve temporary disruption and amenity effects such as noise and vibration and dust emissions and these will be managed through the CEMP.

Social severance has been carefully considered and it was found that even in the short term (post-construction), community severance is unlikely to be a significant issue for any of the existing rural communities and town-based communities in the Project area. In addition, in the long term it is anticipated that the Project will reinforce the identity of Rolleston as a focus of urban development.

Active transport, considered an important component of social wellbeing, will be enhanced through proposed links through the Project area and the Little River Rail Trail, which has been achieved through design features. There is likely to be an increase in commuter cycling to Lincoln and there is the opportunity for territorial authorities to develop a new cycling commuter route on local roads between Rolleston and Hornby, separately from this Project.

Overall positive effects

Once operational the Project will have a number of positive effects including:

- large reductions in traffic along the bypassed sections of Main South Road (17,000 vpd and 2400 fewer trucks) and Halswell Junction Road (10,000 vpd);
- significantly improved amenity and accessibility for Templeton and Hornby through the diversion of traffic away from the existing Main South Road route;
- significant travel time improvements between Rolleston and Brougham Street of around 40% or up to 12 minutes during weekday peak periods by 2041 for all traffic (people and freight);
- improved reliability of travel times throughout the Project area and in the connecting local networks;
- significant improvements in accessibility from the city and the Port of Lyttelton to the growing south west area of Christchurch and to points further south on SH1;
- safety improvements for all road users arising from the provision of a high standard, median separated, limited access highway with a predicted 40% reduction in fatal and serious crashes;
- facilitation of growth and further urban development in Templeton, Prebbleton, Lincoln and more particularly Rolleston as promoted through regional and local RMA planning documents. The route provides relief around and directly services the development of Rolleston and its Izone industrial area;
- enhancement of active transport by providing links for cyclists and pedestrians;

- economic growth as a result of the provision of the efficient movement of goods and people;
- improvement of flood risk and downstream water quality as a result of the design of the stormwater treatment devices; and
- enhancement of terrestrial and ecological habitat through the proposed plantings.

Statutory assessment

A wide range of objectives and policies in national, regional and local policy and other planning instruments are relevant to the Project. The Project was assessed against these provisions and the RMA with the main conclusions being:

- overall, the Project is consistent with, and will give effect to the relevant objectives and policies of the statutory planning documents, including recent plan changes;
- as a nationally significant infrastructure project there will be significant positive effects from its construction and operation. The route alignment and design, in conjunction with appropriate management and mitigation measures, are considered to adequately avoid, remedy or mitigate the actual or potential adverse effects of the Project in the context of the purpose and principles of the RMA;
- the Project is consistent with the Urban Development Strategy for Greater Christchurch, will facilitate access to areas identified for urban growth South-West of Christchurch and contributes to land use and transport integration;
- the Project is a key part of the Southern Corridor RoNS programme which will provide significant safety improvements and travel time savings between Christchurch and areas to the south, and facilitate more efficient movement of freight and people into and out of Christchurch and the Port of Lyttelton. This is consistent with regional transport policy;
- the Project will promote the sustainable management of natural and physical resources. It is intended to meet the growing transportation needs of Christchurch City, Selwyn District and the Canterbury Region, and includes elements that will support walking, cycling and local connectivity. In turn, these outcomes will enhance the social, economic and cultural well-being of people and communities;
- the Project will sustain the potential of natural and physical resources to meet the reasonable foreseeable needs of future generations and satisfactorily safeguard the life-supporting capacity of air, soils, water and ecosystems;
- the Project provides for, and has appropriately responded to, the matters in sections 6, 7 and 8 of the RMA; and
- the statutory assessment concludes that the Project meets the statutory tests of the RMA.

PART A: INTRODUCTION AND BACKGROUND TO THE PROJECT

1. INTRODUCTION

Overview

The NZ Transport Agency ("the NZTA") is lodging Notices of Requirement ("NoRs") and resource consent applications to widen and upgrade Main South Road to provide for a four-lane median separated expressway from Rolleston to between Waterholes Road and Robinsons Road (Main South Road Four Laning or "MSRFL"). The Project also includes constructing, operating and maintaining a motorway from the end of the four-laning of Main South Road to the end of the Christchurch Southern Motorway Stage 1 ("CSM1") at Halswell Junction Road (Christchurch Southern Motorway Stage 2 or "CSM2").

The Project is part of the Southern Corridor of the Christchurch Motorways 'Roads of National Significance' ("RoNS"), one of three state highway 'corridors' around Christchurch which were identified as RoNS in terms of the 2009 Government Policy Statement on Land Transport Funding ("GPS") and the recent 2012 GPS.

This Assessment of Environmental Effects ("AEE") assesses the potential effects of the construction, operation and maintenance of the Project to support the NoRs and resource consent applications submitted to the Environmental Protection Authority ("EPA") under the National Consenting Process.

1.1. The requiring authority

A notice of requirement for a designation may only be lodged by a requiring authority. Under section 166 of the RMA, a requiring authority is defined as:

(a) a Minister of the Crown; or

(b) a local authority; or

(c) a network utility operator approved as a requiring authority under section 167.

The NZTA is a network utility operator approved as a requiring authority under section 167 of the Resource Management Act 1991 ("RMA"). The Gazette Notice reference approving the applicant as a requiring authority is contained in Appendix A of this AEE (Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994), which was notified in the Gazette on 3 March 1994[4].

The NZTA is a Crown entity, and its objective as set out in section 94 of the Land Transport Management Act 2003 ("LTMA") is to:

[4] Under clause 29 of Schedule 2 of the Land Transport Management Amendment Act 2008, the NZTA replaced Transit New Zealand as the requiring authority approved under this Gazette Notice.

"undertake its functions in a way that contributes to an affordable, integrated, safe, responsive and sustainable land transport system".

The NZTA's statutory functions include:

- to promote an affordable, integrated, safe, responsive, and sustainable land transport system[5]; and
- to manage the State highway system[6].

The NZTA's operating principles are set out in section 96 of the LTMA. Section 96(1) of the LTMA requires the NZTA to exhibit a sense of "social and environmental responsibility" in meeting its objectives and undertaking its functions. The NZTA also has a statutory obligation to "use its revenue in a manner that seeks value for money" under section 96(1)(b) of LTMA.

One of the NZTA's five strategic priorities, as defined in its Statement of Intent 2011 - 2014, is to plan and deliver the RoNS.

1.2. The Project

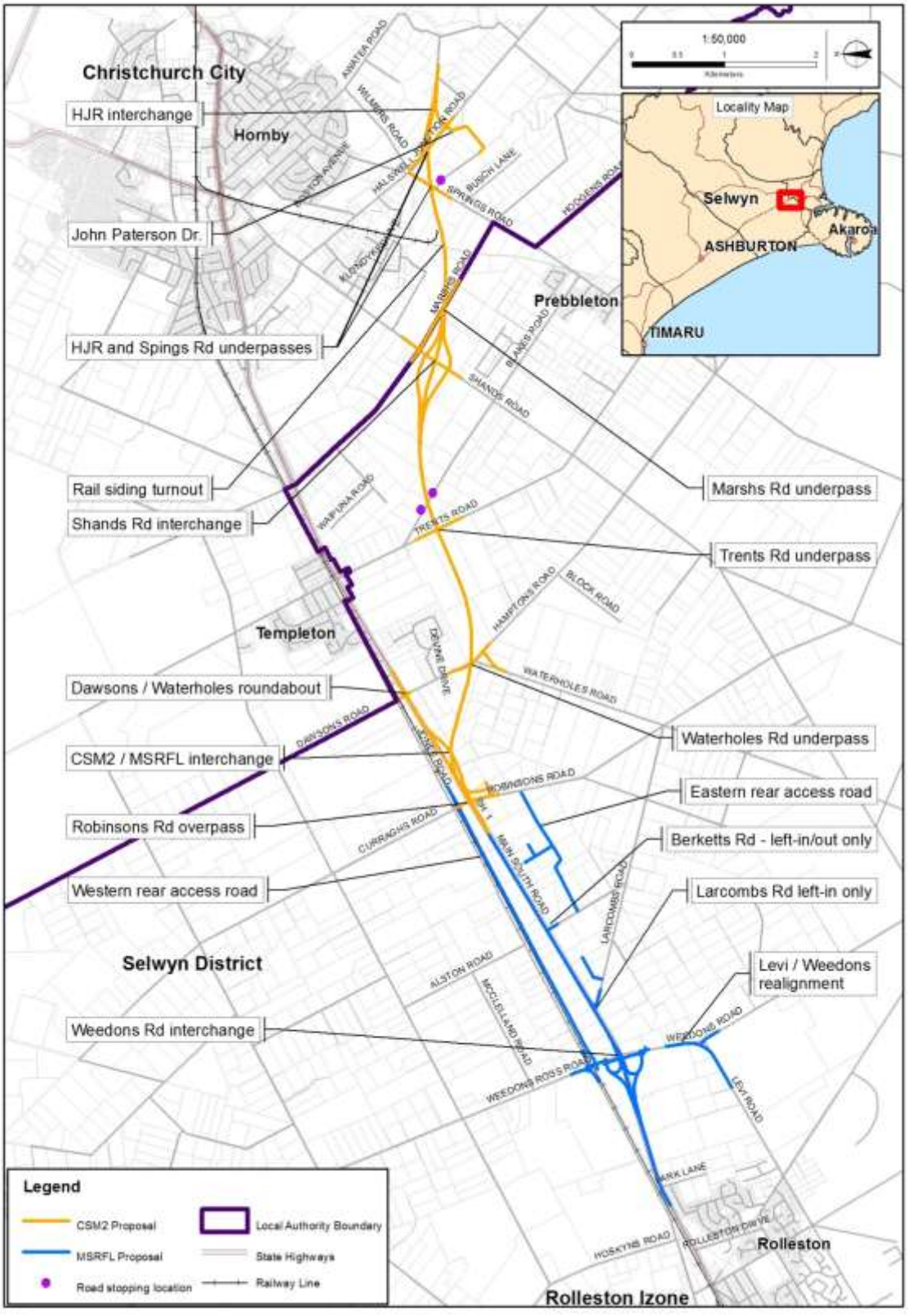
The Project involves the widening and upgrading of SH1 Main South Road between Rolleston and Robinsons Road to provide a four-lane median separated expressway (Main South Road Four Laning known as MSRFL) and the construction, operation and maintenance of the Christchurch Southern Motorway Stage 2 (known as CSM2), being a four-lane median separated motorway[7] which continues from Robinsons Road to the end of CSM1. A total of 16km of new and upgraded local road is proposed to be built also. An overview map of the Project is provided on Figure 1.

[5] Section 95 (1)(a) of the LTMA 2003

[6] Section 95 (1)(c) of the LTMA 2003

[7] CSM2 will not become a motorway until the Governor-General declares it to be a motorway upon request from the NZTA under section 71 of the Government Roading Powers Act 1989 (GRPA). However, for the purposes of this report, the term "motorway" may be used to describe the CSM2 section of the Project.

Figure 1: Proposed location map



1.2.1. MSRFL

MSRFL will be approximately 4.5km in length and will extend from Park Lane at Rolleston to the connection of CSM2 with SH1 at Robinsons Road. MSRFL will comprise four lanes separated by a median strip and barrier. An interchange at Weedons / Ross Road will provide full access on and off MSRFL, and there will be alterations of existing roads intersecting with Main South Road and the alteration of the current private property access arrangements. Rear accesses in the form of rights of way and new local roads are proposed on both the west side of SH1 (between Weedons Ross Road and Curraghs Road), and the east side to maintain property access.

1.2.2. CSM2

CSM2 will extend from SH1 Main South Road near Robinsons Road for approximately 8.4km linking with the end of CSM1 at Halswell Junction Road, comprising four lanes separated by a median strip and barrier. Access to CSM2 will be limited to two interchanges at Weedons Road and Shands Road, and a grade separated half-interchange with east facing ramps at Halswell Junction Road. Three road underpasses are proposed to ensure the connectivity of the local road network is maintained. CSM2 will largely be constructed at grade, with a number of elevated structures to allow the local road network to pass over the motorway. Several local roads will be realigned for safety and to minimise impacts on private property and access, and includes the realignment of John Paterson Drive to connect with the CSM2 westbound off-ramp and Halswell Junction Road roundabout (east of CSM2).

1.2.3. Purpose and scope of the AEE

This AEE (and the supporting information contained in the accompanying documents) has been prepared in support of the NoRs for new and altered designations and applications for resource consents which will authorise the construction, operation and maintenance of the Project under the RMA.

This AEE addresses all aspects relevant to the consideration and determination of the NoRs and resource consent applications. These matters are all being lodged with the EPA, as together, they form part of a proposal of national significance. Further information on the statutory context for the Project is provided in Chapter 6. The NoR and resource consent application forms are provided in Volume 1.

1.2.4. Integrated assessment process

The information presented in the AEE and supporting documents is the culmination of an extensive design and environmental assessment exercise undertaken since the Project commenced in 2010.

The assessment process has involved close collaboration between the Project designers, specialist assessment teams and stakeholders. The close working relationship has resulted in a high level of integration between the proposed design and the mitigation measures proposed.

Specific details about how particular potential adverse environmental effects are proposed to be managed are provided in Parts G and H of this report, but in general terms, the approach has been:

- to modify the design and proposed alignment to avoid, where practicable, potential adverse effects;
- where avoidance of adverse effects is not practicable, to develop measures to adequately remedy and/or mitigate potential adverse effects;
- where mitigation and/or remediation is required, to co-ordinate these measures as much as practicable to promote good environmental outcomes; and
- involvement of a wide range of stakeholders in the design process through a multi-stage consultation and option development process. Statutory and non-statutory stakeholders involved include:
  - Environment Canterbury;
  - Ngai Tahu;
  - Network utility providers;
  - Landowners;
  - Residents' associations;
  - Cycling and walking advocacy groups;
  - Business groups;
  - Other special interest groups;
  - The general public; and
  - Individual directly affected parties.

1.2.5. Structure of the AEE

The matters covered in this AEE include:

- a description of the existing environment, including a description of the receiving environment;
- a description of the operation and construction of the Project;
- an assessment of alternative sites, routes and methods (as necessary);
- identification of the parties affected by the Project, a description of consultation undertaken in the development of the Project and how this has influenced the design process;
- an assessment of the actual or potential effects on the environment of the construction, operation and maintenance of the Project, including a description of proposed mitigation measures;
- an assessment of the Project against relevant provisions of statutory policies and plans; and

- proposed conditions (including proposed management plans and monitoring) for the designation and resource consents.

The relevant documentation is contained within five volumes[8]:

- Volume 1: Resource Management Act Forms;
- Volume 2: Assessment of Environmental Effects;
- Volume 3: Technical Assessment Reports and Supporting Documents;
- Volume 4: Management Plans; and
- Volume 5: Plan Set.

1.3. Approvals sought

The NZTA is lodging three notices of requirement with the EPA for the designation of land required to undertake maintenance, operation, use and the improvement of a State highway and associated local roads:

1. NoR (1) to alter the existing designation for State highway 1 (Main South Road) and associated works to the local road network within the Selwyn District Plan;
2. NoR (2) for new State highway designation for CSM2 section and associated works to the local road network within the Selwyn District Plan; and
3. NoR (3) for new State highway designation for CSM2 and associated works to the local road network within the Christchurch City Plan.

The documentation provided in support of the NoRs for the designations contains all the information that would be required to be provided with an outline plan under section 176A RMA, therefore that information has been incorporated into the designations for the purposes of section 176A(2)(b) RMA. An outline plan will therefore not be required for the Project.

A series of regional resource consents are also sought for the Project, along with land use consents under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

The regional consents required for the Project under the Canterbury Natural Resources Regional Plan (NRRP) and the Proposed Land and Water Regional Plan (PLWRP) are set out in Table 1 below and discussed in detail in Section 6.5 of this AEE.

[8] In order to assist readers to familiarise themselves with the structure of the lodgement documentation and the key naming conventions used, a *'Guide to lodgement documentation'* has been prepared.

Table 1: Regional consents summary table

Regional consents summary:			
Activity	Description	NRRP Summary	PLWRP Summary
Land use consents (section 9)			
Excavation of land	Excavation over an unconfined or semi-confined aquifer where either deeper than 5m or deeper than the highest groundwater level and greater than 100m^3	Non-Complying Activity in accordance with Rule WQL36	Discretionary Activity in accordance with Rule 5.156 and Non-Complying Activity in accordance with Rule 5.159
Deposition of fill	Deposition of more than 50m^3 over an unconfined or semi-confined aquifer where land is excavated to a depth of 5m or deeper and groundwater is less than 30m below ground level	Discretionary Activity in accordance with Rule WQL37	Discretionary Activity in accordance with Rule 5.161
The use of land to store or use hazardous substances	Hazardous substance storage and use during construction	Permitted Activity in accordance with Rule WQL 38A	Restricted Discretionary Activity in accordance with Rule 5.163
Construction and use of a bore	Investigation and monitoring bores Bore / infiltration facility related to Robinsons Rd overpass and Halswell Junction Road ponds Domestic and stockwater bore relocation	Restricted Discretionary Activity to construct in accordance with Rule WQL31	Permitted Activity to construct and use in accordance with Rules 5.78 and 5.79
Earthworks within riparian margins	Earthworks within riparian margin adjacent to Upper Knights Stream	Permitted Activity in accordance with Rule BLR8	Restricted Discretionary Activity Rule in accordance with Rule 5.149

Regional consents summary:			
Activity	Description	NRRP Summary	PLWRP Summary
Land use consent (section 13)			
Land use consent for works within stream bed	Disturbance / reclamation of former stream bed	Restricted Discretionary Activity in accordance with Rule BRL5	Discretionary Activity in accordance with Rule 5.6
Water permits (section 14)			
Diversion and take of water	Diversion of water races	Restricted Discretionary Activity in accordance with Rule WQN4	Non-Complying Activity in accordance with Rule 5.100
Taking of groundwater	Taking of groundwater as required dependant on groundwater levels	Non-Complying Activity in over-allocated / no allocation limit zones in accordance with Rules WQN13 and WQN14	Discretionary Activity in accordance with Rule 5.106
Discharge permits (section 15)			
Discharge of stormwater to land during construction and operation	To discharge stormwater to land during construction and operation	Discretionary Activity in accordance with Rule WQL6	Restricted Discretionary Activity in accordance with Rule 5.71
Discharge of stormwater to water during construction and operation	To discharge stormwater from the stormwater treatment facilities to water during construction and operation	Discretionary Activity in accordance with Rule WQL48 for construction phase and Permitted Activity under Rule WQL7 once operational	Restricted Discretionary Activity in accordance with Rule 5.71 for construction and operation.
Discharge of water and contaminants to water associated with dewatering	Discharge of site dewatering to surface water during construction and operation	Discretionary Activity in accordance with Rule WQL48	Permitted Activity under Rules 5.92 and 5.77

Regional consents summary:			
Activity	Description	NRRP Summary	PLWRP Summary
Discharge of water and contaminants to land	Discharge to land at Robinsons Road, associated with operational dewatering	Permitted Activity under Rule WQL2	Discretionary Activity in accordance with Rule 5.6
Discharge of dust to air during construction	To discharge dust to air from earthworks and construction activities	Discretionary Activity in accordance with Rule AQL57	N/A

1.4. Proposal of National Significance

It is considered that this Project meets the criteria to be a proposal of national significance under section 142(3) of the RMA because:

- the Project has attracted widespread public interest since it was announced as part of the Christchurch Southern Corridor, an identified RoNS in terms of the 2009 GPS. During consultation there has been a high level of public engagement and numerous submissions have been received throughout this process (section 142(3)(a)(i));
- the Project will involve the use of natural and physical resources. It is a roading Project that will result in the use of designated land for a State highway. This will be a significant change in the use of land from its current state, which supports numerous land uses such as rural activities, private residences, businesses and industries (section 142(3)(a)(ii));
- the Project will assist the Crown in fulfilling its safety functions by providing a safer upgraded route based on the latest safety roading practices. This includes a median and barrier separating the different directions of traffic and there will be restricted or no direct access to local roads and individual properties that currently have direct access (section 142(3)(a)(viii));
- the Project will result in irreversible changes to the environment where it will involve the addition of a motorway to the largely rural environment with large structural and elevated components (section 142(3)(a)(v)); and
- the Project relates to a network utility operation (the State highway) that will extend over more than one district (Christchurch and Selwyn Districts) (section 142(3)(a)(x)).

The NZTA is lodging the NoRs and associated resource consent applications for the Project with the EPA pursuant to section 145 of the RMA, requesting that the Project be directed to and determined by a Board of Inquiry ("BoI") as a Proposal of National Significance.

The EPA will recommend a course of action to the Minister for the Environment (section 146 RMA). The Minister will make a decision pursuant to section 147, guided by the advice of the EPA

and taking into account the factors for determining whether proposals are of national significance under section 142 of the RMA.

2. STRATEGIC CONTEXT TO THE PROJECT

Overview

A Christchurch Southern Motorway ("CSM") that extends from SH1 south of Templeton to the city has been a long-established concept in transport planning for Christchurch, dating back to the 1960s. In 2002, the Christchurch Rolleston and Environs Transport Study ("CRETS") which set out a transport strategy to accommodate anticipated urban growth and associated travel demand in areas south-west of the city, included the four-laning of Main South Road ("MSRFL") with the next stage of the CSM extension from SH1 to the city ("CSM2"). The Project will complete the Christchurch Southern Motorway, a key component of the southern corridor of Christchurch state highway network.

In 2009, the Government Policy Statement on Land Transport Funding ("GPS") identified the Christchurch Motorways as one of the seven Roads of National Significance. In addition to being part of the Roads of National Significance ("RoNS") programme, the Project is a key component of a number of national, regional and local transport strategies, policies and plans. It will provide more efficient and safer access between the Port of Lyttelton, the city centre and the south of Christchurch for people and freight.

2.1. Introduction

This chapter provides the strategic background to the Project, setting out the following aspects:

- the benefits of the Project;
- the strategic context of the Project;
- the requiring authority objectives for the Project;
- the legislative and national, regional and local policy context; and
- the history of the Project.

2.2. The benefits of the Project

The Project will complete the current Christchurch Southern Motorway ("CSM") corridor identified within the Christchurch Motorways RoNS. As such the benefits of the Project are considered in the context of the CSM corridor and wider Christchurch strategic network.

The CSM forms a strategic link between State Highway 1 (from the south) to the Lyttelton Port. It will form part of the southern segment of the Christchurch Strategic network. The CSM represents lead infrastructure, when considering the earlier timing of the Project in the Christchurch Rolleston Environs Transport Study ("CRETS", see section 2.6). In addition Canterbury's growing rural economy, in conjunction with the increased importance of the Lyttelton Port to Canterbury and the effects of the recent Canterbury earthquakes mean that the CSM is a significant piece of infrastructure for the future Canterbury economy.

The Project will assist regional and national economic growth, as well as delivering a range of other benefits, including:

- improved access and connectivity between the Port of Lyttelton, the City Centre and industrial areas in the south of Christchurch and Rolleston by providing a faster and more direct route;
- improved safety performance for motorists. A high standard, median divided road with grade separated interchanges between Rolleston and CSM1 is expected to result in a 40% reduction in fatal and serious injury crashes;
- more reliable and reduced travel times. Travel time savings of up to eight minutes for the journey between Brougham Street and Rolleston are predicted from opening, increasing by up to 12 minutes by 2041;
- economic development as a result of travel time savings and improved trip time reliability;
- provision of an alternative route for through-traffic with direct access to the industrial areas in Hornby, the south of Christchurch and the Port of Lyttelton;
- improvements to network resilience through the provision of additional road capacity;
- potential for improved passenger transport in the south west of Christchurch through a reduction in traffic on existing routes;
- enhancement of active transport by providing links for cyclists and pedestrians; and
- economic growth as a result of the provision of the efficient movement of goods and people.

More specific benefits of the Project are identified in the later chapters of this report, particularly Chapter 11 relating to traffic and transportation effects and within the Assessment of Traffic and Transportation Effects (Technical Report 2 appended within Volume 3).

2.3. Strategic context of the Project

2.3.1. Land use context

Christchurch City is the economic hub of the South Island and has the second largest population in the country with an estimated 2011 residential population of 368,000[9]. The Greater Christchurch area is expected to grow from a 2006 population base of 414,000, to 501,000 in 2026 and 549,000 in 2041[10]. Over the 30 year period between 2011 and 2041, it is projected that there will be an approximate 40% increase in total households and 25% increase in employment in the Greater Christchurch area[11].

Both the neighbouring districts of Selwyn to the south and Waimakariri to the north have fast growing populations, with estimates of 41,100 and 48,600 respectively in 2011. In particular the Selwyn District was the fastest growing district in New Zealand in 2011 (up 3.9% from 2010).

[9] Statistics New Zealand subnational population estimates (as at 30 June 2011).
[10] Greater Christchurch Urban Development Strategy 2009 Demographic Update. Projection is based on Statistics New Zealand medium/high growth scenario.
[11] Projected post-earthquake household and employment data for the Greater Christchurch UDS area based on a "Rapid Recovery" scenario.

Christchurch South West continues to grow with major residential developments such as Wigram Skies, the Longhurst and Knights Stream Park (the recent subdivision near Halswell) and the Aidenfield development. Business and employment is also growing with the new industrial development adjacent to Marshs and Shands Roads (Plan Change 54 to the Christchurch City Plan) and a new town centre at Wigram Skies.

Many of these residents travel to work, study and shop in the City, increasing traffic on key arterial roads in and out of Christchurch. The Project will provide for these land use changes by enabling a higher standard and faster route for this traffic. As a result of the diversion of traffic along this route, congestion and crash rates will be lowered on the bypassed roads and intersections. Further benefits to these residents are outlined in section 2.2.

2.3.2. Transport context

The land use changes have provided the basis for the Project being identified as part of the Government's expenditure priorities to achieve its economic outcomes. It was included in the 2009 GPS as one of the Government's seven RoNS[12]. The Christchurch Motorway RoNS support urban and economic growth by easing severe congestion to the north and south of Christchurch and maintain critical access to and from Christchurch City, the Christchurch International Airport and the Port of Lyttelton.

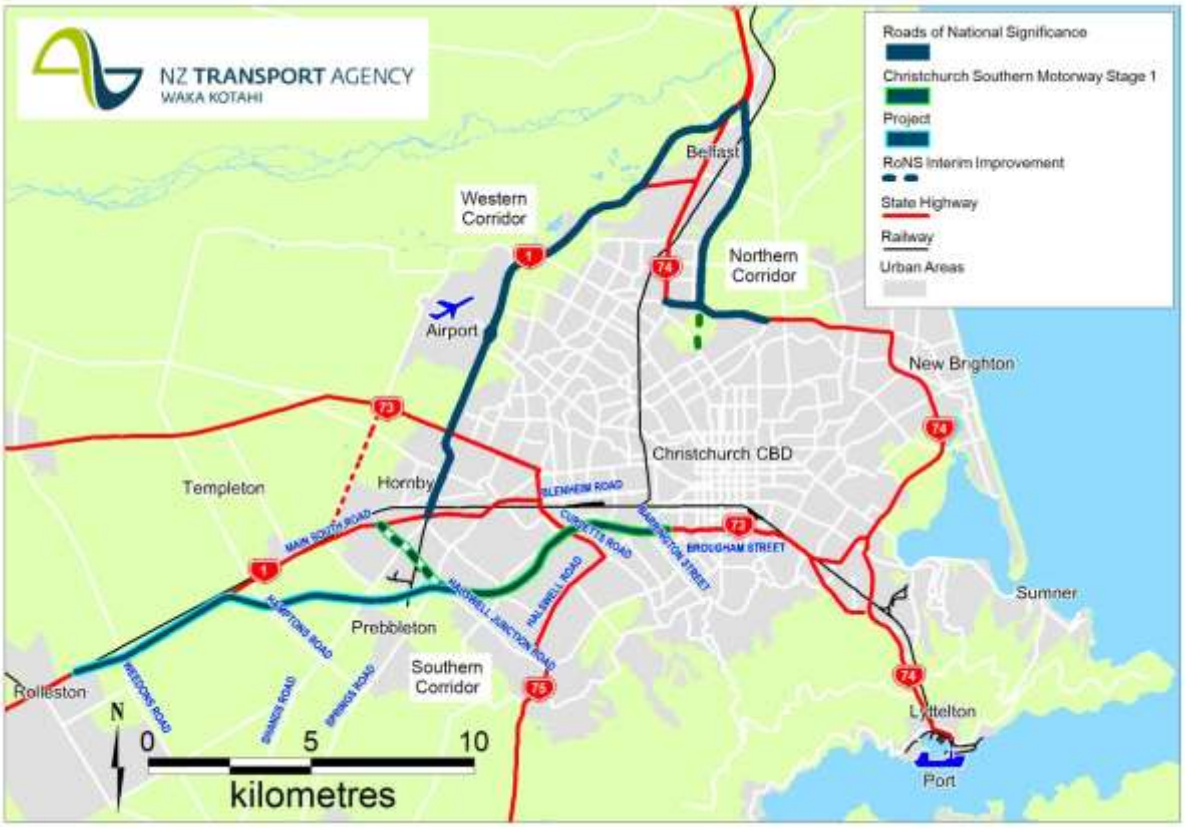
The NZTA's objectives for the Christchurch RoNS are to[13]:

- give effect to the Government Policy Statement on Land Transport Funding, in particular to deliver the Christchurch Motorways package;
- improve economic growth and productivity;
- improve travel time and reliability to the port, airport and Central Business District ("CBD");
- improve access to key activity and industrial areas (Hornby, Sockburn and Belfast);
- improve land use integration;
- improve access for public transport, walking, cycling in the Greater Christchurch Urban Development Strategy ("UDS") growth node of Belfast; and
- improve safety and social amenity in the UDS township areas, thereby giving effect to other UDS outcomes.

The Christchurch RoNS have been grouped into three corridors described as follows:

[12] The seven RoNS are Puhoi to Wellsford – SH1, completing the Western Ring Route - SH16 and SH20, Victoria Park Tunnel Auckland - SH1, the Waikato Expressway - SH1, the Tauranga Eastern Link - SH2, the Wellington Northern Corridor - SH1 and the Christchurch Motorways.
[13] New Zealand Transport Agency. Christchurch Motorways Roads of National Significance Network Plan. September 2010.

Figure 2: Christchurch motorways RoNS map



2.3.3. Northern corridor

The Christchurch Northern Corridor provides the main northern access to the Christchurch City Centre and the Port of Lyttelton via Queen Elizabeth II ("QEII") Drive (SH74). The corridor includes the proposed new Northern Arterial connecting the existing Christchurch Northern Motorway to QEII Drive near Winters Road and the four-laning of QEII Drive between Main North Road and Innes Road.

2.3.4. Western corridor

The Christchurch Western Corridor provides access to Christchurch International Airport along the existing SH1 between the Christchurch Northern Motorway and Hornby. The corridor includes the proposed Western Belfast Bypass and the four-laning of the Johns, Russley, Masham and Carmen Roads sections of SH1.

2.3.5. Southern corridor

The Christchurch Southern Corridor provides the main southern access to Lyttelton Port and the Christchurch City Centre. The corridor includes the first stage of the Southern Motorway from Barrington Street and Halswell Junction Road (CSM1), currently under construction, and this

Project involving the motorway extension from Halswell Junction Road to SH1 near Robinsons Road and four-laning the existing SH1 from Robinsons Road to just north of Rolleston.

The CSM supports and is supported by a number of national and regional strategic documents. It forms part of a wider transport and land use strategy which was originally devised in the 1960s and more recently has formed part of the transport studies and growth strategies through from 2000.

These strategy documents (described in detail later) reinforce the role of the CSM in providing an integrated package of transport network improvements to support a growing regional economy and increasing residential population. The strategies describe the CSM as providing both an important freight function as well as an indirect role in easing severe congestion for a growing residential population and employment area.

2.4. Objectives of the Project

The NZTA's requiring authority objectives for the Project are:

- to contribute to the region's critical transport infrastructure and it's land use and transport strategies[14] by providing more predictable travel times and connections between the first stage of the Christchurch Southern Motorway and Rolleston for people and freight;
- to improve accessibility from Christchurch and the Port of Lyttelton to the south and west for individuals and businesses while improving local access to work, shops and social amenity in Templeton and Hornby;
- to align traffic types and movements with the most appropriate routes by separating through traffic from local traffic to the south west of Christchurch and promoting other routes for passenger transport;
- to improve network resilience and safety by providing a route with enhanced safety standards and capacity; and
- to manage the social, cultural, land use and other environmental impacts of the Project in the Project area and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, design and conditions.

The requiring authority objectives are of key importance in the consideration of this proposal. Section 149P(4) of the RMA requires that a board of inquiry must have regard to the matters set out in Section 171(1) of the RMA. Section 171(1)(c) requires that particular regard is given to:

> *"whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought."*

[14] Land Use and Transport Strategies include the Christchurch Urban Development Strategy, the Canterbury Regional Land Transport Strategy, the Christchurch to Rolleston and Environs Transportation Study and other strategies and plans prepared by relevant statutory agencies for future land use and transport development and management within Canterbury.

The works, as part of the Project will contribute to these objectives by providing:

- improved route security and resilience of Canterbury's regional State highway network;
- improved safety performance for the movement of people and freight as compared with the existing road network access between the Port of Lyttelton, the city centre and the south of Christchurch;
- reduced travel times along many key routes and increased accessibility across many parts of the Region's road network; and
- economic development as a result of travel time savings and increased accessibility.

2.5. Legislative context

2.5.1. Land Transport Management Act 2003 ("LTMA")

The LTMA is the principal statute for New Zealand's land transport planning and funding system. The purpose of the LTMA is to contribute to the aim of achieving an affordable, integrated, safe, responsive and sustainable land transport system[15].

The LTMA provides guidance on national funding priorities through the GPS on Land Transport Funding. Transport projects seeking funding from the National Land Transport Fund must be included in the National Land Transport Programme. The Programme must give effect to the GPS, thereby implementing the Government's funding priorities.

2.5.2. National policy context

At a national level the Project fits within a number of strategic initiatives including:

- the Government Policy Statement on Land Transport Funding 2012-22;
- Connecting New Zealand 2011; and
- the National Infrastructure Plan 2011 ("NIP").

Government Policy Statement on Land Transport Funding 2012

The most recent GPS came into effect on 1 July 2012. This document translates the long-term targets of Connecting New Zealand (discussed below) into specific short to medium-term impacts. This reflects the current Government's priorities for land transport expenditure for the three year period to 2014/15. It also provides indicative expenditure targets for 2015/16 – 2021/22. The NZTA is required to give effect to the GPS when evaluating projects and preparing the National Land Transport Programme.

The Government has three priorities for the direction of transport policy. These are[16]:

- economic growth and productivity;

[15] Section 3 of the LTMA

[16] Government Policy Statement on Land Transport Funding 2012-13 – 2021/22, para 15

- value for money; and
- road safety.

The short to medium term impacts that are expected to be achieved through the allocation of the National Land Transport Fund are:

- improvements in the provision of infrastructure and services that enhance transport efficiency and lower the cost of transportation through:
- improvements in journey time reliability;
- easing of severe congestion;
- more efficient freight supply chains;
- better use of existing transport capacity;
- better access to markets, employment and areas that contribute to economic growth;
- reductions in deaths and serious injuries as a result of road crashes;
- more transport choices, particularly for those with limited access to a car;
- a secure and resilient transport network;
- reductions in adverse environmental effects from land transport; and
- contributions to positive health outcomes.

The Roads of National Significance

Initially identified in the 2009 GPS, and now through the 2012 – 22 GPS, the Government has identified seven Roads of National Significance as a key component to achieve its objective of achieving economic growth and productivity. These are identified around New Zealand's five largest population centres and include the Christchurch Motorways.

The GPS states that "continuing to progress the seven RoNS is a critical part of the economic growth and productivity priority and a significant part of the government's National Infrastructure Plan. The RoNS programme will be on going and an important part of the National Land Transport Programme"[17]. Therefore the Project is an integral component in executing the priorities of the GPS.

Connecting New Zealand

Connecting New Zealand is the primary long-term government transport strategy. It was issued by the current Government in 2011 as a summary of the Government's intentions for the entire transport sector.

Connecting New Zealand is a non-statutory document but establishes the context for developing the GPS on land transport funding. Connecting New Zealand sets out the direction for the transport sector for the 10 year period to 2021. It is based around the Governments three key

[17] Government Policy Statement on Land Transport Funding 2012/13 – 2021/22, paras 25 and 27

themes of economic growth and productivity, value for money and road safety. It confirms as a key action, the completion of the current RoNS programme.

The key actions for land transport are:

- investing $36 billion in land transport over the next decade, including $19.5 billion in State highways and $12.5 billion in subsidies for regional and local roads, and public transport;
- completing the first set of RoNS;
- growing public transport patronage with less reliance on subsidies;
- driving greater performance and value for money from the NZTA; and
- continued reduction in emissions in carbon dioxide from land transport over time[18].

National Infrastructure Plan 2011

The second version of the NIP was released by the Government in July 2011. The NIP outlines a framework for infrastructure development in New Zealand over a 20 year timeframe and sets out a vision where:

> *"By 2030, New Zealand's infrastructure is resilient, coordinated and contributes to economic growth and increased quality of life."* [19]

The NIP sets out the current situation, key issues, strategic opportunities and a vision in each of New Zealand's major infrastructure sectors. This includes transport, telecommunications, energy, water and social infrastructure. For transport, the vision is for:

> *"A transport sector that supports economic growth by achieving efficient and safe movement of freight and people."*[20]

The RoNS are an investment priority in the transport sector to help support New Zealand's economic growth. The NIP signals that these will be the major roading investments for the next ten years[21].

The RoNS require significant development to reduce congestion, improve safety and support economic growth[22].

2.5.3. Regional and local context

The Project is proposed within the context of a number of regional and local strategic planning documents, including:

[18] Connecting New Zealand, Ministry of Transport, 2011, p.20
[19] National Infrastructure Plan 2011, p.11.
[20] National Infrastructure Plan 2011, p.26.
[21] National Infrastructure Plan 2011, p.28.
[22] Government Policy Statement on Land Transport Funding 2009/10 – 2018/19.

- Canterbury Regional Policy Statement 1998 ("RPS") and Proposed RPS 2011;
- the Canterbury Regional Land Transport Strategy 2012 – 2042 ("RLTS");
- Greater Christchurch Urban Development Strategy and Action Plan 2007 ("UDS");
- Draft Christchurch Transport Plan 2012-2042 ("DCTP"); and
- South-West Christchurch Area Plan 2009 ("SWAP").

Canterbury Regional Policy Statement 1998

The RPS was adopted by the Canterbury Regional Council in 1998. It provides an overview of the resource management issues in the Canterbury Region and sets out how natural and physical resources are to be managed to meet the requirements of the RMA. The transport objectives set out in the RPS are to:

- enable a safe, efficient and cost-effective transport system to meet regional, inter-regional and national needs for transport; and
- avoid, remedy or mitigate the adverse effects of transport use and provision.[23]

In July 2007, the Canterbury Regional Council notified Proposed Change 1 (PC1) to the RPS (with variations 1-4 notified in August 2008). Once operative, PC1 was to become Chapter 12A to the RPS.

PC1 provided direction for future growth within Greater Christchurch by setting out land use distribution. A key principle of PC1, drawing on the UDS, is improved integration between land use and infrastructure to provide a more efficient use of infrastructure and to encourage sustainable communities. From a transport perspective this means a land use that supports a range of transport options. For example PC1 has identified areas available for urban development, including specifying residential densities and provision for businesses. Although PC1 promoted intensification of land use within existing urban areas it also identified appropriate areas for greenfield developments to accommodate projected growth and population relocation. The Commissioners' decision on PC1 was issued in December 2009, but was subject to a number of appeals to the Environment Court.

The RPS was amended by the Minister for Earthquake Recovery under the Canterbury Earthquake Recovery Act 2011 to include Chapter 12A (Development of Greater Christchurch). This was based on (PC1) to the RPS but was updated as a result of the Canterbury earthquakes. The effect of the Minister's decision was to terminate the appeals on PC1. However the Minister's decision to include Chapter 12A and revoke PC1 was successfully challenged through judicial review proceedings in the High Court. As a result, Chapter 12A has been set aside, the Environment Court appeals on PC1 reinstated and the previous (Commissioners' decision) version of PC1 is now relevant for the purposes of this Project. The High Court decision has been appealed.

[23] Canterbury Regional Policy Statement, 1998, p.230.

Further assessment of the Project in relation to the detailed objectives and policies of the RPS is provided in Chapter 28 of this AEE. Relevant provisions from this statutory document are listed in Technical Report 20, the Statutory Provisions Report appended in Volume 3.

Proposed Canterbury Regional Policy Statement 2011

A full review of the 1998 RPS commenced in 2006 in accordance with the RMA requirements. The Proposed RPS was notified in June 2011 and submissions closed in August 2011. The hearings for the Proposed RPS were held between January and March 2012, with the decision notified on 20 July 2012. Appeals to the High Court on points of law have been lodged and the Proposed RPS will not be made operative until the appeal process has been resolved.

The transport network objective 5.2.3 set out in the Proposed RPS is for:

> *"a safe, efficient and effective transport system to meet local, regional, inter-regional and national needs for transport, which:*
>
> *(1) supports a consolidated and sustainable urban form;*
>
> *(2) avoids, remedies or mitigates the adverse effects of transport use and its provision;*
>
> *(3) provides an acceptable level of accessibility; and*
>
> *(4) is consistent with the regional roading hierarchy identified in the Regional Land Transport Strategy."*[24]

PC1 to the Operative RPS will be incorporated into the Proposed RPS at the time PC1 becomes operative.

Further assessment of the Project in relation to the detailed objectives and policies of the Proposed RPS is provided in Chapter 28 of this AEE and relevant provisions are listed in Technical Report 20, the Statutory Provisions Report appended in Volume 3.

Canterbury Regional Land Transport Strategy 2012 – 2042

The Canterbury RLTS was released in February 2012 by the Canterbury Regional Transport Committee on behalf of Environment Canterbury ("ECan"). It is prepared under the LTMA and sets the strategic direction for land transport within the region over the 30 year period to 2042.

The vision of the RLTS is that: "Canterbury has an accessible, affordable, integrated, safe, resilient and sustainable transport system"[25].

This vision is supported by objectives to:

- ensure a resilient, environmentally sustainable and integrated transport system;
- increase transport safety for all users;

[24] Proposed Canterbury Regional Policy Statement, 2011.
[25] Canterbury Regional Land Transport Strategy 2012 – 2042, 2012, p.2.

- protect and promote public health;
- assist economic development; and
- improve levels of accessibility for all.

The RLTS outlines a strategic direction based on staged development and investment. This plan transitions from high levels of short-term investment in strategic road improvements around Christchurch, to longer-term investment in the provision of a multi-modal transport system[26]. This translates into a short term strategy to complete planned strategic infrastructure improvements. This includes an initial expenditure focus on the Christchurch motorway RoNS. This will deliver key outcomes such as improved journey time reliability on the strategic transport network and key freight routes.

Greater Christchurch Urban Development Strategy – 2007

From a land use planning perspective, the most relevant strategic document is the UDS formulated by project partners, (Christchurch City Council, Selwyn District Council, Waimakariri District Council, Environment Canterbury and the NZTA), and was published in 2007[27]. The UDS provides the primary strategic direction and an integrated planning framework for addressing future land use change, development and population growth in the wider Christchurch area out to the 2041 planning horizon. Specifically, it seeks to integrate future land use planning with transport networks.

The City centre, port and airport are noted as the main economic hubs for the region with a need to provide good transport access to these destinations. Several other key commercial and business activity centres are also identified such as Belfast and Hornby on the City edges, which provide some of the focal points for employment and the transport network. The main district towns are identified as Rangiora and Kaiapoi in the north, and Rolleston and Lincoln in the south, all of which require improved strategic road connections into Christchurch City.

Transport is one of the key aspects underpinning the UDS, highlighting the importance of integrating land use development with the transport system. The UDS also recognises that increasing traffic volumes could have a number of adverse consequences for Greater Christchurch if the transport network is not managed and developed accordingly.

Traffic volumes are expected to increase by 40% - 50% by 2021 and most of this additional traffic will be on arterial roads. The UDS responds to this by recognising transport as a key component of an integrated approach to land use development so residential and employment growth is accommodated. For the strategic road network it states:

> *"Securing the main north, west and southern corridors to ensure accessibility to the Port of Lyttelton and International Airport are top priorities".*

[26] Canterbury Regional Land Transport Strategy 2012 – 2042, 2012, p.6.
[27] http://www.greaterchristchurch.org.nz/

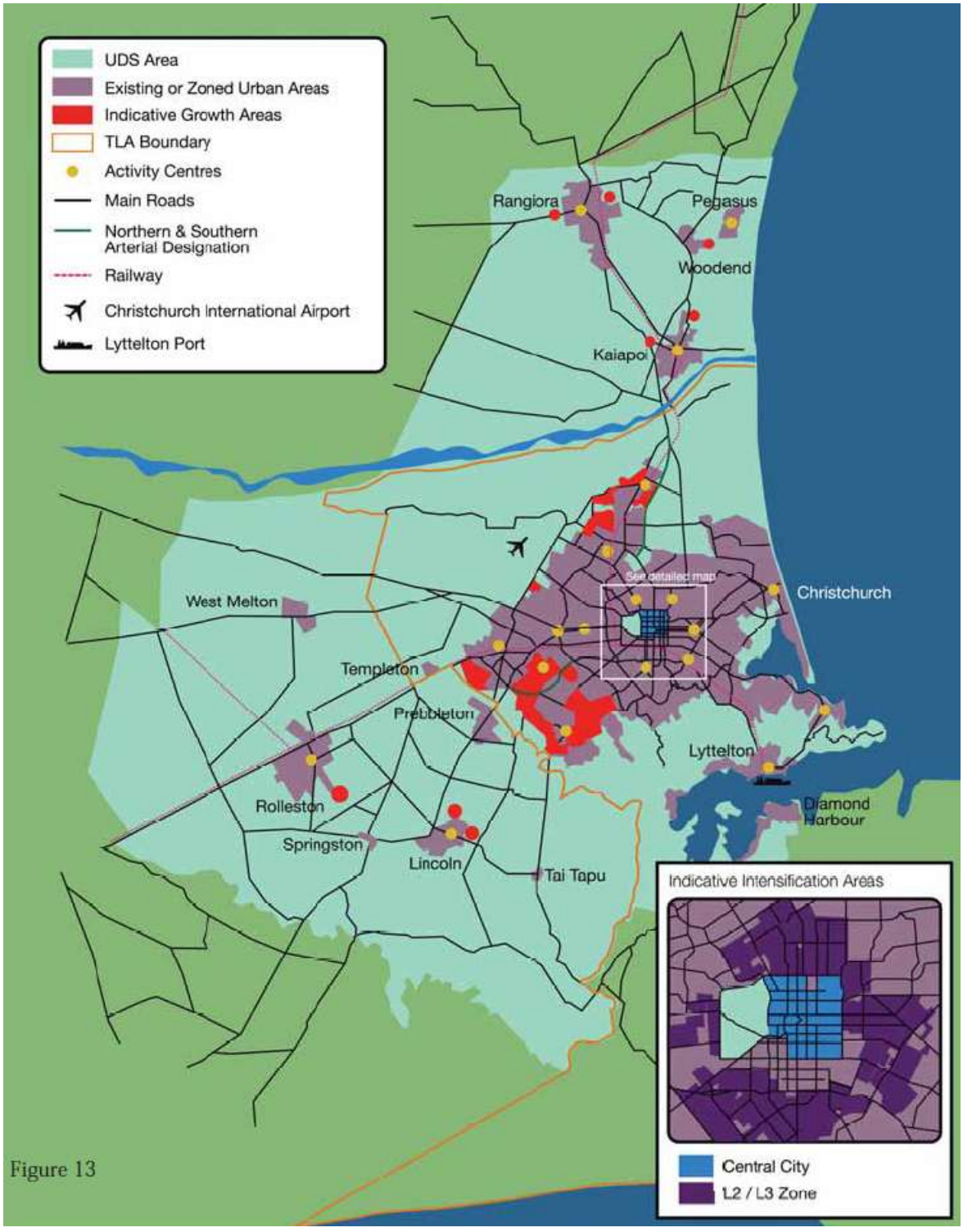
The Christchurch Motorway RoNS are therefore a fundamental component of the UDS strategic transport network. Specifically in relation to this Project, the UDS supports strategic road improvements through Selwyn District into Christchurch City to help accommodate the projected 11,900 new households around the main towns of Rolleston and Lincoln and to a lesser degree West Melton and Prebbleton, along with the Izone Southern Business hub at Rolleston.

In relation to the UDS and more specifically along the Southern Corridor, the RoNS projects are assessed as supporting:

- Residential and business growth in the Christchurch City South West and Selwyn District areas;
- Improved access and connectivity to key locations including the main economic hubs in the City centre and port, as well as district activity centres at Rolleston and Hornby;
- Improved safety and amenity, with the proposed motorway attracting a significant volume of traffic away from the existing State Highway 1 corridor through Templeton and Hornby;
- Future public transport improvements between Rolleston and Hornby. Although public transport initiatives are not part of the Project, the existing State Highway 1 corridor is likely to be used for an improved service which will benefit from the proposed upgrading between Rolleston and the CSM2 connection, and significant reduction in traffic volumes between Templeton and Hornby; and
- Further development of the cycle network through integrating a shared use off road path on CSM1 and CSM2 to link with the Little River Rail Trail.

The indicative UDS settlement pattern is shown in Figure 3 and further analysis is provided in Chapter 28.

Figure 3: Indicative UDS settlement pattern



Selwyn District Plan

The Project will improve the performance of the road network and will support the following transport objectives and policies of the Selwyn District Plan:

- Objective B2.1.2 - Adverse effects on the environment from constructing and maintaining roads and rail links are mitigated.
- Objective B2.1.1- The safe and efficient operation of roads, railway lines and airfields is not compromised by effects of new land uses.
- Policy B2.1.8 - Discourage new property access directly on to Strategic Roads unless there is no alternative legal access available; or effects on the safe and efficient flow of traffic along the road will be minor.
- Policy B2.1.3 - Manage roads classified as Strategic Roads in Appendix 9 [including MSR], primarily to ensure the safe and efficient flow of through traffic en route to its destination.

Further assessment of the Project in relation to the objectives and policies of the Selwyn District Plan is provided in Chapter 28 of this AEE and relevant provisions are listed in Technical Report 20, the Statutory Provisions Report in Volume 3.

Christchurch City Plan

The Project will improve the performance of the road network and will support the objectives and policies of the Christchurch City Plan listed as follows:

- Objective 7.2 - An efficient and effective road network that allows the City to function and develop with minimal conflict between land uses, traffic and people.
- Policy 7.2.1 - To continue to plan, build, maintain, and manage the operation of the roads in Christchurch as a hierarchical network comprised of roads of different classifications, and to recognise the different functions and roles of roads and their environmental impacts within those classifications.
- Policy 7.2.3 - To plan legal and paved road widths to reflect the differing functions of various elements of the road hierarchy.
- Policy 7.2.4 - To take account of social and environmental impacts as well as economic benefits when planning changes to the road network.
- Policy 7.2.6 - To encourage public participation in the planning of transport and roading improvements to avoid, remedy or mitigate adverse effects and make use of local knowledge.
- Objective 7.7 - The maintenance and improvement of transport safety throughout the City.
- Policy 7.7.1 - To continue a substantial programme of traffic improvements, principally for safety reasons.

Further assessment of the Project in relation to the objectives and policies of the Christchurch City Plan is provided in Chapter 28 of this AEE and relevant provisions are listed in Technical Report 20, the Statutory Provisions Report in Volume 3.

Draft Christchurch Transport Plan 2012 – 2042

The DCTP was released by the CCC in July 2012 for public consultation. It details the transport actions for Christchurch City over the next 30 years. The DCTP seeks improvements to the strategic road and freight network and confirms that new infrastructure is essential, particularly the upgrading road infrastructure, including some long-awaited improvements to key strategic routes. The DCTP notes that these road improvements are reflected in the NZTA's RoNS programme.

Christchurch Rolleston and Environs Transportation Study – 2007 (CRETS)

CRETS was commissioned in 2002. This study identified possible CSM2 routes and the need for four-laning Main South Road to Rolleston as part of an integrated transport strategy for southwest Christchurch. The final transport strategy published in 2007 was designed to accommodate a number of future urban growth scenarios in the southwest area to around the year 2021, and the connectivity into Christchurch City. The development of the UDS was being carried out in parallel with this study, which ensured that there was a high degree of integration between transport and land use planning in this part of Greater Christchurch.

In the Terms of Reference for CRETS, the objective was[28] :

> *"The study of transportation requirements in the Christchurch to Rolleston broad area is seen as a key component in the planning for the development of the roading network to the west and south of Christchurch for the ensuing 25 year period.*
>
> *The key output of the study is the identification, justification and reporting of a strategy that details the most appropriate stages for the progression of improvement projects that will achieve an ideal roading network to satisfy projected demands."*

CSM2 was included in the Christchurch Southern Access Corridor package of work as a medium term improvement. The project was described as a four lane extension of the Christchurch Southern Motorway south west from the Halswell Junction Road/ Springs Road intersection to connect to State Highway 1 about 2 km south of Templeton. A major interchange was identified at the Shands Road/ Marshs Road intersection with no motorway access provided at the Halswell Junction Road/ Springs Road intersection.

Analysis through CRETS identified the four-laning of Main South Road as part of the Hornby to Burnham package of improvements. It recommended the project be in place in the medium term (by 2021) when CSM2 is complete with construction of an interchange at Weedons Ross Road/ Weedons Road being an integral item of work associated with MSRFL. The Weedons interchange was anticipated to function as the main access point into Rolleston (via Levi and Lowes Road) and the industrial area (via Jones Road) with the existing Weedons Road and Weedons Ross Road becoming a district arterial between the Selwyn towns of West Melton and Lincoln.

[28] Christchurch, Rolleston and Environs Transportation Study. Transport Strategy Final Report. September 2007, Executive Summary, p.1.

Implementation of the Weedons interchange was related to the eventual replacement of the current traffic lights on State Highway 1 at Hoskyns Road and Rolleston Drive with a new bridge over State Highway 1 connecting Rolleston Township and the industrial area.

South-West Christchurch Area Plan – 2009

The south-west area of Christchurch City is identified in the UDS as a major urban growth area, with 12,000 new households and approximately 200 ha of industrial expansion forecast by 2041. In response, the South-West Christchurch Area Plan ("SWAP") was developed to provide a planning framework to help guide and manage future development. The SWAP integrates land use development with major infrastructure improvements, including proposed long-term roading improvements. The extension of the Southern Motorway to the Christchurch City Council territorial boundary at Marshs Road is indicated within the SWAP planning maps.

2.6. Strategic consideration of the Canterbury earthquakes

The southern corridor passes through the southwest activity corridor of the Greater Christchurch Urban Development Strategy (UDS). Associated population growth and future land use development in this area will continue to put pressure on the strategic road network. Post-earthquake, there is potential that both population and commercial growth in this area will increase at a faster rate than previously predicted. If it does occur, this growth will result in the operation of the strategic road network degrading at an earlier date than predicted.

Traffic flows in the wider Christchurch area have altered significantly following the February 2011 earthquake. It should be noted that growth forecasts used in assessing traffic demand in this AEE and supporting documents do not take account of any changes brought about by the Canterbury earthquake of 22 February 2011. At the time the traffic modelling was undertaken (prior to 22 February 2011) there was insufficient information to assess the likely long-term effects on population and employment. The NZTA is actively pursuing a programme to update these forecasts, although the initial outcomes suggest that for the area most affected by this Project, the original pre-earthquake forecasts are likely to remain realistic.

The NZTA is undertaking a programme of works to understand how the earthquakes have affected where people live, the changes in employment locations and how they travel. The initial outcome from this work is that the pattern of growth forecast from before the earthquakes is likely to continue, although in the short term, population and employment numbers are likely to lag behind those forecasts. Further, with the on-going rebuild in the Christchurch City centre and the continued emphasis on development to the southwest of Christchurch, medium to long term travel patterns are expected to be as per estimates from before the earthquakes within the area of influence of this project. However, by 2026 the total regional population is expected to be the same as predicted before the earthquakes. In the south-western area (such as Rolleston, Prebbleton and Halswell) by 2026 the population is forecast to be higher than predicted by the pre-earthquake forecasts used for the assessment of this Project, although by 2041 there is virtually no difference in the forecasts for this area.

2.7. Development of the Project

The concept for the CSM can be dated back to the early 1960s through the work of the Christchurch Regional Planning Authority. The Christchurch Master Transportation Plan, released in 1962,[29] described the Southern Motorway as a major proposal that extended from Waltham Road, through to Halswell Junction Road near the intersection of Springs Road, and rejoining SH1 south of Dawsons Road near Templeton.

The Christchurch Regional Planning Authority commenced a transport study for the region in 1969[30]. This transport study noted that both the Southern and Northern Motorways can be extended outwards to meet the long term needs of external growth and inward to distribute traffic to the city centre and beyond. Based on the 1962 Transportation Plan, this study described a staged sequence of major road improvements. Specific to the Southern Motorway, the proposed staged programme of works included:

- period II (by 1980): Curletts Road to Brougham Street, described as the Sunnyside Section;
- period III (by 1990): Extension from Curletts Road, described as the Wigram / Springs Section (possibly to Shands Road); and
- period IV (late 1990s): Further southern extension, described as the Hamptons Section to Rolleston.

During the 1970s, staged development of the motorway commenced. The first stage involved the State Highway 75 ("SH75") Curletts Road link between Halswell Road and Yaldhurst. This section was opened in 1979. The second stage opened in 1981 and involved the section from Curletts Road to Brougham Street. This was originally to be a four lane motorway all the way through to Main South Road, west of Halswell Junction Road. However, this was reduced in scope immediately prior to construction due to funding constraints. Consultation material from the Ministry of Works during the construction period describes an ultimate extension to the Weedons / Templeton area.

In the early 1980s, the remaining unbuilt length of the motorway route was redesignated. The route generally followed the alignment developed in the original 1960s plan, but with a significantly reduced designation width. Notably for the Project, the termination point of the CSM2 section with SH1 was also modified from its location near Rolleston to a point just south of Templeton. Further modifications in 1994 saw the CSM2 designation uplifted and the termination point shifted to the western end of Halswell Junction Road. This is the current form of the CSM presently under construction.

The next studies to specifically address the development of the CSM did not occur until the 1990s. These focused on what is now recognised as Stage 1 of the CSM (CSM1). These led to the "Investigation and Reporting" phase for CSM1 and the production of a "Scheme Assessment

[29] Christchurch Regional Planning Authority. Christchurch Master Transportation Plan. 1962.
[30] Christchurch Regional Planning Authority. Second Transport Study. Report No 210. 1975

Report" in 2002. The NZTA's decision confirming the Notice of Requirement for CSM1 was made on 20 March 2009. Construction of the duplication and extension commenced in 2010. Work for CSM1 is programmed for completion in 2013.

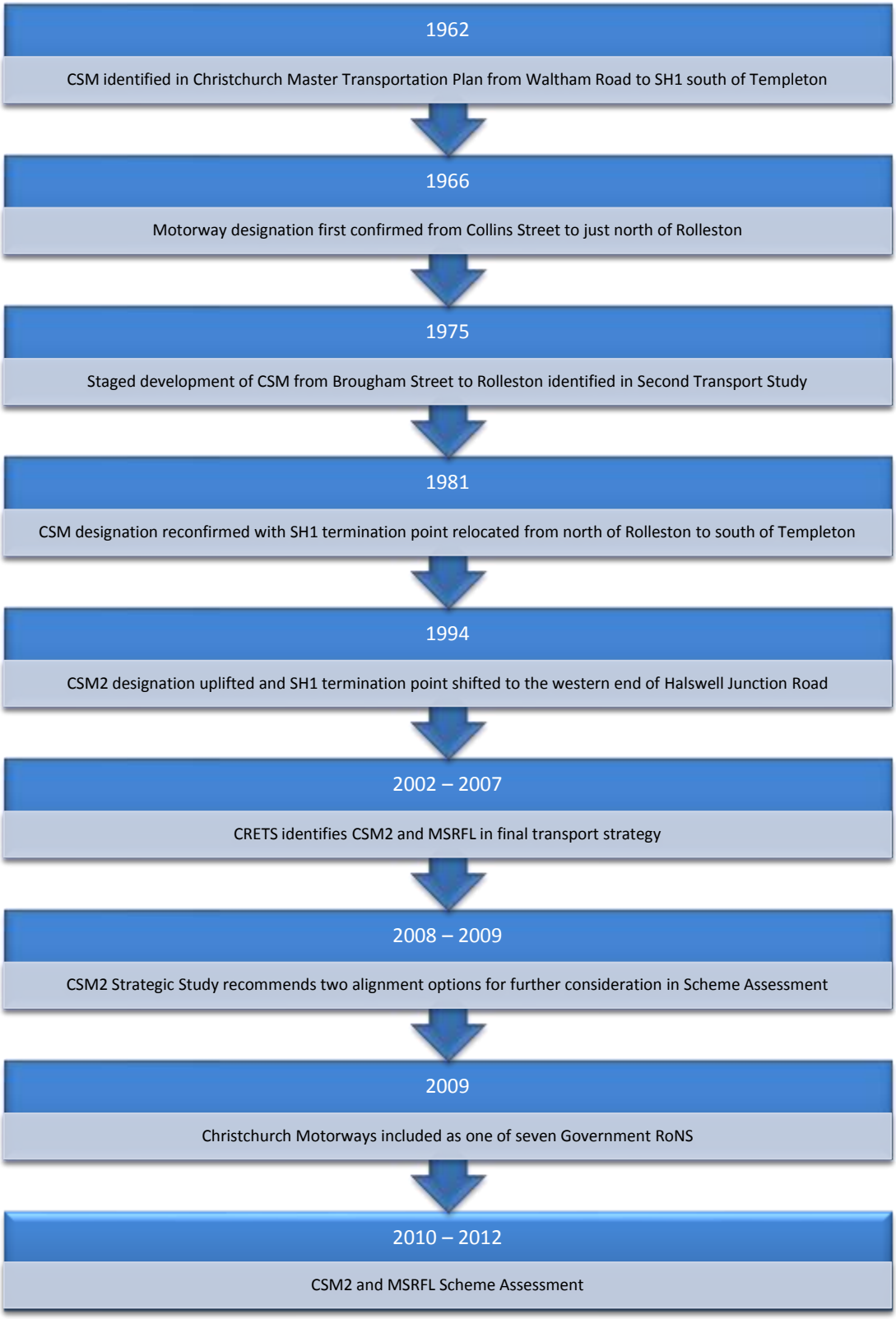
No significant studies investigating the CSM extension beyond the current proposal to Halswell Junction Road were completed until the CRETS was commissioned in 2002 and completed in 2007. This study identified possible CSM2 routes and the need to four-lane Main South Road to Rolleston as part of an integrated transport strategy for southwest Christchurch. The objectives, options analysis and key findings of CRETS that are of relevance to this Project are discussed more fully in section 7.4.1 of this AEE.

Following publication of the final CRETS strategy in 2007, the Christchurch Southern Motorway Extension Stage 2 – Strategic Study was completed in 2009. Four alignment options were developed for CSM2, with two options being recommended to form the option alignment corridor in the scheme assessment phase. The CSM2 Strategic Study is discussed further in section 7.4.2 of this AEE.

In March 2009 the Government announced the seven RoNS, which included this Project, as part of the Southern Access package of the Christchurch Motorways work. The scheme assessment phase confirmed the alignment for the Project between 2010 and 2012.

The key aspects in the development history of the Project are shown in Figure 4.

Figure 4: Key aspects in the development of the Project



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.

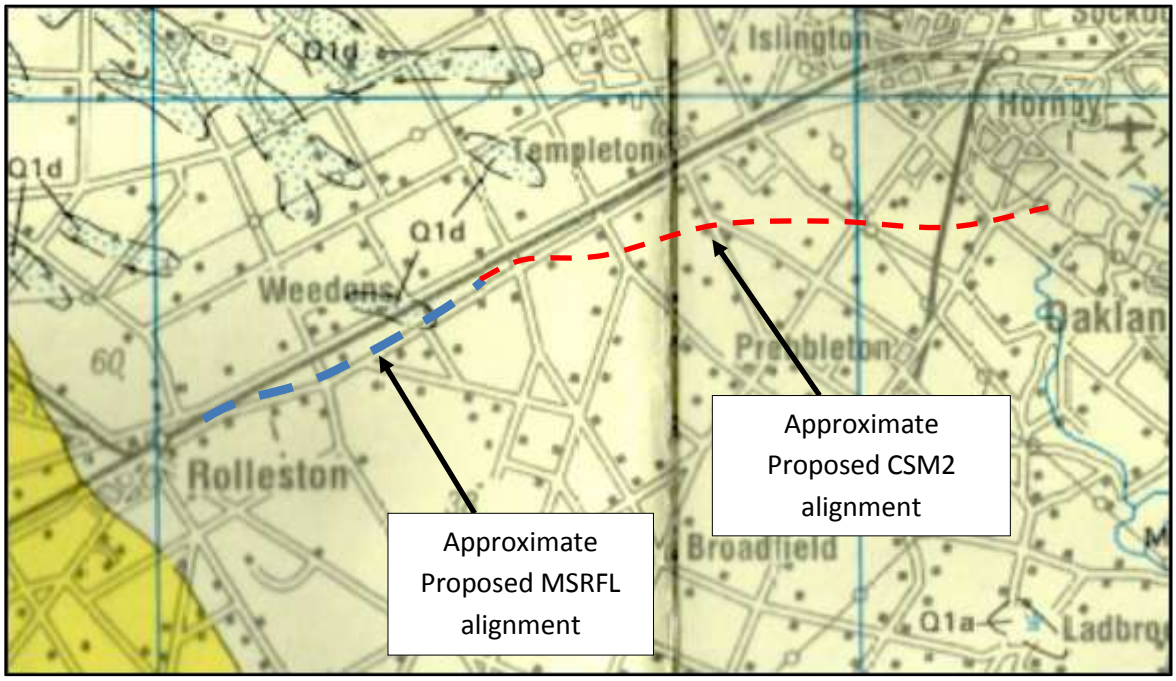
The industrial area of southern Hornby is located to the north of this section of the CSM2 alignment; from Marshs Road and through to where CSM2 joins with CSM1. The proximity of this industrial area gives this section a different character. Though the land use is still predominantly rural, the presence 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.

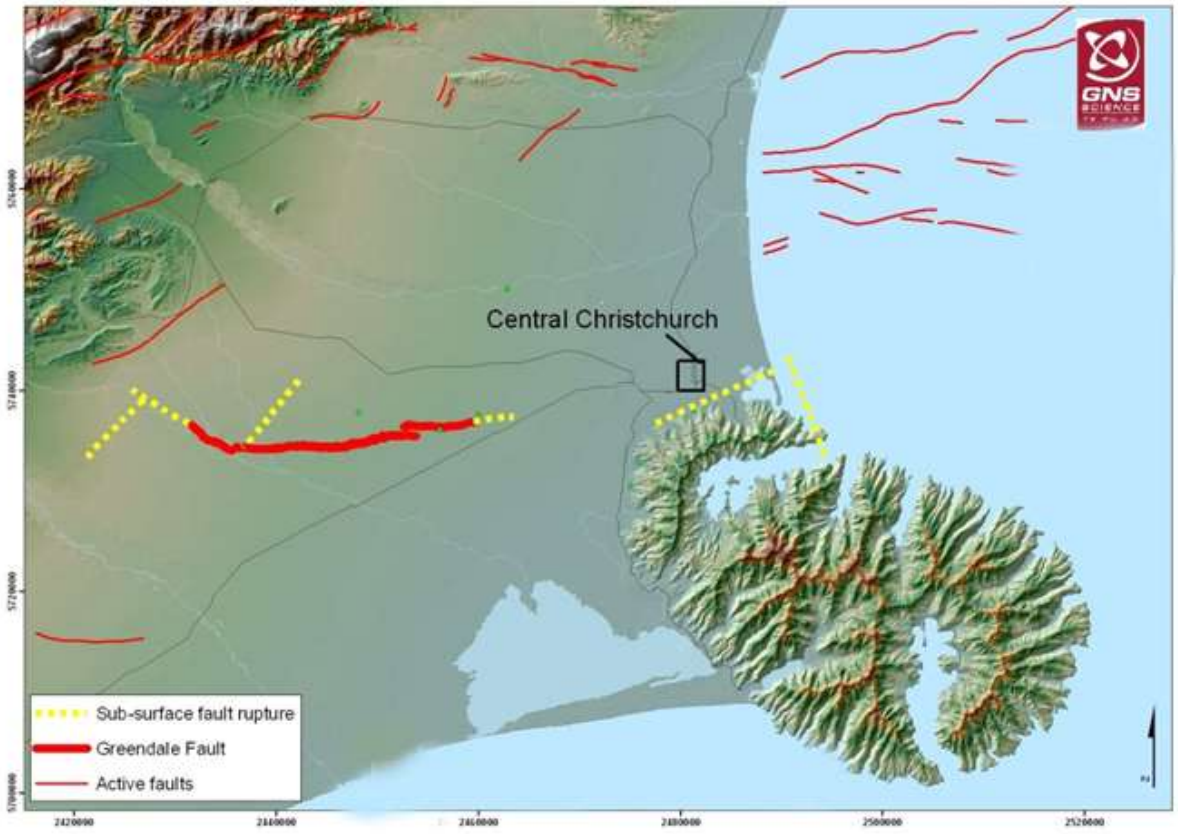
Table 2: Known active faults in the north South Island

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.

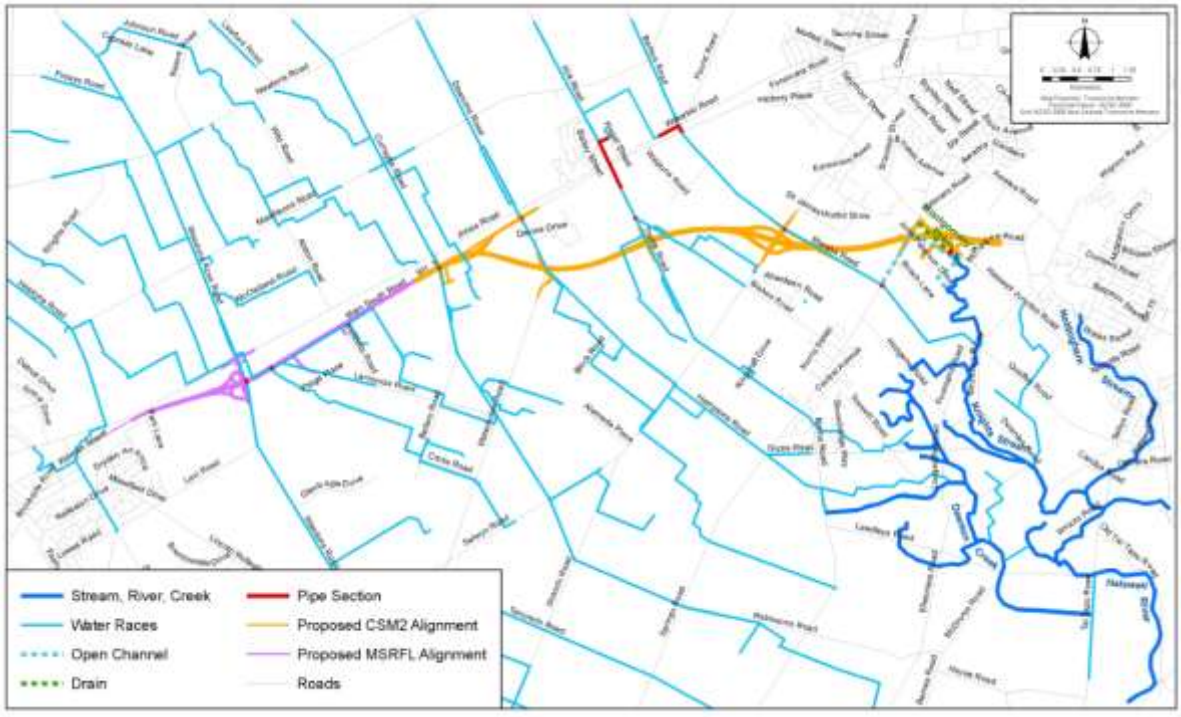
3.4. Climate

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

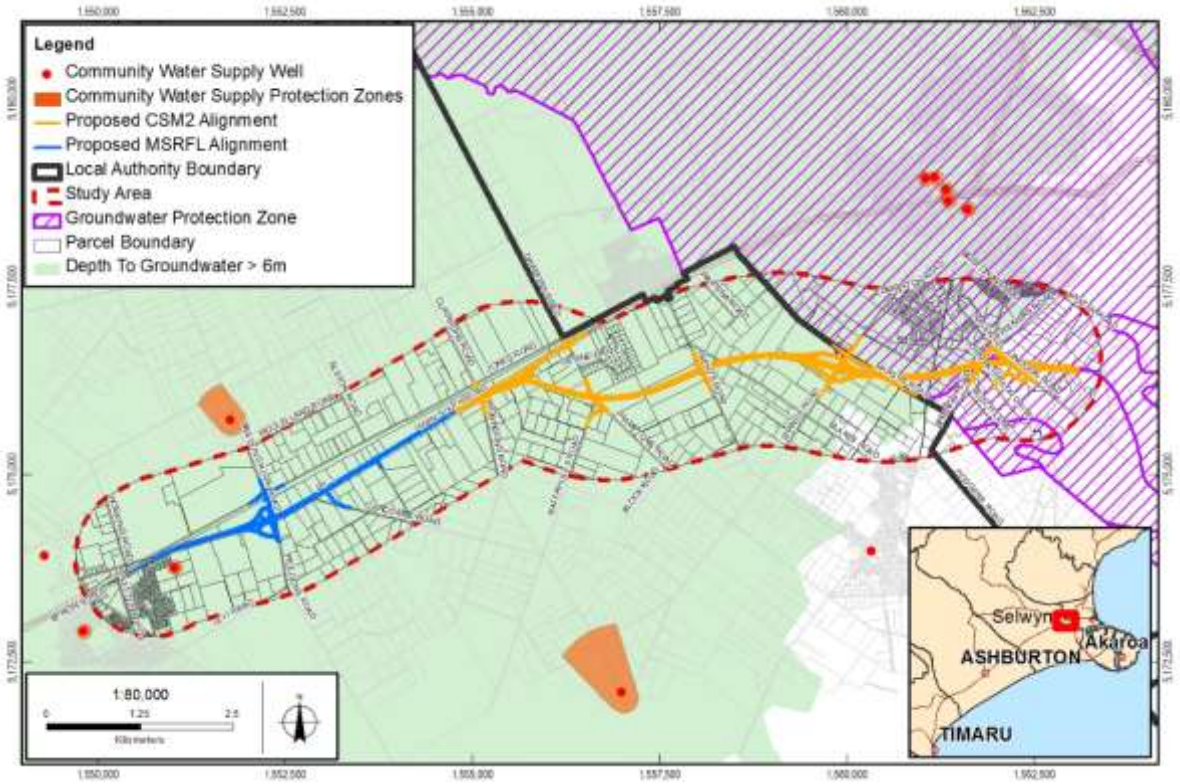
The groundwater of the Quaternary alluvial gravels of the Canterbury Plains typically extend within shallow (<20 m depth) unconfined aquifers with hydraulic connection with any nearby surface water courses. Groundwater yields tend to vary laterally over short distances indicating that more permeable 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;

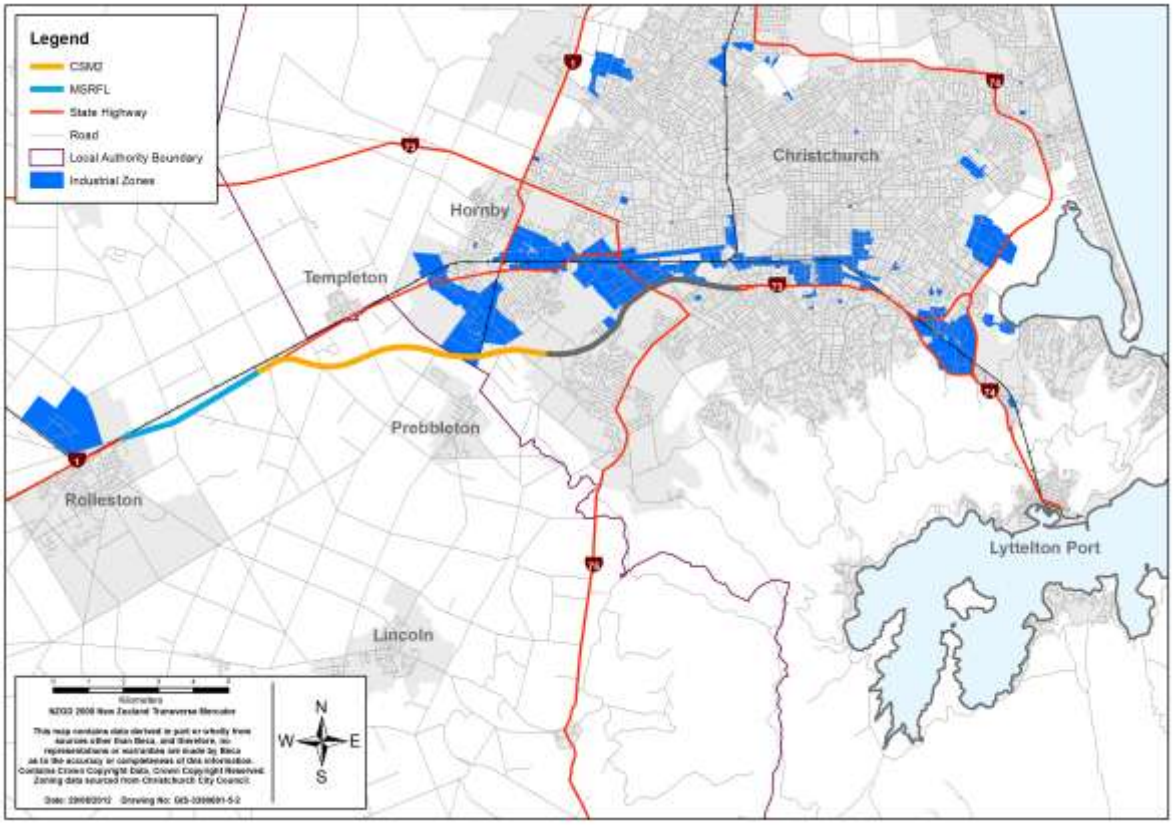
- Kirk Road: This road, connecting Main South Road with SH73, provides the main access to Main South Road for Templeton. It intersections with Main South Road at a priority intersection;
- Trents Road: This road is the continuation of Kirk Road on the eastern side of Main South Road. It crosses Shands 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.

PART C: DESCRIPTION OF THE PROJECT

4. PROJECT DESCRIPTION

Overview

Main South Road will be four laned from just north of the intersection of SH1 and Park Lane at Rolleston. This four-laning continues northwest on SH1 for approximately 4.5km to a new interchange which will connect State Highway 1 with CSM2 just north of Robinsons Road. MSRFL will consist of two lanes in each direction, a median with barrier separating oncoming traffic, and sealed shoulders. An interchange at Weedons Rd will provide full access on and off the Main South Road for property access. Access at Berketts and Larcombs Road intersections will be modified due to the new median and all private accesses will be transferred to new rear access roads running parallel to Main South Road.

The CSM2 section of the Project will extend from SH1 at Robinsons Road for 8.4 km linking with the CSM1 at Halswell Junction Road. The road will be a motorway standard comprising of four lanes, with two lanes in each direction, a median and a barrier that will separate oncoming traffic and provide for safety. Access to CSM2 will be available from Main South Road and the merger with CSM1 and the interchanges at Shands Road and Halswell Junction Road, enabling the efficient and safe flow of traffic. There will be the choice to avoid entering CSM2 at Robinsons Road and to remain on Main South Road. At seven places along the motorway, the local road will pass over the State highway to maintain existing connectivity for the State highway (Main South Road) and local roads (Hamptons/Waterholes, Trents, Shands, Marshs, Springs and Halswell Junction Roads). In addition, Robinsons Road will pass under CSM2.

Upon completion, CSM2 will be numbered State Highway 76 (“SH76”). The Project is shown on the plans included in Volume 5 – Plan Set, which contains the drawing sets for the applications. The Plan set has been split for MSRFL (Set A) and CSM2 (Set B) for ease of reference. These should be viewed in conjunction with this section of the AEE.

4.1. Introduction

This chapter outlines a description of the Project,including:

- the design objectives;
- traffic services;
- road alignment;
- interchanges, connections and bridges;
- predicted traffic volumes and flows;
- pavements and surfaces;
- walkways and cycleways;
- noise attenuation;

- stormwater design, treatment and management;
- urban design and landscaping; and
- transmission lines.

The construction phase of the Project is outlined in Chapter 5 of this AEE.

4.2. Design objectives

The Project is to be constructed to expressway standard on MSRFL and motorway standard on CSM2. Expressway standard is achieved by four-laning with a dividing median and limiting access to the two existing intersections at Berketts Road and Larcombs Road only, with direct private property access removed from Main South Road and alternate rear access provided. Motorway standard is achieved by a four lane median divided arterial road with no property access or intersections. Access onto the motorway is provided by the interchanges. The Project will ensure the motorway network in Christchurch is upgraded to cope with the future demands that growth and development in the city will place on infrastructure.

The design philosophy for the Project is outlined below:

- land take required is minimised - land take and the number of land owners affected is minimised through appropriate road cross-sections, interchange forms, and stormwater treatments;
- effects on adjacent residents are minimised (access, noise and visual elements);
- effects on the environment are minimised (stormwater, noise and landscaping);
- connectivity of existing infrastructure is maintained including local roads, property accesses, walking and cycling routes, and stockwater races;
- all elements of the Project are designed to the relevant design standards including the NZTA's RoNS design standards and guidelines;
- route security is provided for including recognition of secondary routes, design to standards, especially relating to stormwater (flooding) and structures (seismic effects), and the setting of the designation footprint;
- construction and maintenance costs are minimised; and
- continuity with CSM1 including cross-sectional widths, pavement and structure types, levels of accessibility, and landscaping and visual approach to design.

Along with the above philosophy, the Project design has been driven by the traffic modelling results and the receiving environment, particularly the existing flat terrain of the Canterbury plains and existing and proposed subdivisions and residences. For further information about the design philosophy refer to Technical Report 1 (Design Philosophy Statement) in Volume 3 of the application documents.

4.2.1. Road geometric design

The geometric design standards for this Project are based on the following standards and guidelines:

- the NZTA's Roads of National Significance (RoNS) Design Standards and Guidelines;
- the NZTA State Highway Geometric Design Manual (Draft);
- Austroads suite of road design standards; and
- Christchurch City Council Construction Standard Specification.

The RoNS geometric Design Standards specify the minimum desirable measurements for 110km/h and 100km/h curves.

The main topography of the Project terrain is predominately flat land, with most of the area covering rural land. The road has been designed at or near grade, to avoid significant visual effects of an elevated motorway and to allow disposal of stormwater above groundwater levels. The alignment of the motorway will bypass the built up areas of Templeton and Hornby, as well as avoiding the residential subdivisions at Claremont and Aberdeen. Further information on the vertical and horizontal alignment is provided in Chapter 7 (Consideration of Alternatives).

4.2.2. Design speed

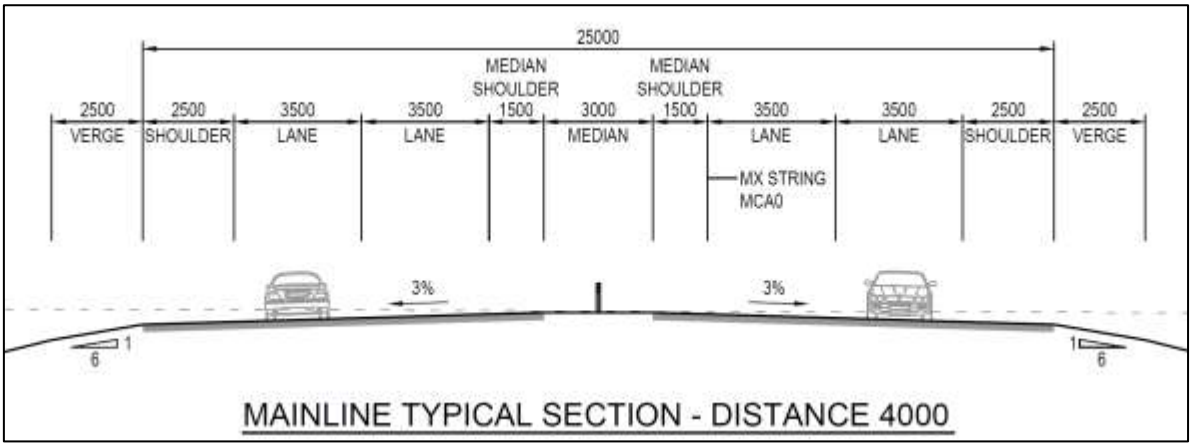
A design speed of 100km/hr has been adopted for MSRFL from the existing two-lane section, just north of Rolleston to the proposed tie-in to the CSM2 interchange. A design speed of 110km/hr has been adopted for CSM2 from the Main South Road SH1 interchange intersection to the tie-in to CSM1, east of Springs Road/Halswell Junction Road.

4.2.3. Typical cross sections and lane widths

The typical MSRFL and CSM2 cross section has been designed to current standards and will achieve consistency with CSM1, comprising the following components equating to a carriageway width of 25m (inclusive of the central median but exclusive of verge and swales):

- 2.5m wide outside shoulder;
- four x 3.5m wide traffic lanes;
- 1.5m wide inner shoulder; and
- 3.0m wide central median (inclusive of wire rope barrier).

Figure 14: Typical Cross Section



The wider cross section, including swales, is shown in the Typical Cross Section Scheme Plans appended in Volume 5.

4.2.4. Property access

Residential and commercial properties occupy both sides of MSRFL. With the construction of the four-laning and central median with barrier, accesses will be restricted for all properties with current access to Main South Road. It is proposed to close all private access onto MSRFL where access onto other roads is available or can be provided. Along the west side of MSRFL a new local rear access alongside the western property boundaries will be provided, running parallel with the Main Trunk Railway Line, between Weedons Ross Road and Curraghs Road. For properties fronting the eastern side of MSRFL, rear access is to be provided via an extension of Berketts Lane and private rights of way.

Residential and commercial properties will be purchased in whole or part which are directly along the CSM2 alignment. Affected accesses will be modified where required.

A list of the properties required in part of full for the Project is included in Appendix B and are illustrated on the land requirement plans in Volume 5.

4.2.5. Intersections

The Project will require changes in priority, relocation, or new provisions for intersections due to the MSRFL and CSM2 alignments. These will include improvements to Weedons Road / Weedons Ross Road, Larcombs Road, Berketts Road, Dawsons Road / Waterholes Road, Waterholes Road / Hamptons Road, Shands Road / Marshs Road, Halswell Junction Road and John Paterson Drive. The layout and lane configuration of these intersections are generally indicated on Layout Plans, 62236-A-C020 to C014, and 62236-B-C020 to C038 in Volume 5 and will be finalised during the detailed design phase following consenting. Options to enhance the safety and efficiency of these intersections include restrictions to left in/left out, priority “T” intersections, traffic signals and roundabouts.

4.2.6. Vehicle tracking and over-dimensional route

MSRFL and CSM2 (SH76) will be “over dimensional” and “overweight” permit routes. The required 10.5 m wide x 6.1 m high over dimensional envelope has been allowed for, with an additional 1m lateral clearance, as per the requirements that have been put in place for the CSM1 alignment. Median island signal poles (and potentially overhead masts) may need to be collapsible to allow for continuity of the “over dimensional” route.

Tracking paths have been undertaken on heavy vehicle turning movements to check there is adequate room provided. A minimum 600 mm additional clearance has been allowed to the tracking path to cater for driver error or misjudgement. The design vehicle is the RTS 18 m long quad rear axle semi-trailer, as this provides the worst case tracking path out of the heavy vehicle group.

4.3. Traffic services

Traffic services include the following features:

- permanent road signs;
- road lighting;
- road markings;
- barrier protection;
- traffic signals; and
- a Commercial Vehicle Inspection Unit (outlined in section 4.14).

The precise design and location of traffic services that will be in place when the Project opens will be confirmed in the detailed design phase and will be in accordance with all required standards that apply at the time of construction. Throughout the life of the road, it is anticipated that traffic services will be renewed and upgraded as required, ensuring the long term serviceability and safety of the road.

4.3.1. Signs

When it initially opens the Project will incorporate signage required for traffic safety purposes, throughout the alignment, as shown on the signage drawings A-C501 to 508 and B-C501 to 517. Gantries are proposed at chainage 5800 (MSRFL) and chainage 380 and 780 (CSM2). Design of all road signs and markings will be in accordance with the following standards, taking into account any updates to these standards:

- The Manual of Traffic Signs and Markings (MOTSAM); and
- Land Transport Rule: Traffic Control Devices.

4.3.2. Lighting

Lighting is proposed in accordance with the relevant New Zealand standard for road lighting, AS/NZS 1158.1.1 Lighting for roads and public spaces - Vehicular traffic (Category V) lighting - Performance and design requirements. As the Project is in a semi-rural environment, full lighting of the motorway and Main South Road is not proposed. Throughout the alignment, the minimum gap in lighting is 300m. In some sections, no lighting is required to meet V3[46], for example on MSRFL, chainage 3900 to 5800 and CSM2 chainage 1400 to 4200. The V3 standard will generally be applied to all lengths of the alignment and all connections, underpasses and interchanges. The following specific sections of the proposed lighting design are noted:

- MSRFL: Berketts intersection – intersection flag lighting will be used;
- CSM2: Hamptons and Trents overbridge – no lighting required however ducting will be installed for future use; and

[46] This will require an average luminance level no less than 0.75 candela per square metre, with an overall uniformity (minimum-to-average) to be above 0.33; a longitudinal uniformity to be above 0.3; a Threshold Increment (T.I. for glare control) below 20%; and a minimum Illuminance for intersections and other specified locations to be above 7.5 lux.

- CSM2: Waterholes and Hamptons Road intersections – isolated lit section to comply with subcategory V4[47].

Lighting of adjoining local SDC and CCC roads will also be carried out at Jones, Levi, Weedons, Shands, Marshs, Springs, Halswell Junction and John Paterson Drive, and the unnamed industrial road adjacent to the railway. Lighting of local roads will comply with V3 or V4 as appropriate.

The Little River Trail extension is proposed to be lit to comply with lighting subcategory P3[48]. All underpasses will be lit to comply with subcategory P10[49].

Lighting will be designed as part of the detailed design stage, and is the focus of Technical Report 19, located in Volume 3.

4.3.3. Barriers

Vehicle barriers will be provided along all centre medians to separate oncoming traffic, along roadsides where there are hazards such as trees or irrigation waterways and on all bridges.

All barrier protection will comply with the appropriate versions of the following standards when they are designed and constructed:

- The NZTA 'Safe Systems' memorandum, 2012.
- The Transit NZ M/23:2000 Guide for Road Safety Barrier Systems;
- NZS 3114:1987 Concrete Surface Finishes;
- AS/NZS 3845:1999 Road Safety Barrier Systems;
- The NCHRP Report 350 – Recommended Procedures for the Safety and Performance Evaluation of Highway Features (NCHRP 350);
- The State Highway Geometric Design Manual (SHGDM); and
- The Transit NZ Bridge Manual, September 2004 Revision.

New barriers for the Project will typically be:

- Central median - Test Level 4 (TL4) wire rope barrier;
- Roadside - TL4 nu-guard W-section; and
- Bridges and approaches - TL4 concrete 'F-Shape' edge barrier.

4.3.4. Traffic signal design standards

The traffic signal design is to be based on the following standards:

[47] will require an average luminance level no less than 0.5 candela per square metre, with an overall uniformity (minimum-to-average) to be above 0.33; a longitudinal uniformity to be above 0.3; a Threshold Increment (T.I. for glare control) below 20%; and a minimum Illuminance for intersections and other specified locations to be above 5 lux.

[48] will require an average horizontal illuminance level no less than 1.3 lux, with a minimum horizontal point illuminance of 0.22 lux, an overall uniformity (maximum to average illuminance) to be less than 10, and a minimum vertical illuminance of 0.22 lux.

[49] will require an average horizontal illuminance level no less than 35 lux, with a minimum horizontal point illuminance of 17.5 lux, an overall uniformity (maximum to average illuminance) to be less than 10, and a minimum vertical illuminance of 17.5 lux.

- Austroads Guide to Road Design – Part 4a: Unsignalised and Signalised Intersections;
- Austroads Guide to Traffic Management – Part 9: Traffic Operations;
- RTS 14 Guidelines for Installing Pedestrian Facilities for People with Visual Impairment;
- Signals New Zealand User Group (SNUG) National Traffic Signal Specification; and
- The NZTA (Transit's) Standard Signal Layout Draughting Guide Drawing 1/ 1061/ 140/ 8104/ Sheet 1/ Rev 0.

There are currently no existing traffic signal facilities within the existing Main South Road alignment or the roads which will intersect with CSM2. This Project includes three signalised intersections at interchange points; one at the existing Shands Road / Marshs Road intersection, one at the proposed Shands Rd / Eastbound Off Ramp/ Eastbound on ramp intersection and one further south on Shands Road at the proposed intersection of Shands Rd / Westbound Off Ramp/ Westbound on ramp.

The design preference is not to have traffic signals south of Marshs Road in order to retain the rural environment. Further traffic modelling at the detailed design phase will determine the most suitable treatment. The traffic signal design for each option will be developed along with the detailed intersection layouts in consultation with CCC and SDC.

4.4. Road alignment

The road alignment will be approximately 4.5km (MSRFL) and 8.4km (CSM2) long and the following general approach is proposed:

- four lanes (two lanes in each direction with a median and barrier dividing oncoming lanes);
- new full grade separated interchange at Weedons Road;
- new roundabout at Weedons Ross / Jones Road;
- left in only intersection at Main South Road / Larcombs Road;
- left in and left out intersection at Main South Road / Berketts Road;
- intersection at Weedons / Levi Road;
- rear access provision on Main South Road to provide full alternative access for properties with Main South Road frontage (both east and west of Main South Road);
- grade separated overpass at Robinsons Road;
- construction of a grade separated Y-junction (overpass) with Main South Road near Robinsons Road;
- roundabout intersection at Dawsons/Waterholes Road;
- closure of part of Blakes Road where it currently crosses CSM2 and conversion to two cul-de-sacs;
- grade separated underpasses at Springs Road, Marshs Road, Trents Road, and Waterholes Road;
- new full grade separated interchange at Shands Road;

- realignment of John Paterson Drive to connect with Halswell Junction Road off-ramp roundabout; and
- new grade separated underpass at Halswell Junction Road with east facing on and off ramps linking to CSM1.

The alignment has been designed at grade. The majority of the Project is within SDC boundaries. The section north of Marshs Road is within the CCC boundary. Further information about the vertical and horizontal positioning of the road alignment can be found in Chapter 7 (Consideration of Alternatives).

The interchanges and connections are described below.

4.5. Interchanges, local connections and bridges

The key interchanges, intersections and local road connections proposed for the Project are:

- Weedons Road interchange;
- Weedons Ross / Jones Roads roundabout;
- Weedons / Levi Roads intersection;
- Main South Road / Larcombs Road intersection;
- Main South Road / Berketts Road intersection;
- Main South Road back access;
- Robinsons / Curraghs Road overpass;
- Dawsons / Waterholes Road roundabout;
- CSM and Main South Road connection;
- Waterholes Road underpass (motorway under local road);
- Trents Road underpass;
- Shands Road interchange;
- Marshs Road underpass;
- Springs Road underpass;
- Halswell Junction Road underpass; and
- Halswell Junction Road interchange.

These proposed intersections and local connections are listed in order of location, from the south-western most end of the motorway alignment (MSRFL) continuing north-east just past the Springs and Halswell Junction Roads roundabout (where the CSM2 and CSM1 alignments merge). These interchanges, underpasses (motorway under local road), overpasses (motorway over local road) and bridge structures are described in more detail below.

4.5.1. Weedons Road interchange

It is proposed to construct a grade separated interchange at Weedons Road. This will enable Weedons Ross / Weedons Road to pass over Main South Road with exit and entry loops to cater for traffic in both directions. The southbound exit ramp loop is designed for the slowing of traffic

with a design speed of 50 km/h, ready to join Weedons Road via the roundabout. The northbound entry ramp loop is slightly wider to cater for the increasing speeds of traffic joining the motorway. Both ramp terminal intersections will be controlled by dual-laned roundabouts.

Main South Road remains at grade throughout the interchange. Weedons Road and has adopted a 60km/h design speed. This is considered adequate as the roundabouts at each end reduce speeds through the site. The maximum vertical grade along Weedons Road is 6.8 percent.

Figure 15: Weedons Road interchange photo simulation

Weedons Road interchange bridge structure

The Weedons Road underpass is the only bridge structure which spans over the new MSRFL alignment. The bridge is not directly connected to Main South Road but the approach roads to the structure link back into the motorway on-ramps and off-ramps.

The proposed bridge abutments and piers are skewed with respect to the centreline of the bridge at an angle of approximately 83 degrees. The bridge is a four span bridge with the internal skewed span lengths of 22 m and the end spans of 20 m. The central pier is located in the middle of SH1 with rigid barriers either side. The two outer piers are positioned clear of the back face of the edge barriers at the shoulders of the road.

The overall deck width is 15.3 m to the outer edge of the footpath. This provides for a carriageway width of 10 m, 2 x 2.0 m wide footpaths, 2 x 0.4 m wide rigid barriers and allowance for pedestrian handrails at the outer edges of the deck. Each span of the structure consists of 12 x 0.9 m deep precast prestressed concrete double hollow core ("DHC") units. An in-situ topping concrete of 180 mm minimum thickness at either edge of the deck forms the raised footpath. A surfacing course will overlay the DHC units across the width of the road carriageway.

The three piers comprise of three 1000 mm diameter columns on top of 18 m x 6 m x 1.2 m thick spread footings. The pier crossheads provide seating for the DHC units. The abutments comprise of a 1.8 m wide spread footing. A 250 mm thick, 3 m long settlement slab is provided to minimise post-construction differential settlement.

The vertical clearance from the underside of the Weedons Road bridge structure to the Main South Road surface is at least 6.1 m to allow for over-dimensional vehicles.

4.5.2. Weedons Ross Road / Jones Road roundabout

The construction of the Weedons interchange will promote Jones Road as the main access route into the proposed Rolleston Izone industrial area. The consequent increase in traffic demand, in particular heavy vehicles which will be generated by the Izone, necessitates an upgrade of the intersection at Weedons Ross Road and Jones Road.

The design proposes construction of a large diameter dual lane roundabout. In consideration of the close proximity to the Main Trunk Line, the roundabout has been shifted to the west to meet minimum separation distances from the level crossing.

The roundabout design allows for a minimum 32 m separation between the centre of rail track to the limit line for straight and right turn traffic entering the roundabout. For left-turning traffic, a free left turn has been provided for the dominant traffic movement and HGV's heading south on Jones Road to the Izone. It is noted that the ability to widen on the eastern approach is constrained by the existing sub-station on the southern side.

4.5.3. Weedons Road / Levi Road intersection

Levi Road currently intersects Weedons Road at a priority controlled T junction, approximately 1 km east of the proposed Weedons interchange. With the construction of the new interchange, Levi Road will be promoted as the primary access into the Rolleston township, relieving pressure through the lights on SH1.

It is therefore proposed to change the current intersection priority from Weedons Road to Levi Road to allow free-flow movements to and from Rolleston. This will involve realignment of the current intersection approaches, to introduce an 80 km/h design speed curve.

4.5.4. Main South Road / Larcombs Road intersection

Larcombs Road currently intersects Main South Road at an oblique angle, which restricts driver visibility and promotes high speed left turns from Larcombs Road into the major traffic movement on SH1. For safety reasons, it is proposed that the Larcombs Road intersection with Main South Road be left in only. The proposed layout includes a left turn deceleration lane to enable left turning traffic to move clear of high speed southbound traffic on Main South Road, and left turn only onto Larcombs Road.

4.5.5. Main South Road / Berketts Road intersection

The Berketts Road / Main South Road intersection also presents safety issues and in order to enhance safety and improve driver sight distance, it is proposed to change this intersection to left in / left out only. The proposed layout includes a left turn deceleration lane to enable left turning traffic to move clear of high speed southbound traffic on Main South Road, and a left turn acceleration lane onto Main South Road.

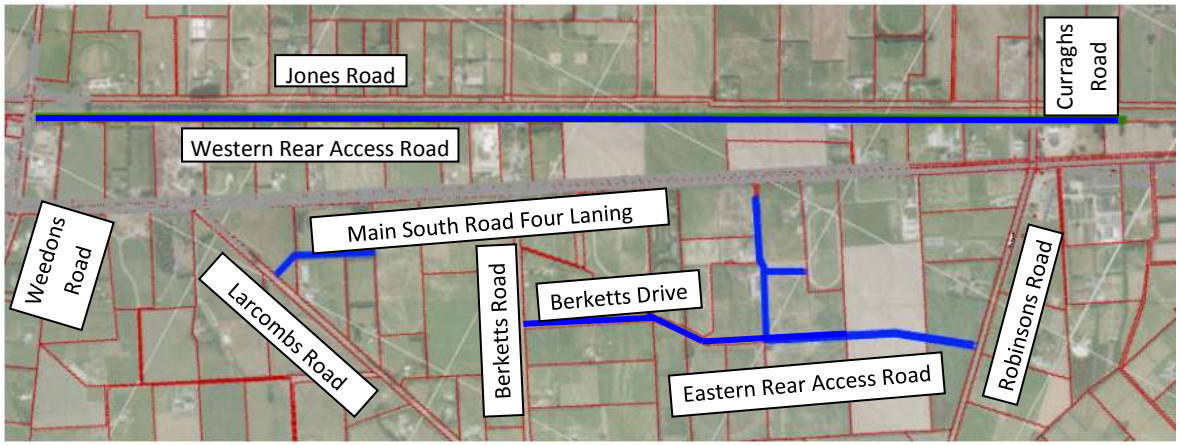
4.5.6. MSRFL rear accesses

A local access road is included as part of the Project running adjacent to and on the eastern side of the rail corridor between Weedons Ross Road and Curraghs Road and to 250m north of Curraghs Road. This road is proposed to provide rear access to all western properties with existing access fronting Main South Road along this section.

The preliminary design for the western side rear access involves a 17m road reserve to allow for a 7m carriageway and 5m either side for drainage, services and batter slopes. This rear access road is predominantly situated on a mixture of Crown owned KiwiRail land and private land.

Rear access for private access is also included for properties on the east side of Main South Road. Access will be provided off Larcombs Road and a rear access road will join Berketts Drive to Robinsons Road. Rear access provides both safety and efficiency benefits by the introduction of alternative access for these properties which allow closure of private access onto Main South Road. All rear roads will be constructed prior to the removal of any State highway access.

Figure 16: MSRFL rear access roads (shown in blue)



4.5.7. CSM2 / Main South Road connection

The Main South Road and CSM2 connection is located just north of Curraghs and Robinsons Roads. At this junction the northbound Main South Road alignment forks – with CSM2 to the east; and continues northwards along SH1 (Main South Road) before merging with the southbound lanes south of the SH1 Dawsons / Waterholes intersection.

Figure 17: MSRFL / CSM2 connection - Robinsons Road overpass photo simulation

The Main South Road southbound alignment is at grade until it approaches the CSM2 alignment, where the southbound lane diverges from the northbound lane and climbs over the CSM2 alignment at a maximum grade of 4 percent. This flyover provides southbound access onto the CSM2 alignment from Main South Road.

The southbound alignment ties back in with the northbound lane as it crosses the Robinsons / Curraghs intersection. The Robinsons Road / Curraghs Road overpass enables traffic to drive under SH1 along Robinsons Road and connect with Curraghs Road. This overpass and its structural details are described further below.

An exit lane has been included on the southbound lane of Main South Road to provide access to adjacent properties that will have their present access severed by the motorway alignment. The exit lane will also link to the local road network via a new roundabout with Robinsons Road.

A design speed of 100 km/h has been adopted for both the northbound and southbound lanes of Main South Road.

CSM2 / Main South Road connection bridge structure

This flyover is a four span bridge with two internal span lengths of 42m and end spans of 3m. The proposed bridge abutments and piers are in line with the centreline of the bridge. The bridge however is skewed at an angle of approximately 45 degrees to the CSM2 proposed alignment. The central pier is located in the middle of the motorway with rigid barriers either side. The two outer piers are positioned clear of the back face of the edge barriers at the shoulders of the road.

The overall deck width is 13.05m to the outer edge face of the footpath. This provides for a carriageway width of 10m, 1 x. 2.0m wide footpath, 2 x 0.4m wide rigid barriers and allowance for

a pedestrian handrail at the southern edge of the deck. Each span of the structure comprises four Steel I-girders with an in situ topping slab. The I-girders are typically 1800mm deep with 500mm wide top and bottom flanges. The in situ deck topping is a constant concrete thickness of 250mm. A surfacing course will overlay the deck across the width of the roadway.

The central pier comprises of a single 1500mm diameter column on top of a 9m x 7.5m x 1.5m thick spread footing, the outer piers consist of 2 x 1250mm diameter concrete columns on top of 17m x 6.5m x 1.5m spread footings. For the central pier the I-girders are cast integral with the pier crosshead whilst the end pier, crossheads provide seating for the I-girders. The abutments comprise a 2.75m wide spread footing. The overall height of the abutment from the top of the deck to the underside of the footing is approximately 3.0m. A 250mm thick, 3m long settlement slab is provided to minimise post-construction differential settlement.

The vertical clearance from the underside of the Main South Road southbound structure to the CSM2 road surface below is at least 6.0 m to allow for over-dimensional vehicles. This criteria is similar to that adopted on CSM1.

The maximum height above ground for the CSM2 / Main South Road connection bridge structure is 11.5m.

4.5.8. Robinsons / Curraghs Road overpass

A link has been provided between Robinsons and Curraghs Road passing underneath the State highway to improve the connectivity with the local road network.

The maximum vertical grade of the road passing beneath the motorway is eight percent on the western side. This maximises the length of flat grade (about 50m) leading into the at-grade rail crossing. The bridge structure at Robinsons/Curraghs Road is required to carry the motorway over the road and to allow vehicular access beneath the motorway.

A 60km/h design speed has been adopted for the link primarily to allow the road to safely tie into the existing railway crossing on the western side near Jones Road.

Robinsons / Curraghs Road overpass bridge structure

The proposed bridge abutments are skewed with respect to the centreline of the bridge at an angle of approximately 82 degrees. The single span bridge spans 24m between the abutment centrelines. The abutments are located on top of mechanically stabilised earth walls.

The overall deck width is 45.8m to the outer edge of the bridge girders. This provides for a carriageway width of approximately 40m with TL4 w-section flexible barriers on either side of the bridge. The structure consists of 40 x 0.9m deep precast prestressed concrete double hollow core (DHC) units. An in-situ topping concrete of 200 mm minimum thickness at either edge of the deck forms the raised kerb slab. A surfacing course will overlay the DHC units across the width of the road carriageway.

The abutments comprise an 1800mm wide reinforced concrete footing supported on top of vertical mechanically stabilised earth retaining walls. The footing has an upstand beam and the overall height of the abutment is 1700mm. A 250mm thick, 3m long settlement slab is provided to minimise post-construction differential settlement.

A 4.9m minimum vertical clearance has been adopted under the bridge structure to cater for standard legal road vehicles.

4.5.9. Main South Road / Dawsons Road / Waterholes Road intersection

A new roundabout is to be constructed at the Main South Road / Dawsons Road / Waterholes Road intersection to allow safe access to the Claremont subdivision and provide a "U" turn facility for traffic from the south.

4.5.10. Waterholes Road underpass

Where the CSM2 alignment crosses Waterholes Road, an underpass is proposed to enable traffic on Waterholes Road to pass over the CSM2 before tying back into the existing Waterholes Road. The southern leg of Waterholes Road intersects with a slightly realigned Hamptons Road intersection about 150m south of the CSM2 underpass. This minor realignment is intended to increase safety at this intersection.

Figure 18: Waterholes Road underpass photo simulation

The reverse curves of the CSM2 horizontal alignment have been designed to allow the new Waterholes Road connection and associated structures to be built off-line, while minimising the impact on private property and accesses.

The maximum vertical grade along Waterholes Road is 6.2 percent. An 80km/h design speed has been adopted for where Waterholes Road passes over CSM2. This is considered adequate based on the rural environment and reasonably low traffic volumes.

Waterholes Road underpass bridge structure

This bridge spans over the new CSM2 alignment linking the northern end of Waterholes Road to the southern end. The structure is not connected to the motorway and therefore there are no on-ramps or off-ramps.

The proposed bridge abutments and piers are skewed with respect to the centreline of the bridge at an angle between 43 degrees and 55 degrees. The bridge consists of four skewed span lengths of 24m. The central pier is located in the middle of the motorway with rigid barriers either side. The two outer piers are positioned clear of the back face of the edge barriers at the shoulders of the road.

The overall deck width is 15.3m to the outer edge face of the footpath. This provides for a carriageway width of 10m, 2 x 2.0m wide footpaths, 2 x 0.4m wide rigid barriers and allowance for pedestrian handrails at the outer edges of the deck. Each span of the structure consists of 12 x 0.9m deep precast prestressed concrete DHC units. An in-situ topping concrete of 180mm minimum thickness at either edge of the deck forms the raised footpath. A surfacing course will overlay the DHC units across the width of the roadway.

The three piers comprise of three 1000mm diameter columns on top of 20m x 6m x 1.2m thick spread footings. The pier crossheads provide seating for the DHC units. The abutments comprise of a 1.8m wide spread footing. A 250mm thick, 3m long settlement slab is provided to minimise post-construction differential settlement.

The maximum height above ground for the Waterholes Road bridge structure is 9.5m.

4.5.11. Trents Road underpass

An underpass is proposed where CSM2 crosses Trents Road. This will enable local traffic on Trents Road to pass over the CSM2 alignment. Nearby, Blakes Road will become two cul-de-sac roads. Blakes Road through traffic will be diverted onto Trents Road.

Figure 19: Trents Road underpass photo simulation

The reverse curves of the CSM2 horizontal alignment have been designed to allow the new connection and associated structures to be built off-line, while minimising the impact on private property and accesses.

The maximum vertical grade along Trents Road is 6.3 %. An 80km/h design speed has been adopted. This is considered adequate based on the rural environment and reasonably low traffic volumes. There are no side roads or accesses over this section of Trents Road.

Trents Road underpass bridge structure

The Trents Road underpass spans over the new CSM2 alignment linking the north western end of Trents Road to the southern eastern end. The bridge is not connected to the motorway and therefore there are no on-ramps or off-ramps.

The proposed bridge abutments and piers are skewed with respect to the centreline of the bridge at an angle of approximately 87 degrees. The bridge is a three span bridge with an internal skewed span length of 30m and skewed end spans of 27m. The two piers are positioned clear of the back face of the edge barriers.

The overall deck width is 15.3m to the outer edge face of the footpath. This provides for a carriageway width of 10m, 2 x 2.0m wide footpaths, 2 x 0.4m wide rigid barriers and allowance for pedestrian handrails at the outer edges of the deck. Each span of the structure comprises six precast pre-stressed concrete “Super Tee” beams with an in situ topping slab. The precast “Super Tee” beams are 1225mm deep and 2400mm wide across the top flanges. The in situ deck topping concrete thickness is a minimum of 200mm. A surfacing course will overlay the deck across the width of the roadway.

The two piers comprise of two 1000mm diameter columns on top of 14.5m x 5m x 1.2m thick spread footings. The pier crossheads provide seating for the "Super Tee" beams. The abutments comprise of a 2.0m wide spread footing. The overall height of the abutment from the top of the deck to the underside of the footing is approximately 5.0 m. A 250 mm thick, 3m long settlement slab is provided to minimise post-construction differential settlement.

The maximum height above ground for the Trents Road bridge structure is 9.5m.

4.5.12. Shands Road interchange and Marshs Road underpass

The connections proposed at this section of the motorway include a typical diamond interchange at Shands Road and an underpass beneath Marshs Road. In addition there are traffic signals proposed at the intersection of Shands and Marshs Roads.

The full grade-separated interchange at Shands Road south of Marshs Road will allow drivers to turn left and right, or go straight ahead from any direction. Shands Road is proposed to retain its existing straight alignment; thus maximising the visibility to the ramp intersections with Shands Road. The four-ramp terminal intersections at this interchange will be controlled by traffic signals.

The maximum vertical grade along Shands Road is 6.4 percent. CSM2 remains at grade throughout the interchange with Shands Road. A 60km/h design speed has been adopted.

Figure 20: Shands Road interchange and Marshs Road underpass photo simulation

To the east of the Shands Road interchange, the Marshs Road underpass will enable traffic to pass over the CSM2 alignment. Marshs Road will retain a straight horizontal alignment as it passes over the CSM2 alignment. The on and off-ramps are designed to comply with the NZTA's motorway drawing M1 (Standard Exit and Entrance Details) from the MOTSAM manual.

The maximum vertical grade along Marshs Road is 6.6 percent. A design speed of 80km/h has been adopted for Marshs Road underpass due to the relatively close proximity to the Shands Road interchange.

Shands Road underpass and Marshs Road underpass bridge structures

The Shands Road bridge structure spans over the new CSM2 alignment linking the north eastern end of Shands Road to the south western end. The bridge is not directly connected to the new motorway but the approach roads to the structure link back into the motorway on-ramps and off-ramps.

The proposed bridge abutments and piers are skewed with respect to the centreline of the bridge at an angle of approximately 70 degrees. The bridge is a three span bridge with an internal skewed span length of 30m and end spans of 27m. The two piers are positioned clear of the back face of the edge barriers at the shoulders of the road.

The overall deck width is 22.6m to the outer edge face of the footpaths. This provides for a carriageway width of 17.3m, 2 x 2.0m wide footpaths, 2 x 0.4m wide rigid barriers and allowance for pedestrian handrails at the outer edges of the deck. Each span of the structure comprises nine precast pre-stressed concrete “Super Tee” beams with an in situ topping slab. The precast “Super Tee” beams are 1225mm deep and 2400mm wide across the top flanges. The in situ deck topping concrete thickness is 200mm. A surfacing course will overlay the deck across the width of the roadway.

The two piers comprise of three 1000mm diameter columns on top of 22m x 5m x 1.1m thick pile caps. Each pile cap is supported by 48 x 14m long driven piles. The piles are founded in the competent Riccarton gravels. The pier crossheads provide seating for the “Super Tee” beams. The abutments comprise of a 2.75m wide capping beam which have 30 x 20m long driven piles piled down to competent Riccarton gravels. The overall height of the abutment from the top of the deck to the underside of the footing is approximately 4.0m. A 250mm thick, 3m long settlement slab is provided to minimise post-construction differential settlement.

The Marshs Road Underpass spans over the new CSM2 alignment linking the north western end of Marshs Road to the south eastern end. The bridge is not connected to the motorway and therefore there are no on-ramps or off-ramps.

The proposed bridge abutments and piers are in line with the centreline of the bridge. The bridge however is skewed at an angle of approximately 45 degrees to the motorway. The bridge is a four span bridge with the internal span lengths of 48m and 54m and the end spans of 40m. The central pier is located in the middle of the motorway with rigid barriers either side. The two outer piers are positioned clear of the back face of the edge barriers at the shoulders of the road.

The overall deck width is 15.3m to the outer edge face of the footpath. This provides for a carriageway width of 10m, 2 x 2.0m wide footpaths, 2 x 0.4m wide rigid barriers and allowance for pedestrian handrails at the outer edges of the deck. Each span of the structure comprises four

Steel I-girders with an in situ topping slab. The I-girders are typically 2400mm deep with 500mm wide top and bottom flanges. The in situ deck topping is a thickness is 250mm. A surfacing course will overlay the deck across the width of the roadway.

The central pier comprises of a single 1500mm diameter column on top of 10m x 8.75m x 1.6m thick pile caps. The outer piers consist of 2 x 1250 mm diameter concrete columns on top of 16.25m x 7.5m x 1.4m pile caps. The pile caps are supported by 18m long 310UC 118 driven piles. The piles are founded in the competent Riccarton gravels. For the central pier the I-girders are cast into the pier crosshead whilst the end pier crossheads provide seating for the I-girders. The abutments comprise of a 2.75m wide capping beam which have 20m long 310UC 118 driven piles piled down to competent Riccarton gravels. The overall height of the abutment from the top of the deck to the underside of the footing is approximately 3.8m. A 250mm thick, 3m long settlement slab is provided to minimise post-construction differential settlement.

The maximum height above ground for the Shands Road and Marshs Road bridge structures is 8.5m.

4.5.13. Springs Road underpass

An underpass is proposed where CSM2 crosses Springs Road. This will allow local traffic and cyclists to drive / cycle over the CSM2 alignment. It is proposed to realign John Paterson Drive on the southern side of Springs Road, and to connect John Paterson Drive into the off-ramp roundabout on Halswell Junction Road.

Figure 21: Springs Road underpass photo simulation[50]

[50] This photosimulation shows an earlier design. The John Paterson Drive link to Springs Road has now been realigned to Halswell Junction Road. Refer to the Plan Set for the correct design details.

The maximum vertical grade along Springs Road is 6 percent. A design speed of 80km/h has been adopted. This is considered adequate based on the peri-urban environment and nearby Springs Road roundabout.

Springs Road underpass bridge structure

The Springs Road underpass spans over the new CSM2 alignment linking the north eastern end of Springs Road to the southern western end. The proposed bridge abutments and piers are skewed with respect to the centreline of the bridge at an angle of 44 degrees and 53 degrees. The bridge consists of four skewed span lengths of 20m. The central pier is located in the middle of the motorway with rigid barriers either side. The two outer piers are positioned clear of the back face of the edge barriers at the shoulders of the road.

The overall deck width is 15.3m to the outer edge face of the footpath. This provides for a carriageway width of 10m, 2 x 2.0m wide footpaths, 2 x 0.4m wide rigid barriers and allowance for pedestrian handrails at the outer edges of the deck. Each span of the structure consists of 12 x 0.9m deep precast prestressed concrete DHC units. An in-situ topping concrete of 180 mm minimum thickness at either edge of the deck forms the raised footpath. A surfacing course will overlay the DHC units across the width of the road carriageway.

The three piers comprise of three 900mm diameter columns on top of 21m x 5m x 1.1m thick pile caps. Each pile cap is supported by 36 x 18m long driven piles. The piles are founded in the competent Riccarton gravels. The pier crossheads provide seating for the DHC units. The abutments comprise of a 2.75m wide capping beam which have 22 x 24m long driven piles piled down to competent Riccarton gravels. The overall height of the abutment from the top of the deck to the underside of the footing is approximately 2.5m. A 250 mm thick, 3m long settlement slab is provided to minimise post-construction differential settlement.

The maximum height above ground for the Springs Road bridge structure is 9m.

4.5.14. Halswell Junction Road underpass

To the east of the existing Springs Road roundabout, an underpass is proposed for the CSM2 alignment to traverse beneath Halswell Junction Road. Halswell Junction Road will retain a straight horizontal alignment as it passes over the CSM2 alignment.

Figure 22: Halswell Junction Road underpass photo simulation[51]

Halswell Junction Road grades down to the existing road level about 100m prior to the Springs Road roundabout. The maximum vertical grade along Halswell Junction Road is 6.4 percent.

The proposed design allows for east facing ramps connecting from CSM2 into Halswell Junction Road. These ramps provide full access for all vehicles. The on-ramp commences 100m east of the Springs Road roundabout with a typical lane diverge, merging into the CSM2 alignment with typical 2 percent motorway on-ramp geometry. The off-ramp is a standard 8 percent motorway exit, connecting into a new Halswell Junction Road roundabout. The off ramp is generally at ground level; however the on ramp requires to grade up slightly to match the Halswell Junction Road embankment, before it can diverge horizontally. The maximum vertical grade along the on-ramp is five percent.

A design speed of 80km/h has been adopted due to the relatively close proximity of the Springs Road roundabout and proposed off ramp roundabout. There is potential for the design speed to be reduced here, as the roundabouts either side of the underpass will create speed thresholds and the anticipated speed environment would be in the vicinity of 60km/h to 70km/h.

Halswell Junction Road underpass bridge structure

The Halswell Junction Road underpass spans over the new CSM2 alignment linking the north western end of Halswell Junction Road to the south eastern end.

The proposed bridge abutments and piers are skewed with respect to the centreline of the bridge at an angle of approximately 37 degrees. The bridge consists of four equal skewed span lengths of

[51] This photosimulation shows an earlier design. The John Paterson Drive link to Halswell Junction Road is not shown. Refer to the Plan Set for the correct design details.

25m. The central pier is located in the middle of the motorway with rigid barriers either side. The two outer piers are positioned clear of the back face of the edge barriers at the shoulders of the road.

The overall deck width is 23.2m to the outer edge of the bridge. This provides for a carriageway width of 20m, 1 x 2.0m wide footpath, 2 x rigid barriers and allowance for pedestrian handrails at the outer edges of the deck. Each span of the structure consists of 20 x 0.9m deep precast prestressed concrete DHC units. An in-situ topping concrete of 180mm minimum thickness at one edge of the deck forms the raised footpath. A surfacing course will overlay the DHC units across the width of the roadway.

The three piers comprise of five 900mm diameter columns on top of 37.5m x 5m x 1.1m thick pile caps. Each pile cap is supported by 60 x 18m long 310UC 118 driven piles. The piles are founded in the competent Riccarton gravels. The pier crossheads provide seating for the DHC units. The abutments comprise of a 2.75m wide capping beam which have 40 x 24m long 310UC 118 driven piles piled down to competent Riccarton gravels. The overall height of the abutment from the top of the deck to the underside of the footing is approximately 2.5m. A 450mm thick, 6m long approach slab is provided to assist in resisting longitudinal loads from the structure.

The maximum height above ground for the Halswell Junction Road bridge structure is 9.5m.

4.6. Hornby Industrial Line rail siding

The proposed CSM2 alignment passes across the existing KiwiRail rail corridor (Hornby Industrial Line) that is used for shunting trains into the Watties factory. The rail corridor is approximately 10m wide but only extends as far south as the Preshes Investments Ltd property at 303 Marshs Road (Lot 2, DP397092). This provides adequate length for the train to shunt the wagons back up the track into the Watties area. To enable CSM2 to remain at-grade, it is proposed to turn the rail tracks out to the east on a curve clear of CSM2, catering for the shunting of carriages into Watties. KiwiRail accepts this is a workable solution and that the rail line will end at CSM2.

KiwiRail has indicated that it has no intention of extending the rail line further south and it is currently not nor will it in future be used for commuter rail. KiwiRail and the NZTA will enter into a formal agreement (a Deed of Grant) to enable the NZTA to pass across the corridor. If, in the future, a rail extension to Prebbleton was justified, any associated upgrade works for the rail to pass across CSM2 would be undertaken by the NZTA.

4.7. Traffic volumes and flow

4.7.1. Overview

The Project will contribute to the CSM and improve traffic flow from Rolleston to the Port.

The CSM2 section will provide a direct, motorway standard, connection between the end of CSM1 at Springs Road and Main South Road at Robinsons Road. It is forecast that a significant volume of

traffic will use the CSM2, relieving roads such as Main South Road through Hornby and Templeton and Halswell Junction Road which would otherwise remain heavily congested.

With the reduction in traffic volumes on these alternative routes to the CSM2, intersection delays are forecast to decrease significantly, as are link travel times. Significant benefits in terms of improved levels of service are forecast following the construction of CSM combined with MSRFL. The completion of the Weedons Road interchange will provide alternative access into the Rolleston residential area and the Izone industrial hub via Levi Road and Jones Road respectively. MSRFL

The key impacts on traffic movements which are forecast to occur following the completion of the MSRFL part of the Project are as follows:

- increase in traffic volume along Weedons Ross Road. This is due to the new interchange at Weedons Road. For the 2041 evening peak hour, this diversion is in the order of 300 vehicles;
- increase in traffic volume along Levi Road. This is due to the new interchange at Weedons Road;
- reduction in traffic volumes along Jones Road between Templeton (Kirk Road) and Weedons Ross Road and on Selwyn Road from Rolleston due to rerouting onto the upgraded Main South Road; and
- significant increased traffic on Main South Road between Rolleston and CSM2 interchange.

The Main South Road/Weedons Road intersection has been identified to be of high importance due to the location of the junction in relation to Rolleston and the Izone development, traffic from which will travel through this intersection to access the CSM and Rolleston.

4.7.2. CSM2

North of the CSM2 and Main South Road Interchange there will be a large drop in traffic volumes on Main South Road and Halswell Junction Road, as vehicles reroute onto CSM2. This reflects the attractiveness of the CSM2, which along with CSM1 provides a faster and shorter route and increased capacity through to Brougham Street.

There will be increased volumes along the CSM1 and CSM2 between the Curletts Road interchange and Main South Road and a decrease in traffic on Shands Road, as vehicles remain on the CSM2 rather than head to the southern side of Rolleston. On Brougham Street, capacity constraints reduce attractiveness, so Brougham Street is forecast to experience a smaller increase in traffic than for CSM1, which connects to it.

Around the western end of CSM1, traffic volumes on Halswell Junction Road northwest of Springs Road are expected to drop significantly, since CSM2 will provide a more efficient connection south. On Halswell Junction Road, east of Springs Road there is likely to be an increase in traffic volumes, as the reduction in congestion around the end of CSM1 will be aliviated by CSM2, making travelling through here relatively more attractive.

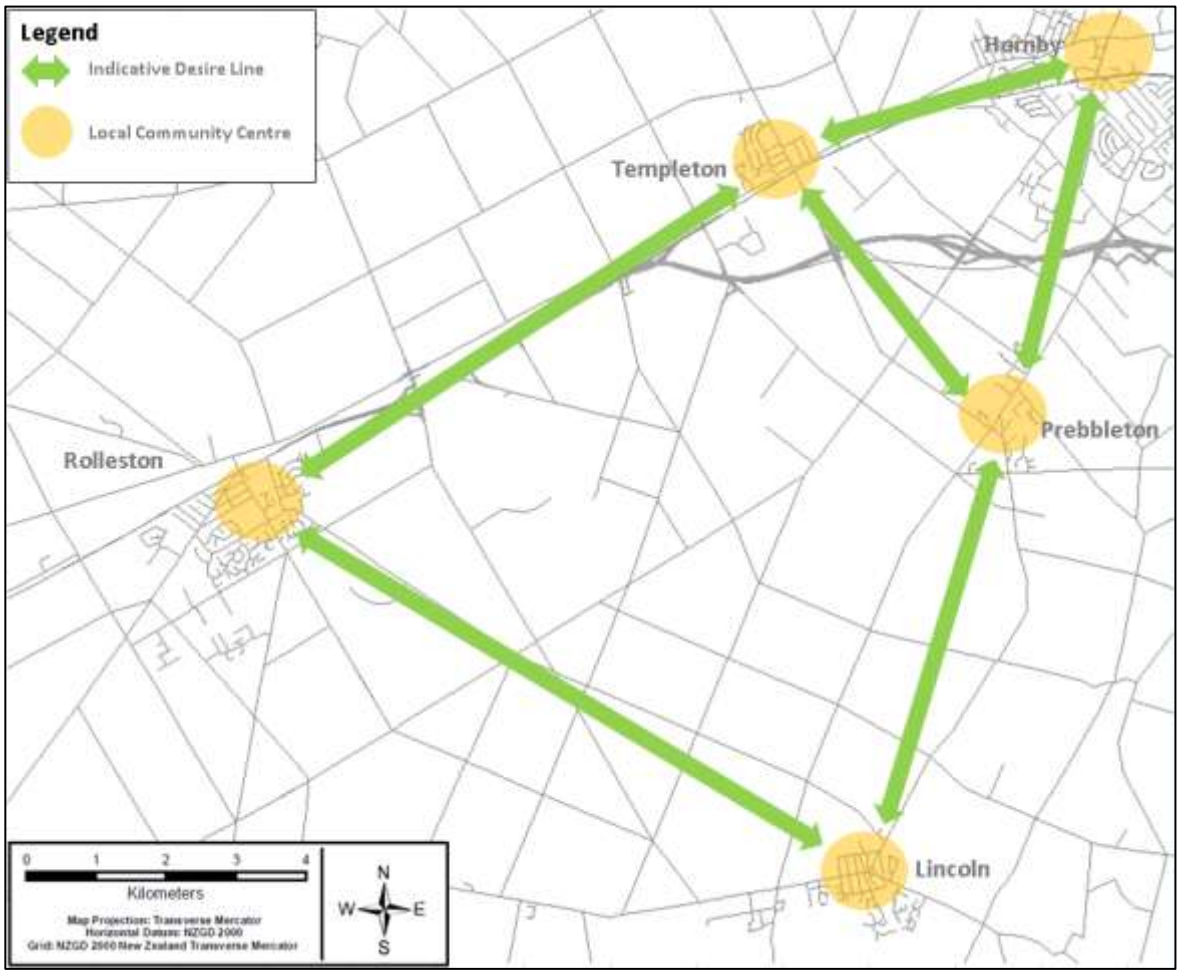
Marshs Road and Shands Road (south of the Shands Road interchange) are both expected to see higher volumes as traffic uses those roads to access the CSM. The new interchange on Shands Road will draw traffic from the parallel Springs Road routing from Lincoln, enabling access to the motorway without having to travel through Prebbleton or the Halswell Junction Road/ Springs Road roundabout.

4.8. Walkways and cycleways

Walking demand in the Project area is generally limited to local trips within the local community centres (Rolleston, Prebbleton, Lincoln, Templeton and Hornby). The distances between these centres discourages pedestrian activity, leaving cycling as the most preferred active mode.

For cyclists, trips are expected to be either within the local community centres, between these centres or are recreational trips on facilities such as the Little River Rail Trail. These are shown in Figure 23, with the Little River Rail Trail connecting Hornby, Prebbleton and Lincoln, and continuing southwards. Apart from the Rail Trail, there are currently no specific cycle facilities on routes serving these identified "desire lines".

Figure 23: Desire lines



Specific provision for walking and cycling facilities on Main South Road is not supported by the safety audit carried out for the Project, however the NZTA accept that the Main South Road section can be used by cyclists as it will not be designated as a motorway. It is noted that there are alternative preferred cycling routes available on parallel routes via the new rear access road to the west and Jones Road[52].

Subject to the outcome of any consultation, the NZTA currently intends to request the Governor General to declare CSM2 a motorway under section 71 of the Government Roading Powers Act 1989. As such, cyclists and pedestrians will not be able to use the CSM2 section of the Project. Provisions for cyclists and pedestrians have been included in the Project, where possible, in the local roads, intersections and bridges.

Underpasses at the following locations will provide access and connectivity for walkers and cyclists on the road bridges:

- Weedons Road;
- Main South Road connection bridge;
- Hamptons Road/ Waterholes Road;
- Trents Road;
- Shands Road;
- Marshs Road;
- Springs Road; and
- Halswell Junction Road.

On the above listed crossings, cyclists will be accommodated at the road shoulder incorporated as part of the road design, however as foot traffic is expected to be very low, it is anticipated that cyclists may also use the footpaths when using the bridges.

A width of 3.5 metres to 4.0 metres has been allowed for dedicated pedestrian and cycle facilities on all bridges. Two metre wide footpaths are proposed on both sides of the Weedons Road overbridge, Hamptons/Waterholes Road overbridge, Shands Road overbridge, Springs Road overbridge and Halswell Road overbridge. The Trents Road and Marshs Road overbridge will have a 3.5m shared facility for cyclists and pedestrians. The bridge footpaths/shared facilities will be confirmed at the detailed design phase.

Where considered necessary, pedestrian crossing phases will be provided for at the signalised intersection options.

4.8.1. Marshs Road and Little River Rail Trail

A shared use walking and cycling facility is proposed as part of the Project, which has been developed through a series of workshops with SDC and CCC. The facility links the CSM1 shared use path currently under construction and the Little River Rail Trail.

[52] The SDC has agreed with the NZTA that the alternative routes are preferable for cyclists and pedestrians than Main South Road.

Currently the Little River Rail Trail runs down Shands Road from Hornby, crossing over the proposed motorway before turning onto Marshs Road and then following the rail corridor to Prebbleton. When completed, the Little River Rail Trail will provide a cycle route from Hornby to Little River. The 3.5km section of the route between Shands Road and Prebbleton was opened in 2009 and the 7km section from Prebbleton to Lincoln was opened in 2006. The final sections of the trail linking Lincoln to Motukarara are currently under construction by the Rail Trail Trust. The Rail Trail is typically 3m wide and provides a shared use commuter and leisure facility for pedestrians and cyclists.

The proposed cycle link involves an extension from the CSM1 route at the Owaka subway. This is proposed to continue west along CSM2 to the south of the alignment within the new designation. The path would pass under the bridges at Halswell Junction Road and Springs Road and utilise the disused section of rail corridor to Marshs Road, whereupon it connects with the existing Little River Rail Trail. The proposed route alignment (highlighted in light blue) is shown in Figure 24.

The Marshs Road section of the existing Little River Rail Trail will be maintained from Shands Road and the signalised intersection associated with the Shands Road interchange will facilitate a cyclist crossing from Marshs Road to Shands Road. This maintains connectivity for cyclists to Hornby via Shands Road.

Figure 24: Proposed alignment of shared use path and locations of potential changes

4.8.2. Other opportunities

The Selwyn District Council's Walking and Cycling Strategy identifies the potential for a cycling corridor along Jones Road, connecting Rolleston to Hornby. It is recognised that the western rear

access road proposed as part of this Project could serve as part of this cycling corridor, with the advantage of reduced traffic volumes and a lower speed environment when compared with Jones Road. Provision or contribution towards this cycling corridor is not proposed to be constructed as part of this Project however, and it is a matter for SDC to address.

4.9. Pavements and surfacing

The pavement design for MSRFL involves strengthening of the existing pavement to cater for the design traffic, and the installation of new pavement to accommodate the additional two lanes. The final pavement design will be confirmed in the detailed design phase.

The final design of the pavement for the CSM2 section will also be carried out during the detailed design phase of the Project. The design will be based on the requirements in the NZTA Supplement to Austroads (NZTA 2007), particularly in relation to the standard for a modified aggregate base to reduce the risk of rutting. It is proposed to match the pavement construction methodology to that of the CSM1, ensuring continuity and durability where possible.

A foamed bitumen basecourse has been selected and pavement surfacing of Open Graded Porous Asphalt (OGPA) is proposed for the majority of the main alignment for maintenance purposes, as well as its properties of noise reduction and surface water reduction. There will be areas where the more durable Stone Mastic Asphalt (SMA) surfacing will be used, including on the approaches to interchanges (on and off ramps), at intersections and some underpasses. The majority of the extent of local roads within the Project will be surfaced with standard chip seal, with SMA utilised at intersections and some overpasses. The proposed pavement treatments for the Project are illustrated on Drawings 62236-A-C250 to 253 and 62236-B-C250 to 255 (the pavement drawings in Volume 5).

4.10. Noise attenuation

Along Main South Road, 1.8m high acoustic fences are proposed for several properties (1528 Main South Road, 95 Berketts Road and 1213 Main South Road) to mitigate noise effects along this section of the alignment.

Noise mitigation for the new motorway (CSM2) will include the use of low noise road surface (OGPA) and acoustic fences in certain isolated areas. For a section of Springs Road that is impacted by the Project, mitigation will involve using OGPA surface on the local road bridge southern approach, and a 1.8m high acoustic fence will be built along the road boundary at 312 Springs Road. The assessment of noise and details of proposed noise mitigation measures is contained in Chapter 16 of this report and in Technical Report 8, appended in Volume 3 of this application.

The low noise road surface areas (OGPA) are illustrated on Drawings 62236-A-C250 to 253 and 62236-B-C250 to 255 (the pavement drawings in Volume 5).

4.11. Stormwater design, stormwater treatment and flood management

The operational drainage and stormwater treatment design for the Project has been driven by two key requirements:

- ensuring that stormwater does not inhibit the safe and effective operation of the Project; and
- ensuring that the potential adverse environmental effects associated with stormwater are mitigated.

4.11.1. Stormwater design

A design groundwater level was established for the Project, using historical data, local current data, and allowances for the Central Plains Water Enhancement Scheme (CPWES). An allowance of 1m between the designed groundwater level, and the bottom of the land disposal layer that is specified in the NRRP, means surface water can be treated prior to it mixing with groundwater.

The proposed stormwater collection and treatment system will cater for a total rainfall depth of 140.7mm for MSRFL, and 158.4mm for CSM2, for the 24 hour duration 100 year Annual Recurrence Interval (ARI) event. Utilisation of the total storm detention will ensure that spilling into Upper Knights Stream in the Halswell catchment, via Montgomery's Drain, will only occur in extreme rainfall and/ or groundwater events where dilution will be significant.

Surface water will be dealt with differently in the MSRFL and CSM2 alignments. Main South Road and the adjacent rail embankment have impediments to overland flows, and they have little stormwater infrastructure in place. The widening of Main South Road will have little impact on the current behaviour of the catchment. Therefore, isolated soak pits in the low lying areas are proposed, with allowances for potential over topping.

For the CSM2 section at low points in the topography of the area, overland flows will pass underneath the motorway using a series of siphons designed to a 100 year ARI event. Bunds will protect the roadside swales and dispersal points. The additional disposal areas at locations of concentrated overland flows will provide protection to the road against flooding. In locations where overland flow siphons will be impractical (given length or geometric constraints) "surface water soakage areas" have been proposed to accommodate overland flow. These are required around the Shands Road and Weedons Ross Road interchanges and are illustrated on the Drainage Layout drawings in Volume 5.

Stockwater races will be passed under the motorway via a siphon system, typically measuring between 300mm and 450mm. In addition to the water supply function of the races they have a secondary function of being used for land drainage. Thus at each crossing a larger diameter siphon will be required to convey the storm flows under the project alignment. This second siphon will provide for the ability to carry out maintenance on the primary stockwater race siphon.

The proposed alignment is typically at or near grade, allowing for the disposal of stormwater above design groundwater levels. This minimises the depth of stormwater crossings and stockwater race siphons, and minimises the risk of road closure due to flooding. The elevation of the design groundwater level limits the depth at which the vertical alignment can be dropped into a trench.

The swales have been designed in general accordance with the NZTA Stormwater Treatment Standard for State Highway Infrastructure (May 2010). Overflow from one swale to the next will be prevented via low bunds immediately downstream of the soak pit entry points. Two detention basins are required at the CSM1 end due to low percolation rates and high groundwater levels. Where these detention basins are situated coincides with the groundwater protection area, and as such first flush basins are proposed to treat stormwater prior to disposal to land.

A variable design disposal rate was applied along the alignment to account for changes in ground condition, generally increasing with distance from the city. These design disposal rates allow a disposal footprint to be calculated for a required design outflow, i.e. flow out of the soak pit or detention basin.

The Robinsons Road overpass will be at an inverted level, which could mean that, without mitigation the road might be flooded every 3 to 4 years, for a period of between weeks to a month or more (based on ECan data). Proposed mitigation measures to address this issue are a pumping system, piping the adjacent stockwater race (to ensure separation to the excavation), bunding, and installation of pavement that is better suited to submergence. An alternative option of allowing the local road to flood occasionally is also available.

CSM1 stormwater infrastructure will be impacted by CSM2, most notably:

- construction of the southbound off-ramp will partially fill the Lee Pond; and
- construction of the northbound on-ramp will require backfill of less than one tenth of the CSM1 'Mushroom Pond'.

To ensure the CSM1 system still operates as intended, allowances for modifications to this infrastructure have been made in the design of CSM2 to integrate stormwater treatment. With the Lee Pond, a small proportion of the existing alignment will now drain to the new Ramp Pond. For the Mushroom Pond, the remaining 90% of the pond will be sufficient to service the Halswell Junction Road roundabout and associated impervious areas. The on-ramp and CSM1 contributing areas will be diverted to the new "Maize Maze" pond which will be designed to have the capacity to capture this shortfall.

4.11.2. Stormwater treatment

The proposed method of stormwater treatment will be via a series of grass filter strips (verge edge and swale batter), swales, first flush basins and infiltration devices. Stormwater methods were designed using the following guides:

- Canterbury Natural Resources Regional Plan ("NRRP");

- the NZTA Stormwater Treatment Standard for State Highway Infrastructure (2010);
- Christchurch City Council Waterways and Wetlands Drainage Guide (Parts A and B), 2003 (revision to design rainfall guidance in 2010);
- Selwyn District Council Engineering Code of Practice July 2010;
- Auckland Regional Council, Technical Publication No 10 (TP10) Stormwater Management Devices Design Guideline. Auckland. 2003;
- Ministry for the Environment, Climate Change effects and impacts assessment. A guidance manual for Local Government in New Zealand. (Prepared by the New Zealand Climate Change Office, 2008); and
- Facility for Advanced Water Biofiltration, Monash University, Stormwater Biofiltration Systems, Adoption Guidelines: Planning, Design and Practical Implementation, Version 1, June 2009.

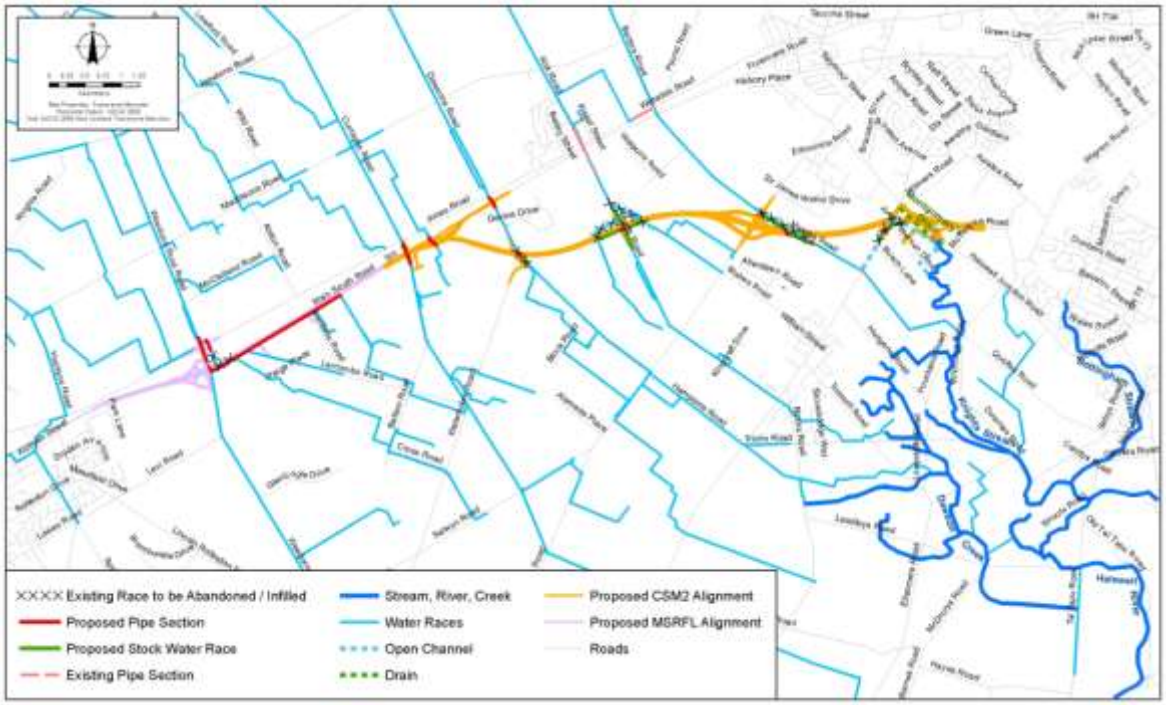
The various components of the stormwater and drainage system have been designed for the 100 year ARI. This standard is set in the NZTA Stormwater Treatment Standard for State Highway Infrastructure. This standard is appropriate for this Project, as the vast majority of the stormwater collection and treatment system will be constructed below the existing ground level, limiting the ability to 'spill' out of the system in large events.

The 100 year ARI standard exceeds the requirements of the CCC Waterways, Wetlands and Drainage Guide, the SDC Engineering Code of Practice and the NZ Building Code. Events in excess of this ARI have the potential to cause flooding upstream of the State highway and of the State highway itself.

4.11.3. Diversion of water races

Nine existing stockwater races cross the proposed alignment and various measures are required in conjunction with construction of the Project, particularly in relation to the CSM2 alignment. In addition, a 2.1km section of race which runs alongside Main South Road will be piped. These are illustrated in Figure 25 below.

Figure 25: Proposed diversions of stockwater races



Where stockwater races pass under the State highway, a siphon system will be constructed, with pipes typically measuring between 300mm and 450mm being utilised. In addition to the water supply function of the races they have a secondary function of being used for land drainage. Thus at each crossing two conduits will be required. A smaller pipe to convey the normal race flows and a large conduit to convey the storm flows under the Project alignment plus allow for maintenance of the smaller pipe.

In other cases, stockwater races will be diverted to allow for the construction of embankments and to reduce the number of siphons. These diversions will be fully lined to prevent water loss. This rationalisation of the stockwater race network will limit the number of piped crossings beneath the Project, reducing the risk of upstream flooding and minimising the on-going maintenance of the system.

The existing stockwater races at Weedons Ross and Weedons Road crosses Jones Road SIMT rail and SH1. Upgrades will be required to pipe stockwater race flows under Jones SIMT rail and SH1 to take race water and be suitable for its modified land drainage function. This pipe will also feed the “Digga-Link” race branch to feed the Larcombs and Berketts branches by means of a new 2.1 km pipe to be laid parallel with SH1.

The existing stockwater race on the west side of Robinsons / Curraghs Road will be piped below SH1 and continue flowing south on the other side. Minor realignment will be required to bypass the embankments required for the intersection construction. The function of the race can be maintained.

The existing stockwater race at the intersection to be formed between SH1 and CSM2 at chainage 800m will also be piped below the proposed CSM2 alignments. The function of the race can be maintained.

A minor realignment will be required to bypass the Waterholes Road roundabout and for intersection construction.

The existing stockwater race at the proposed Waterholes Road and SH1 will be piped under the new interchange. Further down Waterholes Road and at the SH1 underpass at chainage 1950m, the race will be piped below the proposed CSM2 alignment and realigned to suit the extents of the proposed embankments for the underpass. The function of the race will be maintained.

There is an existing stockwater race flowing south on the east side of Trents Road and one on the west side of Blakes Road. Trents Road will cross CSM2 by means of an underpass and modifications to the Trents Road stockwater race will be required as part of these works. It is proposed to realign the race along the bottom of the eastern embankment of Trents Road that will form the underpass. The stockwater race will pass below CSM2 and continue on in the new alignment until the proposed embankment ends, allowing the race to recommence its original alignment.

An existing branch departs the main stockwater race and heads west off Trents Road at chainage 250 before turning south, crossing the proposed CSM2 alignment at chainage 3100m. This branch connection point will be removed as part of the underpass works, and it is proposed that this branch be infilled or a soak pit be placed downstream of the final race user. This will reduce the requirement for a stockwater race crossing at chainage 3100m. The branch will recommence on the south side of the CSM2 alignment, picking up a new branch that will come from the realigned stockwater race on the western side of the Trents Road underpass.

It is proposed that the stockwater race on the south side of Blakes Road will continue but with reduced capacity and will terminate at a soakhole beside the CSM2 alignment. The overland flow / land drainage function of the race will continue and an inverted siphon under the CSM2 will allow this overland flow to continue down Blakes Road.

At Marshs Road the existing stockwater race will terminate and Shands Road and will become a land drainage race. The existing race is to be re-aligned to the toe of the new Marshs Road embankment and piped by siphon under CSM2.

Further changes to stockwater race / land drainage races are proposed at Springs Road and to the alignment of Montgomery's Drain at Halswell Junction Road.

At the John Paterson Drive extension the race is realigned along the western embankment of the extension.

The proposed rationalisation of the stockwater race network will reduce the maintenance burden of the scheme and minimise flooding risks to the Project and adjacent property owners. It will be implemented in accordance with the construction staging for the Project.

Only very brief shut downs of the races will occur to allow the new connections to be made. The new alignments will be constructed by excavating trenches, thrust piping or installing culverts. For thrust piped or excavated sections, once the alignment is completed the upstream connection will be made during which time a shutdown of the race may be required. Race shut offs would require the upstream junction to be closed off, leaving water flowing down only one of the races at a junction. This would allow the connection to occur and the closure or decommissioning of the upstream end of the existing alignment. Once the connection has been made, the new alignment can be used and supply will recommence.

For culverted sections of the alignment along MSRFL, over-pumping of the section in construction will be employed to maintain supply. A shut down would only be required for the final connection of the culvert. Shut downs are expected to be in the order of eight hours, but will not exceed 36 hours.

The Selwyn District Council Water Race Bylaw 2008 controls the shutdown periods of the water races. The Selwyn District Council Policy Manual (policy W117) includes a time limit for planned management of the system, limiting this to 36 hours. As stated above it is expected that all alterations and changes would be able to be carried out within eight hours which is well within the normal 36 hour shutdown period allowed by the Policy. The NZTA will seek approval from SDC for this.

Realignments and piping of water races are to occur on the land parcels listed in Table 9. All of the affected races are on land within the designation (and proposed to be acquired for the Project) and/or is on land already purchased by the Crown.

Table 9: Land parcels where works are required to pipe and realign water races

Property acquisition reference	Owner	Legal Description		Title Ref
MSRFL				
118	MacLee Holdings Limited	Pt Lot 3	DP 25904	CB8B/713
154	Timargo Holdings Limited	Lot 2	DP 25718	CB7D/15
CSM2				
2	Her Majesty the Queen	Lot 2	DP 81942	CB47B/504
16	Her Majesty the Queen	Lot 1	DP 408618	431405
18	Emma Joy Steel Michael Joseph Sweeney	Lot 2	DP 408618	431404
19	Her Majesty the Queen	Lot 3	DP 408618	431406
20	Her Majesty the Queen	Lot 1	DP 19955	CB760/91
22	Her Majesty the Queen	Lot 1	DP 322541	89932
23	Her Majesty the Queen	Lot 2	DP 340332	165870
44	Calder Stewart Industries Limited	Lot 1	DP 397092	387248

Property acquisition reference	Owner	Legal Description		Title Ref
MSRFL				
49	Her Majesty the Queen	Pt	RS 1480	CB493/44
50	Her Majesty the Queen	Pt	RS 1480	NZG1972p497
54	Richard John Sissons Carolyn Beverley Sissons	Lot 1	DP 318764	73541
59	Her Majesty the Queen	Lot 3	DP 307041	27368
66	Her Majesty the Queen	Lot 1	DP 19825	CB756/94
67	Grant Phillip England Halie Sharleen Kellaway	Lot 8	DP 318764	73548
103	Templeton Investments Limited	Lot 2	DP 18353	CB667/57
129	Godfried Maria Louise van Tulder Sandra Kay van Tulder Philip Robert Haunui Royal	Pt Lot 2	DP 82599	CB47D/144
171	Gary John Cross Gerard Joseph Twaites	Lot 1	DP 406023	421093
172	The Selwyn District Council	Section 2	SO 435267	544078
178	Martin Richard Harcourt Aiko Harcourt Peter Ian Cullen	Lot 4	DP 318764	73544
179	Fulton Hogan Land Development	Lot 2	DP 3256	CB759/44
181	Kiwi Rail	Main South Line		NA

Water supply will not be meaningfully disrupted to any other users outside of land required by the NZTA for the Project as a result of the realignment works. Therefore no other water race users will be affected.

4.11.4. Groundwater intervention

The majority of the Project has sufficient clearance from groundwater as not to be impacted by the groundwater level and seasonal variations thereof. The Central Plains Water Enhancement Scheme (CPWES) has now been consented and is part of the "existing environment" for planning purposes. There is a 4 m and 1 m predicted rise in the groundwater from the effects of the CPWES at the south and north ends of CSM2 respectively.

At the CSM2 ponds at Halswell Junction Road (Maize Maze and Ramp ponds) and the CCC ponds (Halswell Junction Road ponds and Owaka Basin), the future groundwater highs have the potential to impact upon pond performance. As such, a primary intervention strategy of controlled release of water collected in the stormwater ponds to Montgomery's Drain is proposed. A second

intervention strategy is proposed to intercept rising groundwater and to convey these flows by a gravity pipe and to discharge this flow to Upper Knights Stream.

At the Robinsons Road overpass, the future groundwater high level is predicted to flood the pavement for shorter periods of days to a month every few years. As such an intervention strategy to pump groundwater is potentially required to maintain an open road. Alternatively, the local road which passes under the State highway may be closed at times, when flooded. Local road diversions will be used in this situation.

4.12. Urban design and landscaping

The design and landscaping of the Project will follow the design principles in the NZTA Urban Design Policy (2007), and aims to ensure that:

- roads fit in sensitively with the landform and the built, natural and community environments through which they pass;
- all systems of movement along and across the corridor are integrated into the design of State highway projects with good connections and access to the communities;
- the design contributes to the quality of public space and to the road user's experience; and
- the design is generally consistent with the parkway appearance of CSM1 so it can be extended through to Main South Road.

The CSM2 alignment is considered to form a logical extension to the Christchurch urban limit between Springs Road and Shands Road. The motorway, in conjunction with Marshs Road, Halswell Junction Road and Upper Knights Stream Corridor, provide a robust urban limit.

The alignment is of a gentle curvilinear nature and the landscaping for the Project is in line with the NZTA's Environmental, Urban Design and Landscape Masterplan for CSM[53]. Landscaping has been designed with the possible views of the Port Hills and Southern Alps in mind.

The main objectives regarding the landscaping design of the Project are to:

- mitigate the visual effects of the Project;
- integrate with the planting and landscaping already in place at CSM1;
- retain open views to Port Hills and Southern Alps where possible; and
- develop site specific landscape treatment that complements any noise mitigation measures.

Landscape planting was chosen in order to be in keeping with the surrounding rural environment, and the historic native plantings of the area. Continuing with the CSM1 plantings, the focus is on the interchange embankments, amenity plantings, visual and noise mitigation plantings, and stormwater plantings.

[53] NZTA, 2011, Environmental, Urban Design and Landscape Masterplan for CSM

Walkway and cycleway links are included and safety sightlines, setbacks and Crime Prevention through Environmental Design (CPTED) provisions. The grassed median will be consistent throughout the Project, and will link with CSM1 near the Halswell Junction underpass.

4.13. Transmission lines

Two lines of Transpower pylons intersect just north of the proposed Shands Road / Marshs Road interchange and require modification as a result of the Project, in order to ensure safe clearances.

Realignment / strengthening of existing transmission lines is proposed to facilitate the proposed alignment. It is likely that one or two towers along the Islington-Springston A (ISL-SPN A) 66 kV transmission line will be increased in height and/ or relocated to provide the required ground and road crossing clearances required under the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34:2001).

Discussions with Transpower to confirm the exact modifications required to these lines are on-going.

4.14. Commercial Vehicle Inspection Unit (CVIU)

There has been a request from the NZ Police to include a Commercial Vehicle Inspection Unit (CVIU) facility as part of the Project in the vicinity of Halswell Junction Road. The CSM2 weigh station would include a weigh bridge catering for 25 m long vehicles with room for parking, inspection and unloading, and would also allow for drink driver testing. NZ Police would like the facility to be able to capture both northbound and southbound movements, with the potential need for associated variable message board signage to direct traffic. Overweight vehicle infrastructure is being planned and coordinated within the Greater Christchurch area. Further liaison between the NZ Police and the NZTA is required to confirm the ideal location, funding and operational details of this CVIU facility.

5. CONSTRUCTION OF THE PROJECT

Overview

This chapter provides an overview of key construction activities and is a basis for the assessment of environmental effects in Part G. Staging strategies have been developed to minimise the disruption and duration of construction.

There are a range of construction effects assessed in Part G of the AEE and within the technical reports, appended in Volume 3, with recommended mitigation measures included in these reports. The most significant construction effects requiring mitigation relate to earthworks, traffic management, the operation of SH1, general amenity effects on nearby properties relating to noise, vibration and dust. Also, there are works relating to land purchase and construction compounds.

Construction is expected to take between three and four years and will be carried out concurrently at several locations along the Project alignment. There is an overall philosophy to construct local road connections early in order to maintain local connectivity and minimise disruption during construction.

Initial enabling construction activities involve shifting of boundary lines, relocation of businesses and other property related effects, temporary and permanent property access, temporary road connections, and modification to utilities including high voltage transmission lines. Early works will also involve establishing an estimated four construction site compounds and smaller satellite compounds at interchange and bridge locations.

Construction related activity will be contained within the designation boundaries and relate to site clearing, establishing traffic management (including on roads outside the designated areas), constructing and maintaining sediment controls, earthworks, building of retaining and bridge structures, storm water devices, intersection upgrades, pavement surfacing, landscaping and related road furniture.

5.1. Introduction

This chapter contains high level information about the construction of the Project. Construction of the Project is influenced by a number of factors, including:

- designation and resource consent conditions;
- the detailed engineering design for the Project;
- construction duration and target completion date;
- procurement method adopted for construction of the Project;
- resource constraints that may arise as a result of the re-build effort following the Christchurch earthquake events;
- construction methodology;
- technology adopted for construction; and
- existing traffic demands at the time of construction.

This chapter is intended to provide sufficient detail on the anticipated construction activities to assess their potential environmental effects and to identify any necessary measures to avoid, remedy or mitigate those effects, where appropriate. It is recognised that once the contract for the Project has been awarded and a contractor is in place, the construction methodology will be further refined and developed. This will be undertaken within the scope of the designation and consent conditions which will be in place to manage the environmental effects of the construction activities. As such, this chapter should be considered as a guide to the likely construction activities, noting that the construction methodology and details may change.

Construction management plans supporting an overarching CEMP, a draft of which is contained in Volume 4, will be secured by conditions on the designations and consents and to ensure all mitigation measures are implemented as required. Should a contractor wish to undertake construction activities in a manner which is not authorised by the consents held, appropriate authorisations would need to be obtained at that time.

5.2. Early construction activities

5.2.1. Relocation of significant businesses

There are several significant businesses that are directly affected by the proposed Project works. The NZTA's property agents have already commenced discussions with these businesses and it is expected that they will have been relocated and/or any modifications will be completed prior to physical works commencing.

5.2.2. Local road connections

Main South Road rear access roads and property access

The majority of businesses and land owners along the MSRFL section have indicated during consultation they would like the proposed rear access roads on both sides of Main South Road to be built in advance of the main physical works contract. This will allow the affected properties to be re-orientated to the new road locations and be fully operational prior to the construction of MSRFL. The existing Main South Road accesses will be closed off, providing the contractor with a clear workspace and simpler traffic management, resulting in overall efficiency and cost savings. Access will be provided to each affected property off the new rear access roads.

Waterholes Road access to Southern Woods Nursery

A new road is proposed to access the land that becomes "landlocked" north of the Southern Woods Nursery as a result of the new CSM2 / Main South Road connection. The accessway extends from Waterholes Road running adjacent to the CSM2 alignment before veering south towards the Southern Woods Nursery and linking into an existing easement. This new connection will be constructed early to maintain access to these rear properties during the construction period.

5.2.3. Site compounds

There are four key locations proposed for site compounds, all within the proposed designation, which are outlined as follows:

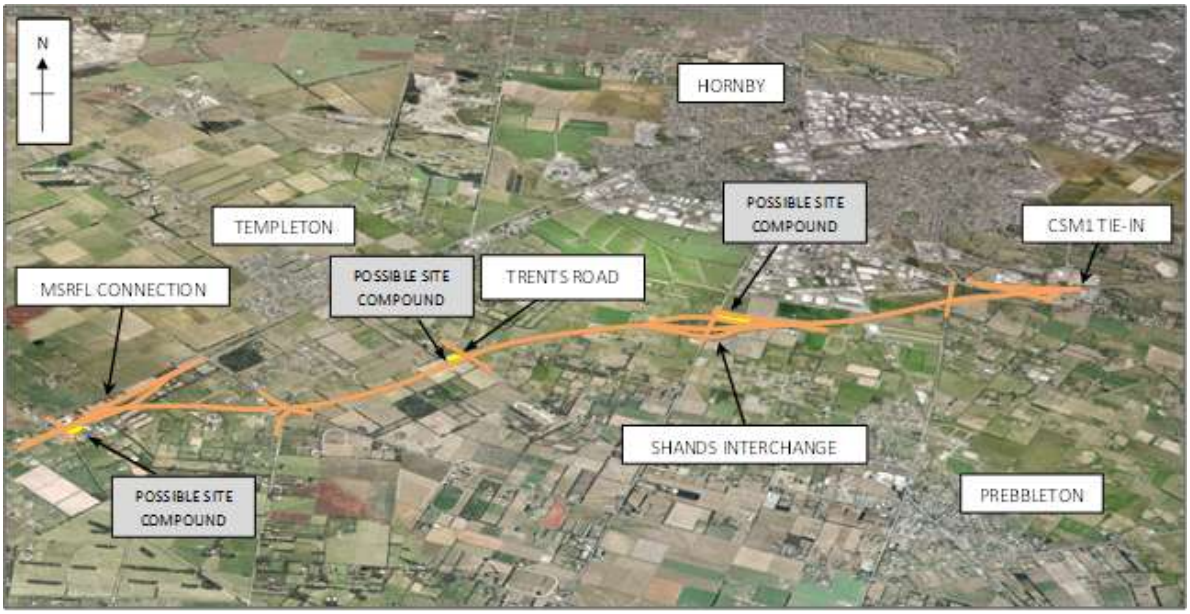
- east of the CSM2 / Robinsons Road, utilising the existing Evergreen Nursery facilities once it is vacated[54];
- north eastern corner of the Marshs / Shands intersection, in the space between the intersection and the proposed on ramp;
- inside the proposed parclo arrangement at Weedons Interchange; and
- near Trents Road.

The locations of the site compounds are presented in Figure 26 and Figure 27.

Figure 26: MSRFL available main site compound location

[54] Evergreen Nursery will be a total purchase so the contractor could use the garden centre building as the main project office.

Figure 27: CSM2 available main site compound locations



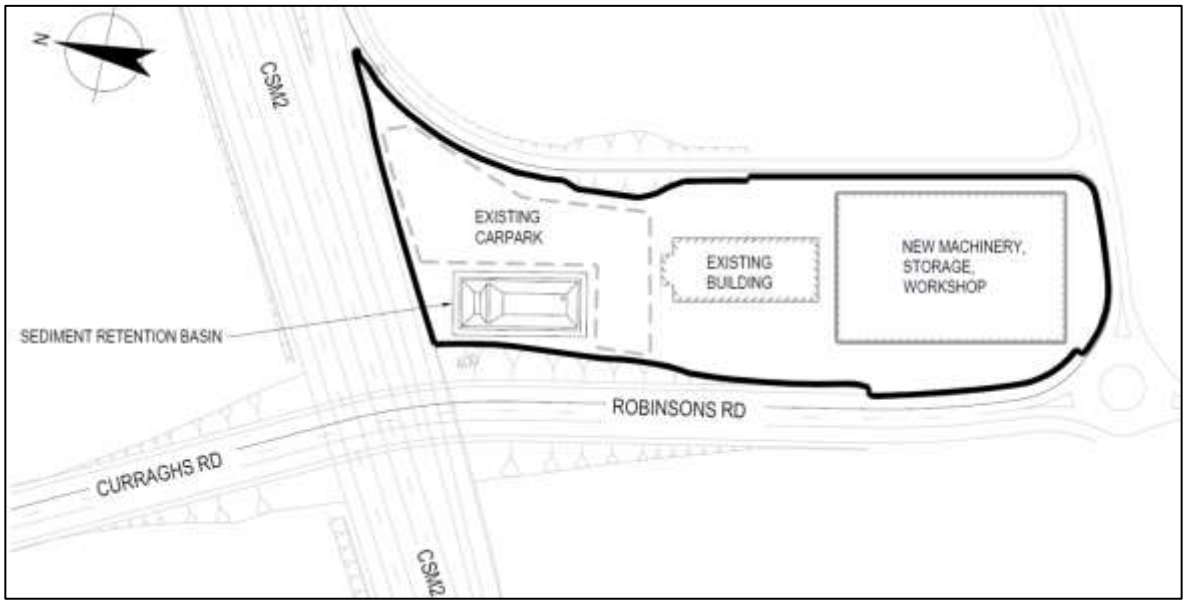
Additional smaller satellite compounds may be required by the contractor and have been shown at each interchange or bridge location.

The main site compound will contain features commonly associated with construction facilities, including:

- temporary site buildings;
- material laydown areas;
- workers' office and workshop accommodation;
- plant and equipment maintenance facilities;
- refuelling facilities;
- wheel washing and cleaning facilities;
- car parking; and
- plant and equipment storage areas.

An indicative layout for a main site compound is presented in Figure 28.

Figure 28: Indicative main site compound arrangement



Site compounds will be specifically designed prior to their establishment, in order to provide for the appropriate management of stormwater. This will involve the following elements:

- Perimeter bunds to prevent clean water run on from areas outside of the compound area and to prevent dirty water runoff from site compound onto adjacent land;
- Stormwater runoff within the compound is to be collected and treated prior to discharge to ground; and
- Fuel / chemical storage tanks will be bunded to a minimum of 110% of the storage tank volume to provide full containment in the event of a spill. Rainwater collected within the bunded area will be removed by vacuum truck and disposed of to an approved discharge facility.

5.2.4. Traffic management

Construction of the Project involves road closures, traffic management, diversions and periods of lowered speed limits on some roads, all of which have the potential to cause inconvenience to road users and residents. A Draft Construction Traffic Management Plan (CTMP) is contained within Volume 4 (Management Plans) detailing traffic management methodologies and mitigation measures to be adopted for the Project during construction.

The CTMP, when finalised by the contractor, will detail the traffic control activities, the impacts on pedestrians, cyclists, residents, businesses, public transport, and general traffic and typical mitigation measures that will be considered in the development of Site Specific Traffic Management Plans (SSTMP) and in the general management of Project construction. A SSTMP will be required for each of the work areas to maintain public road safety and minimise the disruption of the construction activities on motorists, and to provide a safe working environment for the contractors.

The extent of construction traffic is dependent on the phase of works. The majority of construction vehicle movements are expected to be to/from quarries located in areas to the west of Main South Road. Construction vehicles will therefore access Main South Road from the west, predominantly from Weedons Road, Dawsons Road or Curraghs Road. The specific route is dependent on the location of the site works. While the majority of construction movements will be via the roads specified above, other alternatives will be required for some sections. For example, for works on MSRFL west of Weedons Road where access is expected to be via a left turn at Hoskyns Road north of Rolleston.

Access to the Project from the city will be predominantly via Shands Road and Halswell Junction Road for the eastern end of the Project. Construction traffic travelling through Templeton will be encouraged to remain on Main South Road, rather than utilising Jones Road. The SSTMPs will detail the acceptable routes for construction vehicles and the expected frequency of heavy commercial vehicle movements. Any required mitigation measures will also be assessed and detailed in the SSTMPs. Construction related truck drivers are to be briefed on the appropriate routes and made aware of sensitive areas and points of high pedestrian and cycle usage.

Construction traffic movements through certain intersections and roads, at locations to be agreed with the Road Controlling Authorities, will be restricted at am and pm peak periods to reduce the impact of construction vehicles. In these instances, alternative routes will be established or the timing of construction movements adapted to maintain capacity. These restrictions will be detailed in the SSTMPs.

5.2.5. Alteration of services

Transpower 66 kV transmission lines

Transpower currently operate two main transmission lines within the Project area being:

- a 220kV line that runs in a northwest to southeast direction, passing to the north of the Shands/Marshs intersection and north of the Prebbleton Township; and
- a 66kV line that runs north/south, generally parallel and to the west of Shands Road. This 66kV line passes under the alignment of the 220kV line approximately 200 m north of the Shands Road/Marshs Road intersection.

The proposed CSM2 alignment passes under the 220kV line just south of Marshs Road and under the 66kV line just to the west of Shands Road. The standard clearance envelope is not achieved where CSM2 passes under the 66kV line. Transpower is currently undertaking a study for the modification of these lines to achieve the required clearance standards. The preferred option is to raise one, possibly two, of the existing towers, one of which may also require minor relocation to achieve horizontal and vertical clearances.

The preferred solution will be identified when the Project advances to detailed design. Any modifications to these 66 kV lines will be undertaken prior to the construction of CSM2 in that area. This will provide the contractor with a clear and safe working space during the construction of the Shands Road interchange.

Orion utilities

Throughout the Project area, electricity distribution assets are owned and operated by Orion (excluding the transmission lines note above). Numerous overhead and underground lines will be affected by the Project. Necessary modifications to the Orion infrastructure will be carried out prior to the main alignment works, as this will allow a more efficient and construction environment during construction.

Telstra Clear and Chorus utilities

Telecommunications assets within the Project area are owned by Telstra Clear and Chorus. Several underground fibre optic cables will be affected by the Project. Necessary modifications to the telecommunications infrastructure will be carried out prior to the main alignment construction starting.

5.2.6. Erosion and sediment control

Erosion and sediment control will be installed prior to bulk earthworks and will be maintained throughout the duration of the construction works to ensure protection of the downstream receiving environment from the adverse effects of sediment from the work area.

An Erosion and Sediment Control Plan (ESCP) will be prepared by the contractor as part of the CEMP. A draft ESCP is included in Volume 4 of the application documents. The principle behind the ESCP is to control erosion across the construction site, to manage any sediment-laden stormwater runoff and prevent unacceptable discharges of sediment into the receiving environment. As the receiving environment is groundwater, the protection of the groundwater aquifer is also required.

Typical erosion and sediment control mitigation measures to be implemented in advance of bulk earthworks are as follows:

- for fill areas, a ditch with a silt fence will be constructed at the bottom of the embankment to catch and contain unsuitable runoff from the earthworks;
- for areas in cut, a channel will be formed at the side of the road to collect run-off from the embankments;
- stabilise/roughen the surface of embankments with mulch, a weed mat and landscape planting to reduce erosion and assist with dust control;
- the sediment from the main alignment will be collected by the permanent swales which will initially be excavated to approximately 200mm above the final level. Temporary bunding will be provided at 100m intervals along the swale to slow the flow and allow sediment to settle to the bottom. Shortly before completion of the Project, the swales will be cleaned and cut to their final level;
- decanting earthbunds will be installed at soak pit locations to protect soak pits; and
- material stockpiles will be at nominated locations or the contractor has to assess the effects of runoff of alternative locations.

All sediment and erosion control measures will be inspected on a regular basis and following any significant rainfall event. The ESCP is a "live" document, and should be reviewed and updated where necessary if any measure is not achieving its intended purpose.

The options for disposal of stormwater runoff during construction are limited by the absence of surface water disposal points. Key issues which require management in the ESCP are:

- control of stormwater and isolating runoff from the stockwater network;
- keeping clean water separate from sediment laden construction runoff;
- protecting adjacent landowners from surface discharge from the construction runoff;
- minimising sediment leaving the site; and
- disposal of excess water to land.

Sediment retention devices are proposed throughout the construction phase of the Project, including decanting earth bunds, swales with bunding, sediment retention ponds and silt fencing.

Temporary soakage solutions will be used to dispose of runoff from the site. Regular positioning of soak pits along the construction corridor will be undertaken to minimise the risk of discharges from the site. Sediment retention basins will be used at sites where soak pits are required for prolonged periods. This will allow waterborne sediment to settle out prior to disposal, thus limiting the need for regular cleaning and/or replacement of the soak pits.

More details regarding erosion and sediment control measures for the Project are contained within Volume 4 (Management Plans) which includes the draft ESCP (SEMP002).

5.2.7. Stockwater race modifications

Modifications will be required to the existing stockwater race network, where stockwater races are being decommissioned or diverted. These will be constructed early to provide a clear working site and to separate the construction sites from surface waters.

5.2.8. Water

Water will be required for a number of construction activities, including:

- dust suppression;
- earthworks supply (moisture conditioning for engineered fill construction);
- pavement works;
- concrete and aggregate production (placement and curing);
- irrigation for landscaping to establish a vegetation cover; and
- vehicle tyre wash to prevent tracking of sediment on roads.

Water will be sourced from existing local wells and/or brought to site by water truck. There is also the possibility of taking water from the stockwater races, subject to SDC approval and any resource consents required for this.

The peak water demand (typically full scale construction occurring during the summer months) has been estimated at 2,500m^3 per day. The volume of water required will be reduced during periods of wet weather. This water needs to be readily available across the construction site.

The contractor will obtain sufficient water supply for construction of the Project. At this stage it is not desirable to confine the contractor to a particular source. Should the chosen source(s) require additional resource consents, then the contractor will be required to obtain these directly from ECan.

5.2.9. Noise and vibration

The most effective way to control construction noise and vibration is through good on-site management. A draft Construction Noise and Vibration Management Plan (CNVMP) has been prepared for the Project and is contained within Volume 4 (Management Plans). This plan includes information required by NZS 6803:1999 Acoustics – Construction Noise, such as:

- general construction practices, management and mitigation;
- noise management and mitigation measures specific to activities and/or receiving environments;
- monitoring and reporting requirements;
- procedures for handling complaints; and
- procedures for review of the CNVMP throughout the Project.

The CNVMP will be implemented on site for each specific area of work. Construction noise management schedules will be prepared for each area of work once details of construction equipment and locations have been confirmed.

Where compliance with the relevant construction noise criteria in NZS6803:1999 cannot be achieved with the implementation of practicable management and onsite mitigation, a Site Specific Noise Management Plan (SSNMP) will be developed in communication with the affected residents and relevant Council. A SSNMP will set out specific conditions relating to a defined activity in a pre-determined location and be relevant for that activity only. Generally, SSNMPs are developed for activities that have been identified as likely to exceed the Project noise criteria, prior to commencement, and onsite mitigation is not practicable. This may apply to activities such as the bridge beam placement which is proposed to occur during night-time in order to avoid daytime road closures of local main roads.

Table 10 outlines the plant and machinery likely to be required during construction activities which will produce noise emissions.

Table 10: Plant and machinery involved in construction activities

Construction Activity	Plant and Machinery likely to be required
Topsoil Stripping	Motor-scraper, excavator, trucks and water carts.

Construction Activity	Plant and Machinery likely to be required
General Earthworks	Large excavators, spreaders, rollers/compactors, trucks and water carts.
Bridge foundations	Excavators, steel sheet piling, rollers/compactors, pile drivers for bored concrete piles and driven steel piles, truck movements.
Bridge Construction	Mobile cranes, truck movements, concrete pumping
Pavement Construction	Spreader machine, grader, paving machine, vibratory roller, truck movements and water carts.
Electricity Network Utilities	Mobile cranes and jointing methods

5.2.10. Dust

The most effective way to control construction dust is through good on-site management. A draft Air Quality Management Plan (AQMP) has been produced for the Project and is contained within Volume 4 (Management Plans).

The AQMP will be implemented on site for each area of construction work, to manage the following potential sources of dust and other air contaminant discharges associated with the construction phase of the Project:

- dust from roads and access areas generated by trucks and other mobile machinery movements during dry and windy conditions;
- excavation and disturbance of dry material;
- loading and unloading of dusty materials to and from trucks;
- smoke and odour from diesel-engine machinery and truck exhausts; and
- stockpiling of materials including material placement and removal.

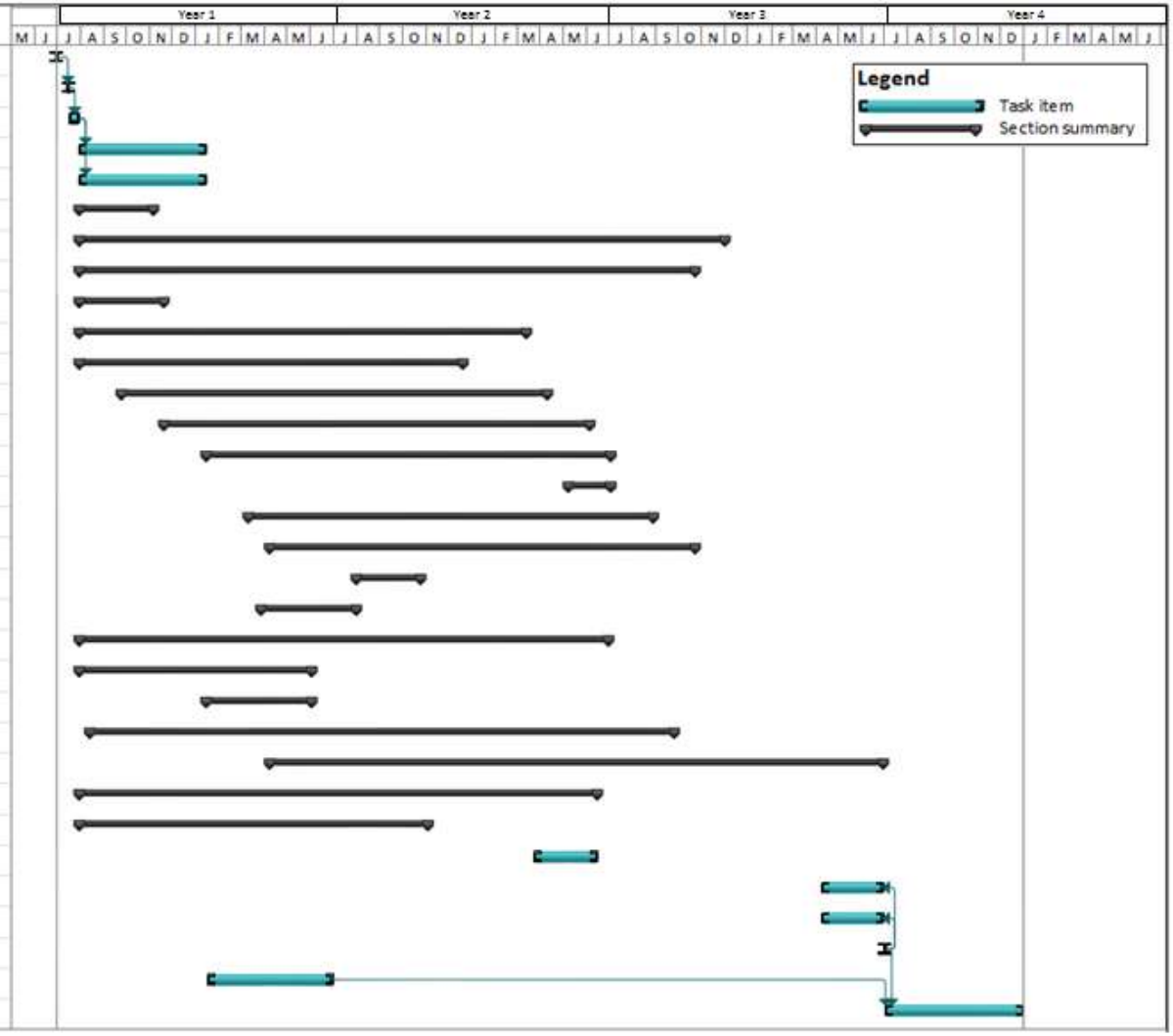
Chapter 18, the air quality effects assessment, contains a detailed list of the proposed mitigation measures to be adopted for this Project.

5.3. Construction programme

An indicative construction programme has been developed to inform the AEE, which is provided in Figure 29. Construction of the Project will take three to four years and will be carried out simultaneously at several locations along the Project alignment.

Figure 29: Indicative construction programme

ID	Task Name	Duration
1	Award of construction contract	1 day
2	Site possession	1 day
3	Stand down period	10 days
4	Site Clearance	120 days
5	Erosion and Sediment control	120 days
6	**Site Compound**	**70 days**
9	**Utilities**	**611 days**
30	**Local Road Connections**	**582 days**
31	**John Patterson Drive**	**80 days**
35	**Halswell Junction Road**	**422 days**
44	**Springs Road**	**362 days**
51	**Marshs Road**	**402 days**
59	**Shands Road**	**402 days**
67	**Trents Road**	**382 days**
74	**Blakes Road**	**40 days**
76	**Waterholes Road**	**382 days**
85	**Weedons Road**	**402 days**
92	**Levi Road**	**61 days**
96	**Weedons Ross / Jones Road roundabout**	**90 days**
98	**Robinsons / Curraghs Road**	**501 days**
109	**Western Rear Access Road**	**220 days**
112	**Eastern Rear Access Road**	**100 days**
115	**CSM2 Alignment**	**552 days**
121	**MSRFL Alignment**	**581 days**
130	**Stormwater**	**490 days**
131	**Stormwater Ponds**	**330 days**
136	Overland flow soakpits	60 days
137	Lighting	60 days
138	Barriers	60 days
139	Open CSM2 and MSRFL	1 day
140	Construct Waterholes / Dawsons roundabout	120 days
141	Risk / Contingency	130 days



5.4. General construction activities

5.4.1. Earthworks

The Project will generate approximately 405,000m^3 of excavated (cut) material (excluding topsoil) with approximately 320,000m^3 of this cut material suitable to be placed for fill embankments. Approximately 1,035,000m^3 of fill will be required for the Project of which approximately 715,000m^3 will be imported fill, approximately 300,000m^3 of topsoil will be stripped and stockpiled for reuse on site, as appropriate.

Imported fill

The imported fill will be sourced from local quarries or rivers (Waimakariri/Selwyn) or from suitable screened demolition material resulting from the recent Christchurch earthquakes, if economically viable.

Cut slopes

Cut slopes will be minimal, generally up to 2.9m in height with shallow cut slopes of 4h:1v. The only exception will be the Robinsons Curraghs link which passes under Main South Road in a 7m deep cutting. Cut material will be excavated mechanically and will be stockpiled or loaded directly onto trucks to be transported for use elsewhere on the Project.

Fill embankments

The fill embankment slopes, typically up to 8m in height (to a maximum of 10.5m high), will be formed from materials sourced from cuttings but predominately from imported fill.

Surplus material and topsoil

There will be approximately 85,000m^3 of excavated material that is deemed unsuitable for construction. For the most part, this material can be disposed of on site, reducing haulage distances. There is sufficient capacity within the site to accommodate the currently identified volume of waste fill material although the NZTA may also choose to use some of the fill for one or more of its other projects in the region.

All topsoil will be removed and stockpiled. Some topsoil will be re-used within the Project area. There is expected to be excess topsoil which will be available for re-use elsewhere.

5.4.2. Bridges and retaining walls

The Project will involve the construction of nine bridges and associated retaining walls for the interchanges, overpasses and underpasses. Bridge components such as steel and precast concrete deck beams, will be manufactured in a controlled environment at an off-site facility. Other components such as columns and deck topping slabs will be cast in-situ using local ready mixed concrete providers.

The bridge foundation piles will be either bored concrete or driven steel sections. The Design Philosophy Report (Technical Report 1, Volume 3) has full details of the materials required for the proposed bridge structures.

5.4.3. Pavement and surfacing

The proposed materials for the CSM2 and MSRFL mainline pavement are an Open Grade Porous Asphalt (OGPA) or Stone Mastic Asphalt (SMA) surfacing over a foamed bitumen stabilised base, which in turn overlays a sub-base. The depth of the sub-base material varies at different locations. The pavement for the local roads has still to be determined; however the surfacing is likely to be chip seal.

The sub-base and base layer granular materials will be imported to site by trucks and laid by a grader and roller compacted to the required levels. The base layer will utilise specialist equipment to modify the material to create the foamed bitumen layer. The asphalt surfacing material will be delivered to site by trucks and laid by a paving machine.

One main alignment carriageway will be utilised as a haul route through the site after the sub-base material has been laid. The other carriageway can be completed to seal to enable immediate protection of the pavement layers. Following completion of all earthworks, the haul route will be paved and surfaced.

5.5. Site specific construction

This section outlines the Project in five sectors and discusses the construction activities that will be undertaken in each sector, anticipated sequencing of construction activities and management of these activities. An overview of traffic sequencing details for each sector is provided in Chapter 8 of the Assessment of Traffic and Transportation Effects (Technical Report 2).

5.5.1. Sector 1 - Weedons Road Interchange and Main South Road Four Laning

This sector is located between chainage 1350 (south end of existing passing lanes) and 5900 (south of Robinsons Road intersection), and includes Weedons Road interchange and 4.55km of the Main South Road mainline.

Construction activity overview

Early works include the Main South Road rear western and eastern property access routes and relocation or protection of electricity and telecommunication services. This will enable the closing of property access onto Main South Road, to facilitate the upgrade of this existing state highway.

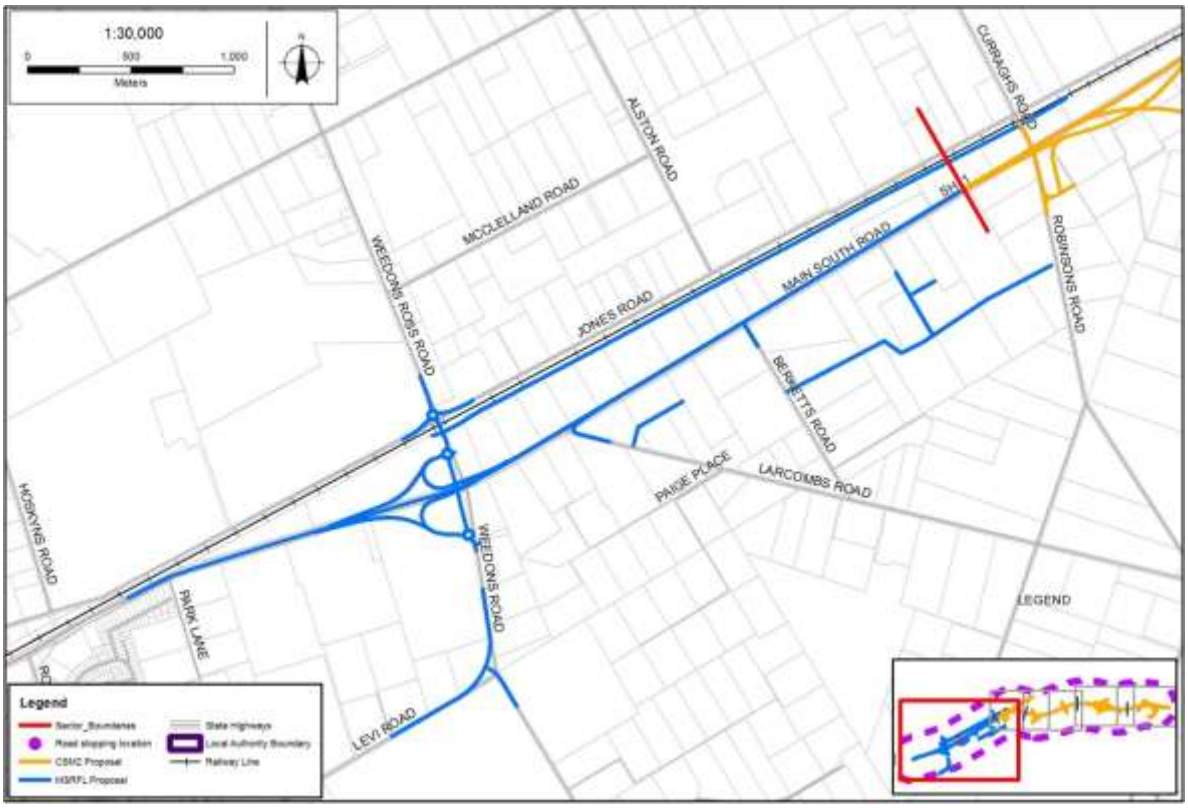
There is land available within the footprint of the Weedons interchange for a potential site compound location, if the contractor needs this.

Construction of the Jones Road/Weedons Ross Road intersection will be undertaken early to provide a secure detour route when part of Weedons Ross Road is closed later in the Project. The improved intersection works at Weedons Road/Levi Road can also be undertaken at this time.

The Weedons Road underpass and embankments are being constructed off-line from the existing Weedons Road alignment enabling access to existing dwellings. This will be followed by construction of the on and off-ramps to complete the interchange.

The widening of the Main South Road west (future northbound) carriageway will be constructed at the same time as the interchange before moving over to reconstruct the existing carriageway (future southbound lanes), which will include the interchange tie-ins to Main South Road. Incorporated in the east carriageway works will be restricted access to Larcombs Road (left turns in only) and Berketts Road (left in and left out turns). This will be followed by construction/installation of roadside infrastructure, including lighting, road side barriers and signage.

Figure 30: Extent of Sector 1



Weedons Road underpass

Construction of the four span Weedons Road underpass will involve reinforced concrete spread footing foundations, abutments, columns and cross-head construction. The double hollow core deck beams will be manufactured off site in a precast concrete construction yard and then transported to site and placed in position followed by construction of the in-situ concrete topping slab.

Temporary traffic management

The following traffic management will be utilised:

- the western (northbound) carriageway of Main South Road will be constructed allowing traffic to remain on the existing carriageway. Traffic will then be moved over to the new carriageway to upgrade the existing carriageway;
- Berketts Road will be closed during its reconstruction with vehicle access diverted to Larcombs Road. The opposite will apply when undertaking the works at Larcombs Road with alternative property access provided where necessary; and
- Bridge beam placement may proceed under night-time closures due to day-time traffic volumes on Main South Road. The traffic detour will utilise Jones Road; and
- close Weedons Ross Road between the access to the Digga-link property, on the corner of Main South Road and Weedons Ross Road, and the western property rear access road to allow the construction of the northern interchange roundabout. The traffic detour will utilise Jones Road.

Erosion and sediment control

The general mitigation measures stated in 5.2.6 will apply for this sector.

Stockwater races and siphons

Stockwater race modification includes:

- the piping of the open stockwater ditch on the eastern side of Main South Road;
- increasing the capacity of stockwater race and associated culvert adjacent to Weedons Ross Road, to compensate for the decommissioning of the stockwater race 200m north of Weedons Ross Road; and
- maintaining overland flow capacity and land drainage function of the stockwater races by installation of siphons to convey flows under the MSRFL carriageway.

Service relocations

A number of existing services require relocation or protection as follows:

- undergrounding/relocation of the Orion 66kV overhead lines and 11kV underground lines in the vicinity of the substation located on Weedons Ross Rd adjacent to the railway corridor;
- undergrounding/relocation of Orion 11kV overhead lines that currently run along the eastern side of Main South Road from Park Lane to Waterholes Road and also along Jones Road; and
- protection and/or relocation of Telstra Clear underground fibre optic cables

5.5.2. Sector 2 - Robinsons Road / Curraghs Road/ Dawsons Road

This sector, between chainage 0 and 1500 (CSM2), includes Robinsons Road overpass, Main South Road (Main South Road)/CSM2 interchange, Main South Road/Dawsons Rd intersection and 1.5km of the CSM2 mainline.

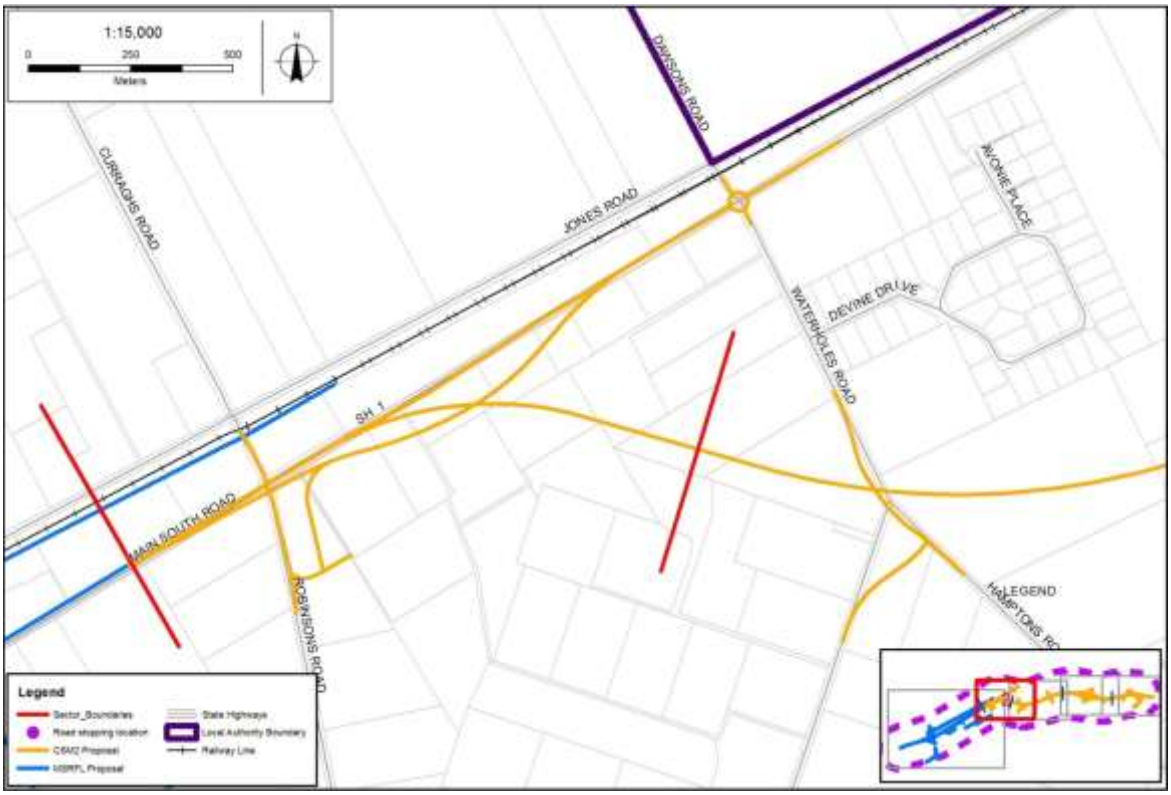
Construction activity overview

Early works include the relocation or protection of electricity and telecommunication services. There is land available northeast of CSM2 and Robinsons Road for a potential site compound location, if the contractor requires this.

Initial work will include the construction of alternative access arrangements, via Robinsons Road, to properties on the eastern side of Main South Road and construction of a new land drainage culvert, which will enable construction of the SH1 Southbound On-Ramp Bridge to be undertaken. The construction of the new Main South Road/Dawsons Road roundabout will be undertaken at this time also, to provide a safe crossing of Main South Road.

The Robinsons Road overpass will be then constructed in two stages in conjunction with the widening and reconstruction of Main South Road. The main motorway alignment, which is generally at-grade, will commence at this time, followed by construction/installation of roadside infrastructure, including lighting, road side barriers and signage.

Figure 31: Extent of Sector 2



Robinsons Road overpass

Construction of the single span overpass will be undertaken in two stages, with the south half first followed by the north half. The abutments comprise a reinforced concrete footing supported on top of vertical mechanically stabilised earth retaining walls. The double hollow core deck beams

will be transported to site and placed in position followed by construction of the in-situ concrete topping slab.

SH1 southbound on-ramp bridge

Construction of the four span bridge will involve reinforced concrete spread footing foundations, abutments, columns and cross-head construction. The steel I-girder deck beams will be transported to site and placed in position followed by construction of the in-situ concrete topping slab.

Temporary traffic management

The following construction traffic sequencing will be utilised:

- Robinsons Road overpass will be constructed in two parts. This will initially require closure of Robinsons Road between the new roundabout and Main South Road (for construction of the southern half of the bridge) and then closure of Robinsons Road between the new roundabout and Jones Road (for construction of the northern half of the bridge). Traffic will use Waterholes Road as the diversion route;
- diversion of all Main South Road traffic to the SH1 Southbound On-Ramp, which would be used for two-way traffic, will be necessary to enable construction of the Robinsons Road overpass and tie-in between CSM2 and Main South Road;
- the earlier works will enable the motorway overpass to be completed with associated traffic management at its tie in with Main South Road; and
- the new roundabout at Main South Road/ Dawsons Road can be built on line with standard traffic management in place.

Erosion and sediment control

In addition to the general mitigation measures stated in 5.2.6, it will be necessary during construction to pump out surface water from the cutting at Robinsons Road overbridge to the proposed sediment retention basin at the south east corner of Robinsons Road and Main South Road.

Stockwater races and siphons

Modification includes:

- diversion of existing stockwater race to the north east of the new roundabout at Main South Road/Dawsons Road;
- diversion of the existing stockwater race at chainage 780 under Main South Road, CSM2 and SH1 Southbound On-Ramp Bridge via a siphon;
- diversion of the existing stockwater race at chainage 370 further west of Robinsons Road; and
- the instllation of a series of siphons early in the construction sequence to maintain the passage of overland flow under the proposed carriageway.

Service relocations

A number of existing services require relocation or protection as follows:

- undergrounding/relocation of Orion 11kV overhead lines that currently run along the eastern side of Main South Road from Park Lane to Waterholes Road and also both sides of Waterholes Road/Hamptons Road; and
- protection and/or relocation of Chorus underground fibre optic cables running under CSM2 at chainage 700.

5.5.3. Sector 3 - Waterholes to Blakes

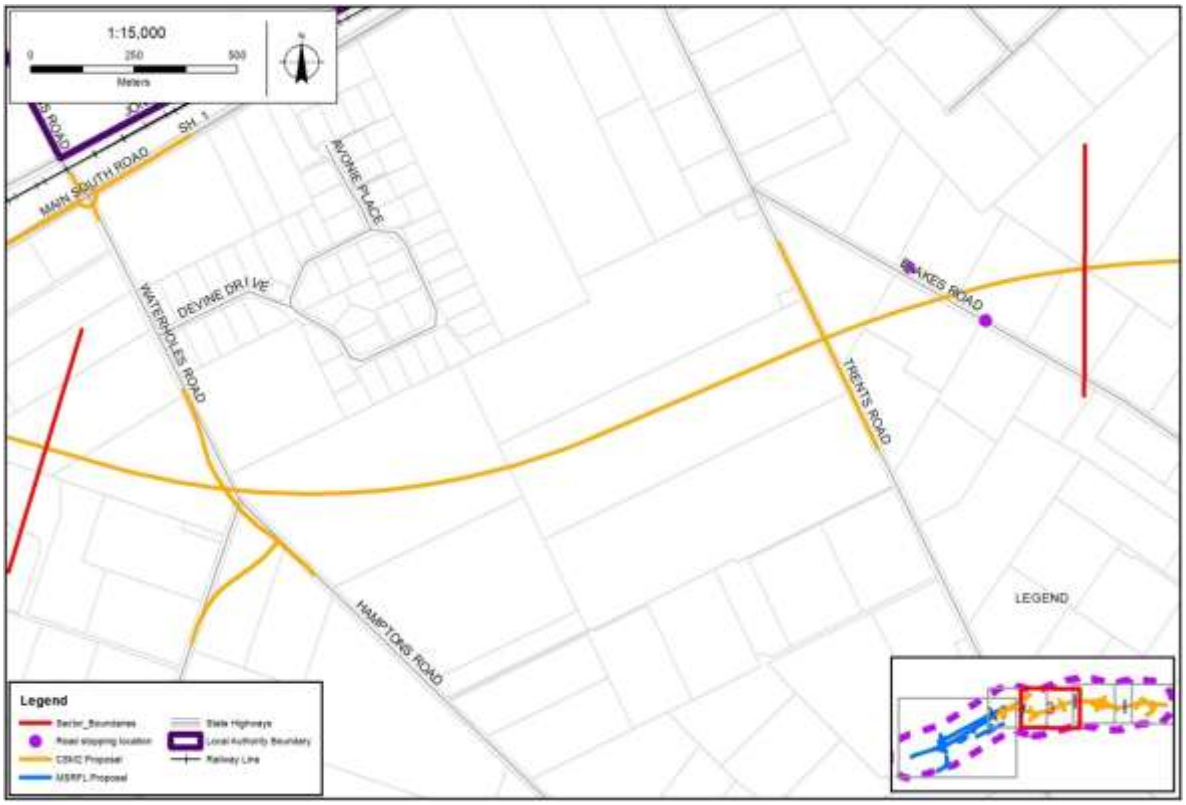
This greenfields sector, between chainage 1500 and 4200, includes the Waterholes Road underpass, Trents Road underpass, the closure of Blakes Road and 2.7km of the CSM2 main alignment.

Construction activity overview

Early works include the relocation or protection of electricity and telecommunication services and construction of the access road from Waterholes Road through to Southern Woods (required before two driveways are closed where CSM2 merges with Main South Road). A site compound location could be constructed west of Trents Road, north of CSM2, if the contractor requires

The construction of the embankments and bridges of Waterholes Road and Trents Road will be undertaken first followed by the main motorway alignment, which is generally at-grade. After completion of the Trents Road underpass, the infrastructure will be put in place to terminate Blakes Road either side of CSM2, which will then enable construction of the motorway mainline to be undertaken at this location. This will be followed by construction/installation of roadside infrastructure, including lighting, road side barriers and signage.

Figure 32: Extent of Sector 3



Waterholes Road underpass

Construction of the four span underpass will involve reinforced concrete spread footing foundations, abutments, columns and cross-head construction. The double hollow core deck beams will be transported to site and placed in position followed by construction of the in-situ concrete topping slab.

Trents Road underpass

Construction of the three span underpass will involve reinforced concrete spread footing foundations, abutments, columns and cross-head construction. The double hollow core deck beams will be transported to site and placed in position followed by construction of the in-situ concrete topping slab.

Temporary traffic management

As this is a greenfields sector, temporary traffic management requirements are limited to the local road crossing points. The following construction traffic sequencing will be utilised:

- a temporary road will be constructed to the west of Waterholes Road / Hamptons Road, including an intersection with the existing Waterholes Road, which will enable construction of the embankments and bridge to be undertaken;

- a temporary road will be required to the east of Trents Road, which will divert to the section of Blakes Road north of the CSM2 alignment, providing uninterrupted access to construct Trents Road bridge and northern embankment and
- bridge beam placement may proceed under night-time closures due to the volume of daytime traffic using both Waterholes Road and Trents Road.

Erosion and sediment control

The general mitigation measures stated in 5.2.6 will apply for this sector.

Stockwater races and siphons

Modification includes:

- relocation of the stockwater race along Trents Road to the east to keep it clear of the new embankments;
- new westbound and eastbound connections, along the southern side of CSM2, are required to connect with the existing stockwater races at chainage 3100 and along Blakes Road. Siphon piped crossings are required under CSM2, Trents Road and Blakes Road;
- the decommissioned stockwater race along Blakes Road, to the north of CSM2, is to be retained to act as a land drainage function during heavy rain;
- diversion of the stockwater race along the east side of Waterholes Road will be required to keep it clear of the new embankments, which will include a siphon piped crossing of CSM2; and
- the instllation of a series of siphons early in the construction sequence to maintain the passage of overland flow under the proposed carriageway.

Service relocations

Existing services require relocation or protection as follows:

- relocating Orion 11kV overhead lines at Trents Road and Blakes Road; and
- protection and/or relocation of Chorus underground fibre optic cables running NE-SE under Trents Road.

5.5.4. Sector 4 - Shands Road Interchange and Marshs Road

This sector, between chainage 4200 and 6600, includes the Shands Road interchange, Marshs Road underpass and 2.4km of the CSM2 mainline.

Construction activity overview

Early works includes the relocation and protection of electricity and telecommunication services, including the lifting of the existing Transpower 66kV overhead transmission lines at the interchange to provide the necessary clearance envelope. The realignment of the Hornby Industrial Rail Line including an eastern turnout at the eastern end of this section will also be required. A site compound is available to be constructed on the southeast corner of the Marshs

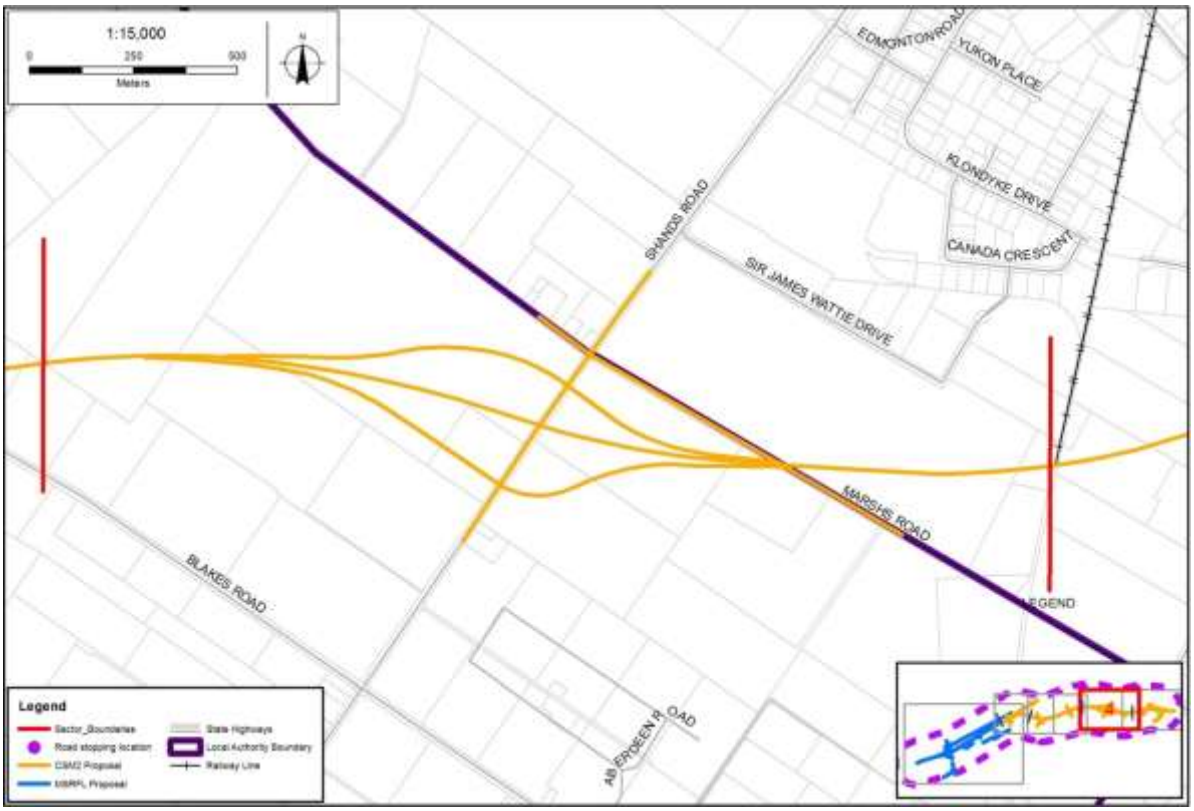
Road / Shands Road intersection, in the space between the intersection and the proposed on-ramp.

The construction of the embankments and bridges at Shands Road and Marshs Road will be undertaken first followed by the main motorway alignment and the on and off-ramps, which are generally at-grade. This will be followed by construction/installation of roadside infrastructure, including lighting, road side barriers and signage.

The installation and commissioning of traffic signals at three intersections will occur at the existing Shands Road/Marshs Road, proposed Shands Rd/eastbound off-ramp/eastbound on-ramp, and proposed Shands Rd/westbound off-ramp/westbound on-ramp.

The commercial vehicle inspection unit (CVIU) facility, including a weigh station and parking/ inspection area, will be constructed at the southeast corner of the Marshs Road/Shands Road intersection nearing the completion of the Project, or independently to it.

Figure 33: Extent of Sector 4



Shands Road underpass

Construction of the three span underpass will involve piled foundations, reinforced concrete abutments, columns and cross-head construction. The double hollow core deck beams will be manufactured off site in a precast concrete construction yard and then transported to site and placed in position followed by construction of the in-situ concrete topping slab.

Marshs Road underpass

Construction of the four span bridge will involve piled foundations, reinforced concrete abutments, columns and cross-head construction. The steel I-girder deck beams will be transported to site and placed in position followed by construction of the in-situ concrete topping slab.

Temporary traffic management

The following construction traffic sequencing will be utilised:

- temporary roads can be constructed to the west of Shands Road and to the southwest of Marshs Road to enable construction of the bridges and embankments on these two local roads; and
- bridge beam placement may proceed under night-time closures due to the volume of daytime traffic using both Shands Road and Marshs Road.

Erosion and sediment control

The general mitigation measures stated in 5.2.6 will apply for this sector.

Stockwater races and temporary stormwater management

Modifications are:

- diversion of the existing stockwater race further north of Marshs Road, to be clear of the bridge embankments, which will include a piped crossing under CSM2, the capacity of which will need to consider the land drainage function too; and
- installation of a number of additional siphons to be constructed early in the construction sequence to maintain land drainage.

Service relocations

Specific existing services require relocation or protection as follows:

- lifting the existing Transpower 66kV overhead transmission lines at the interchange;
- relocating 11kV overhead line at Marshs Rd and 33kV overhead line along Shands Rd; and
- protecting and/or relocating Chorus underground fibre optic cables running north east to south east through the interchange.

5.5.5. Sector 5 - Springs Road / Halswell Junction Road

This sector, between chainage 6600 and 8600, includes the tie-in with CSM1, Halswell Junction Road interchange, Springs Road underpass and 2km of the CSM2 mainline. The John Paterson Drive realignment is also within this sector.

Construction activity overview

Early works include the relocation or protection of electricity and telecommunication services.

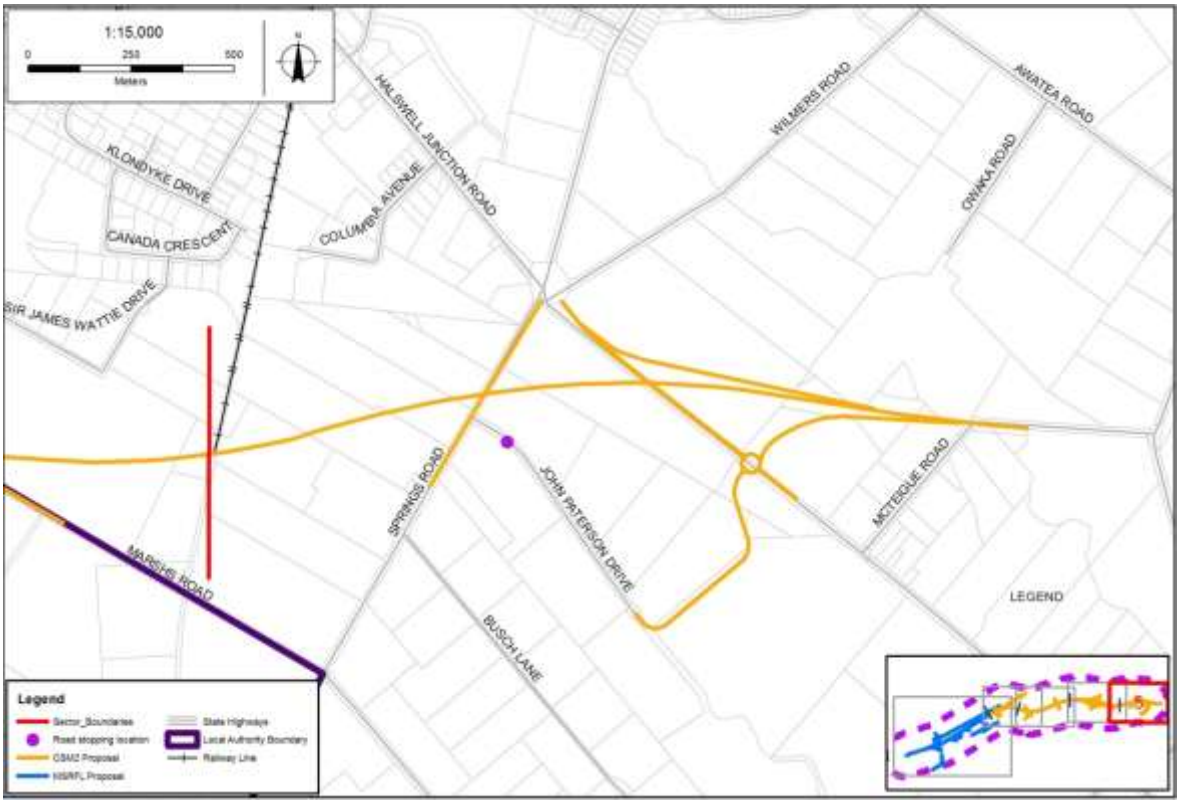
Initial works will involve the construction of three stormwater retention ponds in the vicinity of Halswell Junction Road interchange. Two of these will be either side of the Halswell Junction Road westbound off–ramp with a pipe connecting them. The third pond (Maize Maze Pond) is located at the south west corner of CSM2 and Halswell Junction Road. After the new ponds are operational, part of the existing CSM1 Mushroom pond will be filled in to enable the construction of the Halswell Junction Road eastbound on-ramp later in the Project.

Following construction of the Halswell Junction Road westbound off-ramp, the realignment of John Paterson Drive and deconstruction of the existing CSM1/Halswell Junction Road roundabout, the embankments and bridges along Halswell Junction Road and Springs Road can be constructed.

During this time the construction of the mainline motorway, which is generally at-grade, together with the Halswell Junction Road eastbound on-ramp will commence. This will be followed by construction/installation of roadside infrastructure, including lighting, road side barriers and signage.

The construction of a remote shared cycleway/footpath (an extension of the CSM1 route at the Owaka subway), continuing west along the CSM2 alignment, passing under Halswell Junction Road and Springs Road and connecting to Little River Rail Trail, can be undertaken during the main motorway alignment works.

Figure 34: Extent of Sector 5



Springs Road underpass

Construction of the four span underpass will involve piled foundations, reinforced concrete abutments, columns and cross-head construction. The double hollow core deck beams will be manufactured off site in a precast concrete construction yard and then transported to site and placed in position followed by construction of the in-situ concrete topping slab.

Halswell Junction Road underpass

Construction of the four span underpass will involve piled foundations, reinforced concrete abutments, columns and cross-head construction. The double hollow core deck beams will be manufactured off site in a precast concrete construction yard and then transported to site and placed in position followed by construction of the in-situ concrete topping slab.

Temporary traffic management

The following construction traffic sequencing will be utilised[55]:

- the new Halswell Junction Road off-ramp will be constructed as two lanes for two-way traffic, together with the removal of the existing Halswell Junction Road roundabout and construction of the new Halswell Junction Road roundabout. Traffic will be diverted to and from CSM1 via the new roundabout and off-ramp. John Paterson

[55] Further detail is provided in section 8.8 of Technical Report 2, appended in Volume 3.

Drive will be connected through to the new roundabout on Halswell Junction Road, with residents initially using the existing alignment to continue accessing Springs Road;

- implementing temporary traffic diversion routes to the west of Halswell Junction Road and Springs Road, around the site of the new bridges and approach embankments. At the same time the John Paterson Drive connection on Springs Road will be terminated and the traffic directed to use the new alignment;
- after completion of the bridges and associated road works, the traffic will be routed back to Halswell Junction Road and Springs Road. The westbound off-ramp will be reconfigured from the temporary two-way traffic flow to one-way flow; and
- bridge beam placement will proceed under night-time closures due to the volume of daytime traffic using both Springs Road and Halswell Junction Road.

Erosion and sediment control

In addition to the general mitigation measures stated in 5.2.6 the construction of part of the Maize Maze pond will be required as temporary sediment control for the Halswell Junction Road embankment construction and temporary diversion road runoff. It will also compensate for the loss of the Mushroom first flush (east) basin.

Land drainage races

A permanent diversion of the existing land drainage race around the south side of CSM2, including a new siphon piped crossing under Springs Road, is to be constructed.

The existing Montgomery's Drain will be re-aligned along the north side of CSM2 and piped to the open swale between Wilmers Quarry and Owaka Basin. An overflow from Owaka basin to Montgomery's Drain is to be constructed under Halswell Junction Road. Further drainage works will be required early in the construction sequence to maintain the land drainage function of the various waterways, drainage races and overland flow paths.

Service relocations

Specific existing services require relocation or protection as follows:

- relocating 11kV overhead lines at Springs Rd and Halswell Junction Road; and
- protecting and/or relocating Chorus underground fibre optic cables.

PART D: STATUTORY CONTEXT

6. STATUTORY CONTEXT

Overview

This chapter sets out the key statutory matters under the Resource Management Act 1991 (RMA) relevant to the Project, namely:

- the purpose and principles of the RMA;
- designations and notices of requirement;
- outline plans;
- resource consents;
- proposals of national significance;
- the Environmental Protection Authority process;
- relevant plans and policy documents;
- notices of requirement and outline plans required;
- a summary of the regional resource consents sought;
- resource consents sought under National Environmental Standards; and
- other matters and approvals.

6.1. Resource Management Act 1991

6.1.1. Purpose and principles

Part 2 of the RMA is comprised of sections 5 to 8, and outlines the purpose and principles of the RMA. Section 5 states the purpose of the RMA is to promote the sustainable management of natural and physical resources where sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety while:

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

Section 6 of the RMA contains 'matters of national importance' with which all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for in achieving the purpose of the RMA. These are:

a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development;

b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development;

c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;

d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers;

e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga;

f) the protection of historic heritage from inappropriate subdivision, use, and development; and

g) the protection of protected customary rights.

Section 7 of the RMA states that all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to the following issues relevant to the proposed works associated with the construction of the Project and the local environment:

a) Kaitiakitanga;

b) the efficient use and development of natural and physical resources;

ba) the efficiency of the end use of energy;

c) the maintenance and enhancement of amenity values;

d) intrinsic values of ecosystems;

g) any finite characteristics of natural and physical resources;

f) maintenance and enhancement of the quality of the environment; and

i) the effects of climate change.

Section 8 of the RMA states that all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi.

6.1.2. Designations and Notices of Requirement

A designation is a planning mechanism that enables existing or future infrastructure to be efficiently managed and land requirements associated with future infrastructure to be signalled in district plans. Where a designation is provided in a district plan, any provisions that might normally apply, including zoning and land use controls, do not apply to public works or projects or works undertaken by the requiring authority (in this case the NZTA) under the designation. There is no current designation in the Christchurch City Plan or the Selwyn District Plan for the CSM2

portion of the Project, although there is a designation in the Selwyn District Plan for the existing road and part of the widening required for the MSRFL portion of the Project.

Pursuant to section 181 of the RMA, a notice of requirement (NoR) to alter the existing designation within Selwyn District is being sought to widen an existing roading corridor (TR1) for the Project (NoR1).

Pursuant to sections 168 to 179 of the RMA, two new designations for State highway purposes are being sought by the NZTA for the land required for the CSM2 part of the Project in Selwyn District and Christchurch City:

- NoR2 – new designation for CSM2 in the Selwyn District; and
- NoR3 – new designation for CSM2 in the Christchurch City.

Section 168(2) applies to the notices lodged by the NZTA and reads as follows:

> *A requiring authority for the purposes approved under section 167 may at any time give notice in the prescribed form to a territorial authority of its requirement for a designation -*
>
> *(a) for a project or work; or*
>
> *(b) in respect of any land, water, subsoil, or airspace where a restriction is reasonably necessary for the safe or efficient functioning or operation of such a project or work.*

The prescribed form for a NoR is set out in Form 18 of the Resource Management (Forms, Fees, and Procedure) Regulations 2003 is to be supported by an AEE[56]. The matters that should be included in an AEE are set out in clause 1 of Schedule 4 of the RMA. Clause 2 of Schedule 4 provides direction on further matters that should be considered when preparing an AEE. The AEE (as documented in this report) has been undertaken in accordance with Schedule 4, and also fulfils the requirements of the AEE required in support of the resource consents sought for the Project.

As the notices of requirement will be lodged with the EPA under section 145(3) of the RMA, section 145(7) directs that section 168 applies, except that every reference in that section to a territorial authority must be read as a reference to the EPA. Provided the Project is referred to a Board of Inquiry (BoI) as requested by the NZTA, once the hearings have been held and the proposal and any submissions have been considered, the BoI makes a decision on the matter. Section 149P(4) directs that a BoI:

> *(a) must have regard to the matters set out in section 171(1) and comply with section 171(1A) as if it were a territorial authority; and*
>
> *(b) may -*

[56] The AEE has been included to support the NoR applications. However, it is noted that there is no legal requirement to provide an AEE in accordance with Schedule 4 of the RMA with a NoR.

(i) cancel the requirement; or

(ii) confirm the requirement; or

(iii) confirm the requirement, but modify it or impose conditions on it as the board thinks fit; and

(c) may waive the requirement for an outline plan to be submitted under section 176A.

In making a decision on a NoR under section 171, the BoI will be required to consider the effects on the environment of allowing the requirement, having particular regard to policy statements and plans, whether adequate consideration has been given to alternative sites, routes and methods, whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority and any other matter considered reasonably necessary in order to make a decision. The decision is also subject to an overall assessment under Part 2 of the RMA as to whether the proposal represents sustainable management. An assessment of the effects on the environment of allowing the requirement is provided under Part G of this document. Discussion of the consideration given to the necessity of the work for achieving the Project objectives and alternatives are considered in Parts A and E respectively. An analysis of the Project in relation to the relevant policy framework and Part 2 of the RMA is provided in Part I of this AEE.

6.1.3. Outline Plans

Section 176A of the RMA requires outline plans of works to be constructed on designated land to be submitted to territorial authorities to allow them to request changes before construction is commenced. Section 176A(3) of the RMA states:

An outline plan must show—

(a) The height, shape, and bulk of the public work, project, or work; and

(b) The location on the site of the public work, project, or work; and

(c) The likely finished contour of the site; and

(d) The vehicular access, circulation, and the provision for parking; and

(e) The landscaping proposed; and

(f) Any other matters to avoid, remedy, or mitigate any adverse effects on the environment.

The information that would be required to be provided with an outline plan has been incorporated within the NoR and supporting documents, particularly on the drawings included in Volume 5 of the documents submitted. The information that would be required to be provided with an outline plan has been incorporated within the NoR and supporting documents. Therefore,

due to the operation of section 176A(2)(b) RMA no outline plans will be required for the initial construction of the Project.

6.1.4. Resource Consents

Applications by the NZTA for regional resource consents and district resource consents under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (the "Soil NES") are lodged under section 145(1)(a) to the EPA, and in accordance with section 88 of the RMA. Regional resource consents are necessary for regional matters that form part of the Project. The regional rules applicable to the Project are contained within the Natural Resources Regional Plan (NRRP) and Proposed Land and Water Regional Plan (PLWRP) as set out in section 6.5 below. A summary of all regional consents required is also provided in Table 11, later in this chapter. District resource consents are necessary for contaminated land matters under the Soil NES as an NES prevails over a designation. This is set out in Section 6.6.1 below.

The prescribed form for an application for resource consent is set out in Form 9 of the Resource Management (Forms, Fees, and Procedure) Regulations 2003. The matters that should be included in an AEE required to support a resource consent application are set out in clause 1 of Schedule 4 of the RMA. Clause 2 of Schedule 4 provides direction on further matters that should be considered when preparing an AEE. The AEE (as documented in this report) has been prepared in accordance with Schedule 4.

As the resource consents will be lodged with the EPA under section 145(5) of the RMA, section 145(5) directs that section 88 applies, except that every reference in that section to a consent authority must be read as a reference to the EPA. Provided the Project is referred to BoI as requested by the NZTA, once the hearings have been held and the proposal and any submissions have been considered, the BoI makes a decision on the matter. Section 149P(2) directs that a BoI must apply sections 104 to 112 and 138A as if it were a consent authority.

In making a decision on a NoR under section 104, the BoI will be required to consider the effects on the environment of allowing the requirement, having particular regard to policy statements, plans and national environmental standards, and any other matter considered reasonably necessary in order to make a decision. The decision is also subject to an overall assessment under Part 2 of the RMA as to whether the proposal represents sustainable management. As for the NoR applications, an assessment of the effects on the environment of allowing the requirement is provided under Part G of this document and an analysis of the Project in relation to the relevant policy framework and Part 2 of the RMA is provided in Part I of this AEE.

6.1.5. Proposals of National Significance

Part 6AA of the RMA provides for the consideration of matters which, singularly or collectively, constitute a proposal of national significance, with section 145 allowing certain matters to be lodged directly with the EPA. These include:

- an application for a resource consent (section 145(1)(a)); and
- a notice of requirement for a new designation or to alter an existing designation (section 145(3)).

As outlined in Section 1.4 of this AEE, the NZTA considers that the Project fulfils the criteria for a proposal of national significance. In accordance with section 145 of the RMA, the NZTA has lodged applications for resource consents and NoRs for the Project directly with the EPA, and the applications and NoRs have also been served on the relevant local authorities (CCC, SDC and ECan).

6.1.6. Environmental Protection Authority (EPA)

The 2009 amendments to the RMA provided for the establishment of an EPA to centralise and streamline the decision making process relating to proposals of national significance in accordance with Part 6AA of the RMA. Under section 145 of the RMA an applicant may lodge a resource consent application and NoR directly with the EPA.

The EPA will recommend to the Minister for the Environment whether the applications should be referred to a BoI, the Environment Court or the local authority for consideration and a decision (section 147). In making a direction, the Minister is to apply section 142(3) which provides guidance in determining whether a matter is, or is part of, a proposal of national significance.

The NZTA has lodged NoRs which incorporate the information which would be required to be provided in an outline plan along with resource consent applications for the Project directly with EPA, with the process for determining the NoRs set out under sections 6.1.2 to 6.1.4 above. As discussed in Part A, the NZTA considers the Project would best be heard and determined by a Board of Inquiry as the Project fulfils the criteria for a proposal of national significance (see section 1.4).

Normally, the requiring authority who lodges the NoR also makes the decision on whether to confirm the NoR. However, if the NoRs are referred to a BoI, the BoI considering the NoRs will cancel or confirm (with or without modifications) the NoRs. Importantly, this is the final decision on the NoRs and is subject only to appeal to the High Court on questions of law.

6.2. Plans and Policy Documents

6.2.1. Overview

The national, regional and district planning and policy documents relevant to the Project (prepared in accordance with the RMA) are listed below.

6.2.2. National Policy Statements

The National Policy Statement for Freshwater Management came into effect on 1 July 2011. This NPS is primarily relevant in developing regional plans but is a matter to be given regard in the

consideration of applications for regional resource consents involving water takes and discharges. Accordingly, it is relevant to the proposed stormwater discharges.

The National Policy Statement on Electricity Transmission came into effect on 10 April 2008 and is relevant to the transmission line modifications required by the CSM2 alignment crossing under the Islington to Springston (ISL-SPN A) 50/66 kV transmission line to the southwest of the Shands Road and Marshs Road intersection.

While not gazetted yet, the Proposed National Policy Statement on Indigenous Biodiversity was publicly notified on 29 January 2011 and may come into effect during the consideration of this application. This NPS has some but very little relevance, as there is negligible indigenous biodiversity that will be affected by the Project.

6.2.3. Canterbury Regional Policy Statement

The Canterbury Regional Policy Statement (RPS) was made operative in 1998. The objectives and policies of the RPS are broad and reflect the purpose and principles of the RMA. They cover matters such as transport and water, which are of particular relevance to the Project. The relevant provisions are set out in Technical Report 20 and discussed in Chapter 28 of this AEE.

Environment Canterbury has initiated Proposed Change 1 (PC1) to the RPS to insert a new Chapter 12A addressing growth and development of Greater Christchurch. In addition to the text of PC1 an accompanying map identifies both Business and Residential greenfield areas. Several aspects of PC1 have direct or indirect implications for the Project up to 2041 with respect to identifying land for residential land use and business use. Territorial authorities are required to amend their district plans to give effect to some of the changes, for example zoning changes.

Environment Canterbury released its decision on PC1 in December 2009, but the decision was then subject to appeals to the Environment Court. Before these appeals could be resolved, a version of PC1 was made operative (as Chapter 12A) in October 2011 by the Minister for Canterbury Earthquake Recovery under section 27 of the Canterbury Earthquake Recovery Act 2011. This had the effect of terminating the appeals against PC1. The Minister's decision was then successfully challenged by judicial review and as a result, the Minister's decision has been set aside and the previous proposed version of PC1 (which is subject to appeals to the Environment Court) is relevant for the purposes of this Project.

Key transport provisions from PC1 are listed below:

> *Objective 4: Integration of Land Use, Infrastructure and Funding: Long-term planning for land use change, which ensures that the rate and location of development is integrated with the provision of strategic and other infrastructure, the provision of services, and associated funding mechanisms.*
>
> *Objective 7: Integration of Transport Infrastructure and Land Use: Ensure that the planning and provision of transport infrastructure is integrated with development and settlement patterns*

and facilitates the movement of goods and provision of services in Greater Christchurch, while: (a) limiting network congestion; (b) reducing dependency on private motor vehicles; (c) reducing emission of contaminants to air and energy use; and (d) promoting the use of active transport modes.

Objective 8: Development and Protection of Strategic Infrastructure: Achieve urban land use and development that does not adversely affect the efficient operation, use and development of strategic infrastructure and enables the development of the additional Strategic Infrastructure necessary to meet the needs of growth in population and economic activity in the Greater Christchurch area.

Policy 9 Transport Effectiveness: (a) Development of Greenfields Areas, Key Activity Centres, and areas accommodating intensification and rural residential activities shall avoid overloading existing and proposed transport network infrastructure, particularly strategic roads, and avoid detracting from the primary through-traffic function of State Highways and arterial roads; (b) The Canterbury Regional Council, territorial authorities and transport infrastructure providers shall ensure that the transport networks within Greater Christchurch provide for the safe, sustainable, integrated movement of goods and people both within the sub-region, and to and from locations outside the sub-region.

6.2.4. Proposed Canterbury Regional Policy Statement

The Proposed RPS was notified on 18 June 2011 and submissions closed on 15 August 2011. Decisions were notified on 20 July 2012 with the appeal period closing 10 August 21012. Four appeals were received.

The key provisions for this Project are the objectives and policies addressing urban development within Greater Christchurch, which generally seek to integrate the development of strategic transport infrastructure with land use planning. The key provisions are those listed above from PC1 (which will form a chapter in the Proposed RPS once appeals are resolved).

6.2.5. Canterbury Natural Resources Regional Plan

The Canterbury Natural Resources Regional Plan (NRRP) was made fully operative on 11 June 2011. With respect to the NRRP planning maps, the zones and notations applicable to the Project include:

- the “Christchurch Clean Air Zone 2” (the eastern end of the alignment, between Halswell Junction Road and Springs Road);
- the “Coastal Confined Gravel Aquifer System” (near the eastern-end of the Project, around John Paterson Drive);
- “Semi-Confined or Unconfined Aquifers” (affecting the majority of the alignment);
- “Ground Water Protection Zones 1, 1A and 2” (near the eastern-end of the alignment);

- "Drainage Scheme 6 Zone" (eastern end of the alignment, but not directly relevant as no consents required under Chapter 6); and
- the Selwyn-Waimakariri groundwater allocation zones (most of alignment) and the Christchurch-West Melton (Marshs Road east) – these notations are relevant to water takes).

Table 11 below summarises the proposed activities in relation to the NRRP rules, and also sets out the various resource consents required in accordance with the NRRP. The scope of activities requiring consideration under the NRRP includes:

- earthworks;
- the storage of hazardous substances;
- bores;
- the taking or diverting of water including groundwater;
- the discharge of stormwater, groundwater and contaminants; and
- the undertaking of works within a stream bed.

6.2.6. Proposed Land and Water Regional Plan

The Proposed Land and Water Regional Plan (PLWRP) was publically notified 11 August 2012. Submissions closed on 5 October 2012. This proposed plan will eventually replace Chapters 4 to 8 of the NRRP relating to land and water resources, and embeds throughout the Plan the provisions currently found in Chapter 2 relating to Ngai Tahu and the management of natural resources. At this stage, while the rules have effect from the notification date, the PLWRP can only be afforded limited weight as it has not progressed through the public submission process.

With respect to the PLWRP planning maps, the zones and notations applicable to the Project include:

- the "Coastal Confined Gravel Aquifer System" (near the eastern-end of the Project, around John Paterson Drive);
- "Semi-Confined or Unconfined Aquifers" (affecting the majority of the alignment);
- "Soil Erosion Risk LH1" (affecting the entire alignment);
- "Christchurch Groundwater Protection Zone" (affecting the eastern-end of the Project from Marshs Road);
- "Selwyn/Waimakariri Groundwater Allocation Zone" (most of alignment) and the "Christchurch/West Melton Groundwater Allocation Zone" (Marshs Road east) – these notations are relevant to water takes; and
- "Selwyn-Waihora" (most of alignment) and "Christchurch-West Melton" in respect of the Canterbury Water Management Strategy sub-regional sections included in the PLWRP.

Table 11 below also summarises the proposed activities in relation to the PLWRP rules, and also sets out the various resource consents required in accordance with the PLWRP. The scope of activities requiring consideration under the PLWRP is similar to those in the NRRP and includes:

- earthworks;
- the storage of hazardous substances;
- bores;
- the taking or diverting of water including groundwater;
- the discharge of stormwater, groundwater and contaminants; and
- the undertaking of works within a stream bed.

6.2.7. Selwyn District Plan

The existing and proposed designations sought for the Project within Selwyn District means that resource consents are not required under the Selwyn District Plan (pursuant to Section 176 of the RMA), and detailed consideration of any rules contained within the Selwyn District Plan is therefore not necessary. The objectives and policies of the Selwyn District Plan are relevant to the consideration of the proposed designation and are addressed in the statutory assessment in Chapter 28 of this AEE.

Zoning and notations

With respect to the underlying zoning, from Marshs Road the zoning is entirely Inner Plains (Rural) until Living 1 zoning of the properties fronting Park Lane in Rolleston, but no Living 1 land is required for the Project.

There are two plan notations in the Selwyn District Plan that are near to the Project footprint:

- a heritage building (H208) sited on a property adjacent to the proposed route on its southern side, known as the Trents Chicory Kiln. This heritage building is also listed as Category II with the Historic Places Trust. It does not fall within the designation boundaries; and
- the Project is partially located within the Christchurch International Airport noise contours as noted on the Selwyn District Plan maps.

Plan Changes

There are two proposed plan changes to the Selwyn District Plan – PC17 (now PC32) and PC12 – that are of relevance to the Project. In addition, PC7 is a recently operative plan change applicable to the Project area. These are summarised as follows:

1. PC17 was to create a new rural-residential zone (Living 4) to accommodate 170 rural residential households in six locations near to Rolleston, Lincoln, Prebbleton and West Melton. Of potential relevance to MSRFL, a new rural-residential area was proposed just east of the Rolleston Living 1 zone with a boundary adjoining SH1 (Main South Road). The Proposed PC17 was withdrawn on 28 March 2012 and Proposed Plan

Change 32 (PC32) was notified in its place. Submissions on PC32 closed on 4 May 2012. The purpose of PC32 was to respond to the changes inserted into the RPS through the Minister's version of Chapter 12A (although noting this is no longer operative) and submissions received on PC17. It proposes to incorporate more detailed and prescriptive Living 3 Zone objectives and policies to inform the assessment of privately requested plan changes seeking a Living 3 Zone. PC32 does not propose the rezoning of any sites to Living 3 Zone densities and its scope is restricted to amending and proposing new objectives, policies and rules of the District Plan to manage rural residential activities within the Greater Christchurch Urban Development Strategy area of the Selwyn District.

2. PC12 (operative)is a plan change which aims to provide for a more sustainable land transport system, better urban form and to cater for future transport networks. This plan change recognises that transport standards have a strong influence on the urban environment and seeks to ensure that the District Plan encourages a good standard of development. PC12 allows for a variety of living environments to be created and integrated design of transport and land development. PC12 changes to the transport objectives and policies and the rules for roading and subdivision. PC12 was has been made operative , however it is subject to appeal to the Environment Court.
3. PC7 (operative) rezoned land identified in PC1 to the RPS and the Lincoln and Rolleston Structure Plans. This provides for the future urban growth of both townships in accordance with the UDS. The plan change was notified 27 February 2010 and became operative on 5 March 2012. Of relevance to MSRFL is an area of land located between the current edge of Rolleston town and the rural-residential area noted in regard to PC17. This area has been rezoned (Living Z) to provide for residential development. The outline development plan for this area provides for a set-back from SH1. The land requirement plan for MSRFL does not extend into the land subject to PC7.

The Project will service the residential growth areas provided for by these proposed or operative plan changes and help in facilitating the integration of land-use with transport infrastructure.

Land Subject to Existing Designations

The NZTA has a designation for the purpose of 'State highway' (Designation TR1 as listed in the Selwyn District Plan) relating to that part of the route within Selwyn District. In addition, the section of SH1 proposed for widening presently has land designated on its western side for such purposes. Where the proposal begins near Robinsons Road, a 10m wide strip of designated land extends west towards Weedons Road where it narrows to 6m before terminating short of the intersection (Designation TR4). Another section of designated land for road widening is located near the Hoskyns Road intersection where the proposed four-laning merges with the existing road network. This designated land is approximately 250 m in length and is 7.5m at its maximum width (Designation TR2).

Designated land within the Project footprint that is not identified for roading purposes is identified as follows:

- New Zealand Railways Corporation designation for the Main South Line (Designation RC1); and
- Gravel reserve required by SDC, located near the intersection of Larcombs Road and Main South Road (SH1) (Designation D275);

Consultation has been carried out with these existing requiring authorities and formal approval will be sought prior to construction, in accordance with section 177 of the RMA. It is not expected that the Project will prevent of hinder the public works to which these existing designations relate.

Other designated land located within two kilometres of the proposed alignment but unaffected by the Project footprint includes the following:

- the Weedons Depot and Communications Site required for defence purposes by the Ministry of Defence located on Jones Road (Designation DE4); and
- a gravel reserve located near the intersection of Curraghs and Jones Roads, across the Main Trunk Rail Line (D274), a cemetery on Maddisons and Weedons Ross Road (D178) and two areas located on Maddisons (D203) and McClelland Roads (D125) designated for the purpose of recreation reserve. SDC is the requiring authority for these designations.

6.2.8. Christchurch City Plan

The proposed designation for the part of the Project within Christchurch City (Marshs Road through to its merger with CSM1) means that resource consents are not required under the Christchurch City Plan (pursuant to Section 176 of the RMA) for the works within the proposed designation, and detailed consideration of rules contained within the Christchurch City Plan is therefore not necessary.

The objectives and policies of the Christchurch City Plan are relevant to the consideration of the proposed designation and are addressed in the statutory assessment in Chapter 28 of this AEE.

Consideration of the network utilities rules is necessary in relation to one aspect of the Project which is located outside of the proposed designation. The proposed artificial lowering of the groundwater level under the proposed stormwater ponds located at Halswell Junction Road (the Maize Maze and Ramp Ponds) will involve the placement of an underground drainage system under the ponds which will continue via an underground pipe for a length outside of the proposed designation area, until it terminates with an outfall within the bed of Upper Knights Stream. Under the Christchurch City Plan – Part 9 General City Rules, the placement of an underground utility is a permitted activity, where a utility is not specified as a controlled, discretionary or non-complying activity (Rule 4.3.1). It is noted that the utility rules supersede zone rules and the placement of an underground pipe will comply with all relevant community and critical standards. Accordingly, while the pipeline is outside of the proposed designation, no land use consent is required for this.

Zoning and notations

With respect to the underlying zoning, from the north-eastern end of the proposed alignment towards the south-west the Christchurch City Plan shows the zoning as Business 7 (Wilmers Road – subject to special provisions); Rural 2 (Templeton – Halswell); Business 5 (General Industrial); and Rural 2 (Templeton – Halswell) to the Marshs Road boundary.

There are three plan notations in the Christchurch City Plan that are within the vicinity of the Project:

- an Ecological Heritage 'A' Site (15.06) located on the corner of Springs and Wilmers Roads, identified as containing Danthonia grassland (this is outside the proposed designation);
- an indicative road proposing to join Colombia Ave to Klondyke Drive to the North of the proposed route; and
- airport approach slope boundaries noted on the planning maps relating to Wigram airfield which is no longer in use.

The NZTA is the requiring authority for the only relevant nearby designation noted on the planning maps (being the designation for the Christchurch Southern Motorway (CSM1). There are no other designations within a 1 km radius of the proposed alignment.

Plan Changes

There are no proposed plan changes to the Christchurch City Plan that are relevant to the Project. There are however, land development plan changes applicable to the Project area, which have recently become operative. These are summarised as follows:

1. Plan Change 54 (PC54) became operative on 16 July 2012, having been privately initiated by Calder Stewart Industries Ltd. It has rezoned some 39.05 ha of land on Shands Road between Sir James Wattie Drive and Marshs Road from Rural 2 to Business 5 (General Industrial) Zone. The subject site is bounded by Sir James Wattie Drive to the north, Shands Road to the west, the Hornby railway siding to the east, and Marshs Road to the south. The proposed CSM2 alignment runs through part of this site which is subject to PC54. The Plan Change seeks to enable general industrial use of the site. The proposed development will also incorporate a small café/ retail amenity area, landscape buffer areas that include a stormwater infiltration system, and cycle and walkways. The site will be serviced by an internal loop road that provides access to Marshs Road and Sir James Wattie Drive.
1. Plan Change 60 (PC60) became operative on 1 November 2011. This private Plan Change request was made by Fulton Hogan Land Development Ltd. Its purpose is to facilitate future urban development (residential and commercial business activities) within a 129 ha block of land bound by Halswell Junction Road to the north, Murphys Road to the east and Quaifes Roads to the south (to be known as 'Halswell West'). The subject site is also intersected by Whincops Road. This site is located to the south and east of the proposed CSM2 alignment. 'Halswell West' was zoned Rural 2 however PC60 rezoned this area to a new Living G zone to provide for residential and

commercial business activities. Within this Living G (Halswell West) Zone there are three different density ranges proposed for residential development.

2. Plan Change 47 (PC47) became operative on 3 June 2011, having been requested by John Jones Steel Ltd to rezone land from Rural 2 to Business 5. The site is bordered to the north by the Shands Road Industrial Park (Business 5 zoning) and Rural 2 land to the south and east. The rail line adjoins the site to the east. The proposed CSM2 alignment crosses a corner of this site.
3. Plan Change 5 (PC5) became operative on 11 July 2011. The purpose of PC5 is to facilitate future urban development within the block of land commonly known as the 'Awatea block'. The entire Awatea block is 205 ha; however PC5 rezoning applies to approximately 148 ha of land that was previously zoned Special Purpose (Awatea) and Rural 2. The areas formerly zoned as Special Purpose (Awatea) have been replaced with a combination of new Living G (Awatea) and Business 7 Zones; and those formerly Rural 2 have been replaced with a combination of a new Living G (Awatea) Zone and Conservation 3 Zone. A cap has also been imposed on the number of residential allotments that may be created prior to 2020 to achieve the consolidation objectives of the RPS and the City Plan. The CSM2 alignment traverses Business 7 zoned land that is now subject to additional provisions. These provisions are intended to manage the visual effects of any development on residential character, amenity and outlook. To ensure that future urban development over the entire 205 ha Awatea block occurs in a comprehensive and integrated manner, development is subject to an outline development plan.

The Project will directly serve the substantial urban growth facilitated by these plan changes, all of which have completed the statutory plan change process, with development now underway.

6.2.9. Recovery Strategy for Greater Christchurch

Under section 15 of the Canterbury Earthquake Recovery Act, the Recovery Strategy is a statutory document that must be read together with, and forms part of the RPS, regional plans and district plans. RMA policy statements and plans must not be interpreted or applied in a way that is inconsistent with the Recovery Strategy. Sections 3 to 8 of the Recovery strategy have this statutory effect, with the rest of the Strategy providing additional information.

The Recovery Strategy sets out goals for economic recovery, social recovery, cultural recover, built environment recovery and natural environment recovery. The most relevant goals in the Recovery Strategy are in the built environment goals:

- coordinating and prioritising infrastructure investment that effectively contributes to the economy and community during recovery and into the future;
- supporting innovative urban design, buildings, technology and infrastructure to redefine greater Christchurch as a safe place built for the future;
- rebuilding infrastructure and buildings in a resilient, cost-effective and energy-efficient manner;
- developing an integrated transport system that meets the changed needs of people and businesses and enables accessible, sustainable, affordable and safe travel choices;

- zoning sufficient land for recovery needs within settlement patterns consistent with an urban form that provides for the future development of greater Christchurch;
- having a range of affordable housing options connected to community and strategic infrastructure that provides for residents participation in social, cultural and economic activities; and
- drawing on sound information about on-going seismic activity and environmental constraints including other natural hazards and climate change.

6.3. Notices of Requirement lodged

The NZTA is lodging three notices with the EPA for the designation of land required to undertake maintenance, operation, use and the improvement of a State highway and associated local roads:

1. NoR (1) to alter the existing designation for State Highway 1 (Main South Road) and associated works to the local road network within the Selwyn District Plan;
2. NoR (2) for new State Highway designation for CSM2 section and associated works to the local road network within the Selwyn District Plan; and
3. NoR (3) for new State Highway designation for CSM2 and associated works to the local road network within the Christchurch City Plan.

Once the Project has been constructed and is operational, the area of land required for the on-going operation and maintenance may reduce in area. Some of the designated land may be surplus to requirements as it may only be required during construction. The works required to local roads and the new rear access roads adjacent to Main South Road will be handed over to the local councils to maintain, once constructed. Once construction has been completed, the NZTA intends to review these designations and determine whether or not to uplift any part(s) of the designation(s) under section 182 of the RMA on the grounds that they are no longer required. Review of the Project designations is included as a proposed condition of the designations.

The proposed lapse period for the designations is 15 years.

6.4. Outline plans not required

As stated in Section 6.1.3 above, the information that would be required to be included in an outline plan has been incorporated within the documentation supporting the NoRs lodged with the EPA in accordance with section 176A(2)(b) of the RMA.

6.5. Resource consents required under regional plans

As stated in section 6.2.5 and 6.2.6 above, the proposed works will include the discharge of stormwater, groundwater and contaminants to land and to water in limited situations, earthworks activities, taking and discharge of water associated with dewatering, storage of hazardous substances, the diversion of water from stockwater races and works within the bed of a stream.

The NRRP (Chapter 6) and PLWRP (Rules 5.112-5.117), covering the land use consent requirements for works within the beds of lakes and rivers, are not considered to be relevant to

the stockwater / land drainage races within the Project, specifically, the proposed water race closures and alterations. Section 2 of the RMA defines "river" as *"a continually or intermittently flowing body of fresh water and includes a stream and modified watercourse but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity generation and farm drainage canal)."*

This definition is also contained within section 6.2.2.3 of Chapter 6 of the NRRP and section 2.10 of the PLWRP. With the exception of Upper Knights Stream, the fresh water bodies within the Project footprint are all artificial watercourses (water supply races) and as such do not meet the definition of "river" in the NRRP or PLWRP. Therefore, activities in the water races are not restricted under section 13 of the RMA. Accordingly, regional land use consents are not necessary for the water race alterations.

The water contained with the water supply races is however captured by the RMA definitions for "water" and "water body" and as such, Chapters 4 and 5 of the NRRP and rules relating to water quality and water quantity in the PLWRP are relevant.

The Upper Knights Stream is regarded as a stream under the regional plans and the location of this is annotated on the NRRP planning maps. This watercourse is considered below in relation to section 13 of the RMA.

The following assessment considers each of the proposed activities with respect to the NRRP and PLWRP and determines the status of each activity (with the most restrictive activity status applying) and the regional resource consents required.

6.5.1. Land use consents

Excavation of land

The Project will involve earthworks over an unconfined or semi-confined aquifer and in a small location over the Coastal Confined Gravel Aquifer System (John Paterson Drive). It is noted that some of the stormwater infrastructure will be designed to operate within one metre of groundwater, however groundwater interaction is not expected during the construction phase. This is a future scenario only, arising due to future predicted groundwater level increases. Notwithstanding this, a precautionary approach has been adopted with respect to the consent scoping. It has been assumed that groundwater may be encountered during excavation work, either in the areas designed to interact with groundwater (described below), or through earthworks accidentally intercepting any unknown springs and affecting confined groundwater.

NRRP: Rule WQL36 states that the excavation of land over an unconfined or semi-confined aquifer requires resource consent where the volume exceeds 100 cubic metres in a 12 month period and the excavation depth exceeds five metres or is deeper than the highest groundwater level which can reasonably be expected to occur. Over the Coastal Confined Gravel Aquifer System, the excavation requires consent where there is less than 1 m of undisturbed material between the base of the excavation and Aquifer 1.

Rule WQL36 Excavation of land in the Coastal Confined Gravel Aquifer System or over an unconfined or semi-confined aquifer.

The use of land to excavate more than 100 cubic metres of material in any 12 month period from land:

(a) over an unconfined or semi-confined aquifer and the depth of excavation:

(i) exceeds five metres; or

(ii) is deeper than the highest groundwater level which can reasonably be expected to occur at the site, based upon the relevant and available groundwater data; or

(b) in the Coastal Confined Gravel Aquifer System where there is less than one metre of undisturbed material between the base of the excavation and Aquifer 1;

is –

1. a restricted discretionary activity if such use complies with all of the conditions of this Rule;

2. a discretionary activity if such use is within Christchurch Groundwater Protection Zone 1B or complies with conditions 1(a), 1(b) or 1(c);

3. a non-complying activity if such use does not comply with any one or more of Conditions 1(a), 1(b), 1(c) or 1(d).

Conditions

1. The use of land shall not occur within:

(a) 50 metres of the bed of any permanently or intermittently flowing river, or a lake; or

(b) 50 metres of a wetland boundary; or

(c) a Community Drinking Water Supply Protection Zone for a well listed in Schedule WQL2; or

(d) Christchurch Groundwater Protection Zone 1, 1A, 1C, 1D or Zone 2, as shown on the Map Volume Part 1 - Planning Maps.

The excavation required for the Project is deeper than the highest groundwater level which can reasonably be expected to occur at the site in isolated places (e.g. where Robinsons Road passes under the State highway and the Halswell Junction Road stormwater detention ponds). These areas are illustrated on the "Drainage Long section" plans included in Volume 5. Accordingly, excavation defaults to a non-complying activity as the affected part of the Project occurs within the Christchurch Groundwater Protection Zones 1, 1A and 2.

PLWRP: Rule 5.155 is similar to Rule WQL36, but outlines that excavation can be undertaken as a permitted activity provided the conditions are met. Where any of these conditions cannot be met the activity will be discretionary (Rule 5.156). There is a separate rule for excavation over the Coastal Confined Aquifer System (Rule 5.157) which is also permitted provided conditions are met (the activity defaults to non-complying if Condition 1 is not met – Rule 5.159).

Rule 5.155 The use of land to excavate greater than 100 m^3 of material within any 12 month period over an unconfined or semi-confined aquifer is a permitted activity provided the following conditions are met:

1. *The excavation is not deeper than 1 m above the highest known groundwater level for the site; and*
2. *The excavation does not occur within:*
   (a) *50 m of the bed of a permanently or intermittently flowing river, a lake or wetland boundary; or*
   (b) *the Christchurch Groundwater Protection Zone, as shown on the Planning Maps.*

Rule 5.157 The use of land to excavate material in or above the Coastal Confined Gravel Aquifer System is a permitted activity, provided the following conditions are met:

1. *There is not less than 1 m of undisturbed material between the base of the excavation and Aquifer 1; and*
2. *The excavation does not occur within 50 m of the bed of a permanently or intermittently flowing river, a lake or wetland boundary.*

The majority of the Project has been determined as being within semi-confined or unconfined aquifers. The CSM2 section north of Marshs Road is within the Christchurch Groundwater Protection Zone, and the local road works required at John Paterson Drive are within with Coastal Confined Gravel Aquifer Zone. The Project will involve earthworks with a volume of more than 100 cubic metres in a 12 month period and will be deeper than 1 m above the highest known groundwater level, as described above. These excavation volumes and depths will occur within the Christchurch Groundwater Protection Zone and potentially the Coastal Confined Gravel Aquifer Zone. The proposed earthworks in these locations are therefore determined to be a discretionary activity within the Christchurch Groundwater Protection Zone pursuant to Rule 5.156 and a non-complying activity within the Coastal Confined Gravel Aquifer Zone pursuant to Rule 5.159.

Deposition of fill

The Project will involve the deposition of fill into the excavated areas over an unconfined or semi-confined aquifer and the Coastal Confined Gravel Aquifer System.

NRRP: Under Rule WQL37, deposition of more than fifty cubic metres of material into land excavated to a depth in excess of five metres over an unconfined or semi-confined aquifer is a controlled activity subject to meeting a number of conditions. If any of these conditions are not able to be met, the deposition is a discretionary activity.

Rule WQL37 Deposition of more than fifty cubic metres of material into excavated land over an unconfined or semi-confined aquifer

Conditions

1. *The material shall only consist of cleanfill.*
2. *The volume of vegetative matter in any cubic metre of material deposited shall not exceed three percent.*
3. *The material shall not be deposited into groundwater.*
4. *Any cured asphalt deposited shall be placed in the land at least one metre above the highest groundwater level expected at the site.*
5. *A management plan shall be prepared in accordance with Section 8.1 and Appendix B of "A Guide to the Management of Cleanfills", Ministry for the Environment, January 2002.*

It is expected that conditions 1, 3, 4, and 5 are able to be met. Condition 2 relating to the volume of organic material in deposited fill, may not be met in the base of some stormwater treatment ponds, because of the need for filter layers, which may exceed a rate of 3% per cubic metre (5-10% of organic material is expected to be necessary in this situation). The deposition of fill associated with construction of soak pits/ treatment ponds which exceed a depth of 5 m is therefore a discretionary activity in accordance with Rule WQL37.

PLWRP: The conditions associated with Rule 5.160 are the same as Rule WQL37, and the activity is also specified as controlled. If any of these conditions are not able to be met, the deposition is a discretionary activity (Rule 5.161).

Rule 5.160 The use of land for the deposition of more than 50 m^3 of material in any consecutive 12 month period onto land which is excavated to a depth in excess of 5 m below the natural land surface and is located over an unconfined or semi-confined aquifer, where the highest level of groundwater which can reasonably be expected to occur at the site is less than 30 m below the natural land surface is a controlled activity, provided the following conditions are met:

1. *The material is only cleanfill;*
2. *The volume of vegetative matter in any cubic metre of material deposited does not exceed 3%;*
3. *The material is not to be deposited into groundwater;*

4. *Any cured asphalt deposited is to be placed in the land at least 1 m above the highest groundwater level expected at the site; and*

5. *A management plan shall be prepared in accordance with section 8.1 and Appendix B of "A Guide to the Management of Cleanfills", Ministry for the Environment, January 2002.*

It is expected that the above conditions are able to be met with the exception of Condition 2, relating to the volume of organic material in deposited fill. The deposition of fill associated with construction of soak pits/ treatment ponds which exceed a depth of 5 m is a discretionary activity in accordance with Rule 5.161 of the PLWRP.

Hazardous substance storage during construction

The Project will involve the storage and use of hazardous substances, such as on-site fuel supplies, during the construction phase.

NRRP: The use of land to store or use a specified hazardous substance needs to be considered under Rules WQL38A and WQL38B. Hazardous substances such as diesel, petrol or oil stored in temporary construction management areas outside of the Christchurch Groundwater Protection Zones are permitted for up to 5000 litres subject to compliance with conditions.

Rule WQL38A Use of land to store or use a specified hazardous substance

The use of land to store or to use a specified hazardous substance in or on land; is –

1. *a permitted activity if such land use complies with Conditions 1, 2, 3, 4 and 5, or Conditions 6, 7 or 9 of this Rule;*

Based on the experience of constructing CSM1, it is expected that less than 5000 litres of hazardous substances will be stored on site at any one time during construction. Storage sites can be outside the Christchurch Groundwater Protection Zone. Relevant conditions under Rule WQL38A include hazardous substance design, containment, management and certification along with location restrictions including not within 20m of a bore, not within a flood area or within 100m of an active fault. There are no known faults at ground surface or mapped within the Project area, and any areas identified as being prone to flooding can be avoided. It has therefore been determined that any hazardous substance storage will be a permitted activity and no resource consent is required under the NRRP.

PLWRP: Rule 5.162 addresses the storage of hazardous substances in a portable container and use of the hazardous substances. Where the conditions cannot be met under Rule 5.162 the activity is a restricted discretionary under Rule 5.163.

Rule 5.162 The use of land for the storage in a portable container and use of a hazardous substance listed in Part A of Schedule 4 is a permitted activity provided the following conditions are met:

1. *The aggregate quantity of specified hazardous substances stored on a site in one or more portable containers does not exceed 2,000 litres;*
2. *The container(s) are located in an area, or a structure, that will contain a leak or spill of the substance and will allow the spilled substance to be collected;*
3. *Equipment that is suitable to absorb any leak or spill of the substance (a "spill kit") is located with the container at all times, along with instructions on how to use the spill kit;*
4. *The container(s) are not located within:*
   (a) *20 m of a surface water body or a bore;*
   (b) *A group or community drinking water supply protection area as set out in Schedule 1; and*
5. *The container(s) do not remain on a site for more than 90 days in any consecutive 12 month period.*

The storage of hazardous substances may exceed 2,000 L (up to 5000 litres is possible) so resource consent is required under Rule 5.163 of the PLWRP.

Contaminated land

While contaminated land investigations were carried out during the earlier investigation phase of this Project, it is concluded that concentrations of contaminants in all soil samples collected within the designated zone for the Project were less than the standards for contaminants in soil that are protective of human health ($SCSs_{(health)}$) of the National Environmental Standard for Assessing and Managing the Contaminants in Soil to Protect Human Health (Soil NES) for industrial land use. This means that remedial action to reduce contamination, cap or remove soil is not necessary. Further detail is provided in Chapter 22 of this AEE.

NRRP: Rule WQL46 relates to the investigation of contaminated land and provides for this activity as permitted. Rule WQL47 relates to the discharge of contaminants from the remediation of contaminated land (restricted discretionary activity) is not applicable to this Project as remediation is not required. Rules WQL46 and 47 could only be relevant in the event of unexpected contamination being encountered during the construction phase.

PLWRP: Once again, Rule 5.168 will only be relevant if future site investigations are required during construction. It is anticipated that all conditions could be met and that any future site investigations would be a permitted activity.

Rule 5.168 The use of land for a site investigation to assess concentrations of hazardous substances that may be present in the soil is a permitted activity provided the following conditions are met:

1. *The site investigation is to be undertaken in accordance with Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils (Ministry for the Environment, February 2004) and reported on in accordance with Section 4 of the Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand, (Ministry for the Environment, November 2003); and*

2. *The person or organisation initiating the site investigation provides a copy of report of the site investigation to the Canterbury Regional Council within two months of the completion of the investigation.*

Bores

The Project is likely to require further geotechnical investigation bores, including bores with a water monitoring function (piezometer). A bore / infiltration facility related to the intermittent pumping of water from the Robinsons Road overpass will also be required and some domestic and stockwater wells will need to be relocated as a part of the Project. This includes bores within the Project footprint and those within 30 metres of the designation boundary that may need to be relocated to serve land severed by the Project. A global consent to install bores within the designation area for the Project and all land adjoining the proposed designation is sought for this Project (refer to the designation drawings in the Plan Set, Volume 5).

NRRP: The bores associated with geotechnical investigations required for the Project are considered under Rule WQL35.

Rule WQL35 Construction and use of a bore, excluding a groundwater bore or a hydrocarbon bore

The use of land to construct, use, alter, or maintain a bore for any purpose other than (a) taking, investigating or monitoring of groundwater; or (b) hydrocarbon exploration or production; is -

1. *a permitted activity if such use complies with all of the conditions of this Rule;*

Conditions

1. *The use of land shall not result in a discharge of groundwater from an aquifer or the movement of groundwater between water bearing layers in an unconfined or semi-confined aquifer, or between an unconfined or semi-confined aquifer and a confined aquifer*

2. *When a bore is not in use, it shall be capped to prevent the entry of contaminants down the bore.*

3. *The bore shall not be located within 20 metres:*

   (a) Of a drinking water supply well; or

(b) Where the aggregate quantity of a specified hazardous substances stored or used is more than Threshold 1 of Schedule WQL11; or

(c) Of the boundary with a neighbouring property, except for any test pit less than five metres deep constructed for a geotechnical investigation.

4. The bore shall not penetrate more than 50 metres below the land surface in an area of an unconfined, semi-confined, or confined aquifer.

5. The terms of Clause 3.1 of Schedule WQL4 shall apply if the bore is:

(a) Located within the Coastal Confined Gravel Aquifer System and intercepts the water table; or

(b) Is more than 5 metres deep.

The purpose of this rule is to ensure that a bore or gallery accessing groundwater is maintained over its life so that it does not provide a conduit for contaminants at or near the land surface to enter into the groundwater, and the conditions seek to control the extraction of water in this respect.

All other bores, including any investigation bores where groundwater monitoring (piezometers) are installed require consideration under Rule WQL31:

Rule WQL31 Construction of a groundwater bore or a water infiltration gallery

The use of land to construct a bore or to excavate land for a water infiltration gallery, for the purpose of taking, investigating or monitoring groundwater; is –

1. a restricted discretionary activity if such use complies with all of the conditions of this Rule;
2. a non-complying activity if such use does not comply with any of the conditions of this rule.

Conditions

1. The activity shall comply with Schedule WQL4 Standards and Terms for the construction of bores and water infiltration galleries.

2. The information recorded as a requirement of Section 3 "Record Keeping" of Schedule WQL4 Standards and Terms for the construction of bores and water infiltration galleries, shall be forwarded to Environment Canterbury within one month of completion of the work.

Geotechnical investigation bores are deemed to be a permitted activity under the NRRP as they will meet all the relevant conditions of Rule WQL35, therefore no resource consent is required for these bores.

Land use consent, in accordance with Rule WQL31 of the NRRP, is sought for all other bores associated with the Project, including the Robinsons Road groundwater collection field associated with the intermittent pumping (diversion) of water from the Robinsons Road overpass, as a discretionary activity (restricted). In addition, the gravity operated groundwater intervention proposed for the ponds located near Halswell Junction Road, will involve a groundwater collection facility also.

The decommissioning of existing bores within the Project footprint and use of all new bores associated with the Project are permitted activities pursuant to Rules WQL33 and WQL32 of the NRRP.

PLWRP: The relevant bore rules do not take effect until 1 November 2013, however this Project is not likely to commence construction until after this time.

Rule 5.78 From the 1st of November 2013, the use of land, including the bed of a lake or river, for the installation, maintenance and use of a bore, other than a bore for geotechnical investigation, or a water infiltration gallery is a permitted activity provided the following conditions are met:

1. *The bore or gallery is installed by a bore driller or bore drilling company that holds a current accreditation under the Canterbury Regional Council Bore Installers Accreditation Programme;*
2. *The bore is not for hydrocarbon exploration or production;*
3. *The screening of any bore or gallery may only be into a single aquifer or water-permeable zone and all aquifers or water-permeable zones of differing pressure, water quality, or temperature are sealed to prevent the interconnection or movement of groundwater between aquifers or water-permeable zones;*
4. *Any bore constructed to abstract groundwater is screened to below any minimum water level for the groundwater zone as set out in Sections 6-15 of this Plan;*
5. *Contaminants or water are prevented from entering the top of the bore or gallery or underlying groundwater by:*
    - *(a) Covering or capping the bore or the above ground portion of the gallery pipe, when not in use;*
    - *(b) Sealing the exterior of the bore with bentonite or concrete grout from ground level to above the screen or 1 m below ground level, whichever is the lesser; and*
    - *(c) Sealing the bore-head or above ground portion of the gallery pipe at ground or pumphouse floor level with a concrete pad of at least 0.3 m radius and 0.1 m thickness which is contoured to slope away from the bore or pipe; and*

6. *Information on bore or gallery location, bore installation (including bore logs and intended uses), and other relevant information to update the wells database is submitted to the Canterbury Regional Council within 20 working days of drilling the bore.*

Rule 5.79 From the 1st of November 2013, the use of land, including the bed of a lake or river, for the installation, maintenance and use of a bore for geotechnical investigation or monitoring is a permitted activity provided the following conditions are met:

1. *For any non-permanent bore, it is decommissioned by filling with clean material and compacted or sealed at the surface to prevent contaminants entering the bore;*
2. *For any permanent bore, including monitoring bores, contaminants or water are prevented from entering the top of the bore or underlying groundwater by:*
   (a) *Covering or capping the bore when not in use;*
   (b) *Sealing the exterior of the bore (the annulus) with bentonite or concrete grout from ground level to above the screen or 1 m below ground level, whichever is the lesser; and*
   (c) *Sealing the bore-head at ground or pumphouse floor level with a concrete pad of at least 0.3 m radius and 0.1 m thickness which is contoured to slope away from the bore or pipe; and*
3. *Information on bore or gallery location, bore installation (including bore logs and intended uses), and other relevant information is submitted to the CRC within 20 working days of drilling the bore.*

Geotechnical investigation bores are deemed to be a permitted activity under the PLWRP as they will meet all conditions of Rule 5.79, therefore no resource consent is required for these bores.

Under the PLWRP all other bores associated with the Project would be permitted from 1 November 2013 as it is considered that all conditions could be met under Rule 5.78.

The decommissioning of existing bores within the Project footprint and use of all new bores associated with the Project are permitted activities pursuant to Rule 5.78 and 5.79 of the PLWRP.

Works in the bed of a stream

The Project largely avoids any natural waterways (as identified on the NRRP planning maps). However, there is one lowland stream, Upper Knights Stream, identified on the planning maps located within the Project footprint. There are 2 locations where this is relevant. The first location relates to the realignment of John Paterson Drive, which extends for approximately 20 metres into the marked stream location on the planning maps. At this location, there is no stream bed evident on site, as the water has been diverted into a nearby stockwater race and the land is

flat farmland, however it is regarded as a stream bed for the purpose of this assessment[57]. The second location is the new outlet pipe proposed to divert groundwater and discharge this into Upper Knights Stream. This is located outside of the designation area, to the south of the existing John Paterson Drive within a formed (but dry) stream bed. The road realignment and pipe outlet therefore require consideration in relation to relevant rules regarding works within the beds of rivers and lakes.

NRRP: The installation of the under pond drainage system at Halswell Junction Road requires the construction of a pipe outlet structure and associated scour protection within Upper Knights Stream. The erection or placement and use of structures in the bed of a river, including associated disturbance and discharge, is a permitted activity under Rule BLR4 provided permitted activity conditions can be met.

Rule BLR4 Erection or placement, and use of structures

1. The erection or placement of a new structure, and use of that structure in, on, over or under the bed of a lake or river; or

2. Any excavating, drilling, tunnelling or other disturbance, planting or removal of any plant or part of any plant, or depositing of a substance or reclamation of the bed necessary to undertake the activities in (1) above; or

3. The discharge of sediment to water necessary to undertake the activities in 1 and 2 above; is:

(a) a permitted activity provided the activity complies with all the conditions of this rule;

Conditions

1. The activity shall not be undertaken in, on, under or over the beds of any high naturalness water body listed in Schedule WQN5 in Chapter 5 or Schedule BLR6.

2. For culvert crossings, the width of the bed at the point of crossing shall be less than 5 metres wide; and

(a) the activity shall not be undertaken within an area identified in Schedule BLR5, unless it is undertaken by or on behalf of Environment Canterbury's Regional Engineer in charge of the Scheme; and

(b) the culvert length (inlet to outlet) shall be no greater than 7.5 metres; and

(c) culverts shall be single or double barrels only and the minimum culvert diameter shall be 300 millimetres for single barrel culverts and 1 metre per culvert for double barrel culverts; and

[57] Advice provided by MWH on behalf of ECan, confirmed that the NRRP planning maps should be relied upon for determining the location of stream beds for consent purposes.

(d) the minimum fill height over the culvert shall be either 500 millimetres, or the diameter of the culvert, whichever is the greater; and

(e) the culvert inlet and outlet shall be protected against erosion; and

(f) the culvert shall be installed at a level no higher than bed level, and no lower than 100 millimetres below the level of the bed of the river, stream or lake; and

(g) the culvert shall provide a fifty percent annual exceedance probability flood flow capacity without increasing upstream water levels; and

(h) the culvert shall provide a five percent annual exceedance probability flood flow capacity without increasing water levels to an extent and degree that will cause flooding of upstream, adjacent, or downstream properties; and

(i) the location is not within any urban area or settlement.

3. Any bridge shall be single span and shall not have piers within the bed; and

(a) the bridge span shall be no more than 10 metres long; and

(b) any such bridge and the approaches shall be designed so that a five percent annual exceedance probability flood event shall not cause any increase in upstream water levels; and

(c) the soffit (underside) of any bridge shall be higher than the top of the river bank, and at least 500 millimetres above the five percent annual exceedance probability flood level; and

(d) no excavation of the banks or the bed of a river or stream shall be carried out; and

(e) the bridge abutments shall be constructed parallel to the flow.

4. The catchment area above any dam or weir shall not exceed 100 hectares, or the mean annual flow of the river being dammed shall not exceed 200 litres per second.

5. Any dam or weir shall not be capable of impounding more than 5000 cubic metres of water, and shall be less than three metres in total height above the bed.

6. The activity shall not be the erection or placement of a jetty or whitebait stand.

7. No plant species identified in Schedule BLR1 shall be planted or introduced.

8. Crack willow shall only be planted or introduced for flood control purposes within those flood control rating district scheme areas where it already exists, as identified in Schedule BLR4.

9. The activity and any associated equipment, materials or debris shall not obstruct or alter the passage of water in a manner that causes:

(a) any more than minor Increase in the risk or potential for flooding of surrounding lands;

(b) any more than minor destabilising of lawfully established flood control structures or flood control vegetation or any other lawfully established structures in, on, under or over the bed of a lake or river;

(c) any more than minor increase in erosion of the river or lake bed; or

(d) drainage of water from the bed or diversion of flows within the bed.

10. Any discharge of sediment into water associated with the activity shall not after reasonable mixing cause a change in colour of more than five Munsell Units, or a decrease in clarity of more than 20%, for more than eight hours in any 24-hour period, and shall not exceed 40 hours in total in any calendar month. For the purposes of this condition "reasonable mixing" shall be 50m from the point of discharge in a lake, and either 200m or ten times the width of the current flow of the river, whichever is the lesser from the point of discharge, in a river or stream.

11. No vegetation used for flood control or bank stabilisation shall be disturbed, removed, damaged or destroyed, except by or on behalf of the person or agency responsible for maintaining that vegetation for flood control purposes.

12. The activity shall not restrict access to lawfully established structures, including flood protection works, or to flood control vegetation, for the purposes of their use, repair or maintenance.

13. The activity shall not obstruct the passage of fish both upstream and downstream, or be undertaken within any significant salmon spawning sites listed in Schedule WQN14 in Chapter 5.

14. The activity and any associated equipment, materials or debris shall not obstruct or alter the navigation of the bed or water body in a manner that has the potential to cause injury to any person.

15. The structure shall be kept in sound condition for the purpose for which it was constructed and be kept clear of accumulated debris.

16. Any substance deposited in, on, under or over the bed associated with the activity, shall be of inert materials, uncontaminated with any hazardous substance and shall not be deposited into surface water or at or below the water table.

17. Any deposited substance in, on, under or over the bed associated with the activity, such as riprap, fill material, retaining walls or anchored tree protection, which remains visible once the activity is complete shall be of colour and material type that blends with the surrounding natural environment.

18. The activity shall not occur within any section of the water body that is backed up by the tide.

19. The activity shall not include any refuelling of machinery or vehicles on the bed.

20. Upon completion of the activity:

(a) any reject, surplus or unused bed material stored in the bed shall be spread out;

(b) any excavated areas shall be left with battered slopes not exceeding a 3:1 slope angle (3 horizontal to 1 vertical); and

(c) all equipment and temporary structures associated with the activity shall be removed from the bed.

It is considered that the pipe outlet structure can meet all of the conditions above and is a permitted activity under the NRRP.

PLWRP: The relevant rule within the PLWRP for the pipe outlet structure is Rule 5.114.

Rule 5.114: The drilling, tunnelling, or disturbance in or under the bed of a lake or river and the installation, maintenance, or removal of pipes, ducts, cables or wires is a permitted activity, provided the following conditions are met:

1. The activity is not undertaken in, on, or under the bed of a lake listed as a high naturalness lake in Sections 6-15;

2. The activity does not involve the deposition of any substance, other than bed material, on the bed of a lake or river;

3. The activity is undertaken at a distance greater than 10 m from any dam, weir, bridge, or network utility pole, pylon or flood protection vegetation, 150 m from any water level recorder, 50 m from any flood protection works;

4. Within 30 days of the completion of the activity the bed of the lake or river is returned to its original contour;

5. Marker posts are erected for the lifetime of the pipes, ducts, cables or wires; and

6. The works do not occur in flowing water.

It is considered that the pipe outlet structure can meet all of the conditions above and is a permitted activity under the PLWRP.

The works required for the John Paterson Road realignment require reclamation / disturbance of a (former) stream bed, identified on the planning maps as Knights Stream. However, it is noted that there is no physical stream bed in this location.

NRRP: This activity requires consideration under Rule BRL5:

Rule BLR5 Excavation, drilling, tunnelling, depositing, reclamation, drainage or disturbance in, on, under or over the bed

1. The excavating, drilling, tunnelling, depositing,reclamation, drainage or disturbance (but not including excavation of materials for the erection, reconstruction, placement, use, alteration, extension, demolition or removal of a structure classified by Rules BLR2, BLR3, BLR4 or BLR7) in, on, over or under the bed of a lake or river,

is:

(a) a permitted activity provided the activity complies with all the conditions of this rule;

(b) a discretionary activity where Condition 1 is not complied with;

(c) a prohibited activity where Condition 12 is not complied with; or

(d) a restricted discretionary activity where any other condition is not complied with.

This rule does not apply to activities in artificial lakes and detention and retention lakes classified by Rule BLR1.

1. The activity shall not be undertaken in, on, or under the beds of any high naturalness lakes listed in Table WQN19 of Schedule WQN5 in Chapter 5 or Schedule BLR6;

2. No part of the activity shall occur within surface water or at or below the water table.

3. The activity shall not involve the disturbance or removal of any rocks with a diameter greater than 500 millimetres on any axis.

4. The activity shall not include the deposition of any substance, other than bed material, on the bed.

5. The activity shall not be, or result in, the reclamation of the bed.

6. The volume excavated by any person or on behalf of any person, organisation or corporation:

(a) in the bed of any river or lake shall not exceed 20 cubic metres per week and not more than 50 cubic metres in any 12 consecutive months or,

(b) between 1 February and 31 August, in the beds listed in Schedule BLR2, shall not exceed 50 cubic metres per month and not more than 250 cubic metres in any 12 consecutive months period; or,

(c) between 1 February and 31 August, in the beds listed in Schedule BLR3, shall not exceed 100 cubic metres per month and not more than 500 cubic metres in any 12 consecutive months period.

7. Any excavation undertaken in accordance with Condition 6 above will include the removal of excavated material (other than surplus or reject material) from the bed within ten days of that material being excavated.

8. The Customer Service Centre of Environment Canterbury shall be notified before any excavation of more than 50 cubic metres in any four weeks is undertaken in accordance with Conditions 6(b) or (c) of this rule. This notification must state, the location of the excavation site, the quantity of material to be excavated, the approximate dates when the activity is to be undertaken and a contact phone number of the person undertaking the activity.

9. To avoid destabilising any lawfully established structure in, on, under or over the bed of a lake or river the activity shall:

(a) be undertaken at a distance greater than 50 metres from any lawfully established dam, weir, culvert crossing, bridge, surface water intake plant or network utility pole or pylon and 150 metres from any lawfully established water level recorder; and

(b) not be undertaken within 5 metres of any existing flood control structures or to a depth exceeding 1 metre.

10. The activity, or any associated equipment, materials or debris shall not obstruct or alter the passage of water in a manner that causes:

(a) any more than minor increase in the risk or potential for flooding of surrounding lands;

(b) any more than minor destabilising of lawfully established flood control structures or flood control vegetation or any other lawfully established structures in, on, or under or over the bed of a lake or river;

(c) any more than minor increase in erosion of the river or lake bed; or

(d) drainage of water from the bed or diversion of flows within the bed.

11. No vegetation used for flood control or bank stabilisation shall be disturbed, removed, damaged or destroyed, except by or on behalf of the person or agency responsible for maintaining that vegetation for flood control purposes.

12. No plant species identified in Schedule BLR1 shall be planted or introduced.

13. The activity and any associated equipment, materials or debris shall not obstruct or alter the navigation of the bed or water body in a manner that has the potential to cause injury to any person.

14. The activity shall not include any refuelling of machinery or vehicles on the bed.

15. Upon completion of the activity:

(a) all reject surplus or unused bed material stored in the bed shall be spread out;

(b) any excavated areas shall be left with battered slopes not exceeding a 3:1 slope angle (3 horizontal to 1 vertical) and any flow channels disturbed during the activity shall be reinstated; and

(c) all equipment and temporary structures associated with the activity shall be removed from the bed.

16. The activity shall not occur within any section of the water body that is backed up by the tide.

The conditions relating to deposition and reclamation may not be satisfied through road realignment within the former stream bed location. So for the avoidance of doubt, consent is sought for reclamation and disturbance as a restricted discretionary activity under Rule BRL5.

PLWRP: Under the PLWRP, the previously cited Rule 5.114 is the relevant permitted activity rule for bed disturbance. In respect of the road realignment in the location of the former stream bed, the conditions relating to deposition and returning the bed to its original contour may not be satisfied. There is no other disturbance to stream bed rule in the PLWRP that applies where the conditions of Rule 5.114 is not met. On this basis, it is concluded that the disturbance of the former stream bed for the realignment of John Paterson Drive is a discretionary activity pursuant to Rule 5.6 of the PLWRP. Rule 5.6 is listed below in relation to discharge activities.

Earthworks adjacent to stream beds

Earthworks adjacent to stream beds are also controlled by rules in the applicable regional plans.

NRRP: Any excavation works within the riparian area associated with the placement of the outlet structure will be permitted under Rule BLR8, as the relevant permitted activity conditions can be met.

Rule BLR8 Land use activities adjacent to the bed of a lake or river that are within 7.5 metres of the bed or a flood protection structure

1. The use of land adjacent to the bed of a lake or river that is within 7.5 metres of the bed, or within 7.5 metres of any flood protection structure; or

2. The discharge of sediment to water necessary to undertake the activities in 1. above;

is:

(a) a permitted activity provided the activity complies with all the conditions of this rule;

or

(b) a restricted discretionary activity where any condition is not complied with.

Conditions

1. The activity and any associated equipment, materials or debris shall not cause:

(a) any more than minor increase in the risk or potential for flooding of surrounding lands;

(b) any more than minor destabilising of lawfully established flood control structures or flood control vegetation or any other lawfully established structure in, on, under or over the bed of a lake or river or land adjacent to the bed; or

(c) any more than minor increase in erosion of a flood protection structure or the bed of a lake or river or land adjacent to the bed.

2. No vegetation used for flood control or bank stabilisation shall be disturbed, removed, damaged or destroyed except by or on behalf of the person or agency responsible for maintaining that vegetation for flood control purposes.

3. Any discharge of sediment into water associated with the activity shall not after reasonable mixing cause a change in colour of more than five Munsell Units, or a decrease in clarity of more than 20%, for more than eight hours in any 24-hour period, and shall not exceed 40 hours in total in any calendar month. For the purposes of this condition "reasonable mixing" shall be 50m from the point of discharge in a lake, and either 200m or ten times the width of the current flow of the river, whichever is the lesser from the point of discharge, in a river or stream.

4. The activity shall not restrict access to lawfully established structures, including flood protection works and flood control vegetation, or prevent access to the bed or banks of the river, for the purposes of their use, repair or maintenance.

5. No disturbed or cut vegetation shall be left in a position where it could enter surface water.

6. The activity shall not include any refuelling of machinery or vehicles.

PLWRP: Excavation works within the riparian area associated with the placement of the outlet structure and road realignment are captured by Rule 5.148.

Rule 5.148 The use of land for earthworks or cultivation outside the bed of a river or lake or adjacent to a natural wetland boundary but within:

a. 20 m of the bed of a lake or river or a natural wetland boundary in Hill and High Country land and land zoned LH2 on the Planning Maps; or

b. 10 m of the bed of a lake or river or a natural wetland boundary in land zoned LH1 on the Planning Maps;

is a permitted activity provided the following conditions are met:

1. The extent of earthworks or cultivation within the relevant setback distances in any property does not at any time exceed:

(a) An area of 500 m^2 or 10% of the area, whichever is the lesser; or

(b) A volume of 10 m^3 of Hill and High Country Land and land zoned LH2 on the Planning Maps;

2. Any discharge of sediment associated with the activity into the water in a river, lake , wetland or the Coastal Marine Area does not exceed 8 hours in any 24 hour period, and does not exceed 24 hours in total in any 6 month period;

3. Any cultivation is across the contour of the land;

4. Any trenches excavated for infrastructure are back-filled and compacted within 10 days of being excavated;

5. The activity does not occur within a significant spawning reach for salmon or an inanga spawning area listed in Schedule 17;

6. Any earthworks or cultivation is not within 5 m of any flood control structure and

7. Earthworks associated with recovery activities or the establishment, maintenance or repair of network utilities and fencing is not required to meet conditions 1 or 2.

Earthworks associated with the construction of the pipe outlet structure and the realignment of John Paterson Drive, within 10m of the mapped Upper Knights Stream bed may exceed the earthworks limit in condition (1) above, accordingly, consent is sought under Rule 5.149 as a restricted discretionary activity as set out below.

Rule 5.149 Vegetation clearance, earthworks or cultivation outside the bed of a river or lake or adjacent to a wetland boundary but within:

1. 20 m of the bed of a lake or river or a natural wetland boundary in Hill and High Country land and land zoned LH2 on the Planning Maps; or

2. 10 m of the bed of a lake or river or a natural wetland boundary in land zoned LH1 on the Planning Maps;

that does not comply with the conditions in Rules 5.147 or 5.148 is a restricted discretionary activity.

6.5.2. Water permits

Diversion of water

The Project will necessitate the temporary diversion of water from water races used for stockwater supply during construction (e.g. by shutting off the water races) and the permanent realignment of some races, and therefore diversion of water.

NRRP: As the water will be diverted only and not 'used' or 'dammed', and as the diversion is for the purpose of road construction and use, Rule WQN4 is relevant to the temporary diversion of water races:

Rule WQN4 Taking and/or diverting and using of water from a surface water body or an artificial watercourse for road construction and road maintenance use

1. *The taking and/or diverting and using of water from a surface water body or an artificial watercourse, for road construction and road maintenance use; is –*

   (c) a restricted discretionary activity where any one or more of conditions 1 to 7 is not complied with.

Conditions

1. *The take and/or diversion, and use shall not exceed 15 litres per second and 100 cubic metres per day except in the Rakaia River and tributaries where the following applies (list omitted).*
2. *The take and/or divert, and use shall be for a period of no longer than two months.*
3. *Environment Canterbury shall be notified in writing at least one week in advance of the intention to take and/or divert water under this rule. This notification shall include the commencement date and completion date of this activity, and shall identify the relevant minimum flow site and minimum flow that will be applied to meet condition 5. If there is no relevant minimum site or flow, the notice shall state this.*
4. *The take and/or diversion shall not at any time exceed 10 percent of the flow at the point of take.*
5. *Where the take and/or diversion is from a water body with a minimum flow that is set in Schedule WQN1 or listed in Appendix WQN1, the take and/or diversion shall cease when the flow is at or below the minimum flow at the closest minimum flow site downstream of the take or diversion.*
6. *The take and/or diversion shall not be from any wetland unless authorised under Rule WQL2 as a permitted activity.*

7. *Fish shall be prevented from entering the water intake as set out in Schedule WQN12 unless they are already being prevented from entering the canal or water storage facility or other artificial watercourse at the initial point of take.*

8. *Where the take and/or diversion is from an irrigation canal or hydroelectricity canal or a water storage facility there shall be an existing written agreement with the holder of the resource consents for the taking and/or diversion of water into the canal or water storage facility for the abstractor to take or divert water.*

9. *The take shall not be from the parts of the Rangitata River or tributaries that are subject to the National Water Conservation (Rangitata River) Order.*

The conditions attached to Rule WQN4 will not be met given the diversion of water will be for a period of longer than two months and for more than 15 litres per second. Some water races will be permanently diverted or closed, for example along Main South Road. Others will be temporarily diverted while siphon arrangements are installed under the new road. The diversion of water during construction will therefore be a restricted discretionary activity under Rule WQN4 of the NRRP.

PLWRP: The PLWRP considers the diversion to be a take and discharge to the same watercourse and where the conditions can be met this will be a restricted discretionary activity. Where the taking and discharge does not meet one or more of the conditions in Rule 5.99 the activity will be a non-complying activity, pursuant to Rule 5.100.

Rule 5.99 The taking and use of water from a lake, river or artificial watercourse and discharge of the same water to the same lake, river or artificial watercourse is a restricted discretionary activity, provided the following conditions are met:

1. *Limits have been set for that surface water body in Sections 6-15 or the lake or river is subject to a Water Conservation Order;*

2. *The taking of water and subsequent discharge will have no effect on the limits set for that water body in Sections 6-15 or the flow and allocation regime set out in the Water Conservation Order;*

3. *The maximum distance from the point of take to the point of discharge is not more than 250 m; and*

4. *The take or diversion is not from a natural wetland, hapua or a high naturalness lake or river that is listed in Sections 6-15.*

The conditions in Rule 5.99 will not be met for the majority of the permanent diversions which are listed below, along with the approximate length of the diversions:

- Weedons Ross Road (north side) - 430m;

- Weedons Ross Road (south side) - 190m;
- Main South Road - 2.1km;
- Robinsons Road - 290m;
- North of Robinsons Road - 150m;
- Waterholes Road - 250m;
- Trents Road - 620m;
- Marshs Road - 530m;
- Springs Road - 480m;
- Halswell Junction Road (Montgomery's drain) - 500m; and
- John Paterson Drive - 150m.

The diversion of water is therefore a non-complying activity under Rule 5.100 of the PLWRP, due to the condition limiting length of diversions to 250 metres.

Taking of groundwater for de-watering

The removal of water for site de-watering will occur during construction of the road, however no significant de-watering is proposed.

NRRP: The taking of water for site de-watering is permitted under Rule WQN12 provided conditions can be met:

Rule WQN12 Taking of water from groundwater for site de-watering

1. *The taking of water from groundwater for the purpose of de-watering of sites for carrying out excavation, construction and geotechnical testing; is –*

   (a) a permitted activity provided the activity complies with all the conditions in this rule.

Conditions

1. *The take shall continue only for the time required to carry out the work but not exceeding nine months.*
2. *The take shall not lower the groundwater level more than eight metres below the ground level of the site.*
3. *The take shall not, in combination with other takes, cause ground subsidence.*
4. *The take shall not have a moderate, high or direct hydraulic connection to a surface water body, determined in accordance with Schedule WQN7.*
5. *The take shall not cause a reduction in the rate and volume of water available from a community or private drinking water supply bore.*

6. *The take shall not cause a wetland to be de-watered, except where this is authorised under Rule WQL2 as a permitted activity.*

PLWRP: Similar to the NRRP, the de-watering is a permitted activity under Rule 5.92 provided conditions can be met, which are slightly more restrictive than the NRRP rule. Where these conditions cannot be met the activity will be restricted discretionary under Rule 5.93.

Rule 5.92 The taking of water from groundwater for the purpose of de-watering for carrying out excavation, construction and geotechnical testing and the associated use and discharge of that water is a permitted activity, provided the following conditions are met:

1. *The take continues only for the time required to carry out the work but not exceeding 6 months;*
2. *The abstraction is not from site where an activity or industry listed in Schedule 3 has occurred or is occurring;*
3. *The take does not lower the groundwater level more than 8 m below the ground level of the site;*
4. *The take does not have a moderate, high or direct stream depletion effect on a surface water body, determined in accordance with Schedule 9, unless the abstracted groundwater is being discharged to the surface water body to which it is hydraulically connected;*
5. *An assessment of interference effects, undertaken in accordance with Schedule 12, does not show that any community, group or private drinking water supply bore will be prevented from taking water;*
6. *At the point and time of any discharge to surface water, the rate of flow in the river or artificial watercourse is at least five times the rate of the discharge;*
7. *The concentration of suspended solids in any discharge to a surface water body does not exceed 50 g/ m^3; and*
8. *The discharge is not within a group or community drinking water supply protection area as set out in Schedule 1.*

As no significant de-watering is anticipated during the construction of the Project, it has been determined that these conditions are able to be met and the construction de-watering activity will therefore be a permitted activity under both the NRRP and PLWRP.

Taking of groundwater during operation

It is proposed to divert and pump water from the Robinsons Road overpass area and the Maize Maze/ Ramp Ponds (on an intermittent basis) during operation of the Project to provide adequate drainage in these locations. Groundwater will be taken and discharged to both ground and

surface water at Robinsons Road and will be taken and discharged to two surface water locations in the case of the Maize Maze/ Ramp Ponds (Montgomery's Drain and Upper Knights Stream). These takes are non-consumptive takes and will only occur during when groundwater levels are high, so won't affect other users.

NRRP: This meets the definition of a water take and therefore needs to be assessed in accordance with Rules WQN13 and WQN14:

Rule WQN13 Taking of water from within an allocation block for a groundwater allocation zone listed in Schedule WQN3 or Schedule WQN4

(1) The taking of water from a groundwater allocation zone for which an allocation block is set in Schedule WQN3 or Schedule WQN4 that is not classified by Rules WQN9, WQN10, WQN11 or WQN12; is –

(c) a non-complying activity where:

(i) condition 1 is not complied with and the take is from a water body with an allocation block set in:

(1) Schedule WQN3 and the taking is for individual or community stockwater supply, group drinking water supply or community drinking water supply; or

(2) Schedule WQN4; or

(ii) condition 2 is not complied with and the take has a stream depletion effect that is to be included within the A surface water allocation block:

(1) set in Schedule WQN1 and the taking is not for individual or community stockwater supply, group drinking water supply or community drinking water supply; or

(2) determined using Schedule WQN2.

Rule WQN14 Taking of water from groundwater for which no allocation limit has been set

(1) The taking of water via a single bore or borefield from groundwater that is not classified by Rules WQN9, WQN10, WQN11, WQN12 or WQN13, and that has no allocation regime set in Schedule WQN4; is

(b) a non-complying activity where Condition 1 is not complied with.

Condition:

(1) The take is an existing take that was lawfully established prior to 1 January 2002 that has not expired for more than six months.

As the Robinsons Road location is in the Selwyn-Waimakariri allocation zone, and that zone is already over-allocated. Therefore any groundwater take is determined to be a non-complying activity and resource consent is required under the NRRP.

The Halswell end of the Project is located within the Christchurch-West Melton allocation zone, which does not have an allocation limit listed in Schedule WQN4. Accordingly, the Maize Maze/ Ramp Ponds groundwater pumping to Montgomery's Drain and gravity diversion to Upper Knights Stream are a non-complying activity under Rule WQN14.

PLWRP: As the take is non-consumptive the PLWRP contains a rule specific for this purpose (Rule 5.105), as a permitted activity. Where the conditions cannot be met the activity is a discretionary under Rule 5.106.

> *Rule 5.105 The non-consumptive taking and using of groundwater, including for heating or cooling purposes, and the associated discharge to groundwater, is a permitted activity provided the following conditions are complied with:*
>
> 1. *The discharge of the groundwater is to the same aquifer or groundwater source as the abstraction, and the discharge is within 50 m of the abstraction point;*
> 2. *The use of the water is for non-commercial purposes; and*
> 3. *No contaminants, other than water of the same or different temperature, enter the groundwater.*

The discharge points for the groundwater takes are further than the 50 metre limit in condition 1. Therefore, the taking of groundwater is a discretionary activity under the PLWRP, pursuant to Rule 5.106.

6.5.3. Discharge permits

Discharge of stormwater onto land

The Project involves the discharge of stormwater onto land during construction and operation.

NRRP: The stormwater discharge onto land needs to be considered under Rule WQL6:

> *Rule WQL6 Discharge of stormwater onto or into land*
>
> *The discharge of stormwater onto or into land where contaminants may enter groundwater; is*
>
> 1. *a permitted activity if the discharge:*
>
> *(a) was lawfully established at 4 July 2004; or*
>
> *(b) is solely from a roof and complies with Conditions 1 and 2; or*
>
> *(c) is from any other source, including a road, and complies with Conditions 1 and 3;*

2. *a discretionary activity if the discharge is:*

   (a) *solely from a roof and does not comply with Conditions 1 or 2; or*

   (b) *from any other source, including a road, and does not comply with any one or more of Conditions 1, 3(b), 3(c) or 3(d); unless another person, who has applied for, or been granted, a discharge permit under Rule WQL8 provides written authority for the activity*

Conditions

1. *Discharge from any source*

   (a) *The discharge shall not cause stormwater from up to and including a 24 hour duration 2% exceedance probability rainfall event to enter any other property beyond the boundary of the property or area in which the discharge occurs, unless written authorisation from the affected landowner is obtained;*

   (b) *The discharge shall not result in the ponding of stormwater on the ground for more than 48 hours;*

   (c) *The discharge shall not cause erosion of soil;*

   (d) *The discharge system shall be located at least one metre above the highest groundwater level that can be reasonably inferred for the site at or about the time the system is constructed; and*

   (e) *The discharge shall not be onto or from a property that has been registered by the Environment Canterbury on its Listed Land Use Register as a site that is; 'not investigated', 'below guideline values for', 'managed for', 'partially investigated', 'significant adverse environmental effects' or 'contaminated for'.*

2. *Discharge solely from a roof*

(not applicable)

3. *Discharge from any source other than a roof*

   (a) *The discharge shall not be within a Community Drinking Water Supply Protection Zone for a well listed in Schedule WQL2 if:*

      (i) *the discharge was not lawfully established before the date this rule became operative; and*

      (ii) *the discharge is from that part of a road, including a State Highway that has four lanes for motor vehicles.*

   (b) *The discharge shall not be from a property where:*

(i) an activity or industry specified in Schedule WQL9 is occurring; or

(ii) the quantity of hazardous substances stored or handled exceeds the thresholds in Schedule WQL9; and the hazardous substances may become entrained in stormwater.

(c) A discharge that is:

(i) solely from a sealed road; or

(ii) from a combination of sources; and is located in an area where the depth to unconfined or semi-confined groundwater is less than six metres as indicated in Map Volume - Part 2 Indicative Maps, shall either be via a fully vegetated soil treatment system with the following characteristics:

(1) a minimum depth of 200 millimetres of soil, and

(2) an infiltration rate between 20 and 50 millimetres per hour, and

(3) at least 5 per cent clay content in the soil, and

(4) be designed to capture and infiltrate all contributing stormwater for rainfall events up to and including a 24 hour duration ten per cent annual exceedance probability; or via an alternative stormwater treatment system that is certified in writing by a suitably qualified and competent person as providing at least equivalent stormwater treatment. A copy of that certification, design plans for the system and appropriate technical documentation that demonstrates the technical basis for the certification shall be provided to the Environment.

(d) Unless the discharge from a combination of sources was lawfully established before the date this rule became operative, or the discharge is into a stormwater collection system for an authorised stormwater discharge, the discharge shall not be from an area of disturbed land of greater than:

(i) 1000 square metres within Zone BP in Map Volume - Part 1 Planning Maps, or

(ii) two hectares in any other location.

There are performance aspects of the stormwater design that will not meet the above conditions outlined in the NRRP as detailed in Technical Report 3, Volume 3. For example, some collection and treatment detention basins or disposal fields will be within one metre of groundwater, for example to manage stormwater from the Halswell Junction Road off-ramp area and the Robinsons Road overpass. There is also one property on the MSRFL corridor which is registered on the ECan listed land use register (former landfill on the NW corner of Robinsons Rd) and one property registered adjacent to the CSM2 corridor (McVicars timber treatment site Halswell Junction Road),

and there will be discharge onto and from these properties. In addition, the area of disturbed ground required for construction of the Project will be greater than 2 hectares overall and the design allows for ponding of stormwater for more than 48 hours within the stormwater treatment ponds only to allow for the controlled release of water to Montgomery's Drain. As a result, the construction of the Project is unable to satisfy the permitted activity conditions for stormwater discharges. As such, the proposed stormwater discharges to land during construction and operation of the Project is determined to be a discretionary activity pursuant to Rule WQL6 and resource consent is required.

PLWRP: The stormwater discharge rules in the PLWRP differ from the NRRP provisions in that they are not prescriptive. The discharge of stormwater from a community or network utility operator stormwater system is listed as a restricted discretionary activity. The definition provided for "community or network utility operator stormwater system" has been assumed to apply to the Project.

> *Rule 5.71 The discharge of stormwater from a community or network utility operator stormwater system onto or into land or into or onto land where a contaminant may enter water or into groundwater or a surface water body is a restricted discretionary activity.*

Under the PLWRP the activity will be restricted discretionary under Rule 5.71.

Discharge of stormwater to water

The discharge of overflow water from the stormwater detention basin to Montgomery's Drain / Upper Knights Stream in an extreme rainfall event and the overflow situations outlined in Chapter 19 (refer to Table 32 and Figure 51) need to be considered.

NRRP: Rule WQL7 addresses discharges of stormwater to water. These are provided for as a permitted activity provided the conditions are met, where they cannot be me the discharge is considered under Rule WQL48:

> *The discharge of stormwater into:*
>
> *(a) a river, lake or artificial watercourse; or*
>
> *(b) onto land where it may enter a river, lake or artificial watercourse; is –*
>
> *1. a permitted activity if the discharge*
>
> *(a) was lawfully established at 4 July 2004; or*
>
> *(b) complies with all of the conditions of this Rule.*
>
> *2. Where the discharge does not comply with any one or more of Conditions 1 to 10 of this Rule the activity is classified by Rule WQL48; unless another person, who has applied for,*

or been granted, a discharge permit under Rule WQL8 provides written authority for the activity to be carried out under their permit.

3. *a non-complying activity if the discharge does not comply with Condition 11 of this Rule; unless another person, who has applied for, or been granted, a discharge permit under Rule WQL8 provides written authority for the activity to be carried out under their permit.*

Conditions:

1. *There is no stormwater collection system available for the collection of the stormwater. For the purpose of this condition, "available" means:*
   - *(a) a stormwater collection system passes within 50 m of the discharge location; and*
   - *(b) the stormwater can flow into the collection system under gravity; and*
   - *(c) the stormwater collection system operator will accept the discharge.*
2. *The discharge shall not be from a property where:*
   - *(a) an activity or industry specified in Schedule WQL9 is occurring; or*
   - *(b) the quantity of hazardous substances stored or handled exceeds the thresholds in Schedule WQL9; and the hazardous substances may become entrained in stormwater.*
3. *The discharge shall not be onto or from a property that has been registered by the Environment Canterbury on its Listed Land Use Register as a site that is; 'not investigated', 'below guideline values for', 'managed for', 'partially investigated', 'significant adverse environmental effects' or 'contaminated for'.*
4. *The discharge shall not be into:*
   - *(a) a water race, as defined in Section 5 of the Local Government Act 2002; or*
   - *(b) a wetland, unless the wetland is part of a lawfully established stormwater or wastewater treatment system.*
5. *The discharge shall not result in an increase in the flow in the receiving water body at the point of discharge of more than one percent of a flood event with an Annual Exceedance Probability of 20 percent (five year ARI event).*
6. *Unless the discharge was lawfully established before the date this rule became operative, the discharge shall not be from an area of disturbed land of greater than:*
   - *(a) 1000 square metres located in Zone BP in Map Volume - Part 1 Planning Maps; or*
   - *(b) one hectare in any other location.*

7. *Where the discharge is from a roof with no other stormwater, it shall be via a system that prevents any other contaminants from entering the stormwater system.*

8. *The concentration of total suspended solids in the discharge shall not exceed:*

   (a) *50 grams per cubic metre, where the discharge is to any Spring-fed river, Banks Peninsula river, or to a lake; or*

   (b) *100 grams per cubic metre where the discharge is to any other river or to an artificial watercourse.*

9. *The discharge of stormwater from an electricity substation area, where oil filled equipment is located, shall only be made to surface water, where:*

   (a) *a connection to a sewerage network is not available, and*

   (b) *the electricity substation area is enclosed within an impervious bunded area, or designed to contain all spillages, or is encircled by interceptor drains, and drains to an oil interceptor of a type and size which gives a concentration of oil and grease not exceeding 15 grams per cubic metre in the discharge as measured by American Society for Testing and Materials (ASTM) Method D4281, or American Public Health Association (APHA) 5520B, and can retain the capacity of the largest container of oil on the site plus 10 percent of that volume; and*

   (c) *a copy of all maintenance records for the stormwater and oil containment systems shall be made available to Environment Canterbury upon request.*

10. *The discharge shall not be within 500 m upstream on a river, or an artificial watercourse, or within 500 m on a lake, from an intake for a community drinking water supply listed in Schedule WQL2.*

11. *Unless the discharge was lawfully established before the date this rule became operative, the discharge shall not be to any water body that is Class NATURAL.*

For the main pond discharges, there are two scenarios for discharge to surface water: overflows from the stormwater ponds during events greater than a 100 year ARI (or combinations of extreme groundwater and lesser rainfall events), and drawing down of the pond during extreme groundwater events.

Both scenarios will discharge into Montgomery's Drain and/or the stormwater network connecting Montgomery's Drain to Upper Knights Stream.

The ponds have been sized for a 100 year total storm detention, therefore condition 5 will be in the overflow scenario. The draw down scenario will occur after the recession of the peak in the prior rainfall event.

Given that the discharges will be significantly diluted (by post-first flush runoff in the overflow scenario and potentially groundwater in the drawdown scenario) and from the downstream end of a treatment system, the water quality aspects are expected to be met without difficulty. Therefore, the discharge of overflow will therefore be a permitted activity in the operational phase of the Project.

The key condition which may be breached in this rule is condition 6, whereby discharges may occur from a large disturbed area if an extreme rainfall event occurs during construction. The relevant rule in this situation is Rule WQL48, addressed below, which requires consent as a discretionary activity.

PLWRP: As per Rule 5.71 above, the discharge of stormwater to water (Montgomery's Drain) will be a restricted discretionary activity in accordance with Rule 5.71.

Discharge of de-watering water

The discharge of water from site de-watering activities needs to be considered. As noted above, no significant dewatering is anticipated for the construction of the Project.

NRRP: Rule WQL2 outlines dewatering discharge as permitted provided it complies with the associated conditions. Where these conditions cannot be met the discharge is considered under Rule WQL48.

Rule WQL2 Discharge of land drainage, site dewatering, aquifer test or bore development water into a river, lake or artificial watercourse, or onto land which may result in water or a contaminant entering a river, lake or artificial watercourse

The discharge of land drainage water, site dewatering water, aquifer test or bore development water:

(a) into a river, lake or artificial watercourse; or

(b) onto land which may result in a contaminant or water entering a river, lake or artificial watercourse; that is not classified by Rules WQL1, WQL4, WQL7 or WQL8; is -

1. a permitted activity if the discharge is:

(a) land drainage water and the discharge complies with all of Conditions 1 to 9 of this Rule;

(b) aquifer test, bore development or site dewatering water and the discharge complies with all of Conditions 1 to 8 of this Rule.

Conditions

1. The specific conductance (conductivity measured at 25 degrees Celsius) of the discharge shall not exceed 40 millisiemens per metre.

2. *The rate of flow in the river or artificial watercourse at the point and time of discharge to surface water shall be at least five times the rate of the discharge.*

3. *The rate of discharge to a lake shall not exceed five litres per second.*

4. *The concentration of:*

   (a) *total suspended solids in a discharge to water shall not exceed 25 grams per cubic metre; or*

   (b) *un-ionised hydrogen sulphide in a discharge to water shall not exceed 0.005 grams per cubic metre.*

5. *The discharge shall not result in:*

   (a) *flooding of a dwelling or land owned or occupied by another person, other than with the express permission of that person; or*

   (b) *erosion of the bed or banks of the receiving water body.*

6. *The discharge shall not, outside of the Mixing Zone:*

   (a) *change the colour of the receiving water by more than five Munsell units;*

   (b) *change the clarity of the receiving water by more than 20 percent;*

   (c) *change the pH of the receiving water by more than 0.5 pH unit;*

   (d) *change the temperature of the receiving water of a river or artificial watercourse by more than two degrees Celsius;*

   (e) *change the temperature of the receiving water of a lake by more than two degree Celsius;*

   (f) *produce conspicuous oil or grease films, scums, foams, floatable or suspended materials;*

   (g) *produce any objectionable odour;*

   (h) *render freshwater unsuitable for consumption by farm animals; or*

   (i) *cause the concentration of Escherichia coli to exceed 550 E. coli per 100 millilitres.*

7. *The discharge shall not reduce the quality of the receiving water within:*

   (a) *500 metres upstream on a river or artificial watercourse; or*

   (b) *500 metres on a lake; from an intake for a community drinking water supply listed in Schedule WQL2.*

8. The discharge shall not contain any hazardous substance, hazardous waste or added radioactive isotope.

Some dewatering may be required, depending on seasonal groundwater levels, in order to construct the foundations for the road and stormwater pond land drainage system at the CSM2/CSM1 connection and during the operational phase from the stormwater ponds in this location also. The discharges will be to Montgomery's Drain, an artificial watercourse and a new outlet proposed within Upper Knights Stream.

Given that Montgomery's Drain and Upper Knights Stream are notionally dry, Condition 2 cannot be met. Accordingly, the discharge associated with dewatering activities where this is discharged to water defaults to a discretionary activity under WQL Rule 48 (detailed below).

The discharge associated with the intermittent pumping of water resulting from the dewatering of the Robinsons Road overpass throughout the operation of the Project will be to land (disposal field) initially and if required, groundwater will be discharged to the adjacent stockwater race. This discharge is expected to meet the relevant permitted activity standards of Rule WQL2, in that it will not cause flooding or erosion of the beds of lakes or rivers and will not cause flooding of a dwelling or land owned or occupied by another person.

PLWRP: The discharge of dewatering water to land is considered to be a permitted activity under Rule 5.92 of the PLWRP (outlined above) in relation to the construction phase, as this "take" rule covers "associated discharge" also. There are no rules in the PLWRP that relate to operational dewatering discharges (of groundwater), so it is assumed that permitted activity Rule 5.77 applies where dewatering is directed to water (any discharge of water or contaminants not classified by any other rules). Where operational dewatering is directed to land (i.e. Robinsons Road), this is covered by the discharge to land "catch all" rule, Rule 5.76. These rules are addressed below.

Discharge of water or contaminants

The discharge of dewatering water that is not specifically provided for as a dewatering discharge must be consider under the relevant rules for discharges of water or contaminants.

NRRP: As the discharges described above do not satisfy all conditions in Rule WQL2 and WQL7 of the NRRP, the Project also needs to be considered with respect to the "catch-all" rule, Rule WQL48:

Rule WQL48 Discharge of water or a contaminant into a river, lake or an artificial watercourse

The discharge of water, or a contaminant, into a river, lake or artificial watercourse; that is not classified by Rules WQL5, WQL7, WQL8, WQL15, WQL16, WQL17, WQL18, WQL19, WQL21 or WQL41; is –

a discretionary activity if the discharge complies with all of the conditions of this Rule; a non-complying activity if the discharge does not comply with any one or more of the conditions of this Rule.

Conditions:

1. *The concentration of the total suspended solids in the discharge shall not exceed the concentrations in the following table:*

	Stormwater discharge	Other Discharge	
Water Quality Management Unit		Minimum ratio of receiving water flow to discharge flow at any time is greater than 3:1	Minimum ratio of receiving water flow to discharge flow at any time is less than or equal to 3:1
	Total suspended solids maximum (grams per cubic metre)		
Banks Peninsula or Spring-fed rivers	100	100	50
All other rivers	250	250	100

2. *The discharge shall not, outside of the Mixing Zone calculated in accordance with Part 2 of Schedule WQL1, meet the relevant water quality:*

   (a) standards in Schedule WQL1 for that water quality class specified on the Map Volume Part 1 - Planning Maps; and

   (b) provisions and standards in any applicable water conservation order.

3. *The relevant water quality standards in Schedule WQL1 shall be met at the point of discharge and there shall be no Mixing Zone within 500 metres upstream in a river or artificial watercourse, or within 500 metres in a lake, from an intake for a community drinking water supply listed in Schedule WQL2.*

The discharge of site de-watering to water will meet the conditions of Rule WQL48 as it will be a discharge of groundwater, therefore it will be a discretionary activity. The discharge of overspill from the ponds into Montgomery's Drain, will also comply with the conditions of Rule WQL48 as the discharge will be significantly diluted and is expected to meet the relevant water quality standards identified above. It is noted that the relevant water quality standard in the NRRP for

the discharges to water, is 100g/m^3 total suspended solids, as Montgomery's Drain contributes to a spring fed waterbody (the Halswell River).

PLWRP*:* The discharges for the Project are not always clearly covered by the specific PLWRP rules outlined above, particularly with regard to operational phase dewatering. Therefore, the Project also needs to be considered with respect to the "catch-all" rules, Rules 5.76 and 5.77:

5.76 Any discharge of water or contaminants onto or into land in circumstances where a contaminant may enter water that is not classified by any of the above rules, is a permitted activity, provided the following conditions are met:

1. The volume of the discharge does not exceed 10 m^3 per day and the application rate does not exceed 10 mm per day;

2. The discharge is not directly into groundwater;

3. The discharge does not result in any overflow or runoff into any surface water body or onto neighbouring site;

4. The discharge does not, in groundwater, render fresh water unsuitable or unpalatable for consumption by farm animals or humans;

5. The discharge does not contain any hazardous substance, hazardous waste or added radioactive isotope;

6. The discharge does not occur when the soil moisture exceeds field capacity;

7. The discharge is not from potentially contaminated land; and

8. The discharge is not within

(a) 50 m of a bore used for water abstraction; or

(b) within a group or community drinking water supply protection area as set out in Schedule 1.

5.77 Any discharge of water or contaminants into water that is not classified by any of the above rules, is a permitted activity, provided the following conditions are met:

1. The discharge is not from potentially contaminated land;

2. The discharge is not into a Natural State water body;

3. The discharge meets the water quality standards in Schedule 5 after reasonable mixing with the receiving waters, in accordance with Schedule 5; and

4. The concentration of total suspended solids in the discharge shall not exceed:

(a) 50 g/m^3, where the discharge is to any Spring-fed river, Banks Peninsula river, or to a lake; or

(b) 100 g/m^3 where the discharge is to any other river or to an artificial watercourse.

Rule 5.76 provides for discharges to land as a permitted activity. This is the "default" discharge to land rule in the PLWRP. It has been considered in relation to the dewatering required to land at Robinsons Road. The potential discharge rate will not comply with condition 1 of this rule. There is no other discharge rule in the PLWRP to apply when Rule 5.76 is not met. On this basis, it is concluded that this dewatering activity is a discretionary activity pursuant to Rule 5.6 of the PLWRP:

5.6 Any activity that is not a recovery activity that would otherwise contravene sections 13(1),14(2), 14(3) or 15(1) of the RMA and is not listed as a permitted, restricted discretionary, discretionary, non-complying or prohibited activity in this Plan is a discretionary activity.

Rule 5.77 provides for discharges to water as a permitted activity and it is considered that the conditions are able to be satisfied. It is noted that the relevant water quality standard in the PLWRP for the discharges to water, is more restrictive than under the NRRP, allowing for only 50g/m^3 total suspended solids.

Discharge of dust to air during construction

Earthworks and construction related activities will result in the discharge of dust to air and therefore need to be considered with respect to the provisions in the NRRP. The PLWRP does not apply to air discharges. Rule AQL38 in Chapter 3 of the NRRP outlines the permitted activity condition:

Rule AQL38 Fugitive dust emissions from unconsolidated surfaces – permitted activity

Discharge of contaminants into air from unsealed or unconsolidated surfaces on industrial or trade premises and/or from industrial or trade processes, not otherwise addressed by rules in the NRRP, is a permitted activity.

Conditions:

The dispersal or deposition of particles shall not cause an objectionable or offensive effect beyond the boundary of the property where the discharge originates.

While every effort will be taken to minimise dust discharges, the discharge of dust to air from earthworks and construction activities may potentially cause objectionable or offensive effect beyond the boundary and therefore is assessed as being a discretionary activity under Rule AQL57 and resource consent is sought for this.

6.5.4. Summary of regional consents sought

Table 11 below presents a summary of regional consents sought.

Table 11: Regional consents summary table

Regional consents summary:			
Activity	Description	NRRP Summary	PLWRP Summary
Land use consents (section 9)			
Excavation of land	Excavation over an unconfined or semi-confined aquifer where either deeper than 5m or deeper than the highest groundwater level and greater than 100m^3	Non-Complying Activity in accordance with Rule WQL36	Discretionary Activity in accordance with Rule 5.156 and Non-Complying Activity in accordance with Rule 5.159
Deposition of fill	Deposition of more than 50m^3 over an unconfined or semi-confined aquifer where land is excavated to a depth of 5m or deeper and groundwater is less than 30m below ground level	Discretionary Activity in accordance with Rule WQL37	Discretionary Activity in accordance with Rule 5.161
The use of land to store or use hazardous substances	Hazardous substance storage and use during construction	Permitted Activity in accordance with Rule WQL 38A	Restricted Discretionary Activity in accordance with Rule 5.163
Construction and use of a bore	Investigation and monitoring bores Bore / infiltration facility related to Robinsons Rd overpass and Halswell Junction Road ponds Domestic and stockwater bore relocation	Restricted Discretionary Activity to construct in accordance with Rule WQL31	Permitted Activity to construct and use in accordance with Rules 5.78 and 5.79

Regional consents summary:			
Activity	Description	NRRP Summary	PLWRP Summary
Earthworks within riparian margins	Earthworks within riparian margin adjacent to Upper Knights Stream	Permitted Activity in accordance with Rule BLR8	Restricted Discretionary Activity Rule in accordance with Rule 5.149
Land use consent (section 13)			
Land use consent for works within stream bed	Disturbance / reclamation of former stream bed	Restricted Discretionary Activity in accordance with Rule BRL5	Discretionary Activity in accordance with Rule 5.6
Water permits (section 14)			
Diversion and take of water	Diversion of water races	Restricted Discretionary Activity in accordance with Rule WQN4	Non-Complying Activity in accordance with Rule 5.100
Taking of groundwater	Taking of groundwater as required dependant on groundwater levels	Non-Complying Activity in over-allocated / no allocation limit zones in accordance with Rules WQN13 and WQN14	Discretionary Activity in accordance with Rule 5.106
Discharge permits (section 15)			
Discharge of stormwater to land during construction and operation	To discharge stormwater to land during construction and operation	Discretionary Activity in accordance with Rule WQL6	Restricted Discretionary Activity in accordance with Rule 5.71
Discharge of stormwater to water during construction and operation	To discharge stormwater from the stormwater treatment facilities to water during construction and operation	Discretionary Activity in accordance with Rule WQL48 for construction phase and Permitted Activity under Rule WQL7 once operational	Restricted Discretionary Activity in accordance with Rule 5.71 for construction and operation.

Regional consents summary:			
Activity	Description	NRRP Summary	PLWRP Summary
Discharge of water and contaminants to water associated with dewatering	Discharge of site dewatering to surface water during construction and operation	Discretionary Activity in accordance with Rule WQL48	Permitted Activity under Rules 5.92 and 5.77
Discharge of water and contaminants to land	Discharge to land at Robinsons Road, associated with operational dewatering	Permitted Activity under Rule WQL2	Discretionary Activity in accordance with Rule 5.6
Discharge of dust to air during construction	To discharge dust to air from earthworks and construction activities	Discretionary Activity in accordance with Rule AQL57	N/A

The duration period sought for the regional resource consents is 35 years. The lapse periods sought for the regional resource consents are 15 years.

6.6. Additional statutory matters

6.6.1. Resource consents held for CSM1

A variation of consent conditions may be required for the CSM1 project stormwater discharge consent(s) where the CSM2 designation overlaps with CSM1 to facilitate the alterations to the stormwater facilities where the two stages of the motorway join at Halswell Junction Road. Any changes to the CSM1 consent conditions cannot be confirmed until after detailed design of CSM2 and any such alteration would not be appropriate from a CSM1 compliance monitoring perspective until the construction on CSM2 starts. For these reasons, if necessary the NZTA will make a separate application for variation directly to Environment Canterbury once these details are known and prior to construction.

The design for CSM2 stormwater infrastructure, while removing some volume from the CSM1 Lee basin, replaces this appropriately in the Ramp ponds. Volume is lost from the CSM1 Mushroom ponds is replaced within the Maize Maze pond. These design matters are addressed in Technical Report 3.

6.6.2. National Environmental Standard for Assessing and Managing the Contaminants in Soil to Protect Human Health

The Soil NES came into effect on 1 January 2012. The Soil NES provides a nationally consistent set of planning controls and soil contaminant values to ensure that land affected by contaminants in

soil is appropriately identified and assessed before it is developed, and if necessary remediated or the contaminants contained to make the land safe for human use. A NES has the status of a regulation and prevails over a designation or alteration to a designation that is made.

The Soil NES is a mix of allowing (permitting) and controlling (requiring resource consents) certain activities on land affected or potentially affected by contaminants in soil. The Soil NES requires all 67 territorial authorities (district and city councils) to give effect to and enforce its requirements.

The Contaminated Land Report (Technical Report 16, Volume 3) has identified a number of potentially contaminated sites within the proposed alignment, but no confirmed contamination was found after testing, within the Project footprint.

However, as several locations along the route are identified as Hazardous Activity Industries List (HAIL) sites within Technical Report 16 (Volume 3) in both the Selwyn District and Christchurch City areas, Clause 9 of Soil NES identifies soil disturbance as a controlled activity subject to the results of a soil investigation stating that the soil contamination does not exceed the applicable standard. Accordingly, a controlled activity land use consent is sought in relation to the Soil NES. As a controlled activity, the activity must be managed under a site management plan, monitored and reported on, including the transport, disposal and tracking of materials taken away in the course of the activity.

The lapse period sought for the land use consent under the Soil NES is 15 years.

6.6.3. National Environmental Standards for Electricity Transmission Activities

The National Environmental Standards for Electricity Transmission Activities (NES ETA) came into effect on 14 January 2010. The NES ETA provides a nationally consistent set of planning controls relating to the operation, maintenance, upgrading, relocation or removal of an existing transmission line. The NES only applies to existing high voltage electricity transmission lines. It does not apply to the construction of new transmission lines or to substations. A NES ETA has the status of a regulation and prevails over a designation that is made.

The NES ETA is a mix of allowing (permitting) and controlling (requiring resource consents) certain activities on existing transmission lines. The NES ETA does not alter whether the matter would be dealt with by a territorial authority or regional council. Therefore all consent authorities are required to give effect to and enforce its requirements.

The NES ETA is applicable to the Project as Transpower has confirmed that modifications will need to be made to the existing transmission lines which are in close proximity to the proposed roadway alignment. The proposed CSM2 alignment will pass beneath the ISL-SPN A (Islington to Springston A) 50/66 kV transmission line to the southwest of the Shands Road and Marshs Road intersection. This may result in the alignment falling within the clearance envelope. In order to lift the transmission lines to rectify the clearance non-compliance Transpower has a number of methods available such as increasing the height of the towers (by replacing with new towers or inserting body or leg extensions), changes in insulator arrangements or modifications to

conductors. Regardless of the rectification method, the activity will require assessment under the NES ETA, in particular Clauses 14, 15 and 16 which address the alteration, relocation and replacement of existing transmission line support structures (which include the associated hardware modifications). In addition, if any earthworks are required as a result of the chosen rectification, this activity will need to be assessed against Clause 33 and the relevant regional rules (as the NES ETA does not apply to earthworks to the extent that they are subject to a regional rule). The relevant regional earthwork rules have been outlined already and consent is sought under these. The clearance distance will be met where the proposed CSM2 alignment falls beneath the BRY-ISL A (Bromley to Islington A) 220 kV transmission line so no modifications will be necessary on this line. However, one transmission tower on this line may require barrier protection which requires assessment against the NES ETA. It is expected that alterations may be designed to fall into the permitted activity classification, but confirmation is required from Transpower before this can be determined.

6.6.4. National Environmental Standard for Air Quality 2004

The National Environmental Standard for Air Quality (NES AQ) is intended to protect public health and the environment by, among other things, setting concentration limits for air pollutants. Different parts of the NES AQ came into effect between 2004 and 2006.

There are five ambient air quality standards relevant to the Project. Schedule 1 of the NES AQ sets out ambient air quality concentration limits for the following:

- carbon monoxide;
- nitrogen dioxide;
- sulphur dioxide;
- ozone; and
- fine particulate matter (PM10).

The results of air quality monitoring indicate that the discharge of air pollutants associated with vehicle emissions are unlikely to exceed air discharge assessment criteria at nearby sensitive receptors and will therefore meet NES AQ air quality standards. No specific consents are required under the NES AQ.

6.7. Other matters relevant to statutory considerations

For the resource consent applications, the BoI must have regard to “any other matter the consent authority considers relevant and reasonably necessary to determine the application” (section 104). For the NoRs, a BoI must have regard to any other matter it considers reasonably necessary in order to make its decision (section 171(1)(d)).

The RMA does not define what matters are to be considered under these sections, however it is accepted that these can include matters outside the RMA, including non-statutory documents. The NZTA considers the factors for determining “other relevant matters for consideration” are:

- the subject and spatial relevance of the matter;
- whether the matter had been through a public process; and
- whether the outcome of the matter (e.g. plan or strategy document) was widely publically available.

Some of the matters considered relevant have been identified as:

- the Government Policy Statement on Land Transport Funding;
- the National Infrastructure Plan 2011;
- Connecting New Zealand;
- iwi management plans;
- Greater Christchurch UDS;
- Recovery strategy for Greater Christchurch (in whole, including non-statutory sections of the Strategy);
- The Draft Christchurch Transport Plan 2012;
- the South-West Area Plan; and
- Selwyn District Council Water Race Bylaw 2008.

These other relevant matters are discussed in relation to this Project in Chapter 28.

6.7.1. Other approvals required

A Wildlife Permit will be sought under the Wildlife Act from the Department of Conservation to disturb (capture and relocate) lizards and for the unintentional killing or injury of lizards as a result of the earthworks as a result of the Project alignment passing through their habitat.

An Archaeological Authority to destroy, damage or modify an archaeological site will be sought from NZ Historic Places Trust ("NZHPT") under the Historic Places Act, prior to earthworks commencing. This will be obtained as a precaution should an archaeological site be discovered during earthworks.

Approval to modify stockwater races will be sought under the Selwyn District Council Water Race Bylaw 2008 prior to any construction works commencing.

A land use consent under the NES for Electricity Transmission Activities may be required for the Project. The NZTA is working with Transpower to confirm whether this will be required for the transmission lines affected by the Project. This was not able to be confirmed prior to lodging the applications for the Project with the EPA. Accordingly, if a consent is required under the NES ETA, this will be progressed separately through the SDC.

These other approvals will be sought once the designations and resource consents sought in this current application are confirmed, prior to starting construction of the Project.

PART E: CONSIDERATION OF ALTERNATIVES

7. CONSIDERATION OF ALTERNATIVES

Overview

Under section 171(1)(b) of the RMA, a requiring authority needs to consider alternative sites, routes and methods of undertaking a work when lodging a NoR if it does not have an interest in the land sufficient for undertaking the work or the work is likely to have a significant adverse effect on the environment. The RMA also requires an applicant to consider alternative methods and locations for resource consents relating to any activity that may have significant adverse effects on the environment or, when an activity involves the discharge of a contaminant, alternative methods of discharge need to be considered.

This chapter outlines the alternatives that were identified and assessed as part of the process to determine the selected alignment and design for MSRFL and CSM2. During the development of the Project there have been three general stages in option assessment; the CRETS work (2002 – 2007); a scoping investigation for each of MSRFL and CSM2 to investigate and narrow down various options; and the Scheme Assessment phase to identify a preferred option for the Project.

The NZTA's assessment of alternatives demonstrates that, in developing the proposed route, the NZTA has considered:

- the alignment, design, and methodology for the Project;
- alternative routes (as appropriate);
- alternative alignments and interchanges/connections to the wider transport network;
- alternative designs and measures to avoid, remedy and mitigate identified adverse effects on the environment; and
- alternative methods of discharge.

The assessment process applied was highly iterative, and involved on-going refinement of the Project on the basis of information derived from desk top studies, field work, community and stakeholder consultation and detailed technical investigations. The process was also informed by the requirements of Part 2 of the RMA, the objectives of the NZTA and relevant national and regional policy directives. The process therefore satisfies the requirements of section 171 and Schedule 4 of the RMA.

7.1. Introduction

This chapter provides a summary of the key aspects of alternatives considered in the development of the Project. It outlines the historical development of the Project and option evaluation process undertaken to arrive at the preferred option for the two main components, consisting of:

- the configuration of the four-laning of Main South Road from CSM2 to Rolleston (MSRFL); and
- the alignment of CSM2.

During the development of the Project there have been three general stages in option assessment:

1. the CRETS study to define the general scope and form of corridor improvements;
2. the two scoping investigations for MSRFL and CSM2 to investigate and narrow down various options; and
3. the Scheme Assessment phase to identify a preferred option.

Stage one of the Scheme Assessment phase was focussed on fundamental road alignment options and the mapping of key environmental constraints from published information such as district and regional plans. Following the selection of a preferred option, the environmental assessments were carried out. Changes to the road alignment and options at this stage were carried out. In particular, consideration was given to the stormwater design, noise impacts and landscaping design.

7.2. Statutory requirement to consider alternatives

Under the RMA, a consideration of alternative sites, routes and methods is required in relation to some aspects of the Project.

The Fourth Schedule of the RMA requires an AEE to include possible alternative locations or methods for undertaking the activity to be described where it is likely that an activity will result in any significant adverse effect on the environment (Schedule 4 clause 1 (b)).

In relation to discharge permit applications, section 105 of the RMA requires regard to be had to various matters including “any possible alternative methods of discharge, including discharge into any other receiving environment”.

In relation to NoRs, section 171 (1)(b) requires particular regard to be given to whether adequate consideration has been given to alternative sites, routes and methods of undertaking the work.

Further, section 16 of the RMA requires a “best practicable option” to be adopted in relation to noise, and this implies consideration of options to mitigate noise is required.

7.3. Historical context

As discussed in Chapter 2, the concept for the CSM dates back to the early 1960s through the work of the Christchurch Regional Planning Authority, including the Christchurch Master Transportation Plan released in 1962[58]. Staged development of the motorway commenced during the 1970s, with the first stage involving the SH75 Curletts Road link between Halswell Road and Yaldhurst, which opened in 1979. The second stage involved the section from Curletts Road to

[58]Christchurch Regional Planning Authority. Christchurch Master Transportation Plan. 1962.

Brougham Street which opened in 1981. This was originally to be a four lane motorway all the way through to Main South Road, west of Halswell Junction Road but was reduced in scope just prior to construction as a result of funding constraints.

In the early 1980s, the remaining unbuilt length of the motorway route was redesignated and generally followed the alignment developed in the original 1960s plan, but with a significantly reduced designation width and a termination point with SH1 just south of Templeton. Further modifications in 1994 saw the CSM2 designation uplifted and the termination point shifted to the western end of Halswell Junction Road, as per the current form of the CSM presently under construction.

The next studies to specifically address the development of CSM did not occur until the 1990s, and these studies focused on what is now recognised as CSM1. These studies led to the construction of CSM1 commencing in 2010.

No significant studies investigating the CSM extension beyond the current proposal to Halswell Junction Road were completed until the CRETS study was commissioned in 2002. This study identified possible CSM2 routes and the need for four-laning Main South Road to Rolleston as part of an integrated transport strategy for southwest Christchurch.

Further detail on the historic development of the Christchurch Southern Motorway was provided in Chapter 2. It is within this strategic context that the consideration of alternatives for the current Project fits.

7.4. Assessment of alternative options

7.4.1. Christchurch Rolleston and Environs Transportation Study (CRETS) (2002 – 2007)

In 2002, Transit New Zealand, Selwyn District Council, Christchurch City Council, Environment Canterbury and the Christchurch International Airport Ltd jointly commissioned a study to investigate the long-term transport needs for areas south and west of Christchurch and develop a transport strategy to accommodate the anticipated urban growth and associated travel demand in the study area.

The objective, as stated in the terms of reference was[59] :

"The study of transportation requirements in the Christchurch to Rolleston broad area is seen as a key component in the planning for the development of the roading network to the west and south of Christchurch for the ensuing 25 year period.

The key output of the study is the identification, justification and reporting of a strategy that details the most appropriate stages for the progression of improvement projects that will achieve an ideal roading network to satisfy projected demands."

[59]Christchurch, Rolleston and Environs Transportation Study. Transport Strategy Final Report. September 2007.

The CRETS study was completed over five years between 2002 and 2007 and involved the production of five major reports including:

- Model Validation Report, April 2005;
- Identification of Potential Problem Areas Report, April 2005;
- Issues and Options Identification Report, April 2005;
- Options Analysis Report, December 2005; and
- Transport Strategy Report. This was completed in two stages; the first draft formed the basis of the 2006 public consultation documents and the Transport Strategy Final Report was released in September 2007.

The CRETS study included two full rounds of public consultation. The first phase of consultation was undertaken between February and June 2002 and helped identify transport-related issues that were then considered in the study. The second phase of consultation was undertaken between September and November 2006 and was designed to obtain feedback on the Draft Transport Strategy. The feedback gained was used in preparing the Final Transport Strategy.

Of particular relevance to this Project, key matters raised in the study brief as specific issues to be addressed included the treatment of SH1 between Hornby and Burnham and the location of the Southern Motorway Extension beyond that proposal. It was identified early on that both of these issues were inter-related, as traffic will divert from SH1 to the future Southern Motorway Extension.

These two specific issues were again highlighted in the initial phase of consultation and supported by the preliminary technical performance analysis where potential problem areas were identified on the SH1 corridor between Hornby and Rolleston, as well as Halswell Junction Road between Springs Road and SH1. The main issues were grouped around the conflicting function of the route, route safety, link volumes and intersection delays and the associated level of service. Essentially, the existing SH1 was identified as not being of a sufficient standard to carry the additional traffic (predicted to increase in the order of 75% by 2021). Furthermore, analysis determined that due to the limited catchments of a passenger rail based service utilising the Main South Line, it would not have a significant effect on the growth in private vehicle traffic and upgrade of the roading network would still be required.

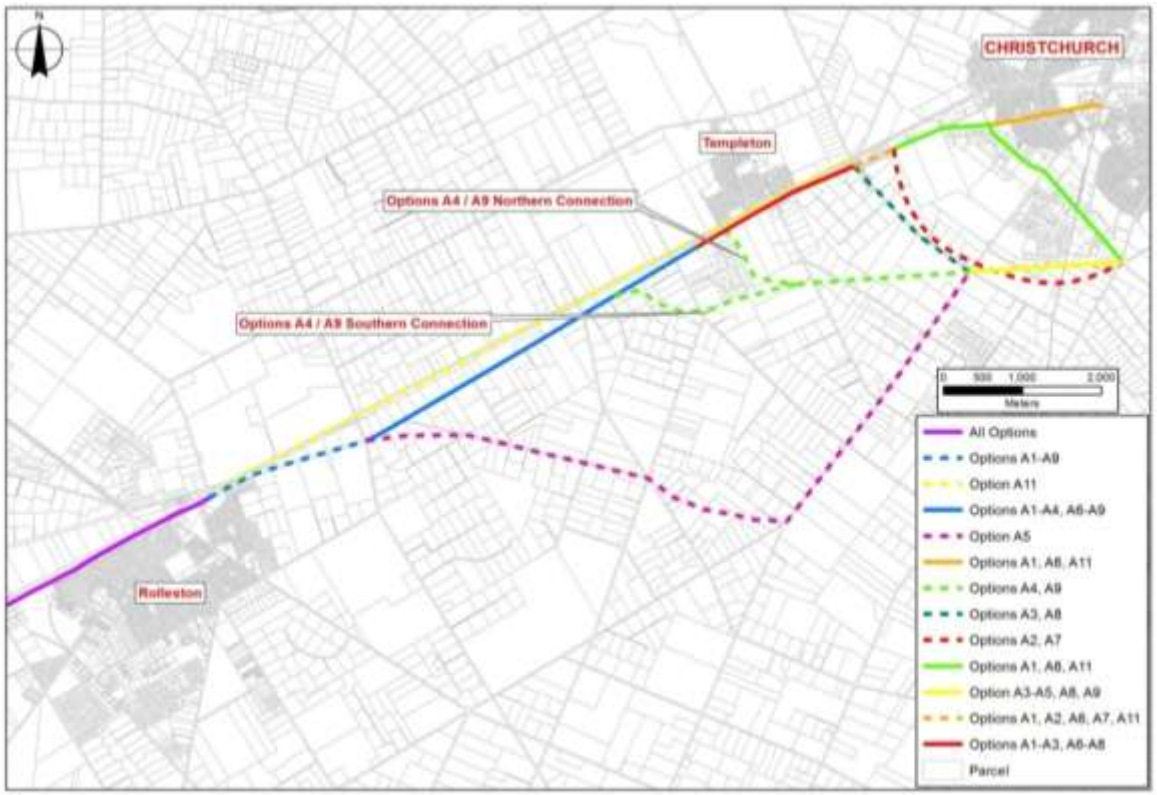
In response to these issues, CRETS developed a number of options along the SH1 corridor and improving the connection of the Southern Motorway Extension. These included four-laning the existing highway, five different route alignments for a connection between CSM1 and SH1, and two upgrade standards for SH1 (80 km/h with access at intersections and 100 km/h with a higher standard of access at intersections). A further option to upgrade Jones Road as a supplementary route was also identified. The full list of the options assessed are set out in Table 12 and illustrated on Figure 35. Private land would be required for all options.

Table 12: CRETS Project options

CRETS Project options	
Option	Description
A1	Four lane SH1 and Halswell Junction Road. Roundabouts at major rural intersections and signals at major urban intersections. SH1 80km/h.
A2	Four lane SH1 and a new link between Halswell Junction Road and Marshs Road. Roundabouts at major rural intersections and signals at major urban intersections. SH1 80km/h.
A3	Four lane SH1 and Marshs Road. Roundabouts at major rural intersections and signals at major urban intersections. SH1 80km/h.
A4	Four lane SH1 and a new link from Springs Road/Halswell Junction Road intersection to SH1 south of Templeton. Roundabouts and interchanges at major rural intersections. SH1 80km/h.
A5	Two lane Christchurch Southern Motorway Extension from Springs/Halswell Junction Road intersection to SH1/Weedons Road intersection using Shands Road and Larcombs Road. Roundabouts and interchanges at major rural intersections. SH1 100 km/h.
A6	Four lane SH1 and Halswell Junction Road (as per Option A1). Interchanges at major rural intersections and signals at major urban intersections. SH1 100km/h.
A6a	Four lane SH1 and two lane Halswell Junction Road. Interchanges at major rural intersections and signals at major urban intersections. SH1 100km/h.
A7	Four lane SH1 and new link between Halswell Junction Road and Marshs Road (as per Option A2). Interchanges at major rural intersections and signals at major urban intersections. SH1 100km/h.
A8	Four lane SH1 and Marshs Road (as per option A3). Interchanges at major rural intersections and signals at major urban intersections. SH1 100km/h.
A8a	Four lane SH1 and two lane Marshs Road. Interchanges at major rural intersections and signals at major urban intersections. SH1 100km/h.
A9	Four lane SH1 and a new link from Springs Road/Halswell Junction Road intersection to SH1 south of Templeton (as per A4). Interchanges at major rural intersections. SH1 100km/h.
A9a	Four lane SH1 and new two lane link from Springs Road/Halswell Junction Roads intersection to SH1 south of Templeton. Interchanges at major rural intersections. SH1 100km/h.

CRETS Project options	
Option	Description
A11	Upgrade Jones Road between Hoskyns Road and Barters Road. Four lane SH1 north of Barters Road and four lane Halswell Junction Road. Priority control at rural intersections and signals at major urban intersections. SH1 100km/h.

Figure 35: CRETS Southern Motorway Extension options considered



Options analysis

The options were subject to a first order analysis against three criteria, including social and environmental effects, transportation effectiveness and economic efficiency.

Options A1 to A4 were rejected on the grounds that the 80 km/h upgrade standards and greater access availability at intersections are not in keeping with the function of a national arterial route. The proposed at grade intersections would result in increased delays and decreased mobility for through traffic and were not considered to be sustainable in the long term.

Option A5 was not carried forward due to its low transportation effectiveness rating. The low effectiveness rating is associated with the option not addressing the conflicting function of the SH1 route, not addressing the low level of service and not addressing the safety concerns of the route.

Option A6 was shown to be not economically viable and Option A7 was assessed to have significant environmental effects in an area popular for lifestyle blocks. Both options would also not address the high traffic volumes through Templeton.

Option A11 was dismissed on the basis of a low transportation effectiveness rating and a BCR of less than 1.0. To function as a supplementary route to SH1, it would also require traffic to cross the railway line twice with associated safety concerns. The promotion of Jones Road would also encourage larger traffic volumes through developed areas where there are low current volumes and was therefore considered unlikely to meet community amenity expectations.

The key recommendation of the first order analysis was:

- that Options A8 and A9 and their variations A8a and A9a be taken forward for further analysis as part of an 'Initial Package of Works'.

Initial Package of Works

The Initial Package of Works covered the Southern Motorway Extension and several other independent road network improvement options within the study area. This package was built from options that best work towards an ideal staged, sustainable long term roading network and for this reason, Option A9 was initially chosen over Option A8. Option A8 would also add significant traffic to the Marshs Road and the Islington/ Templeton areas, and had a lower BCR compared to Option A9. It was later determined that extending the CSM to SH1 south of Templeton results in lower travel times and distances, than upgrading SH1 through Templeton to four lanes.

The Initial Package of Works therefore involved the Southern Motorway Extension to SH1 south of Templeton (just north of Dawsons Road) and four-laning SH1 from the intersection with the future extension to Rolleston. A number of variations to the initial package were also tested, with those of direct relevance to this Project including:

- removal of the CSM interchange at Springs Road/ Halswell Junction Road;
- realignment of the southern end of the CSM extension to connect to SH1 south of Dawsons Road to avoid the new subdivision at Claremont; and
- removal of the Option A9 alignment and replacement with Option A8.

The key findings (specific to the Project) noted in the conclusions of the option analysis work [60] included:

- that the interchange at the intersection of Springs Road/Halswell Junction Road and the Southern Motorway Extension be removed, as connectivity to the Southern Motorway Extension could be provided via existing routes;
- that an interchange should be provided at the intersection of Shands Road and the CSM Extension to provide access from Rolleston, the south of Lincoln, and southern portions of the Hornby Industrial Area;

[60] Summarised from the Christchurch, Rolleston and Environs Transportation Study. Options Analysis Report. December 2005

- that the intersection of SH1 and the CSM Extension should be south of Dawsons Road, in the form of a high speed interchange;
- that SH1 from the CSM Extension connection to Rolleston be four laned;
- that all intersections of side roads and SH1 between the CSM Extension connection and Weedons Road be closed or converted to left in left out to be consistent with the function of SH1; and
- that an interchange be constructed at the intersection of SH1 and Weedons Road and that the intersections of SH1 and Rolleston Drive North and Hoskyns Road be converted to left in left out.

CRETS Final Transport Study 2007

SH1 four-laning and the Southern Motorway Extension from Rolleston were included as a medium term project in the CRETS Final Transport Strategy which was released in September 2007. The analysis showed that this component of the strategy was effective at addressing many of the issues raised including:

- providing capacity for the projected future traffic volumes whilst enabling the highway to provide its function of mobility in the hierarchy;
- significantly decreasing traffic volumes on SH1 through Hornby, Islington and Templeton;
- significantly decreasing traffic on Halswell Junction Road west of Springs Road;
- increased safety as a result of lower traffic volumes on SH1 north of the CSM2 connection and median divided four lane and intersection improvement on the southern section;
- safer movements across SH1 with an interchange at Weedons;
- improved access to industrial areas to the north of Rolleston via Jones Road and the Weedons interchange, along with improved access to the Rolleston residential areas south of SH1 via Weedons Road, Levi Road and Lowes Road and the Weedons interchange; and
- provision of a key access corridor from the south, for increased traffic between Christchurch and Rolleston and strategic traffic travelling to and from Christchurch City and the Port of Lyttelton.

7.4.2. Principal MSRFL options identified

Overview

The MSRFL investigation process involved the following general stages of investigation:

- establish the general scheme defined in the Project scope;
- first round of public consultation;
- development of options and comparative option evaluation for scoping report;
- second round of public consultation;
- draft Scheme Assessment;
- option refinement; and

- final Scheme Assessment.

The Project scope defined the MSRFL scheme as:

- upgrade two lane Main South Road to four lanes median separated from the CSM2 junction near Robinsons Road to south of Weedons Road at Rolleston;
- full grade separated interchange at Weedons Road; and
- other road and property access to be left in/left out only.

The NZTA presented these key features of the Project to the community during the first round of consultation in October 2010. The consultation newsletter indicated that additional land was likely to be required for road improvements, but that it was yet to be decided whether adjoining land would be required on both sides of the existing SH1, or whether land would be required from only one side.

MSRFL Scoping Report

The MSRFL Scoping Report was completed in December 2010. The scoping study investigated four-laning options based on widening the existing Main South Road alignment. These options were developed using a 42.5m wide cross section, adopted from the CSM1 Project currently under construction (for consistency, it was proposed to retain this cross-section through CSM2 and MSRFL).

Options were initially identified and examined by dividing the Main South Road into three discrete sections, described as follows:

- Main South Road North – CSM2/ Robinsons Road to Weedons Road/ Weedons Ross Road;
- Weedons Interchange; and
- Main South Road South – Weedons Road/ Weedons Ross Road to Hoskyns Road.

Options assessment

An options assessment workshop was held in December 2010. The purpose of this assessment was to complete a comparative evaluation of the identified Main South Road widening and Weedons interchange options, and to identify a preferred solution to take forward into the detailed scheme assessment and present at the second round of consultation.

The workshop was attended by selected consultants engaged by the NZTA representing relevant engineering and environmental disciplines.

The options were evaluated under five main criteria:

- cost;
- engineering;
- transport network;

- physical environmental impacts; and
- social environmental impacts.

The evaluation indicated that there were no major differentiators between options. Social impacts, other than those relating to direct property effects, were evaluated as low through the initial social screening process. Initial desktop investigations also did not identify any significant environmental impacts that could not be avoided, remedied or mitigated.

The preferred option for carrying forward to the scheme assessment stage was recommended as comprising:

- Main South Road North – widening to the west on the basis that the existing widening designation is on the west side of Main South Road and it would lessen the impact of local road intersection upgrades on the east side;
- Weedons Interchange – the partial cloverleaf design as it has the least impact on neighbouring properties to the north. It also has lesser environmental impact and a slightly better traffic performance than the diamond options; and
- Main South Road South – a slightly narrower cross section to fit within the existing road reserve as it avoids land purchase and has the least impact on neighbouring property.

7.4.3. Principal CSM2 options identified

Christchurch Southern Motorway Extension Stage 2 Strategic Study[61]

In 2008, the NZTA commissioned the SH73 Christchurch Southern Motorway Extension Stage 2 Strategic Study. This was part of the Southern Corridor Package, one of three corridors in the wider Christchurch area (also including the Northern and Western Corridors).

The Strategic Study recognised earlier work from CRETS and investigations through Stage 1 of the CSM specimen design that *"the upgraded Halswell Junction Road will only provide an interim transport solution and that a second extension of the Southern Motorway westward beyond Halswell Junction Road is required to provide an adequate level of service beyond 2021. In particular the Springs Road/ Halswell Junction Road roundabout could reach capacity before 2016 with Halswell Junction Road reaching capacity by 2018."*

Four main alignment options were considered in the study extending from SH1 near Waterholes Road to the Halswell Junction Road intersection with Springs Road (tying in to CSM1). There was some flexibility at the tie in point at the western end (i.e. to the south of Templeton and the north of Rolleston). The options investigated were (Figure 36):

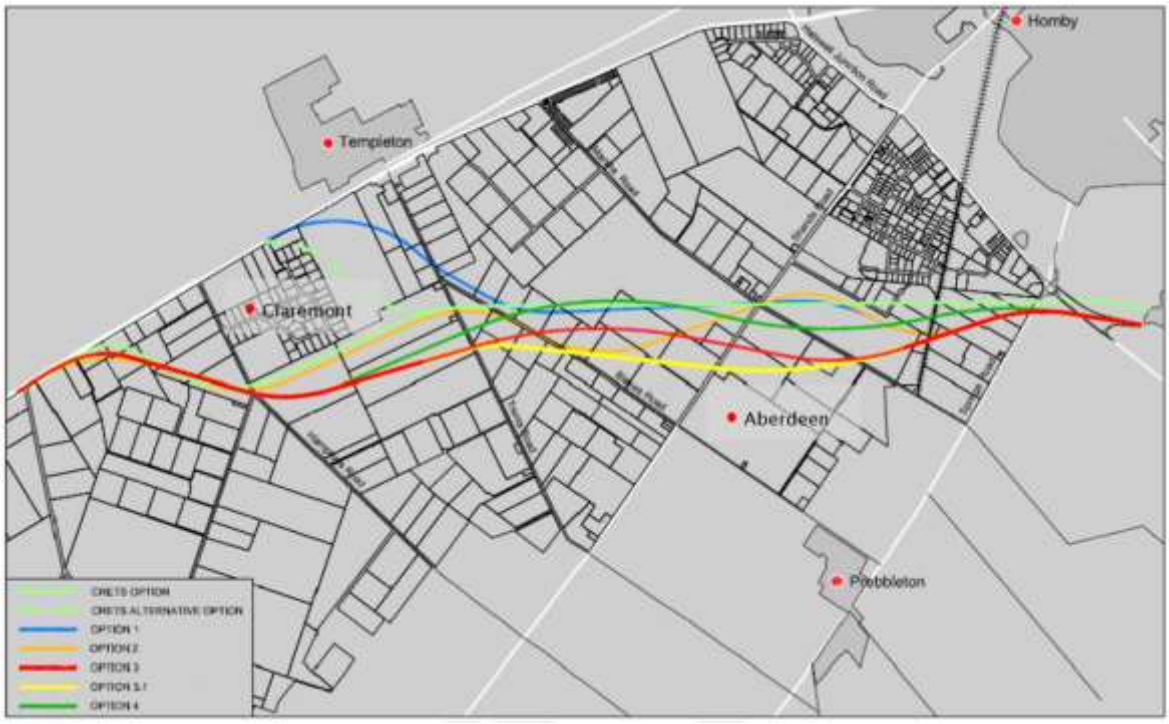
- Option 1 (blue route);
- Option 2 (orange route);
- Option 3 (red route); and

[61] Christchurch Southern Motorway Extension Stage 2 Strategic Study, Opus International Consultants Ltd, 2008

- Option 4 (green route).

It is noted that a fifth alignment, Option 3.1, is also shown. This is an earlier development of Option 3, but was modified to reduce the impact on the Aberdeen subdivision.

Figure 36: CSM2 Strategic Study options considered



Option 1 (blue route)

Option 1 would involve the construction of a 6.1 km motorway extension from SH1 immediately south-west of Templeton, crossing immediately north of the Blakes Road/Trents Road intersection. It then continues south-east over the Marshs Road/Shands Road intersection. It then ties into the CSM1 duplication (currently under construction at grade) after a series of left and right hand turns and after crossing the railway line. The alignment would be elevated over the railway line, Springs Road and Halswell Junction Road, and be located in a cutting under Trents Road.

Option 2 (orange route)

Option 2 was most similar to the alignment advocated in CRETS, however between Trents Road and the Shands Road/Marshs Road intersection, the alignment is moved south to minimise its impact on a large parcel of Greenfield business land (labelled CB9). It would involve the construction of a 7.8 km motorway extension that commences from SH1 approximately 1 km south of Waterholes Road. The route would pass slightly to the north of the Waterholes/Hamptons Road intersection, then crossing Trents Road to the south of the Blakes/Trents Road intersection and continuing towards the Shands/Marshs Road intersection from where it follows a very similar alignment to Option 1.

Option 3 (red route)

This option was developed to reduce the impacts of the alignment on the existing Claremont subdivision, as well as the significant block of Greenfield Business land (CB9) east of the Shands Road/Marshs Road intersection. Starting approximately 1 km south of Waterholes Road, Option 3 is similar to Option 2, until it reaches Hamptons Road where it moves further to the east. The alignment then travels under Trents Road, before cutting across Blakes Road and heading for Shands Road. The option then curves across Marshs Road before crossing the railway line via an overpass and remaining elevated over Springs Road and Halswell Junction Road before connecting with CSM1.

The red route relocates the proposed interchange at the Shands/Marshs Road intersection further to the south-east of this intersection to minimise the relocation requirements for power pylons in the vicinity of the alignment. As part of this interchange, Shands Road would go over the motorway, whilst the on and off ramps would be located to avoid the Aberdeen subdivision.

Option 4 (green route)

Option 4 was developed after community consultation, and resulted in an alignment that focused land take on properties that were unavoidably affected by the proposed motorway extension. It was similar to Option 3, commencing at the same point, however diverting to the west just east of Hamptons Road and crossing both Trents Road and Blakes Road further north. It avoids impacts on large tracts of developable land (Greenfield business land) and crosses Shands Road just south of its intersection with Marshs Road, before continuing towards and over the railway line and remaining elevated over Springs Road and Halswell Junction Road prior to connecting with CSM1.

Option screening process

Before being subjected to a full options analysis, the four options were put through a preliminary screening process. This process considered five key parameters; property, existing infrastructure, geotechnical, environmental impact and design standards. The preliminary screening led to Option 1 being eliminated as it had a significant impact on the Claremont residential subdivision and a large parcel of land west of the railway line that could potentially be developed for industrial purposes. The existence of the Claremont residential subdivision would also have knock on effects in terms of design standards, with the horizontal curvature being compromised at the south-west end of the option where it ties into SH1. In addition, there were concerns about the severance effect the motorway would have between Claremont and the Templeton community.

Options analysis

Options 2, 3 and 4 were carried forward to a full option analysis. This analysis was undertaken from a technical (constraints and opportunities) perspective, as well as broadly against the targets and objectives of the LTMA and the NZTS where there would be sufficient difference between the options. The parameters for the full analysis were similar to those used in the preliminary

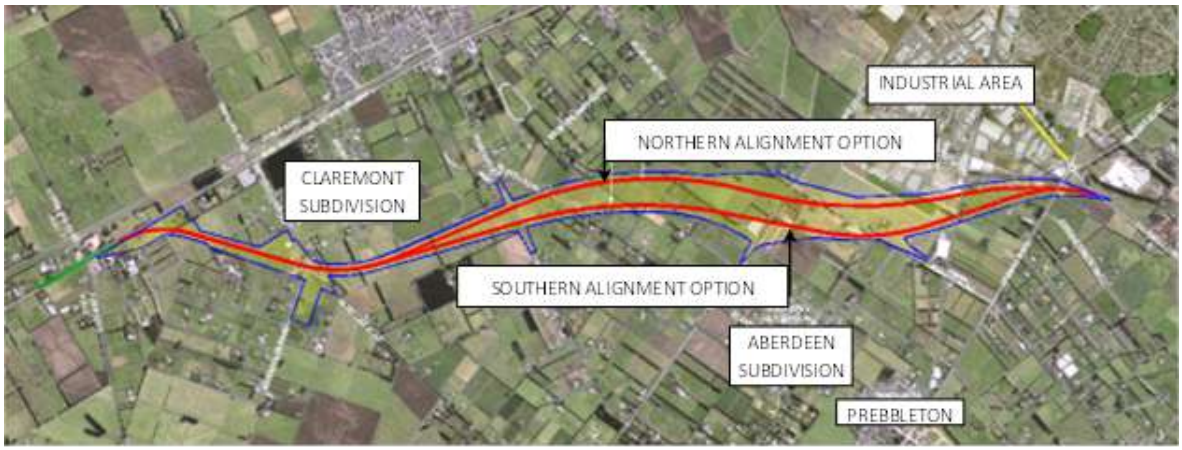
screening exercise however with a further parameter added; community connectivity/access and mobility, including road connectivity, road closures, pedestrian and cycle links and local access.

As a result of the options analysis, Options 3 and 4 were recommended to be taken forward for further investigation in the Scheme Assessment stage. This was on the basis of:

- Option 2 having a greater impact on the Claremont Subdivision, potential industrial land west of the railway line, adjacent properties and their access and greater impact on existing power poles. The route was also less desirable from a design standards perspective in that it had a more winding alignment;
- Options 3 and 4 offered a better route in terms of geometry and minimising the impacts on the Claremont Subdivision, the large parcel of Greenfield business land west of the railway line and the power pylons in the vicinity of the Shands Road/Marshs Road intersection;
- Option 3 maximises the land available for industrial development in the Shands Road/Marshs Road/ Springs Road/Halswell Junction Road block; and
- Option 4 reduces impact on existing businesses and new buildings and increases separation from the Aberdeen subdivision.

Option 3 forms the southern alignment and Option 4 the northern alignment, as indicated below in Figure 37. The NZTA presented these options to the community during the first round of consultation for this stage of the Project in October 2010.

Figure 37: CSM2 study corridor



Feedback from the first round of consultation identified a preference for the northern alignment. Based on this, a 'best fit' option, referred to as Option A, was developed within the study corridor with a design philosophy of locating the alignment as far north as possible in light of the following key constraints:

- Tie in with Main South Road – this was reviewed in some detail and several alternative locations were investigated, including tying in north of the Claremont Subdivision, and further south towards Larcombs Road;

- Claremont Subdivision and Trents Winery – the Claremont Subdivision and heritage building located at Trents Winery are key constraints to the north and south of the motorway alignment respectively;
- Shands Road interchange – locating a full interchange at Shands Road incorporating the intersection of Marshs Road and Shands Road;
- Transpower high voltage (220 kV) transmission lines and towers around the Shands Road/ Marshs Road area;
- Hornby Industrial Railway Line – reconfiguring the industrial rail line north of Marshs Road to allow shunting/access into the existing industrial area;
- Greenfield business land – land owned by Calder Stewart Ltd south of James Wattie Drive is identified in PC1 to the RPS as greenfield business land; and
- Springs Road and Halswell Junction Road underpass - the CSM2 alignment is generally at ground level. Springs Road and Halswell Junction Road need to safely grade over CSM2 and tie into the existing CSM1 Halswell Junction Road/Springs Road roundabout.

7.5. Selection of alignment

7.5.1. Selection of the MSRFL alignment

The MSRFL scoping study developed four-laning options based on widening the existing Main South Road alignment. These options were developed using the same cross section as CSM1. In recognition of the change in road environment, widening options were examined by dividing the Project into two sections north and south of the proposed interchange at Weedons Road.

On the northern section between CSM2 and the Weedons interchange, the existing road reserve is 20m wide, with an additional 10 m wide strip of designated land on the western side. A single preferred option widening to the west was carried forward into the scheme assessment phase, with a proposed 42.5m wide cross-section.

On the southern section between the Weedons interchange and Rolleston, the existing road reserve is wider at 40m to accommodate the passing lanes provided in both directions. An option was therefore identified to keep within the existing 40m wide road reserve and avoid any land purchase requirements. This was recommended as the single preferred option for adoption in the scheme assessment phase.

In response to feedback from the first round of consultation, consideration was also given to an alternative route for MSRFL that utilised widening of the existing rail corridor adjacent to Jones Road. However, this option was discounted due to the following issues:

- significant difficulties designing side road intersections in such close proximity to the railway line, due to the need to either provide at grade crossings or potentially needing to provide additional bridges across the rail line;
- difficulties with integrating the alignment with CSM2 at Robinsons Road but more particularly at Hoskyns Road/Rolleston Drive; and
- safety concerns over the lights from trains at night being on the “wrong” side of opposing traffic creating potential confusion.

On this basis the preferred option of widening to the west and the partial cloverleaf interchange at Weedons Road was carried forward and recommended in the draft Scheme Assessment Report.

The design process following submission of the draft Scheme Assessment Report was then focused on responding to safety concerns raised by a safety audit. The most significant design changes resulting from the safety audit include:

- development of rear access roads on western and eastern sides of Main South Road;
- removal of all direct property access onto Main South Road between Robinsons Road and Weedons Road;
- improving the geometry of the Weedons Road interchange and Jones Road roundabout ; and
- Provision of a roundabout at the Main South Road / Dawsons / Waterholes intersection to facilitate "U" turns for traffic from the south.

7.5.2. CSM2 alignment

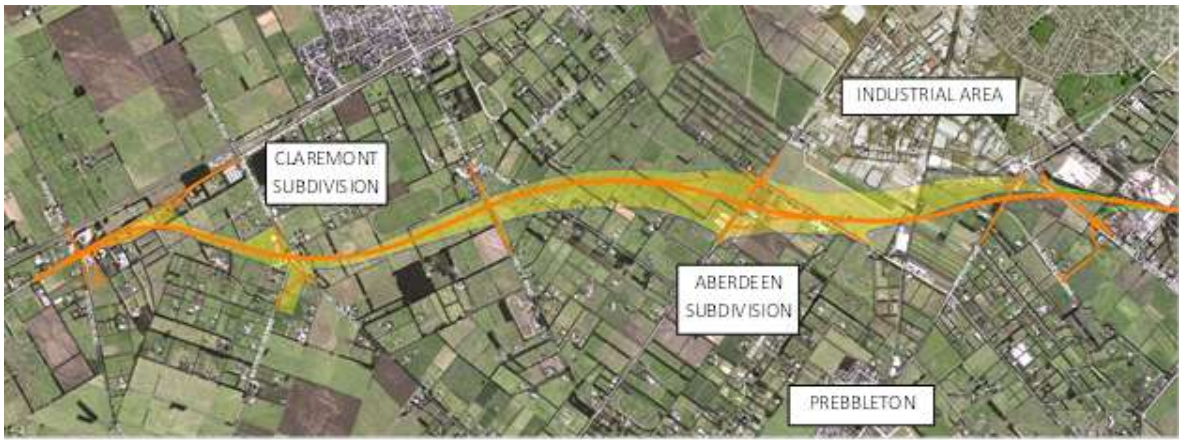
Scheme Assessment

The scheme assessment phase for the Project commenced in 2010. The scope included both MSRFL and CSM2.

The CSM2 alignment investigations were broadly defined by the corridor recommended in the 2009 Strategic Study, with Option 3 forming the southern extent and Option 4 the northern boundary. The selected preferred alignment is based on a "best fit" option, which was developed with the philosophy of pushing the alignment as far north as possible.

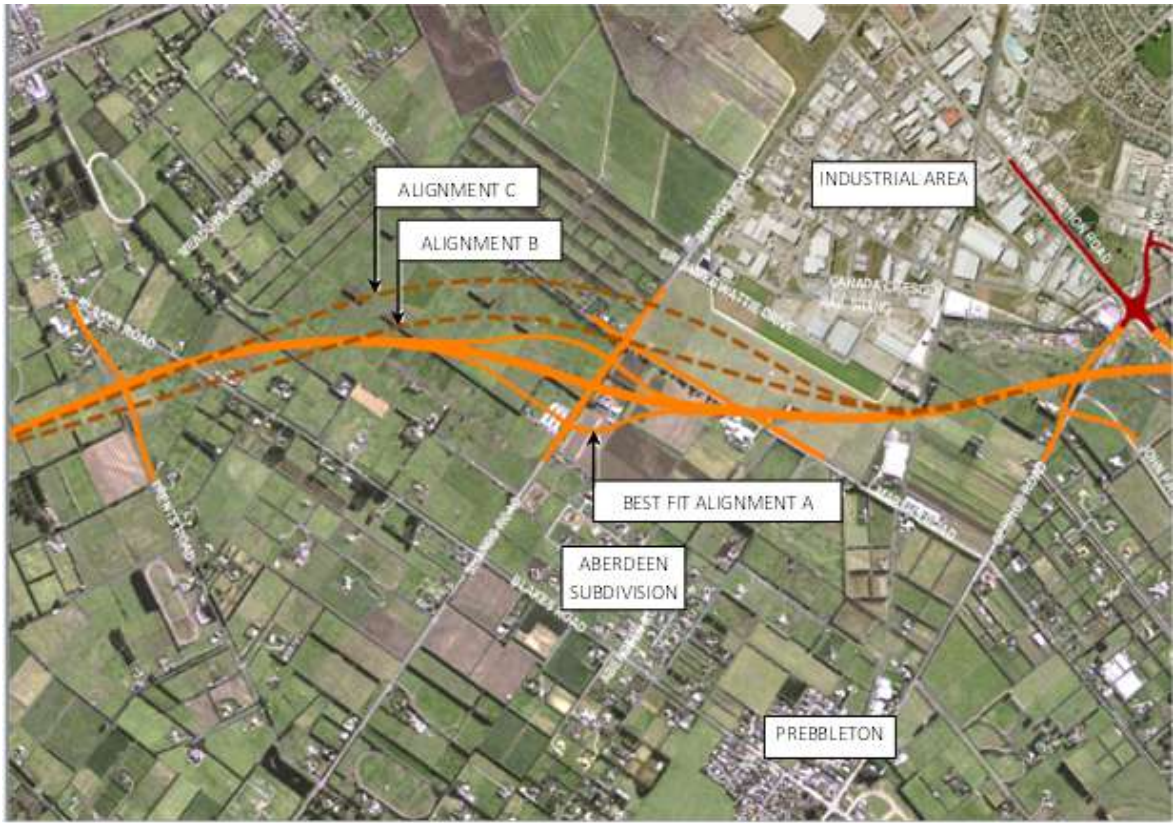
The 'best fit' alignment is presented in Figure 38**.**

Figure 38: CSM2 'best fit' alignment (Option A)



The first round of consultation also identified support for an alternative alignment further north of Marshs Road to increase the separation from the Aberdeen residential subdivision. As a result, two additional alignments, referred to as Option B and C, were developed that passed across Shands Road further to the north. These are presented below in Figure 39.

Figure 39: CSM2 alternative northerly alignments (Option B and C)



Option B was then discounted from further consideration due to the following disadvantages:

- a significant embankment (approximately 8 m in height) would be required for CSM2 to pass over the Shands/Marshs intersection, resulting in a large footprint and potential visual effects;
- a complex bridge structure would be required to span over a large traffic signal controlled intersection;
- the option would have a direct impact on the Transpower high voltage (220kV) transmission lines and towers. Several meetings were held with Transpower to discuss this option. Transpower was very concerned with the likely relocation of a key anchor pylon that acts as a change in direction for the 220kV overhead cables. Transpower considered there would be a high risk of power outages associated with the relocation of the anchor pylon and strongly advised against this option; and
- significant severance of greenfield business land labelled 'CB9' north of Marshs Road identified on Map 1 of Proposed Change 1 to the RPS as future industrial land (this is also known as the Plan Change 54 land).

As a result of the design issues identified with Option B, a more northerly Option C was developed. The advantages of this option relative to Option B were:

- the alignment avoids the 220 kV transmission lines;
- the alignment would require a simpler bridge structure at the Shands Road interchange; and

- it allows the motorway to remain at-grade with Shands Road passing over the top.

Along with the best fit Option A, the alternative northerly Option C was carried forward into an option assessment.

Options assessment

An options assessment workshop was held by the NZTA with its consultants in May 2011. The purpose of this assessment was to complete a comparative evaluation of the two alignment options and identify a preferred alignment to take forward into the detailed scheme assessment and present at the second round of consultation.

The workshop was attended by staff from the NZTA, the NZTA's lawyers (Chapman Tripp) and selected consultants engaged by the NZTA representing relevant engineering and environmental disciplines.

The two alignment options A and C were assessed against the following evaluation criteria:

- cost;
- engineering;
- accessibility;
- physical environmental impacts;
- social environmental impacts; and
- strategic alignment.

The options assessment highlighted that the most significant differences between the two alignments was with respect to property cost and the strategic alignment with regional policy.

The more northerly Option C route bisected a large block of Greenfield business land identified in PC1 of the RPS (the PC54 land). It was assessed that a total purchase of the business land would be required for this option.

While property costs for the 'best fit' alignment are not insignificant, the Option A alignment would only require partial purchase of the business land. The overall difference compared to Option C was therefore very significant, estimated in the order of $14 million to $34 million lower.

Therefore on the basis of cost and being consistent with the strategic land use policy outlined in the RPS, the 'best fit' Option A was selected as the preferred alignment. From an environmental point of view, it was noted that the more northerly Option C was preferable in regards to visual, community and residential amenity parameters, but it was assessed that any adverse impacts associated with Option A could be adequately mitigated.

Draft Scheme Assessment Report

A draft scheme assessment report (SAR) was issued for MSRFL and CSM2 in October 2011. During the preparation of this report, the traffic modelling highlighted future capacity issues on Main

South Road south of Templeton. This will be exacerbated by the introduction of CSM2, in particular delays and queuing associated with the compression of the three lanes of traffic travelling southbound on CSM2 and Main South Road into a single lane. For these reasons, it was recommended that the four-laning of Main South Road should be progressed simultaneously with CSM2, and be opened before or at the same time. As a result of the SAR findings, the Project therefore now combines both MSRFL and CSM2.

7.5.3. Vertical alignment

The CSM2 Strategic Study originally proposed a vertical alignment based on raising the motorway at the eastern end to future proof passing over the Hornby Industrial Rail Line. The majority of the remaining length of motorway was proposed in cut to provide a balance of cut and fill material.

Elevating the motorway was not considered to be practical given the increased environmental effects on the surrounding area, including noise, landscape and visual impacts. A raised motorway would also lead to a significant increase in construction costs associated with structures and substantial embankments.

Following groundwater analysis and considerations regarding discharge into Montgomery's Drain and Upper Knights Stream, the option of placing the whole Project into a trench had a series of problems, potential conflicts and a lack of ability to discharge Project runoff to groundwater. The existing record of groundwater highs had predicted a groundwater table at around 4m below existing surface level at Halswell Junction Road. Further to this, the impacts of the Central Plains Water Enhancement Scheme (CPWES) are projected to raise the groundwater in the area. KiwiRail has also agreed to allow the motorway to pass across the rail corridor at-grade. This is on the basis that the rail line is reconfigured to allow a shunting line so that trains can remain on the western side of CSM2 to access into the existing industrial area.

Overall the proposed alignment is typically at or near grade to allow the disposal of stormwater above design groundwater levels, minimise the depth of stormwater crossings and stockwater race siphons, and minimise the risk of road closure due to flooding. The elevation of the design groundwater level limits the depth to which the vertical alignment can be placed into a trench. Allowing for cross fall across the CSM2, a verge, swale and soak pit, the design disposal layer is typically 1-2 m above the design groundwater level.

In order to maintain connectivity to existing infrastructure, stockwater races, side roads and other local access, maintaining the existing vertical profile (at-grade) on the MSRFL section of carriageway was selected early on.

7.6. Interchanges

The Project includes interchanges at the following locations:

- Weedons Road/ Weedons Ross Road;
- CSM2/Main South Road connection;

- Shands Road; and
- Halswell Junction Road.

Details of the options considered at each of these locations are provided below.

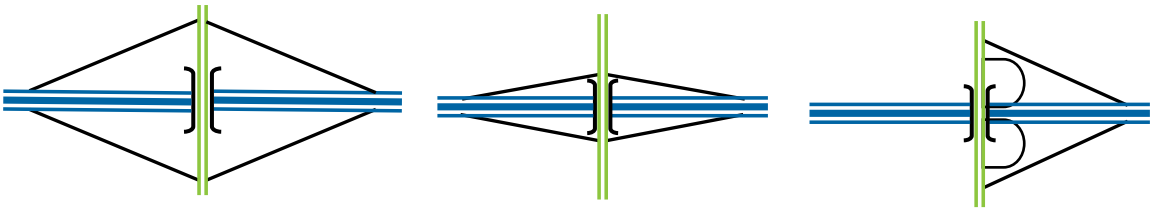
7.6.1. Weedons Road interchange

In CRETS, the construction of a full interchange at Weedons was recommended as a key component of the MSRFL Project. This was on the basis of the interchange functioning as the main access point into Rolleston (via Levi Road) and the Izone (via Jones Road) with the existing Weedons and Weedons Ross Road route becoming a district arterial between West Melton and Lincoln. This approach is supported by both the NZTA and the SDC.

At scoping stage, three interchange configurations were identified. All options maintained the highway alignment at-grade with Weedons Ross / Weedons Road crossing overhead via an elevated bridge structure. The options are listed below with schematics presented in:

- spread diamond layout with conventional on and off ramps;
- closed diamond layout with more closely spaced ramp terminal intersections requiring the ramps to be raised on embankments; and
- partial cloverleaf (parclo), with loop off-ramps and conventional diagonal on-ramps confined to the southern side of the interchange only.

Figure 40: Weedons interchange diagrams



Option 1 – spread diamond *Option 2 – closed diamond* *Option 3 – parclo*

The scoping evaluation process considered each option against five main criteria, including project costs, engineering considerations, transport network impacts, physical environmental impacts and social environmental impacts. The evaluation showed no major differentiators in the first three criteria, but the parclo option was preferred on the basis of having the least impact on property relative to both diamond options and having a less prominent elevated structure than the closed diamond.

As a result of considering the above, only the single option for a parclo interchange has been carried forward. In terms of the parclo ramp terminal intersections, the preliminary traffic modelling identified that an acceptable operational performance could be achieved using two lane roundabouts. There are three roundabouts proposed along Weedons Road to assist with entry/exit from the motorway and improve local road connectivity. Roundabouts are supported by SDC and are the preferred form of control from a safety perspective. For these reasons that design has been confirmed.

7.6.2. Main South Road / CSM2 connection

The Main South Road and CSM2 connection is located on the northern side of the intersection of Robinsons and Curraghs Road. The design philosophy is for the CSM to remain at-grade and function as the primary route in the form of a Y-layout.

Just south of the interchange, the two northbound lanes on Main South Road will deviate on a large radius right hand curve to form the start of CSM2. A third outside northbound lane (northbound off-ramp) will continue straight to merge back into the existing Main South Road south of the intersection with Dawsons and Waterholes Road. In the southbound direction, Main South Road is proposed to diverge on a left hand curve to pass over the top of the CSM2 alignment, before merging back into the Main South Road alignment south (southbound on-ramp) of the Robinsons/ Curraghs Road intersection.

An option for an exit lane has also been included on the southbound lane of Main South Road to provide access to adjacent properties that will have their present access severed by the motorway alignment. The exit lane will also link to the local road network via a new roundabout with Robinsons Road.

During the scheme development stage, a U-turn facility between the northbound off-ramp and southbound on-ramp was also considered as part of the Y-interchange option. However, this was later discounted after it was raised as a concern in the road safety audit. An alternative option for the U-turn movement is now proposed by installing a roundabout further north at the SH1 intersection with Dawsons and Waterholes Road.

Only one option for the interchange layout described above (the parclo interchange) was carried forward.

7.6.3. Shands Road interchange

A full grade separated interchange is proposed at Shands Road to provide access from Rolleston, Prebbleton and southern portions of the Hornby industrial area. High traffic volumes and safety considerations have ruled out any at-grade intersection option at this location.

The CRETS Study and CSM2 Strategic Study recommended a diamond layout as being the only interchange form that was practical at this location. This had been primarily focused on the motorway alignment passing south of Marshs Road. For the purpose of sensitivity testing, the traffic model was also run for interchange locations passing over and north of Marshs Road. This testing demonstrated that at a strategic level, the location of the Shands Road interchange relative to Marshs Road would have no significant impact on traffic patterns in the immediate vicinity.

Given the close spacing of the Shands Road / Marshs Road intersection to the northbound ramps, traffic signals were considered to be the only practical solution for the ramp terminal intersections. Traffic signals provide a greater ability to control, synchronise and co-ordinate movements, and detailed micro-simulation modelling has demonstrated that an acceptable

operating performance can be achieved. The signals also offer a better form of control for pedestrians and cyclists using the Shands and Marshs Road section of the Little River Rail Trail.

A further sub-option for a tighter closed diamond layout was also considered to provide increased spacing from Marshs Road, as well as moving the southern ramp terminal intersection further away from the Aberdeen subdivision. However, this would require the ramps to be raised on substantial embankments including the construction of elevated ramp terminal intersections and therefore, the option was discounted from further investigations. On this basis, only one option involving a spread diamond with traffic signal control was progressed.

7.6.4. Halswell Junction Road interchange

The CRETS study did not favour a direct motorway connection around Springs and Halswell Junction Road. This was on the basis that the CSM2/ Shands Road interchange should be the primary connection in this vicinity to access the motorway from the Hornby industrial estate and local road network. The strategic upgrade of Shands Road to become a district arterial and function as an alternative route to SH1 between Rolleston and Christchurch was an additional factor in favour of an interchange at Shands Road.

Full connectivity at Halswell Junction Road could also have the effect of promoting more traffic to use Springs Road with potential level of service problems and associated amenity issues from increased traffic volumes through Prebbleton Township.

The motorway options presented in the first consultation newsletter in October 2010 did not include an interchange at Halswell Junction Road. This generated a lot of feedback, including CCC requesting consideration of local road connectivity at this location. The CSM2 Strategic Study also identified that east facing freight ramps should be considered at Springs Road to enable Heavy Commercial Vehicles (HCVs) generated by adjacent industrial areas to quickly and efficiently access CSM, Lyttelton Port and Christchurch City.

Based on the above, the following three interchange options were identified at Halswell Junction Road:

- Option 1 – eastward facing ramps for all traffic;
- Option 2 – no connections - all movements on and off the motorway would be via the Shands Road interchange or would utilise the local network; and
- Option 3 – eastward facing ramps for commercial vehicles only. This was as per Option 1, but the ramps would be restricted to freight and passenger transport.

These three options were taken forward for further evaluation in the scheme assessment stage.

7.7. John Paterson Drive

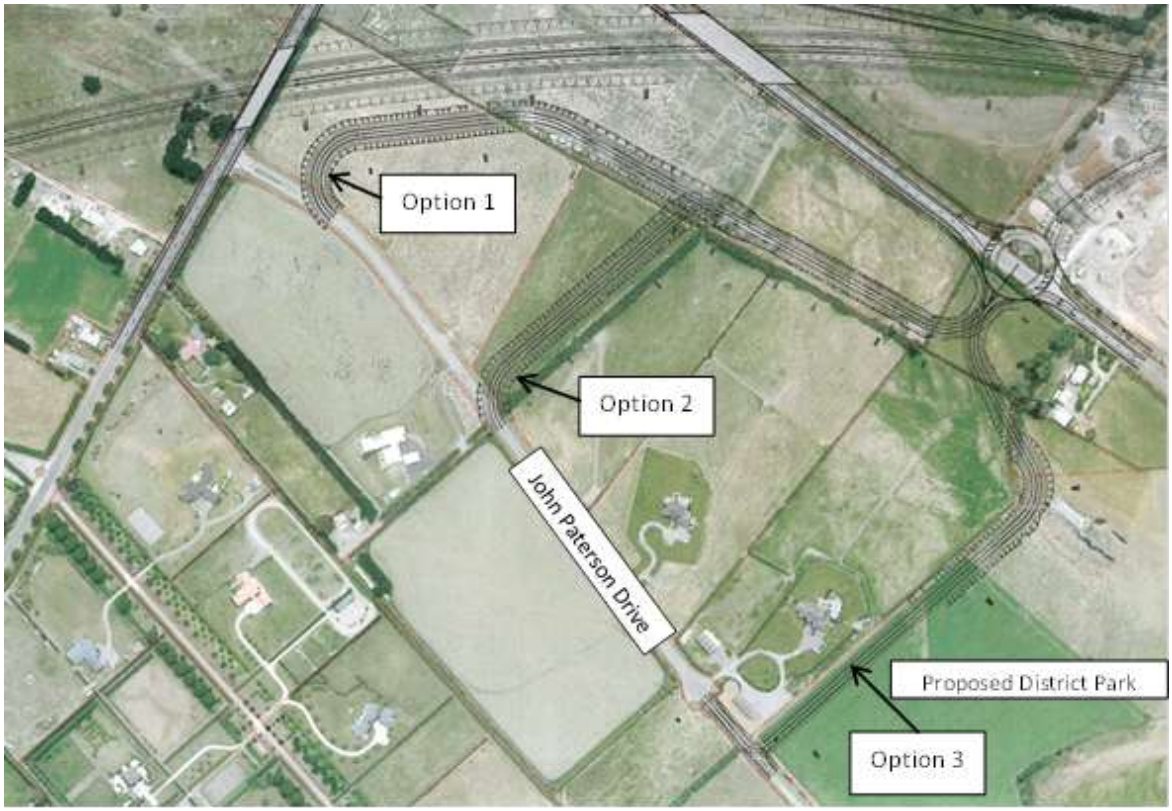
John Paterson Drive currently forms a priority T intersection with Springs Road approximately 300 m south of Halswell Junction Road. This is at the location of the proposed CSM2/ Springs Road underpass where Springs Road will grade over the new motorway.

The initial option considered was for a minor realignment of John Paterson Drive to connect into the southern side of the Springs Road embankment. Due to the close proximity to the embankment structure, an alternative concept was also identified for a more major realignment of John Paterson Drive to connect into the motorway off-ramp roundabout on Halswell Junction Road.

The road safety audit raised the initial design option as a concern and it was subsequently eliminated. Further discussion of the alternative concept for a Halswell Junction Road off-ramp connection was undertaken with stakeholders, with the following three options identified for consideration, as presented in Figure 41.

- Option 1 - utilising the existing John Paterson Drive and realigning the western end;
- Option 2 - realigning the existing John Paterson Drive to pass west of the shelterbelt located midway along the existing road; and
- Option 3 - extending John Paterson Drive further east before running north along the future District Park boundary identified in the adjacent Fulton Hogan plan change. The road would then veer back west to tie into the off-ramp roundabout.

Figure 41: John Paterson Drive options



Further consideration has led to a strong preference for the third option due to the following advantages:

- it will provide good access to a proposed District park and for residents of John Paterson Drive;

- the alignment allows for future connectivity to the Fulton Hogan subdivision immediately to the east;
- it has the shortest length of the three options considered; and
- it requires minimal land take from just one John Paterson Drive land owner.

On this basis, the third option has been adopted.

7.8. CSM2 local road crossings

The proposed CSM2 alignment crosses the local roads listed below. An outline of the options considered at each crossing is provided in the sections that follow:

- Robinsons/ Curraghs Road;
- Waterholes Road;
- Trents Road;
- Blakes Road;
- Marshs Road;
- Springs Road; and
- Halswell Junction Road.

With the exception of Robinsons/ Curraghs Road and Blakes Road, it is proposed to construct underpasses at each location to carry the local road over the new motorway.

7.8.1. Robinsons / Curraghs Road

Robinsons Road and Curraghs Road form a priority crossroads intersection with SH1 on the southern side of the proposed connection between CSM2 and Main South Road. Both are local roads running between Ellesmere Road and SH73.

Given the close proximity to the CSM2 and Main South Road interface, the initial option was to partially close the intersection with consideration to restricting movements to left-hand turns in and out. However, there were safety implications identified with this option related to the design of adequate merge and diverge areas so close to the interchange.

The first round of consultation raised local road connectivity concerns as a key issue amongst the directly affected land owners and community. A further option was therefore considered for Robinsons and Curraghs Road to pass underneath the highway, thereby maintaining a local road connection at this location. This received positive feedback during the second round of consultation and was therefore adopted.

An underpass (local road over the motorway) was considered for this connection. However this was not possible as the proximity of the railway line to the immediate north of the MSRFL alignment and the required mainline vertical clearance meant that the grade required for the western bridge approach would have been too steep.

7.8.2. Waterholes Road

Waterholes Road is a local road in the Selwyn network providing a link from Springston to Main South Road south of Templeton. The CSM2 alignment crosses Waterholes Road near its intersection with Hamptons Road. It is proposed to modify Waterholes Road with a reverse curve alignment to allow the bridge structure to be built offline[62], whilst also minimising impact on adjacent private property and accesses. A minor realignment of the existing Waterholes Road/ Hamptons Road intersection is also required to increase the separation from the new bridge structure.

7.8.3. Blakes Road and Trents Road

Trents Road is classified as a collector road in the Selwyn network and provides an important community link between Prebbleton and Templeton. The initial scheme design was for an offline bridge solution to minimise impact on adjacent properties. However, this design was later discounted following the road safety audit when concerns were raised about the introduction of reverse curves on the Trents Road approaches. Therefore, the confirmed option was for a direct route over the motorway.

CSM2 crosses Blakes Road just south of its intersection with Trents Road. Blakes Road is proposed to be closed either side of the motorway to become two cul-de-sac roads. No other alternatives have been considered given the low traffic demand and the nearby availability of Trents Road as an alternative route for Blakes Road. The skewed alignment across Blakes Road would also mean a significant cost to keep the road open. Closing Blakes Road has received support from the local community and is endorsed by SDC.

7.8.4. Halswell Junction Road, Springs Road and Marshs Road

Marshs Road, Springs Road and Halswell Junction Road will all have an important function in the modified road network, and it was considered important to maintain connectivity across the proposed motorway for all three roads.

Marshs Road passes over the CSM2 alignment just to the east of the Shands Road interchange. An online structure[63] can be accommodated without significant property impacts, so an offline solution was not considered at this location.

Springs Road will cross over the new motorway approximately 300 m west of Halswell Junction Road. An offline design was initially considered for the new structure to improve constructability and provide increased distance grading down the approach to the Halswell Junction Road intersection. However, this option was later eliminated following significant concerns raised in the road safety audit for a reverse curve alignment at this location. The option for a straight alignment has therefore been adopted in the Project.

[62] An offline structure means that the structure is located off the existing road alignment, meaning that the entire construction of the structure can take place while keeping the existing road open.
[63] An online structure means that the structure is located on the existing road alignment.

Halswell Junction Road crosses CSM2 to the east of the existing Springs Road roundabout, approximately half way between this intersection and the proposed off ramp roundabout. Given the relatively close spacing of these intersections, in order to retain the straight horizontal alignment as it passes over the motorway, the online structure was taken forward.

Alternative bridge solutions around Springs Road / Halswell Junction Road

Further options around the Springs Road / Halswell Junction Road area were considered during the earlier stages of scheme development. These were based around the philosophy of removing the requirement for a bridge structure on Halswell Junction Road and re-routing this traffic between Springs Road and the CSM2 off-ramp. The existing roundabout at the Springs Road / Halswell Junction Road intersection would remain, but the south-eastern leg would be replaced by an on-ramp to CSM1. Alternatives included maintaining the motorway at grade or elevating it over Springs Road, as can be seen in the sketches presented in Figure 42 and Figure 43 below.

Figure 42: Sketch of alternative layout at Springs Road/ Halswell - main alignment at-grade

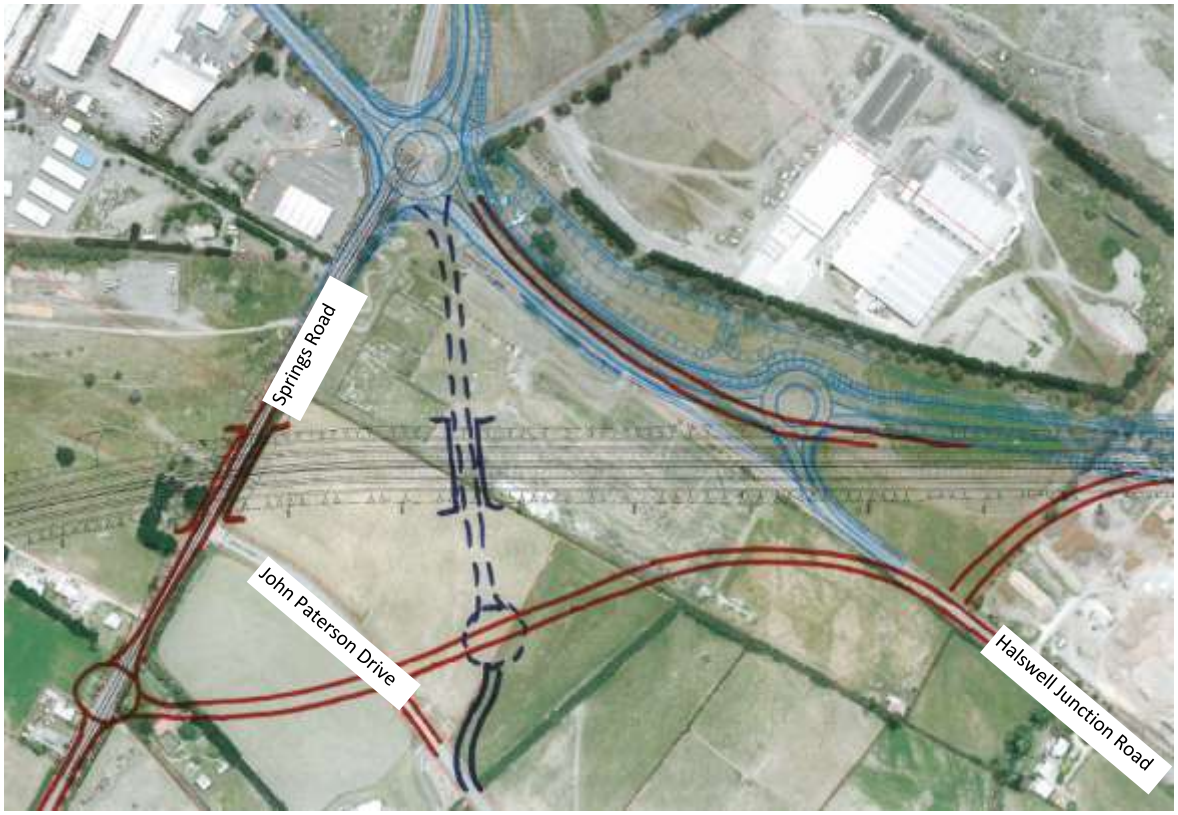
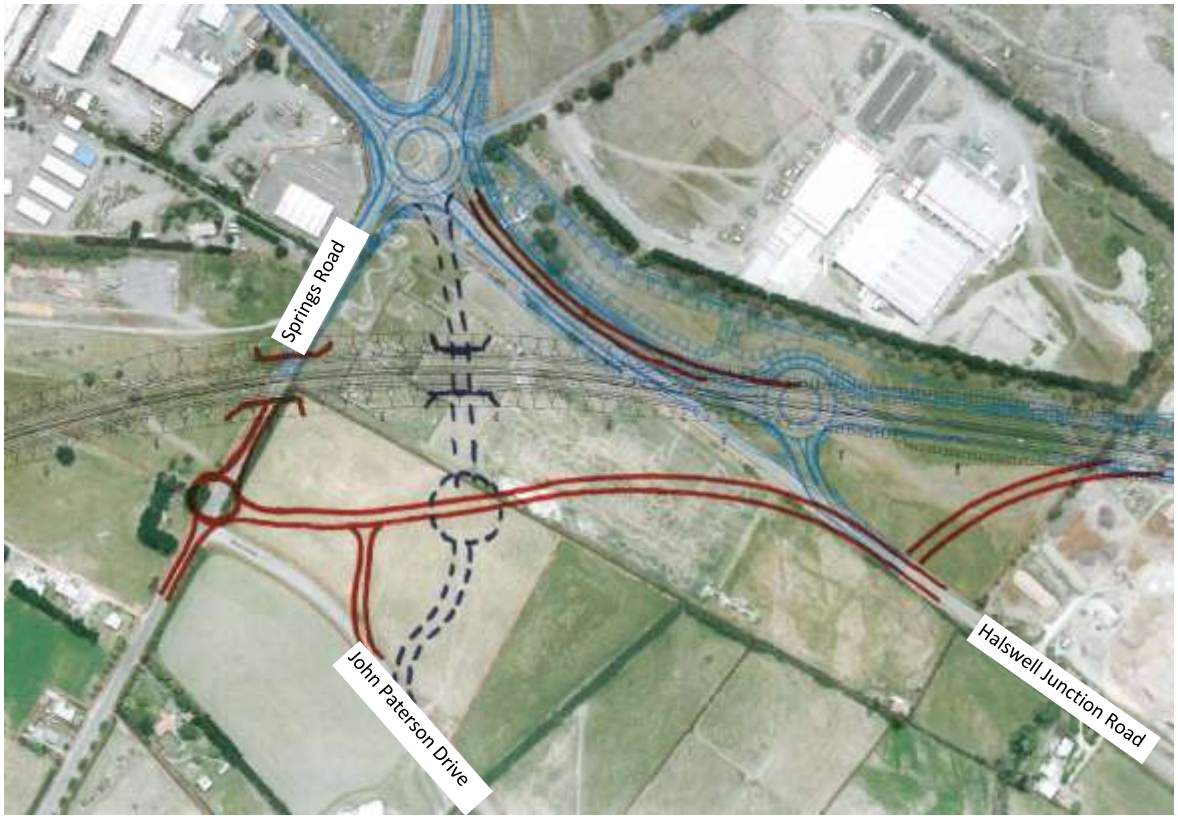


Figure 43: Sketch of alternative layout at Springs Road/ Halswell - main alignment elevated



This arrangement would introduce an obvious disadvantage for commercial vehicles travelling to the Hornby industrial area. Instead of travelling directly up Halswell Junction Road, they would be required to use a more circuitous route. Compared to the preferred option, most traffic movements would also have to negotiate an additional roundabout.

An assessment of the likely intersection performance for the alternative layout indicated that the roundabouts would operate satisfactorily with the motorway ramps restricted to freight only movements. However, the ramps opened to all traffic would result in a serious deterioration in performance at the "new" Springs Road / Halswell Junction Road intersection. Significant delays were predicted on the Springs Road southern approach during the morning peak period giving an overall level of service (LoS) of F[64].

At the "existing" Springs Road / Halswell Junction Road roundabout, more long delays were predicted for the traffic approaching on the western leg of Halswell Junction Road during both the morning and evening peak periods. The overall intersection level of service was LoS E and D respectively, but the Halswell Junction Road approach was operating at LoS F in both periods.

[64] For road sections, the calculation of the level of service is dependent on the type of road being assessed, with different criteria applied to multi-lane motorways and expressways, rural highways and urban roads. Level of service is a measure describing the operational conditions within a traffic stream, based on service measures such as speed, freedom to manoeuver, traffic interruptions, and comfort and convenience. Six LoS are defined, using the letters from A to F, with LoS A representing the best operating conditions and LoS F the worst.

7.9. Main South Road intersections

There are three existing intersections on Main South Road within the extent of the Project:

- Larcombs Road;
- Berketts Road; and
- Dawsons Road/ Waterholes Road.

Details of the options considered at each of these crossings are provided below.

7.9.1. Larcombs and Berketts Road

Larcombs Road and Berketts Road are both priority T intersections located on the eastern side of the alignment. The scoping investigations were based on retaining the intersections, but restricting the access to left hand in and out movements as a result of the central median barrier on Main South Road.

This concept was carried through to the scheme design for Berketts Road, with the proposed layout including the provision of a segregated left turn deceleration lane to enable left turning traffic to move clear of high speed southbound traffic on Main South Road. An associated flush painted island is also proposed to improve lane discipline on the highway approach.

For Larcombs Road, access has been further restricted to left turns in only. Initially left turn out movements were allowed for, but the proximity of the Weedons interchange does not provide sufficient separation for a left turn acceleration lane with respect to the off-ramp for southbound traffic. Consideration was given to realigning the Larcombs Road approach to increase the separation to the exit ramp, however the desired separation could still not be achieved within the land available. Moving Larcombs Road further north would also begin to impact on Berketts Road.

Later during the scheme development stage, the road safety audit raised the idea of fully closing both intersections to fulfil the function of Main South Road as a strategic road with no access except for grade separation. This was met with considerable opposition from local landowners, businesses and also SDC. Therefore, the scheme has maintained a degree of access to/from these side roads.

7.9.2. Dawsons Road / Waterholes Road

Discussions with directly affected landowners around the CSM2 connection with Main South Road identified demand for a U-turn movement close to the interchange. The original proposed layout for the CSM2 / Main South Road connection therefore included a U-turn facility between the northbound off-ramp and southbound on-ramp.

This facility was raised as a concern in the road safety audits, which suggested considering an alternative option for providing the U-turn movement further north by installing a roundabout at the Main South Road intersection with Dawsons and Waterholes Road. The intersection is

currently a priority controlled cross roads layout and a roundabout would also offer additional advantages by allowing safer side road access.

The inclusion of the roundabout at this location will also function as a threshold for northbound traffic approaching Templeton. In the southbound direction, it will signify the transition from the built-up Templeton area into the higher speed rural environment.

The single proposed option is for a large diameter, dual laned roundabout suitable for a high speed environment. A single lane roundabout was also considered, but was discounted in preference of providing a more sustainable, long term solution.

7.10. Weedons intersections

7.10.1. Weedons Ross Road / Jones Road

The construction of the Weedons interchange promotes Jones Road as the main access route into the Rolleston industrial area. The consequent increase in traffic demand (assuming the eventual removal of traffic signals at Rolleston), in particular heavy vehicles generated by the Izone, necessitates an upgrade of the intersection.

Three options were identified during the scoping stage including:

- maintaining existing priority control;
- changing the priority to Jones Road; and
- a roundabout.

Traffic modelling analysis demonstrated that maintaining the existing layout was only sustainable in the short term, with capacity problems and large queues forming on Jones Road by 2026. A change in priority from Weedons Ross Road to Jones Road would increase the design life of the intersection, but capacity issues would emerge by 2041.

On this basis, the single option of a roundabout was adopted for the scheme design. Traffic modelling has confirmed the requirement for a large diameter, dual lane layout. A free left turn lane for the dominant traffic movement heading south on Jones Road to the Izone was initially considered, however this was later discounted due to concerns raised in the road safety audit.

7.10.2. Weedons Road / Levi Road

Levi Road currently intersects Weedons Road at a priority controlled T junction, approximately 1 km east of the proposed Weedons interchange. With the construction of the new interchange, Levi Road will be promoted as the primary access into the Rolleston Township.

During the scoping stage investigations, traffic modelling was undertaken to test the future performance of the intersection for the following three options:

- maintaining existing priority control;
- adding turning lanes; and

- changing the priority to Levi Road.

Similar to the Weedons Ross Road / Jones Road intersection (and assuming the eventual removal of traffic signals in Rolleston), the existing layout was only shown to be sustainable in the short term, with large queues forming on Levi Road by 2026. The addition of slip lanes on the Levi Road approach improves the design life of the intersection, but delays would start to increase by 2041.

Modelling of the alternative option to change the priority from Weedons Road to Levi Road highlighted a significantly improved intersection performance. The change of control also supports the promotion of Levi Road as the primary access into the Rolleston residential area. This option was therefore adopted.

7.11. Main South Road rear access roads

There are numerous property accesses located along the State highway frontage varying from residential accesses to commercial business accesses. The vast majority of these are located on the 3.2 km section of Main South Road between the intersections of Weedons / Weedons Ross Road and Robinsons / Curraghs Road.

With the introduction of a central median to divide opposing lanes, all property accesses along the four-laning corridor would be restricted to left-hand turns in and out. The dividing median is proposed to reduce the crash rate and crash severity from right turning movements and head on collisions, which are typically higher on four lane highways.

One of the key issues raised during consultation was the effects of a left in / left out arrangement on property users. Right turning vehicles will essentially have to travel to the nearest interchange and make a legal U-turn manoeuvre. The scoping stage investigations raised potential measures to mitigate the effects of this including:

- U-turn slots;
- new centrally located link road between SH1 and Jones Road; and
- rear access roads.

There are significant safety concerns with U-turn arrangements in high speed environments. Any new centrally located link road would also require a new level crossing over the railway line and would also introduce a new intersection to the highway. On this basis, these two options were discounted and the scheme investigations focused on the provision of rear access roads.

In addition, various options were identified for rear access roads on both the western and eastern side of the Main South Road alignment before the final solutions were selected.

7.12. Hornby rail siding

The Hornby Industrial Line runs from the Main Trunk Line at Carmen Road heading in a southerly direction across Halswell Junction Road to just north of Marshs Road. The proposed CSM2 alignment passes across the southern end of this rail corridor, which is currently used for shunting

trains into the Watties factory. To enable CSM2 to remain at-grade whilst continuing to cater for the shunting of carriages into Watties allowing the trains to remain on the west side of CSM2, it is proposed to turn out the rail tracks.

Two options were considered including a western turnout and an eastern turnout, which were presented to KiwiRail in February 2011. KiwiRail confirmed that both options appeared feasible and that the turnout to the west would cost less but the eastern turnout may provide more development opportunities. On this basis, the eastern turnout has been taken forward.

KiwiRail has advised it has no intention of extending the railway line further south for future commuter rail purposes or similar. However, KiwiRail initially stated that the rail corridor would not be sold, and that it would expect a Deed of Grant would be required for the NZTA to pass across the corridor. If in the future a rail extension to Prebbleton was justified, any associated upgrade works for the rail to pass across CSM2 would be undertaken as per the NZTA's obligations under the Deed of Grant Agreement. Subsequent discussions with KiwiRail have indicated that the NZTA purchase of the affected section of railway corridor is an alternative option that could be explored.

7.13. Walking and cycling facilities

A preliminary concept for a shared use walking and cycling facility has been identified for the Project. This has been developed through a series of workshops with SDC and CCC and has primarily focused on providing a link between the CSM1 shared use path currently under construction and the Little River Rail Trail.

In collaboration with the key stakeholders, the proposed option involves an extension from the CSM1 route terminus at the Owaka subway, continuing west along the CSM2 alignment and within the new motorway designation to the south. The path would then pass under bridges at Halswell Junction Road and Springs Road before continuing along the disused section of rail corridor to Marshs Road, whereupon it connects with the existing Little River Rail Trail. The proposed cycle route alignments were presented previously in Figure 24.

A second link is also provided on the southern side of Halswell Junction Road to the new CSM2 west bound off-ramp roundabout to create a link with the shared use cycle way where it passed along the CSM2 alignment. In addition, a third link is shown, from the Owaka subway to Halswell Junction Road. This link is being built as part of CSM1, and will remain in place after CSM2 is completed. Access for cyclists across the new roundabout on Halswell Junction Road will be provided based on current standards.

The existing Marshs Road section of the Little River Rail Trail will be retained from Shands Road, and the signalised intersection associated with the Shands Road interchange will facilitate a cyclist crossing from Marshs Road to Shands Road. This maintains connectivity to Hornby via Shands Road.

The option of walking and cycling facilities along Springs Road and Halswell Junction Road (in the vicinity of the bridges) has been discounted, due to safety concerns.

7.13.1. Provision for pedestrians and cyclists at bridge structures

The new motorway scheme includes the construction of eight bridges to maintain local road connections across the motorway alignment. Various combinations were considered, but key stakeholders (CCC and SDC) agreed to a practical approach in providing for pedestrians and cyclists at the bridge structures, described as follows:

- Halswell Junction Road underpass – provide on-road shoulders for confident cyclists, 2m wide separated footpath will be provided either side of the road carriageway;
- Springs Road underpass – provide on-road shoulders for confident cyclists, 2m wide separated footpath will be provided either side of the road carriageway;
- Marshs Road underpass – provide a shared use path on the southern approach. The width of the route is to be ascertained during the detailed design phase, with provision for a barrier separating cyclists from traffic to be included. No footpath is required on the northern side of the bridge;
- Shands Road underpass – provide on-road shoulders for confident cyclists, 2m wide separated footpath will be provided either side of the road carriageway;
- Trents Road underpass – provide (subject to agreement with SDC) a shared use path on the north-eastern side of the bridge. The width of the route is to be ascertained during the detailed design phase, with provision for a barrier separating cyclists from traffic to be included. No footpath is required on the south-western side of the bridge;
- Hamptons Road / Waterholes Road underpass – provide on-road shoulders for confident cyclists, 2m wide separated footpaths will be provided either side of the road carriageway;
- Main South Road underpass – provide on-road shoulders for confident cyclists; and
- Robinson Road overpass – provide on-road shoulders for confident cyclists, 2m wide separated footpaths will be provided either side of the road carriageway.

The actual arrangements are flexible and can be finalised during detailed design within the design envelope of the bridges.

7.13.2. Main South Road

Several options were considered to provide safe, comfortable, direct and attractive facilities for pedestrians and cyclists travelling along or across the Main South Road corridor. The options identified were:

- using the shoulder along the State highway;
- using the rear access road on the western side of Main South Road; and
- using Jones Road.

The first option is to provide access along the Main South Road corridor for cyclists. The number of accessways along the corridor will be greatly reduced as a result of the proposed MSRFL scheme, with only Larcombs Road and Berketts Road intersecting this section of the route. A 2.5 m wide sealed shoulder is provided along the extent of Main South Road and this would provide a coherent and direct route for cycle trips. However, this option is not recommended from a safety perspective.

The second option is to provide a cycle route along the western rear access road. The lower speed environment and reduced traffic flow could make this attractive for less confident cyclists. However, by itself, it does not provide a coherent, safe or direct route option and still requires the use of either Main South Road or Jones Road north of Curraghs Road and south of Weedons Ross Road.

The third option is for the development of a cycle route utilising Jones Road, which is identified in the SDC Walking and Cycling Strategy. This could be in the form of widened seal on the carriageway. This a less desirable option due to the higher speed environment and higher volume of through traffic relative to the rear access route. This route would be considered more comfortable and attractive to some cyclists due to the reduced traffic flows (relative to Main South Road), but would not be as direct or coherent as Main South Road.

Pedestrian provision will be more limited along Main South Road. However, the primary pedestrian access should be catered for by using the Robinsons /Curraghs Road underpass and Weedons Road / Weedons Ross Road overbridge. There will also be the option for pedestrians to cross Main South Road at each of the key intersections north of CSM2 including Waterholes Road, Trents Road and Barters Road.

Ultimately the provision of a walking and cycling facility within the Main South Road corridor is a decision for SDC which needs to reflect the objectives and targets outlined in its Walking and Cycling Strategy. These facilities have not specifically been included as part of this Project, as cycling connectivity in Selwyn is accepted by SDC as being a council commitment, separate to this Project.

7.14. Stormwater

This section provides a summary of the various options for stormwater management. A detailed discussion is presented in Technical Report 3, Volume 3.

7.14.1. Discharge of surface water runoff

Options considered for conveyance and discharge of runoff included:

- kerb and channelling with sumps and piped conveyance system; and
- grassed swales and steep sided open channels.

Given the rural environment, the availability of land and water quality objectives, swales were selected as the preferred option. Swales are a low cost and effective treatment solution. They

also provide storage of stormwater prior to discharge to land. Steep sided open channels were disregarded due to road safety considerations.

Kerb and channelling has been proposed on ramps, structures and on the Project infrastructure around Halswell Junction Road due to the limited depth between the edge of seal and historical groundwater highs. Typically structures will drain to swales to provide treatment prior to disposal.

Disposal to land was considered the only viable option for disposing of stormwater for the Project. Options, such as constructing a piped discharge network to discharge to the Selwyn River and/or Halswell River and/or pumping, were discounted due to the significant costs of such a system. Pumping options were only considered in very rare instances where other solutions were not possible, such as adjacent to Robinsons Road. Conveying runoff to ponds and dedicated larger disposal fields was considered but rejected due to having to designate and purchase larger blocks of land to accommodate these features. The preferred option for regular soakage devices was selected due to increased redundancy and reduced land take.

7.14.2. Stormwater treatment

The treatment of stormwater is required by the NRRP in areas mapped as less than 6 m depth to groundwater. Collection and treatment in swales was considered an acceptable methodology and is typically used throughout the region. The methods set out in the NRRP are prescriptive to achieve a permitted activity status. Virtually the entire Project complies with the NRRP permitted activity rules regarding stormwater treatment and disposal.

Proprietary stormwater treatment devices have not been considered due to high cost and high maintenance requirements.

7.14.3. Treatment of stockwater races

Nine existing stockwater races cross the proposed alignment and will be piped as part of the Project. The vertical grade of the Project was determined early in the design sequence and shifting of the alignment to accommodate open channel flow of the stockwater races was neither practical nor cost effective. A range of alternative options were considered including: closure, part closure, pumping and realignment. Overall the function of the race network must be maintained thus wider closures were not considered. The stockwater races also have a dual function of providing land drainage during heavy rain and providing environmental flows to the Halswell River.

Closing sections of some individual races and /or rerouting races has been considered where it can minimise the number of stockwater siphons. An alternative supply is available to service those customers affected if the race can be reconnected downstream. Pumping was discounted on the grounds of cost and reliability.

Along Main South Road, retention of the existing stockwater race as an open channel has been considered as an alternative to a 2km section of piping between Weedons Rd and the point where

the stockwater race alignment leaves Main South Road. This was investigated to determine whether the loss of aquatic habitat could be avoided.

In order to retain the stockwater race in its current alignment as an open channel, the typical cross section of the road would need amending by installing a wire rope safety fence along the eastern road edge, along with adjustments to the road shoulder and drainage swale design also being required.

There were a number of potential issues identified with retaining this section of stockwater race as it required the road alignment to move to the west and would have resulted in a relatively short length of road with an unacceptable weaving alignment. The wire rope safety fence is more of a hazard to vehicles compared with clear run-out zones and a requirement to steepen the back face of the drainage swale would result in less permeable surface area and therefore less stormwater treatment.

The lengths where this alternative option could be achieved without purchasing land on the eastern side of Main South Road was limited, as detailed below in Table 13.

Table 13: Potential for stockwater race retention

Section No.	Chainage (project running distance in metres)	Length	Comments
1	3100 – 3200	100m	The carriageway is wider at this point to accommodate the southbound exit ramp at Weedons Interchange. A wire rope safety fence is already proposed to accommodate the additional road width and piping this section is necessary because of the interchange.
2	3200 – 3600	400m	There is potential to retain the existing stockwater race.
3	3600 – 3900	300m	A deceleration lane is required into Larcombs Rd and piping this section is therefore necessary.
4	3900 – 4200	300m	There is potential to retain the existing stockwater race.
5	4200 – 4950	750m	A deceleration and acceleration lane is required into Berketts Rd so piping this section is therefore necessary.
6	4950 - 5150	200m	There is potential to retain the existing stockwater race.

Sections 2 and 6 are within the proposed location of the back slope of the swale. If the road and swale were moved to the west, there would be insufficient width of earth remaining between the swale and stockwater race to ensure suitable slope stability, which risks the possibility of the stockwater race side wall collapsing. There is sufficient width of earth along Section 4 to enable it to remain without risking collapse (a distance of approximately 300 metres).

It is considered that only Section 4 could be retained without compromising the proposed MSRFL alignment. However, it is considered impractical and ineffective in terms of aquatic habitat values to retain such a short section of open channel, so this option has been dismissed also.

7.14.4. Overland flow paths

The Project crosses approximately 12 overland flow paths in addition to the stockwater race flow paths set out above. Options to deal with these included:

- ignoring the overland flow path and making the assumption that soakage would prevail. If soakage does not prevail, the overland flow generated in the upstream catchment would discharge to the highway drainage network. Should the highway drainage network then be overwhelmed, it would spill over the Project area centreline and fill the downhill swale before continuing as overland flow downstream of the Project alignment but not necessarily in the same location. This option was rejected as it would require detailed engineering and a full topographical survey to ascertain the extent of flooding and the effects on this and other flow paths downstream of the Project area;
- allowing overland flow to enter the Project drainage swale. This option was rejected because of potential overloading of the highway drainage system. Flows to the Project would be intercepted upstream of the Project and passed beneath in an inverted siphon; and
- pumping and storage options were ruled out because of cost and maintenance and the increase in designation area and its associated land take required to store the necessary volumes.

The preferred solution varies with existing function. Along CSM2, the preferred solution is to bund against the potential overland flow paths and convey the floodwater beneath the Project using siphon arrangements. Along MSRFL the overland flow paths do not typically pass through / beneath SH1 and have the potential to flood the upstream landowners. Protection of the drainage system via earth bunds and shallow timber flood walls was preferred over reshaping of the existing land and wider flood bunds due to land constraints.

7.14.5. Construction phase stormwater discharges

The Draft ESCP (SEMP002) included in Volume 4 of the application documents, sets out a 'toolbox approach' to management of construction discharges, through the proposed application of various erosion and sediment control devices. The tools available for the management of

construction phase stormwater discharges include clean water diversion drains, earth bunds, silt fences, swales, sediment retention ponds, soak pits, surface roughening of embankments and chemical flocculation to assist in the settlement of sediment in ponds.

All of these options will be available to the contractor (as required) within the structure of the final ESCP and this forms the consideration of alternatives for managing the construction phase stormwater discharges.

7.14.6. De-watering

The Project involves potential dewatering at two locations. The dewatering involves lowering of groundwater, which will possibly rise in the future due to groundwater mounding effects unrelated to this Project. The potential dewatering is at the stormwater treatment ponds adjacent to Halswell Junction Road and the Robinsons Road overpass, where the local road passes under the motorway.

The alternatives available to the dewatering option proposed for the Halswell Junction Road ponds within this application are:

- Direct more runoff to surface water and less to groundwater at Halswell Junction Road - the stormwater system could be designed to discharge more runoff directly to surface water with less directed to groundwater via pond seepage. Additional storage facilities (and a larger designation area) would also be required to offset the reduced volume of storage in the unlined ponds caused by high groundwater levels above the pond floors. Additional and more regular discharge to surface water (via surface raceways or subsurface pipe lines eventually to Upper Knights Stream) would be needed to offset the reduced infiltration rates from the unlined ponds where gravity drainage would be significantly curtailed by groundwater levels above the pond floors. In addition, the lined ponds would have to be redesigned to allow for groundwater levels above pond floors to reduce the risk of liner lifting.
- Raise CSM2 at Halswell Junction Road - raising CSM2 by 1 m to 2 m would allow for construction of the unlined ponds at Halswell Junction Road to be raised by a corresponding amount allowing for a greater depth to water. This alternative is probably the highest capital cost of the listed options, but it may allow for operation of the stormwater management system with a minimum of operational costs and pond storage volumes would not be limited by high groundwater levels. However, raising the road would potentially lead to additional visual and noise effects and a greater land requirement for the Project.

The alternatives available to the dewatering option proposed for Robinsons Road where it is potentially affected by future groundwater levels are:

- Raising the level of Robinson Road beneath the Robinson Road overpass - raising the level of the low point of Robinsons Road beneath the overpass by 1 m to 2 m would allow for water levels to be higher than those assessed with less risk of flooding. The utility of the road would be reduced however, as taller vehicles could not use the road if over height. The roadway would be available for use by the lower-height vehicles during wet periods when a deeper roadway would be flooded.

- Raise CSM2 above the Robinson Road overpass - raising CSM2 by 1 to 2 m would allow Robinsons Road to be raised by a corresponding amount without the limitation of the lower clearance described above. However, raising CSM2 would potentially lead to additional visual and noise effects and a greater land requirement for the Project.
- Allow Robinsons Road to flood - building the Robinson Road overpass and CSM2 as planned may result in flooding of Robinsons Road when groundwater levels are high and large rainfall events occur. The depth to water, recurrence interval and duration of such flooding events cannot be accurately predicted at this stage. However, the water level assessment indicates that water levels are likely to be above 37.4 mRL 5 % of the time and above 36.3 mRL10 % of the time. The duration of the flooding will not be known until the future, as it depends on the extent of groundwater mounding effects arising from the implementation of the Central Plains Water Enhancement Scheme, as well as the timing and uptake of this scheme.

In relation to the third option for addressing the groundwater effects at Robinsons Road, it is noted that while the NZTA has proposed dewatering at Robinsons Road and discharge to the nearby stockwater race (for consenting purposes), it also proposes to retain the option of allowing Robinsons Road to flood, where it passes under CSM2. Alternative routes are available to minimise effects on local traffic movements. The NZTA will work with the SDC to determine the preferred approach when (and if) the future groundwater effects arise.

7.15. Air

The Draft Construction Air Quality Management Plan (SEMP001) included in Volume 4 of the application documents, sets out a 'toolbox approach' to management of construction phase air discharges (i.e. dust), through the proposed application of various management techniques. The alternatives available for the management of construction phase air discharges are also set out in Section 18.6 of this AEE.

7.16. Noise

A number of noise mitigation options have been evaluated by the Project team under the Best Practicable Option (BPO) guidance provided by the applicable noise standard NZS 6806:2010. The assessment matters included, but were not limited to, noise reduction, visual impact, safety, planning and cost. For this Project, a workshop was held which was attended by the Project team. Each mitigation option was progressed in order that the BPO could be determined. Of the noise mitigation options that were presented at the workshop, a number of bunds and barriers were immediately identified as not being necessary owing to the intended Crown purchase of the properties they were designed to protect.

Each sector assessment is set out in Chapter 17 of this AEE and contains a summary of all noise mitigation options considered and a description of the selected mitigation option.

PART F: CONSULTATION

8. CONSULTATION & ENGAGEMENT

Overview

Consultation and engagement has been undertaken in accordance with recognised good practice, as well as legislative requirements. Consultation during the Project has involved engagement with local, regional and national stakeholders. This has involved a number of methods, as appropriate, including one-on-one meetings, group meetings, public open days, newsletters and online material.

On-going consultation and communication with the relevant regulatory agencies has also been undertaken as part of the preparation of consenting documentation. In addition, engagement with tangata whenua has been on-going since the commencement of the Project.

8.1. Introduction

This chapter summarises the outcome of two formal consultation phases undertaken on the Project prior to lodging this application. Feedback from a less formal third round is also included. This chapter sets out a summary of:

- the statutory framework for consultation;
- the consultation process;
- the consultation methods used to engage participants;
- each consultation phase, the key issues identified from feedback and the response;
- consultation undertaken with key stakeholders, the feedback received and the response to their issues; and
- iwi consultation.

The consultation approach for the Project has been to work closely with key stakeholders, affected parties and the wider community. This has been completed to determine key constraints, with the intent of finding solutions and developing mitigation measures along the proposed route.

The Project team has engaged with local iwi through Te Runanga o Ngai Tahu (TRONT) and Mahaanui Kurataiao Ltd (MKT), to seek feedback on the Project. A cultural impact assessment (CIA) is currently under preparation and a summary of available published material is included in Chapter 23 of this AEE. This assessment identifies issues of particular relevance to iwi and assisted in the development of specific mitigation measures. Once complete, the full CIA will form Technical Report 15.

An independent research provider was engaged to undertake a social impact assessment that specifically addressed the social impacts upon the various communities affected by the Project.

This involved consultation with various community and social groups within the subject area. The social impact assessment (Technical Report 13, Volume 3) is summarised in Chapter 26.

All of the matters raised have been considered by the Project team and have informed decisions on refinements to the preferred alignment. Some responses to these matters are included in Part E concerning the consideration of alternative options, and Part G, which is the assessment of effects.

8.2. Statutory framework

8.2.1. Resource Management Act

While there is no statutory requirement for consultation under the RMA for either a NoR or an application for resource consent, except in relation to meeting Treaty of Waitangi obligations under section 8, a statement of any consultation carried out in relation to a project is required in accordance with Form 18 of the Resource Management Regulations 2003 (NoR) and Clause 1 of the Fourth Schedule of the RMA. Nonetheless pre-application consultation with potentially affected parties and key stakeholders is considered best practice, especially for major projects. It is the NZTA's policy to consult on such matters to exhibit a sense of social and environmental responsibility including taking into account the views of affected communities.

Within the framework of relevant statutory matters, the three phases of consultation have been carried out in consideration of:

- the actual and potential environmental effects of the Project;
- suitable approaches for avoiding, remedying or mitigating adverse effects on the environment;
- alternative routes and alignments for delivering the NZTA's objectives for the Project; and
- engagement with tangata whenua.

8.3. Land Transport Management Act 2003

The NZTA's operating principles are set out in section 96 of the LTMA. Section 96(1) of the LTMA requires the NZTA to exhibit a sense of 'social and environmental responsibility' in meeting its objectives and undertaking its functions. This is further detailed to include avoiding, to the extent reasonable in the circumstances, adverse effects on the environment.

A comprehensive consultation and engagement process has been developed for this Project.

8.4. NZTA Public Engagement Policy and Guidelines, Working Draft 2008

Deciding when and how to engage the public requires judgment. This document sets out the NZTA's engagement policy and provides guidance for deciding when and how to engage the public. It explains the steps involved and provides a number of engagement resources.

8.5. Consultation process

The NZTA has undertaken three phases of public consultation on the Project since the completion of the CSM2 scoping study:

- an initial phase of consultation, held between 21 October and 13 December 2010;
- a second phase of consultation, held between 5 August and 18 September 2011; and
- a third phase of consultation which began in February 2012.

The purpose of the first phase of consultation was to provide stakeholders, affected parties and the community an opportunity to review and comment on the Project. The NZTA sought feedback on important issues and potential opportunities associated with the Project. Respondents were asked to comment on the proposed options and alignments that were developed as part of the initial scoping exercise for CSM2.

The purpose of the second phase of consultation was to seek feedback on the NZTA's preferred route for the Project.

The purpose of the third phase of consultation was for the NZTA to discuss key updates with directly affected parties along the MSRFL and CSM2 alignments, and key stakeholders. Project updates included safety and design developments and timelines, such as the expected Project start-date and indications as to when land purchasing may begin.

The consultation process for the Project has been carried out in accordance with a Project consultation plan and all responses received have been recorded in a database called "Teamview Consult™".

Feedback from the consultation has been analysed and summarised to inform the Project team in the development of a preferred design for MSRFL and CSM2. The key themes and issues identified from this feedback and how this has influenced the design are outlined in the following sections.

The NZTA and members of the Project team including specialist social impact consultants, along with representatives from the NZTA's property advisers, have been meeting with directly affected parties since late 2010. The NZTA will continue to meet with directly-affected and other parties as required, to discuss detailed property issues and other matters relating to the Project, through the consenting, detailed design and construction processes.

In addition, the NZTA project team has been working cooperatively with groups of key stakeholders to help steer the Project throughout its development, understand and incorporate their drivers, and to provide essential information on the wider aspects and impacts of CSM2 and MSRFL. These two groups are the Project Advisory Group (PAG) and the Statutory Authorisation Advisory Group (SAAG). The PAG and SAAG have been established to provide a forum for local government representatives to directly engage with the NZTA and members of the Project team. The PAG has provided a valuable forum for continued consultation and feedback. It has also facilitated other opportunities for engagement, for instance with community boards and councils.

The SAAG was successful in ensuring that all parties were involved in the statutory decision-making process throughout the Project.

The NZTA has sought to engage with iwi throughout the duration of the Project development and a CIA is currently being prepared (as presented in Chapter 23).

8.6. Consultation methods

In October 2010 and August 2011, a Project newsletter and accompanying letter was sent to key stakeholders, directly affected parties, and other stakeholders registered with the Project team. The newsletter was also delivered to approximately 6,000 households in Prebbleton, Templeton, Rolleston and environs surrounding the Project area. In the first phase of consultation, there were issues with distribution. This resulted in the distribution agency engaged by the NZTA failing to deliver newsletters to some households within the Project area. The newsletters were promptly redelivered by hand to all properties to ensure that the entire area was covered. This enabled those who wanted to provide feedback an opportunity to respond. Newsletters associated with the second phase of consultation were also hand-delivered. A third Project newsletter is due to be sent out in late 2012 to provide parties and stakeholders with an update on the Project and an outline of the statutory processes, as part of the third stage of consultation.

The NZTA held three community open days during phase 1 and 2 of consultation:

- Phase 1: 5 and 6 November 2010 and 2 December 2010; and
- Phase 2: 24, 26 and 27 August 2011.

Visual animations showing the proposed alignment were prepared for the 2011 open days. The general feedback was that the animations were very useful and provided a clear visual reference for the wider community. The animations can now be accessed from the Project website.

The newsletters outlined the key features of the Project. Respondents were asked to identify issues that should be considered, opportunities to reduce potential effects, and any additional comments that may be relevant. For the second phase of consultation, respondents were asked to provide comments on the NZTA's chosen alignment for MSRFL and CSM2.

The key techniques used to encourage feedback on the Project were:

- consultation newsletter mail-outs to directly affected parties, key stakeholders and other parties on the Project database;
- consultation newsletters distributed to SDC, CCC, Rolleston Community Library, Lincoln Community Library, and Lincoln University to be available to the wider community;
- newsletter letter-box drop to approximately 6,000 properties in the Project area;
- public notices in local newspapers including The Press, Christchurch Star, Selwyn Times, Southern View, Western View and SDC's publication Council Call;
- media releases;

- series of three public open days for each phase of consultation with a total of approximately 800 attendees;
- meetings with individuals and interested groups;
- ahead of the second phase of public consultation, members of the Project team telephoned directly affected parties and selected key stakeholders to advise them on the NZTA's chosen alignment. These parties were also invited to attend the open days in advance of the newsletter distribution and the NZTA media release; and
- visual animations of the proposed alignment.

8.7. Phase one consultation

8.7.1. Overview of responses

The first phase of consultation on alignment options for both the MSRFL and CSM2 sections of the Project was undertaken in late 2010. The first newsletter outlined the key features of the Project and the two alignment options for CSM2 (Figure 44 presents the alignment options as they appeared in the first newsletter). It provided an opportunity for the public to identify issues that should be considered; comment on their preferred alignment option for the CSM2 section; identify opportunities to reduce the potential adverse effects of the proposal; and to provide any specific additional comments.

Figure 44: The alignment options presented in the Phase 1 (October 2010) consultation newsletter

In total, 120 respondents provided comments relating to MSRFL, with 62 respondents providing specific MSRFL feedback. In total, 266 respondents provided comments relating to CSM2, with 234 providing specific CSM2 feedback, and 75 respondents providing Project-wide feedback that was generic to both MSRFL and CSM2. Project

8.7.2. Directly affected parties and community feedback

Feedback was categorised and analysed according to three key aspects:

- Project effects;
- Opportunities and mitigation measures; and

- CSM2 alignment options.

The effects of MSRFL that the community and directly affected parties were most concerned about were:

- changes in access, including direct property access, local road connectivity concerns and school bus access with left-turn restrictions;
- increased travel distance with left-in left-out restriction along Main South Road;
- negative impacts on businesses and homes during construction;
- safety concerns – with people concerned about the ability of emergency services to access homes, road safety with more difficult access, and two respondents seeking cycle ways;
- the need to develop a safe Rolleston interchange; and
- reduced property values and business values.

The effects of CSM2 that directly affected parties and the community were most concerned about were:

- impacts on residential lifestyles and business operations;
- loss of quiet rural atmosphere along the route;
- reduction in property values;
- excessive noise;
- increased traffic on local/feeder roads;
- adverse visual effects of motorway, associated intersections and vehicles;
- impacts on safety, for cyclists, local road users and school children; and
- the lack of any direct access to the motorway at Springs Road.

Of the two CSM2 alignment options presented in the newsletter, most respondents favoured the northern alignment. However, many suggested alternative alignments (i.e. not the northern or southern alignments presented by the NZTA). In addition, the NZTA received a petition signed by 415 members of the public objecting "to the siting of the proposed southern motorway", and stating that they would like it "sited further north in vacant industrial land, south of Watties and north of Marshs Road".

Key suggestions put forward to reduce the impacts of MSRFL and CSM2 included:

- Alternative designs or additional features such as cycle ways, walkways, and service lanes (for MSRFL);
- A more northerly alignment;
- improving local road connectivity;
- ecological mitigation such as the planting of native plant species;
- visual mitigation such as landscaping, bunding and walls; and
- noise mitigation such as noise walls and bunding.

A few responses noted that the newsletter had not been received by some people within the Project area after the initial distribution. This issue was addressed through a second delivery of the newsletter and feedback forms in late November 2010.

The feedback relating to MSRFL from this initial phase of consultation was used to prepare a detailed assessment of the issues, constraints and opportunities associated with that part of the Project. This was included in the MSRFL Scoping Report (December 2010) which identified potential options and made recommendations as to which options merited further investigation.

Since the close of the initial feedback period in December 2010, the NZTA and its property consultant has met with all directly affected business and property owners (or contacted absentee directly affected parties).

8.7.3. Additional design considerations in response to feedback

Key aspects of the Project design that the NZTA has instigated in response to the feedback received during Phase 1 include:

- design of and consideration of a more northerly alignment option for CSM2. As discussed in the assessment of alternatives (Chapter 7), this option was not preferred;
- provision of an overpass to maintain connectivity between Robinsons Road and Curraghs Road;
- investigation and adoption of full-access ramps at Halswell Junction Road/Springs Road; and
- development of a service lane option for landowners on the western side of Main South Road.

8.8. Phase two consultation

8.8.1. Overview

Consultation on the NZTA's preferred route for MSRFL and CSM2 was undertaken in August and September 2011. The second Project newsletter outlined the key features of the chosen alignment and provided an update on the Project. The primary purpose of the consultation was for the NZTA to receive feedback on the preferred route for MSRFL and CSM2.

In total, 37 respondents provided written feedback on the Project during the second phase of consultation, including four directly affected parties and two Residents' Associations.

8.8.2. Directly affected parties feedback

Since the inception of the Project, the NZTA Project team has had on-going discussions with directly affected parties[65]. The key issues raised by directly affected parties in meetings with the NZTA have included:

[65] Directly affected parties includes those parties whose land is subject to property purchase.

- stress of uncertainty around their futures and the process of land acquisition;
- impacts on businesses such as effects on operations, customers, suppliers, access, loss of land/facilities, water races, and amenity effects;
- impacts on residential lifestyle, such as noise, visual effects, air quality effects, access, loss of land/facilities and increased travel distances due to the proposed alignment of MSRFL and CSM2 ; and
- concerns over the consultation process were raised by a small number of directly affected parties.

Written feedback received from directly affected parties during the Phase 2 consultation is summarised below.

MSRFL

Written feedback was received from three landowners who own property along the MSRFL alignment. The respondents were concerned about:

- a recently planted shelter belt on private property within land likely to be acquired by the NZTA;
- increased travel time because of being restricted to left-in, left-out access along Main South Road;
- adequate access being maintained to a nearby property and their letterbox;
- suggested noise mitigation measures;
- noise and visual effects;
- safeguarding water-races; and
- adequate compensation from the NZTA.

CSM2

Written feedback was received from two landowners who own property along the CSM2 alignment. The respondents commented on or were concerned about:

- the need for noise and landscaping mitigation;
- the selection of the CSM2 alignment; and
- the consultation process.

8.8.3. Community feedback

Feedback from the community with regard to the Project obtained during the Phase 2 consultation is summarised as follows:

- the need to provide full access between CSM2 and Halswell Junction Road/Springs Road;
- suggested design alternatives or additional features for MSRFL;
- concern regarding local road capacity and the need for upgraded local roads and intersections;

- adverse noise effects;
- safety concerns, including opportunities to protect cyclists;
- concerns regarding land use with the rezoning of nearby rural land to industrial;
- questioning of the accuracy of the calculation of benefits/cost;
- positive feedback on the open days; and
- concern that the Phase 1 consultation had little impact or influence on decisions about the preferred alignment.

Key stakeholder feedback for both the Phase 1 and Phase 2 consultation is summarised in Section 8.10.

8.8.4. Response to feedback

Key responses to the issues raised during the Phase 2 consultation were:

- the NZTA Project team engaged with directly affected parties to provide certainty where possible, and to develop solutions that would minimise the adverse effects of the Project on residents, properties and businesses;
- full access between CSM2 and Halswell Junction Road/Springs Road is now proposed by the NZTA;
- the NZTA is in discussions with SDC regarding future local road intersection upgrades. This includes intersection upgrades that may be required ancillary to the Project, which SDC would be responsible for;
- the NZTA will implement noise mitigation measures to mitigate the effects of the Project. This will be in accordance with the relevant noise standards and guidelines; and
- cyclists will benefit from the provision of a cycle link joining CSM1 and the existing Little River Rail Trail. While it is not intended that there will be a cycleway along the length of CSM2 as part of the Project, CCC and SDC are considering future cycle network upgrades.

The feedback from the Phase 2 consultation has therefore influenced the development of the Project.

8.9. Phase three consultation

8.9.1. Overview

Further consultation was undertaken between February and April 2012. The primary purpose of this consultation was for the NZTA to discuss key Project updates with directly affected parties along the CSM2 and MSRFL alignments. It was also undertaken to update and seek comment from a number of key stakeholders.

The third phase of consultation comprised of one-on-one meetings with directly affected parties. The NZTA also met with various key stakeholders including CCC, SDC, ECAN and KiwiRail. A third Project newsletter providing an update on the Project, the projected timeline and confirming the

key features of the chosen alignment is due to be sent out in late 2012. The Project website will continue to be updated as relevant information becomes available.

8.9.2. Directly affected parties feedback

During this phase of engagement, landowners were consulted on a one-on-one basis and provided with more specific details on how the Project would likely impact upon their properties. The key issues raised included:

- MSRFL western landowners: Generally there was support for the rear access road to be built in advance of the main Project. This was in recognition of the safety concerns on the existing highway. However, landowners sought that amount of land required be minimised as much as possible. In addition, several of the properties have wells, tanks and bore holes that would be affected;
- MSRFL eastern landowners: Generally the landowners were accepting of the proposal to close off direct property accesses. This was in recognition of the safety concerns resulting from the road safety audit, which was reflective of residents' concerns that SH1 was currently unsafe for making right hand turn movements. There was however a strong desire to keep Berketts Road as left-turn-in and left-turn-out, and for Larcombs Road to be a "left turn in" road. As part of the solution it was noted that a private developer has constructed Berketts Drive (a private road) off Berketts Road that could be utilised;
- CSM2/MSRFL Tie-in: Three key directly affected businesses are accepting of the lay-out of this connection. They indicated that they understand the proposed alignment means that there will be no highway access to their properties. In addition, options to provide access to the properties north of Robinsons Road were discussed. Landowners were generally in favour of the SH1/ Dawsons / Waterholes roundabout;
- SH1/ Dawsons / Waterholes landowners: Most landowners were concerned with the safety of the existing intersection. They were generally supportive of the roundabout and the potential loss of land. There was concern with potential noise effects during construction. In addition, some concerns were raised regarding the impacts that the roundabout may have on existing consent conditions relating to the operation of the nearby motordrome, including the noise bund and parking requirements;
- CSM2 (Greenfield): The owners of properties that have been recently purchased or are currently under negotiation were generally not contacted during the Phase 3 consultation as there were no material changes to the Project from the earlier consultations in this location. Those that were consulted expect that the proposed motorway will have some type of landscape screening and bunding. These landowners were generally supportive of the motorway alignment; and
- John Paterson Drive landowners: The residents of John Paterson Drive are generally unhappy that their land was not part of a plan change that rezoned surrounding land areas to rural-residential (which is outside the scope of this Project). However, most agree with the preferred solution of extending John Paterson Drive further east. This will connect with the future district park that is identified in the plan change associated with the Fulton Hogan subdivision (PC60). John Paterson Drive will then tie back into the off ramp roundabout at Halswell Junction Road. This preferred solution has been supported by CCC.

8.9.3. Social impact consultation

The NZTA engaged Taylor Baines and Associates, an independent research provider and consulting firm, to undertake a social impact assessment (SIA) in March 2012. For the purposes of conducting the assessment, Taylor Baines were guided by a list of key stakeholders developed from the NZTA consultation reports and the feedback the Project team had recorded on the consultation database. Taylor Baines contacted a number of those parties listed, plus others that were suggested as the SIA work proceeded.

Altogether, the SIA team undertook key-informant interviews with 28 respondents. These participants had interests that covered primary and secondary schools, pre-schools, the Ministry of Education, emergency services, medical centres, three residents' groups, a cycle users group, business owners and SDC.

The SIA has determined that most adverse social effects can be mitigated so that the residual effects are relatively minor and that the positive effects of the Project outweighed the negative. Accordingly communities will adjust relatively quickly. The SIA (Technical Report 13, Volume 3) is further discussed in Chapter 26 of this AEE.

8.10. Key stakeholder consultation

8.10.1. Territorial Authorities

Project Advisory Group

The PAG comprises representatives from CCC, SDC and ECan, along with representatives from the NZTA, the Project team, and the NZTA's Property Acquisition Agent. Together these parties form the advisory group for the Project. The purpose of the PAG is to provide regular updates to the local authorities with an interest in the Project. It has also provided a forum to discuss opportunities and resolve issues that may arise out of the Project.

The first PAG meeting was held on 10 August 2010. These meetings have been held regularly since that time. All PAG meeting minutes have been circulated to its members. Formal feedback on the Project has also been sought separately from all three local authorities, as outlined further below.

Statutory Authorisation Advisory Group

The SAAG was established to act as an advisory group to the NZTA Project Manager and Planning Manager. The SAAG is comprised of representatives from ECan, SDC, CCC, and the EPA, together with planning representatives from the NZTA and the Project team. The purpose of the SAAG to ensure that all parties are involved in the statutory decision making process throughout the Project. This has enabled a 'no surprises' environment for the statutory approvals process.

Environment Canterbury ("ECan")

In response to the initial phase of consultation, ECan stated that it would like to be kept involved in discussions concerning access to Rolleston and the Izone industrial area. Having recently tendered a five-year contract for bus services in this area, ECan noted that changes to the Rolleston interchange may impact on its ability to service Izone and the Rolleston township. ECan commented that there seemed to be little detail provided on pedestrian and cycle linkages between Izone and Rolleston. ECan did not provide written feedback in response to the Phase 2 consultation.

In relation to other responsibilities, ECan confirmed in 2012 during the Phase 3 consultation that it is comfortable with its current role and responsibilities in regard to the Project. An ECan representative has been present at various SAAG meetings and a representative attended a PAG meeting for the first time on 12 April 2012.

Christchurch City Council ("CCC")

CCC provided written feedback in letters dated 7 December 2010 and 10 February 2012. These letters were a refinement of feedback received prior to the first phase of public consultation. CCC stated that it "welcomes and endorses the consultative approach adopted by the NZTA".

CCC staff identified five priority issues with the CSM2 (and MSRFL) Project:

- severance effects concerning greenfield business land labelled 'CB9' identified in PC1 to the RPS, and the need for alternative forms of connectivity;
- the elevation of local roads over the CSM2 alignment, CCC noted that CSM2 will be the gateway to Christchurch from the south. In light of Christchurch being known as the 'garden city' "*good design elements*" should be included to support this image;
- CCC requested that suitable provision be made to accommodate the existing Little River Rail Trail cycleway;
- CCC noted that CSM2 will close a CSM1 connection (access for general traffic at Springs Road) and thus increase traffic on local roads. This comment was based on traffic modelling conducted for the SWAP. CCC noted that the significance of the interchange location (i.e. Shands versus Springs) "*warrants additional consideration between the NZTA, CCC and SDC, prior to a final location and configuration being determined*"; and
- CCC was of the view that *"CSM2 should not hinder any future use of rail corridor between Prebbleton and Christchurch".*

On balance, CCC preferred the northern-most of the two alignments presented in the 2010 consultation newsletter (Option 4). It endorsed the best-fit (preferred) option shown in the August 2011 newsletter.

CCC also outlined the following potential opportunities:

- Provision of "a cycleway along the Christchurch Southern Motorway would facilitate travel between Rolleston, Templeton and Wigram/Westmorland/Southern Hornby" … and would complement the CSM1 cycleway and the Little River Rail Trail;
- Retaining the opportunity for rapid public transport facilities (such as busways) to be developed within the CSM2 corridor;
- Developing "CSM2 as a strong urban boundary to prevent further urban growth outside of the urban limits"; and
- A connection between CSM2 and the future Western Hornby Bypass.

CCC has been working with the NZTA, through the PAG on these issues and opportunities. CCC's views are summarised below:

- it indicated interest in the form and standard of the proposed cycleway, and was particularly interested in funding arrangements for the cycleway; and
- CCC raised 'community severance' as a concern.

On 20 April 2012, many of the CCC Councillors and a number of key council staff attended a bus tour of all the Christchurch Roads of National Significance projects. This tour and presentation of information included viewing the key areas where CSM2 is proposed.

Further opportunities for Council to provide feedback on the Project occurred in June and September 2012 when joint workshops were held with CCC and SDC to discuss the NZTA's proposed designation and resource consent conditions.

Selwyn District Council ("SDC")

The NZTA has been working closely with SDC on the Project through the PAG. SDC has stated that it fully endorses the Project. Regular email correspondence has been sent to the NZTA outlining SDC's key concerns. In summary, the SDC matters being addressed through the Project design are:

- local road connectivity to proposed motorway works e.g. at interchanges and provision of works and /or funding to enable seamless integration;
- mitigation of effects relating to the Project's proximity to Prebbleton and other key land uses /developments along the preferred route;
- future land use intentions/expectations/opportunities influenced by the motorway being positioned in the "green belt" between the City and Prebbleton;
- "gateway" creation and positioning between CCC and SDC by the motorway;
- wider role of Marshs Road (a district boundary road) to SH1 (in the context of connections to wider development areas and western bypass);
- provision of key walking and cycling linkages to existing Rail Trail and CSM1;
- effects on Springs Road through Prebbleton relating to any provision of ramps at Springs Rd, and traffic increases through the township;
- alternative access arrangements along four-laning sections and land use influences;
- downstream effects on SH1 and local intersections through Rolleston;

- stormwater management;
- water race severance;
- landscaping and visual mitigation; and
- motorway lighting through "rural" areas.

Further opportunities for Council to provide feedback on the Project occurred in June and September 2012 when joint workshops were held with SDC and CCC to discuss the NZTA's proposed designation and resource consent conditions.

8.10.2. Other key stakeholders

Feedback was received from the following key stakeholders and other stakeholders:

KiwiRail

KiwiRail has stated it wishes to protect its existing rail corridor, the Hornby Industrial Line. This includes provisions for maintenance vehicles, and turn-out/shunting requirements in the vicinity of CSM2. It also provided specific dimensions in this respect. KiwiRail advised that in principle it could accommodate the NZTA's desire for a rear-access road within the existing rail corridor for MSRFL. This would be located within the rail corridor between Curraghs and Weedons Ross Road. The purpose for which land is held by the Crown will need to be changed if the NZTA required the land used by KiwiRail land for the road.

Te Runanga o Ngai Tahu

Consultation with Te Runanga o Ngai Tahu is summarised below under iwi consultation (section 8.11).

Community/residents' groups and Community Board

The following feedback was received from community groups during the Project's development:

- Riccarton/Wigram Community Board – The Board supported CCC's feedback and noted that the Southern Motorway should cater for both commuter and industrial traffic. It also proposed that a review of CRETS is needed given progression of CSM2 and MSRFL. It supported a full interchange in the vicinity of Halswell Junction Road and Springs Road, noting that the Awatea/Wigram Basin development makes this interchange even more necessary. It does not support increased traffic on Shands Road, and suggested that an additional south-bound off-ramp is warranted at the CSM2/MSRFL junction. The Board supported the northern alignment outlined in the newsletter. Concerns were also expressed about the Little River Rail trail becoming disjointed if there are no cycleway provisions as part of CSM2. Finally, the Board sought that consideration be given to extending Pound Road south of Main South Road to connect directly with the Southern Motorway;
- Bicycle User Group – the Bicycle User Group advocated provision for cyclists and pedestrians along CSM2, and for strategic crossings to allow people the opportunity to safely commute to the city. The Bicycle User Group specifically advocated the need

for a safe crossing for cyclists at the Rolleston intersection. It also promoted the idea of creating a world class cycleway / walkway the length of the new highway;

- Claremont Residents' Association ("CRA") – CRA expressed that it had no specific issues with the MSRFL Project. The CRA requested an interchange at Waterholes Road to increase connectivity. Also requested was the use of low-noise road surfacing on CSM2 and on the Waterholes Road overbridge. Other issues included effects and mitigation measures associated with elevated roads/bridging, site office location, highway lighting and the opportunity for cycle ways and walkway areas;
- Halswell Residents' Association ("HRA") – The HRA expressed its full support for the Project "given growth in the area". It requested a full interchange at the Halswell Junction Road and Springs Road access point, and highlighted their concern regarding increased traffic through Halswell if this was not provided. The HRA also requested cycle lanes on Halswell Junction Road and provision for safe crossing of CSM1 and CSM2. The HRA also noted that the "Rail trail must be considered and planned for". The HRA asked that noise barriers and low-noise road surfacing and bunding be considered;
- Izone Park Project Team – The Izone Park Project Team represents businesses in the industrial Izone Park. This group expressed concerns with traffic implications between the Rolleston and Weedons interchanges, and future traffic demand forecasts;
- Prebbleton Enviro-Village – The Prebbleton Enviro Village opposed both CSM2 alignment options because of its close proximity to Prebbleton village, and the resulting loss of green space and productive land. The group outlined that the siting of CSM2, in close proximity to Prebbleton village, will lead to increased noise, vibration, air pollution and loss of rural atmosphere for all the residents of Prebbleton. The Prebbleton Enviro Village also expressed concern about the consultation process, outlining that some members of the community had not received the newsletter;
- Rolleston Residents' Association – The Rolleston Residents' Association were concerned about the Rolleston Interchange. It proposed that local roads should go beneath the motorway rather than over, to allow for "easier traffic management" of over-sized vehicles. It also advocated for clear lane markings and "exit this lane" signs being placed well in advance of all exits;
- Templeton Residents' Association ("TRA") – The TRA requested an off-ramp road at Trents Road to increase connectivity. While not directly associated with the CSM2 Project, the TRA requested the installation of traffic signalling at the Main South Road/Kirk Road intersection. In response to the second round of consultation the TRA was generally impressed with the chosen route and effect on Templeton residents. Members were concerned about the safety of wire rope barriers and suggested concrete or armco barriers be used instead;
- NZ Heavy Haulage Association – In response to the second phase of consultation, the NZ Heavy Haulage Association requested that the Project and associated interchanges be designed to accommodate over-dimension heavy haulage vehicles. This included clearances to overhead light poles, overbridges, signage and other restrictions:
- Weedons School – Expressed concern that an existing unresolved safety issues may be exacerbated in the amount of traffic on the road passing the school and the consequent safety of pupils.

In addition to the above parties, consultation has been carried out with all network utility operators in the area including, Transpower, Orion, TelstraClear and Chorus.

8.10.3. Response to feedback

This section provides comments on some of the key issues raised in the above feedback. The key responses to the issues of concern to the community are as follows:

- a cycle link joining CSM1 and the existing Little River Rail Trail is being developed. While it is not intended that there will be a cycleway along the length of CSM2 as part of this Project, CCC and SDC are considering future cycle network upgrades. Strategic cycle crossings will be provided beneath Halswell Junction Road and Springs Road so that users of the cycleway will not need to cross these local roads in this location;
- the provision of an interchange at Waterholes Road has been discarded due to the proximity of other interchanges and because traffic volumes do not warrant access in this location;
- the technical experts advising the NZTA are of the opinion that the siting of CSM2, in relation to Prebbleton village will not lead to increased noise, vibration, air pollution and loss of rural atmosphere for the residents of Prebbleton;
- the Rolleston interchange is outside of the scope of this Project, and hence is not being addressed within this application. Although, the NZTA is likely to consider this issue further in due course. Likewise, extending Pound Road south of Main South Road to connect directly with the Southern Motorway is outside the scope of this Project;
- the suggestion of including an off-ramp road at Trents Road has been discounted because of the close proximity to the Shands Road interchange and because traffic volumes do not warrant access in this location;
- full access for all traffic at Springs Road/Halswell Junction Road has been investigated by the NZTA and while not initially provided, full use east facing ramps are now proposed as part of the Project;
- by using a wire-rope median barrier (as used along many other highways in New Zealand), emergency vehicles will be able to cross the median in designated places. This is more difficult to achieve safely with a concrete barrier; and
- in respect to over-dimension heavy haulage vehicles, the design and dimensions of the Project is consistent with CSM1.

8.11. Iwi consultation

8.11.1. Statement of identified Maori interest

Prior to undertaking Project specific iwi consultation, the Project team prepared a Statement of Identified Maori Interest ("SIMI"). The SIMI was based on a review of existing written reports and provided an initial appraisal of iwi consultation carried out for previous studies and investigations relating to the Project.

The SIMI identified earlier consultation that the NZTA had undertaken with iwi for the Christchurch RoNS projects. However, no specific feedback had been received during this period

that related to either the MSRFL or CSM2 sections of the Project. High level consultation has also been carried out with tangata whenua during the development of the UDS. The MSRFL and CSM2 projects are recognised in the UDS. Consultation with iwi during the formulation of the UDS highlights the long term collaborative approach that is sought by the UDS partner organisations, including the NZTA. Finally, a search of the silent file areas and Ngai Tahu Treaty Settlement Areas on ECan's GIS database and the CCC and ECan planning maps did not locate any of these areas within the vicinity of the Project.

8.11.2. Initial Iwi consultation

The predominant iwi group with mana whenua over the Project area is Te Runanga o Ngai Tahu. In addition, the Project site lies within the boundaries of the Taumutu Runanga and Ngai Tuahuriri Runanga. Accordingly the NZTA has engaged with Te Runanga o Ngai Tahu, and Taumutu Runanga and Mahaanui Kurataiao Ltd (MKT).

As part of the initial phase of consultation for the MSRFL and CSM2 projects, a key stakeholder letter, Project newsletter and feedback form were sent to a representative from Te Runanga o Ngai Tahu and MKT in October 2010. No responses were received at this stage from iwi.

Further consultation material was sent to Ngai Tahu and MKT in August 2011 as part of the second phase of consultation for MSRFL and CSM2. Members of the Project team have met with iwi to seek feedback on the Project and to discuss the development of the Cultural Impact Assessment (CIA).

8.12. Cultural Impact Assessment

A CIA is being prepared to help facilitate iwi participation in the planning process, to identify potential effects of the Project on tangata whenua values, and to assist in the development of mitigation measures to address potential adverse effects.

The CIA looks at the significant Ngāi Tahu and Ngāi Tuahuriri values associated with the land subject to the Project, and identifies a range of ways those values may be adversely affected and what outcomes would avoid, remedy or mitigate (if possible) these adverse effects.

A draft CIA has been produced as part of a consultation method, whereby NZTA's consultant has drafted an initial report, which MKT is peer reviewing on behalf of Ngāi Tuahuriri, as mana whenua. The draft CIA was prepared following a review of existing written material, cultural landscape assessment, and consultation with tangata whenua. The key matters of concern identified in the draft CIA were the potential adverse effects on water quality, and on native species (bird, fish, aquatic) and their habitats.

The CIA methodology, outcome and recommendations are summarised in Chapter 23 and but the full CIA report (Technical Report 15) will not be available until the peer review is complete.

PART G: ASSESSMENT OF EFFECTS

9. SUMMARY OF ENVIRONMENTAL EFFECTS

Overview

The Project will have a number of positive and adverse effects. These will vary in significance, scale (local, regional and national), intensity and duration. The Project will have significant positive transport effects at a local, regional and national scale, including:

- improved resilience for the road network;
- improved safety and reduced crash risk;
- significant travel time savings;
- improved connections to regional freight hubs, including the port and industrial areas;
- more efficient freight movement and associated economic benefits; and
- opportunities to improve passenger transport in the south-west of Christchurch.

Potential temporary effects during construction of the Project include:

- nuisance effects (e.g. dust, noise, traffic, lighting, amenity) from construction activities;
- disruption to network utilities;
- increased sediment and contaminants entering waterways;
- disruption and displacement of wildlife; and
- degradation and loss of terrestrial and freshwater habitats.

Potential long term effects from operation of the Project (in addition to transport effects) include:

- support for strategic growth and development, through providing accessibility to greenfield residential and business areas.
- noticeable changes to the rural outlook for some viewpoints adjacent to and on the motorway;
- landscaping and restoration planting that enhances connectivity and ecological values; and
- increased noise for some receivers.

9.1. Introduction

The purpose of this chapter is to provide a summary of the actual and potential effects of the construction and operation of the Project. This is a summary of the effects discussed in the rest of the chapters in Part G of this AEE. It is intended to provide an overview of the effects associated with the Project, including whether they are positive or adverse, and the scale at which they are likely to occur (i.e. local, regional or national). It does not cover proposed mitigation or offsetting, of adverse effects, which are addressed in Chapter 27.

Section 3 of the RMA defines 'effect' as including:

(a) any positive or adverse effect; and

(b) any temporary or permanent effect; and

(c) any past, present, or future effect; and

(d) any cumulative effect which arises over time or in combination with other effects - regardless of the scale, intensity, duration, or frequency of the effect, and also includes -

(e) any potential effect of high probability; and

(f) any potential effect of low probability which has a high potential impact.

Further details about effects are described in the following chapters in Part G and in the associated technical reports.

9.2. Summary of effects

The actual and potential effects of the construction and operation of the Project are summarised in Table 14 below. This table only provides a summary of the positive and adverse actual and potential effects of the Project. It does not cover the mitigation and / or remediation of adverse effects. Mitigation is summarised in Table 41, Chapter 27.

Table 14: Summary of actual and potential environmental effects

Construction effects
Operational effects

Actual or potential environmental effect identified	Positive	Adverse	Local, regional or national level effect(s)
Traffic and transport			
Increased construction traffic movements of both light vehicles and heavy vehicles are likely to have adverse amenity and safety effects on local roads.		✓	Local
Significant travel time reductions and journey time reliability for travel between the Port of Lyttelton, the City Centre and industrial areas in the south of Christchurch and Rolleston.	✓		Local and regional

Actual or potential environmental effect identified	Positive	Adverse	Local, regional or national level effect(s)
Improved travel time reliability resulting in: • improved certainty around travel times in the corridor for all road users; • more efficient freight movement and associated economic benefits; and • better links to regional freight hubs, including the Port, industrial areas and distribution centres.	✓		Local, regional and national
Significant improvements in safety and a reduction in the frequency of crashes.	✓		Local, regional and national
Improvement to road network resilience.	✓		Local, regional and national
Potential for improved passenger transport in the south-west of Christchurch through a reduction in traffic on existing routes.	✓		Local, regional
Removal of direct access to Main South Road for properties on the west and east of the road.		✓	Local
Property and land use			
Private land will be required to accommodate the Project alignment, rear access roads and ancillary local road improvements.	✓	✓	Local
Some partial land acquisition may result in land severance or a reduction of land area below a useable size. This may have implications for amenity.		✓	Local
Provision of alternative access may reduce the net area of existing properties including below the minimum allotment size in the District Plan.		✓	Local
The Project will take land comprising high fertility soil which might otherwise be used for farming purposes. This land use change will be irreversible.		✓	Local, regional and national
Services / network utilities			
The Project alignment falls within the clearance envelope of a Transpower transmission line.		✓	Local and regional

Actual or potential environmental effect identified	Positive	Adverse	Local, regional or national level effect(s)
Potential for construction activities and dust to cause damage to rail, telecommunications, electricity transmission and distribution, water, stormwater and sewer infrastructure.		✓	Local and regional
During construction, sediment has the potential to enter stockwater races.		✓	Local and regional
Urban form and function			
The Project will provide accessibility to greenfield residential and business areas.	✓		Local and regional
Improved local road cross-corridor connections, pedestrian connectivity in Templeton and general access to the surrounding area.	✓		Local
Landscape and visual			
Temporary visual effects resulting from construction activities, such as construction yards, laydown areas and equipment.		✓	Local
Adverse amenity effects from large-scale of motorway structures, proposed swales and stormwater basins, removal of planting and loss of pastoral land.		✓	Local
The lights of vehicle movements may impact on existing residents and businesses in the vicinity of the Project alignment.		✓	Local
Lighting			
Construction yard and activity lighting, while temporary, has the potential to cause light spill effects on nearby residents and glare on drivers of vehicles.		✓	Local
Lighting installed at intersections and interchanges will contribute to pedestrian and road user safety.	✓		Local
There is the potential for intermittent lighting effects from vehicle movements to impact upon existing residents in the vicinity of the motorway.		✓	Local

Actual or potential environmental effect identified	Positive	Adverse	Local, regional or national level effect(s)
Lighting installed at intersections and interchanges have the potential to adversely affect residents and vehicle drivers primarily through spill light and glare.		✓	Local
Noise and vibration			
Temporary construction noise and vibration has the potential to cause disturbance to residents and occupiers of commercial properties in close proximity to the Project alignment.		✓	Local
Reduced traffic volumes on some local roads will result in reduced traffic noise levels, improving local amenity.	✓		Local
Operational traffic noise has the potential to cause disturbance to residents and occupiers of commercial properties in close proximity to the Project alignment.		✓	Local
Air quality			
Dust and fumes generated by earthworks and other construction activities has the potential to adversely affect air quality for residences within close proximity to the construction works (within 200m).		✓	Local
Terrestrial ecology			
Disturbances from construction activities (in conjunction with habitat loss) may lead to lizard mortality or injury.		✓	Local
Construction activities and particularly heavy machinery presents an opportunity for problem weed species not currently present in the area to become established.		✓	Local
Bird, lizard and invertebrate habitat will be lost to accommodate on-off ramps and local road connections. The road may also obstruct movement of wildlife and pose a hazard to mobility of some species. This may result in a minor loss of ecological functionality at a local level.		✓	Local
Proposed landscaping will enhance ecological value and connectivity and may also provide suitable habitats for wildlife in time.	✓		Local

Actual or potential environmental effect identified	Positive	Adverse	Local, regional or national level effect(s)
Freshwater ecology			
Potential sedimentation and contamination of surface waterways, including stockwater races, from stormwater discharge during construction may adversely affect ecosystems.		✓	Local and regional
Potential habitat degradation and blockage of fish passage through physical disturbance and temporary closure of water races during construction.		✓	Local and regional
Stormwater run-off during operation may contain other contaminants that can result in nuisance growths in waterways.		✓	Local and regional
Potential habitat modification as a result of water race piping, realignment and permanent closure.		✓	Local and regional
Stormwater and groundwater			
The proposed stormwater treatment process will improve the receiving environment water quality.	✓		Local and regional
Disposal to land has the potential to reduce downstream flooding. This is because the area draining to the existing system will be reduced, which currently overflows to the stockwater races in heavy rain.	✓		Local
Adverse flooding and water quality effects from highway stormwater.		✓	Local and regional
Failure of soak pits leading to progressive failure of individual elements in the Project and negative off corridor effects such as additional surface flooding in the Halswell catchment.		✓	Local and regional
Concentration of contaminants and sediments in stormwater first flush basins.		✓	Local and regional
Failure of stockwater race infrastructure to carry design flows across or adjacent to the Project due to modifications undertaken as part of the Project.		✓	Local
Overland flow paths impeded by the Project leading to additional flooding due to modifications made as part of the Project.		✓	Local

Actual or potential environmental effect identified	Positive	Adverse	Local, regional or national level effect(s)
Robinsons Road overpass may be inundated by groundwater has been identified with the predicted CPWES in place.		✓	Local
Dewatering to lower groundwater levels may have adverse effects on other groundwater users.		✓	Local
Dewatering to lower groundwater levels may have adverse effects on the flow within surface waterbodies		✓	Local and regional
Stormwater discharges may affect nearby water quality of nearby groundwater wells/takes.		✓	Local
Groundwater mounding beneath the stormwater treatment ponds at Halswell Junction Road may affect the performance of the ponds		✓	Local and regional
Progressive failure of individual stormwater elements in the Project design due to sediment and erosion effects.		✓	Local
Effects on groundwater quality from bore installation.		✓	Local and regional
The installation of the pipe outfall in Upper Knights Stream may have effects on ecological and other values within the stream.		✓	Local and regional
Use and storage of hazardous substances may affect soil and water quality.		✓	Local and regional
Excavation and deposition over an unconfined/ semi-confined aquifer may affect groundwater quality		✓	Local and regional
Excavation of material may affect aquifer pressure		✓	Local and regional
Natural hazards			
Seismicity in the region means the Project and users may be subject to ground shaking, rupture, liquefaction and related damage at ground level.		✓	Local
Flooding from impeded overland flow or failure of the stormwater system.	✓	✓	Local

Actual or potential environmental effect identified	Positive	Adverse	Local, regional or national level effect(s)
Contamination			
Contaminant risk to human health and/or ecological values during land disturbance activities, and potential for hazardous materials to be discovered during construction resulting in human health risk (largely for workers).		✓	Local
Cultural impacts			
The Project has the potential to adversely affect unrecorded sites of cultural significance or koiwi remains.		✓	Local and regional
The Project has the potential to adversely affect water quality and ecological values, which are important to local iwi.		✓	Local and regional
The planting regime for the Project will enhance native bird, fish and aquatic species habitat and also enhance bio-diversity in the Project area. These values are important to tangata whenua.	✓		Local and regional
The proposed stormwater treatment process will improve the receiving environment water quality, which is important to tangata whenua.	✓		Local and regional
The Project could further erode cultural landmarks.		✓	Local and regional
Archaeology and built heritage			
There are no identified sites of archaeological significance affected by the Project. However there is the possibility that such sites have not yet been discovered, or identified.		✓	Local and regional
Economic			
Construction activity and traffic will cause temporary negative economic effects on some businesses in localised areas.		✓	Local and regional
Disruption of current dynamics for passing traffic to be aware of business offerings.	✓	✓	Local and regional
Social impacts			

Actual or potential environmental effect identified	Positive	Adverse	Local, regional or national level effect(s)
Construction noise and vibration will cause disturbance to those living, working and gathering in proximity to the works.		✓	Local
Disturbance to human health and nuisance caused by dust produced by construction.		✓	Local
The use of local roads for construction traffic may cause delays for people accessing community facilities (such as daycare or schools) and increase road safety concerns.		✓	Local
Improved access to work and a range of services including education, health and emergency services, and retail and commercial services.	✓		Local and regional
Active transport (as a component of social wellbeing) will be enhanced through proposed links between CSM2 and the Little River Rail trail. There will likely be an increase in commuter cycling to Lincoln.	✓		Local and regional
Visual and amenity effects caused by the motorway and associated interchanges.		✓	Local
Operational noise may have an effect on the health and wellbeing of people living near the alignment.		✓	Local

10. ASSESSMENT METHODOLOGY

Overview

The environmental assessment undertaken for the Project involved the collaborative input of a broad range of engineering, environmental, social and cultural specialists.

The Project team worked together to identify the potential adverse and positive environmental effects of the Project. This included developing associated measures to ensure that any such effects are appropriately avoided, remedied or mitigated. Relevant Part 2 considerations of the RMA have also been addressed.

10.1. Introduction

The purpose of this chapter is to outline how the AEE was undertaken for the Project and how previous environmental assessment work has been used. The structure for the remainder of the effects assessment is also presented.

10.2. Purpose of the assessment

The primary purpose of the assessment is to meet the statutory requirements of the RMA. The RMA requires that an assessment of environmental effects be carried out for the proposed activity.

It is also part of the NZTA's environmental policy and its operating principles under section 96(1)(a) of the LTMA to:

> *"exhibit a sense of social and environmental responsibility, which includes –*
>
> *(i) avoiding, to the extent reasonable in the circumstances, adverse effects on the environment;…"*

The requirements of the RMA and the LTMA formed the basis for the assessment of effects undertaken for the Project.

10.3. Environmental assessment undertaken for this Project

The environmental assessment carried out for this Project included the following interrelated processes:

- the identification and mapping of constraints;
- an assessment of alternative route, alignment and associated interchange options; and
- expert technical analysis across a range of disciplines.

The constraints analysis included a detailed examination of the existing environment in the wider Project area. This process highlighted a number of environmental factors relevant to the development and consideration of Project options.

The options assessment involved the application of cost and non-cost[66] related criteria. The outcome of this process was the confirmation of a preferred alignment along with a preliminary indication of its potential environmental impact. These potential environmental impacts, in turn, were subsequently assessed in more detail by various experts through the AEE preparation process. The results of these specialist assessments are reported in various Technical Reports and presented in this AEE.

10.4. Previous environmental assessments

A number of earlier environmental assessments were undertaken prior to the completion of the detailed technical reports which support this AEE. These included:

- AEE for CSM1 in 2008;
- SWAP in 2009;
- Strategic Study for CSM2 that was completed in 2009; and
- Scoping Report for MSRFL that was completed in 2011.

In preparing this AEE, information from these earlier environmental assessments was considered and used where it remained relevant. It is noted that the Scoping Report and the development of the current technical reports involved iterative studies that informed and shaped the development of the Project.

10.5. Assessment methodology

The AEE process has involved a wide range of individuals and groups. The close working relationship between the Project designers (i.e. engineering teams) and the environmental assessment teams for the Project has resulted in a high level of integration between the design and mitigation processes.

The iterative and dynamic nature of this process means that it is virtually impossible to satisfactorily document all outcomes from this process entirely in this AEE. However, where key design changes were made based on their likely environmental effects, these changes have been described either in the Consideration of Alternatives (Chapter 7) or within a specific topic assessment.

In general terms, the approach has been:

- to modify the design of the Project to avoid, or reduce to the extent practicable, potential adverse effects;

[66] Non-cost related criteria include movement, built environment, cultural/heritage, natural environment, social /community and economic, while the cost related criteria include actual costs and the benefit/cost ratio.

- where avoidance of adverse effects was not possible, to develop measures to adequately remedy and/or mitigate potential adverse effects; and
- where mitigation and/or remediation is required, to co-ordinate development of measures between specialists as much as possible to promote optimal environmental outcomes.

Specific details about how particular potential adverse environmental effects are proposed to be managed are provided in each of the remaining chapters within this part of the AEE (Part G). They are also summarised in Chapter 27 (Mitigation and Monitoring) of this AEE.

In addition to the collaborative and integrated manner of assessment, there are other aspects of the AEE process worthy of note. These are the establishment of the Project Advisory Group (PAG) and direct local authority involvement with authors of the specialist reports, and other stakeholder involvement.

10.5.1. Local authority involvement

Local authority involvement from ECan, SDC and CCC has been a key part of the environmental assessment process. The local authorities have been involved in three key capacities:

- as regulatory authorities;
- as asset and infrastructure owners and / or providers; and
- as owners of land that is required for the Project (freehold land and land vested as local road).

In their roles as members of the PAG, the relevant local authorities have been closely involved in shaping the Project and providing input on identified options and mitigation measures (for details of the PAG, refer to Section 8.10 of this AEE).

Project Technical working subgroups were formed from within the PAG. The purpose of the technical working groups was to work through key technical aspects of the proposal, and to seek agreement where possible on key areas of difference between the NZTA, ECan, SDC and CCC. The PAG and technical working subgroups provided valuable feedback that assisted the development of the Project in an integrated manner that considered potential impacts from the outset.

The involvement of local authorities has been discussed in Chapter 8 (Consultation and Engagement). In their capacity as regulatory authorities (through the SAAG) the local authorities have provided advice on district and regional planning provisions and other regulatory matters of relevance to the AEE assessment process and will be responsible for monitoring and enforcement of any conditions.

As asset and infrastructure owners, and / or providers[67] the local authorities have provided feedback on the potential effects of the Project on their assets and how these effects could be

[67] Also, local roads constructed as part of Project may be vested in the local authorities to maintain.

mitigated, where required. Similarly, in the instance where the local authority is a landowner, they have advised on land use and property effects.

10.5.2. Stakeholder involvement

In addition to local authorities, a wide range of stakeholders were involved in the AEE process in a number of different capacities. The consultation undertaken with these stakeholders is set out in Chapter 8 (Consultation and Engagement).

In general terms, stakeholders provided feedback on how they believed the Project would affect them or the interests their organisations represented. Consultation undertaken with various stakeholders is discussed in Chapter 8 and throughout the topic chapters in this AEE as and where it is relevant.

10.6. Structure of the assessment

Chapters 11 to 26 of this AEE provide an assessment of the identified environmental effects for this Project. This assessment captures the effects identified in specialist reports (for different topics). For convenience, each assessment topic is described in a separate chapter, although interactions between topic areas are recognised and discussed where relevant. The topic chapters, and the relevant technical reports (found in Volume 3 of the AEE), are shown in Table 15.

Table 15: Relevant technical reports

AEE report chapter	Topic	Relevant technical report number
11	Traffic and transport	2
12	Property and land use	-
13	Network utilities	-
14	Urban Form and function	5
15	Landscape and visual	1, 4, 5 and 7
16	Lighting	19
17	Noise and vibration	8 and 9
18	Air Quality	10
19	Terrestrial and freshwater ecology	17 and 18
20	Stormwater and groundwater	3

AEE report chapter	Topic	Relevant technical report number
21	Natural hazards	3 and 11
22	Contamination	16
23	Cultural impacts	NA
24	Archaeology and built heritage	12
25	Economic	14
26	Social	13

Each chapter provides a summary of the key potential effects and the topic-related mitigation recommended in the specialist reports and adopted by the NZTA. Further information about the assessment, including the assessment methodology used, is contained in the relevant technical report.

The basic structure for each assessment topic is:

- a description of the existing environment (where greater detail is needed to provide context to the assessment, than was provided in Chapter 3);
- a description of the potential effects (both positive and adverse) resulting from the Project; and
- a description of what measures have been included in the design of the Project, or are recommended to be undertaken, to avoid, remedy or mitigate potential adverse effects that have been identified.

Chapter 27 (Mitigation and Monitoring) summarises how the NZTA will respond to the recommended mitigation (as identified throughout Chapters 11 to 26). It also outlines the relationships between the mitigation to be adopted by the NZTA and the proposed management plans. Chapters 30 and 31 provide the NZTA's proposed conditions for the designation and resource consents as a key method which is proposed to mitigate potential adverse effects.

11. TRAFFIC & TRANSPORT

Overview

The Project is consistent with the Requiring Authority objectives and will have significant positive traffic effects (i.e. benefits) at a local, regional and national level, in that:

- travel times on the Southern Corridor between Rolleston and Brougham Street are expected to be significantly lower with the Project, with travel time savings of up to 12 minutes predicted by 2041 (journey time down from 30 minutes without the Project);
- the reliability of these travel times is expected to improve, as the improved level of service on Main South Road and CSM provided by the Project, and the design providing predominantly grade separated intersections, will reduce the likelihood of unexpected delays;
- it will be significantly safer than the current route (with a predicted 40% reduction in fatal and serious injury crashes), as well as providing more capacity;
- it provides additional road capacity between Christchurch and the Port of Lyttelton to the south and west, and reduces travel times along the corridor by improving the linkage from Rolleston through to Brougham Street, and then on to the Port of Lyttelton. The rerouting of traffic onto this Project is expected to reduce traffic volumes through Templeton and Hornby by over 17,000 vehicles per day, with over 2,000 fewer trucks travelling through Templeton daily; and
- the expected rerouting of some heavy vehicles from Main South Road through Templeton and Hornby onto CSM removes this through traffic from Main South Road and moves them onto a high class motorway facility. The improved level of service provided on Main South Road is also expected to lead to a decrease in traffic on Jones Road, the primary passenger transport route between Christchurch and Rolleston. This will significantly contribute to promotion of the Jones Road route for passenger transport.

There are some localised adverse effects relating to restrictions in access to properties, primarily along the MSRFL section, which will be mitigated by the provision of alternative rear access routes on both sides of Main South Road.

A construction traffic management plan, supported by individual site specific temporary traffic management plans, will manage as far as is reasonably practicable the adverse effects on the road network.

11.1. Introduction

This chapter presents the key findings of the assessment of traffic and transport effects undertaken for the Project. The chapter draws on the information contained in Technical Report 2 and covers the key traffic and transport effects for both the operation (Section 11.7) and construction (Section 11.9) of the Project.

This assessment is primarily informed by traffic modelling, which is described briefly in Section 11.6. Of note, the effects of the Canterbury earthquakes have not been explicitly taken into account in the modelling assessment. At the time the modelling was undertaken, there was

insufficient information to assess their likely long-term effects on population and land-use projections.

The NZTA and UDS partners have recently undertaken a programme of works to understand how the earthquakes have affected where people live, work and travel in the Greater Christchurch area. The outcome from this work is that in the short term, household and employment numbers are likely to lag behind pre-earthquake growth scenarios. However, by 2026 growth projections are expected to be almost the same as predicted before the earthquakes, with similar trends continuing through to 2041.

In the Christchurch southwest area, the updated growth scenario suggests a slightly faster rate of development than projected before the earthquakes (5% higher). Although no quantitative modelling analysis has been carried out, this is considered to further support the Project as this higher rate of growth will increase the demand for travel within the area served by the Project.

11.2. Wider transport planning

As identified in Section 7.4.1 above, the Project was included in the final CRETS strategy as part of a wider package of transportation improvements in the Christchurch to Rolleston area. This strategy was developed to accommodate future population and employment growth to the southwest and south of Christchurch and has since been integrated into other key growth management documents, including the UDS and SWAP.

The Project is therefore a key individual component of a joint overall transport network solution. Primarily, the Project will complete the Christchurch RoNS Southern Corridor and provide the national strategic function of connecting the wider Canterbury and South Island areas to the Christchurch City Centre and Lyttelton Port.

To complement the Project, a number of other local road improvements are currently intended, as identified in CRETS and UDS partner local roading programmes, to service current and future demand from growth in the area. Whilst separate from the Project, these local road improvements will complement the strategic function of the Project by catering for local trips, while maintaining efficient access and connectivity to the arterial network.

Current examples include the upgrade of adjoining local roads and intersections to cater for traffic using the Project interchanges planned near Prebbleton and Rolleston, and the promotion of a route between Lincoln and Christchurch using Ellesmere Road, connecting to Magdala Place via Wigram Road, to reduce future traffic demand from Lincoln on Springs Road through Prebbleton. The upgrade of Selwyn Road and Lincoln Rolleston Road, in conjunction with Shands Road, has created a new district arterial that will connect to the proposed Project interchange on Shands Road to cater for traffic growth from expanding Rolleston southern residential areas.

The NZTA will continue to work with the UDS partners to develop local projects supporting the efficient and safe function of the wider network relating to the Project. In this regard, a short study on wider network operations is currently underway. This study is considering post-

earthquake land use changes and the overall Project configuration, specifically the inclusion of motorway access ramps at Halswell Junction Road and the extent of the effects on the adjoining local network, such as Springs Road and Halswell Junction Road. The desired outcome of this study is to agree amongst the UDS partners the "best for network" solution taking these aspects into account. The study will also help inform other local road upgrades required in the wider study area that may be needed. This may include those already identified in CRETS and other local transport programmes. Projects outside the scope of this Project would be developed by the NZTA and the relevant council through a coordinated planning and funding approach to deliver these. Should the study identify new projects that would enhance the outcomes to be delivered by this Project, the NZTA will work with the relevant council to agree their planning, funding and delivery of such projects.

11.3. Traffic and transport issues and objectives

The Requiring Authority has specific objectives for the Project which are directly relevant to the traffic and transport assessment. These include catering for future growth and traffic demand whilst improving travel times, road safety and access for people and freight in southwest Christchurch. The following sections describe the key issues with the existing network in this regard. The Requiring Authority objectives for the Project are listed in full in Chapter 2 of this AEE.

11.3.1. Travel demand

The route currently experiences congestion and predicted growth in the southwest area will place further demand on this corridor. The completion of CSM1 in 2013 will bring about significant relief on the existing motorway and the Blenheim Road/ Curletts Road corridor. However, the completion of CSM1 will also lead to a large increase in traffic on Halswell Junction Road and congestion issues will remain on Main South Road from Halswell Junction Road through to Rolleston.

Table 16 below presents the baseline 2006 traffic flows, together with the forecast "Without Project" traffic flows in 2016 and 2026 at selected locations along Main South Road and Halswell Junction Road. A percentage change is shown to compare the traffic growth from the Baseline 2006 traffic flows to the future 2016 year and from 2016 to the 2026 year.

Table 16: Baseline "Without Project" Daily Traffic Volumes on SH1 and Halswell Junction Road

Location	2006	2016	2006-2016 Change	2026	2016-2026 Change
HJR: West of Springs Rd	15,750	29,750	89%	34,250	15%
MSR: South of HJR	20,000	30,250	51%	35,750	18%
MSR: South of Trents Rd	18,500	25,250	36%	30,750	22%
MSR: South of Weedons Rd	17,750	24,750	39%	30,500	23%

HJR = Halswell Junction Road, MSR = Main South Road

There is significant growth predicted to occur between 2006 and 2016, in particular on Halswell Junction Road as a result of the direct connection to CSM1. Increases from 15 – 23% are predicted to occur between 2016 and 2026, indicating the continued growth in demographic and economic factors. For example, in Rolleston over the 10 year period between 2016 and 2026, it is projected that there will be a 40% increase in households and employment.

11.3.2. Travel time and congestion

The high travel demand results in congestion and increased travel times during weekday peak periods. For example, in 2026 it is expected that a southbound journey from Brougham Street to Rolleston will take 43% longer in the weekday PM peak when compared to the uncongested Inter-peak. By 2041, it is predicted this journey will be 59% longer.

Travel time variability is also known to increase as a result of traffic congestion. This leads to uncertainty of travel times along the route. The planning of journeys can become increasingly difficult resulting in additional costs for travellers and businesses.

11.3.3. Safety

Between 2006 and 2010, there were 197 reported crashes on Main South Road (Park Lane to Halswell Junction Road) and on Halswell Junction Road (Main South Road to Springs Road). This included one fatal and 14 serious injury crashes. The reported number of high severity crashes has not changed significantly over the five year reporting period.

Of the 197 crashes, 57% occurred on the peri-urban ≤70 km/h sections of Main South Road and Halswell Junction Road. The remaining 43% occurred on the rural 100 km/h sections of Main South Road. Well over a half of crashes (57%) occurred at intersections or property accessways.

The Project will address rising traffic demands by the provision of an upgraded section of Main South Road and provision of an alternative route designed to modern safety standards. Without the Project, existing crash rates are likely to increase with an increase in traffic over time.

11.4. Traffic and transport policy framework

This Project is part of the RoNS programme and fits within a number national legislative and strategic documents including:

- Land Transport Management Act 2003;
- Government Policy Statement on Land Transport Funding 2012/13–2021/22;
- National Infrastructure Plan 2011; and
- Connecting New Zealand 2011.

The national strategic significance and priority of the Project has been incorporated by the regional council and relevant district authorities in regional and local strategic planning documents, including:

- Canterbury Regional Land Transport Strategy 2012–2042;
- Canterbury Regional Policy Statement 1998 (RPS) and Proposed RPS 2011;
- Greater Christchurch Urban Development Strategy and Action Plan (2007);
- Draft Christchurch Transport Plan 2012-2042; and
- South-West Christchurch Area Plan 2009.

Further discussion on these strategies is provided in Chapters 6 and 28 of this AEE.

11.5. The existing transportation and traffic environment

11.5.1. Strategic context

SH1 is an integral part of the strategic road network in the Canterbury region being the primary north-south arterial and providing key linkages to the city, Port and Airport. The route in the Project area serves an important role for inter-regional and longer distance travel, especially freight travelling to the Port. It also connects to some of the major warehousing and industrial areas in the Christchurch region including Rolleston Izone, Hornby and Woolston. The route therefore has an important function in supporting the local, regional and national economy in the distribution and delivery of goods and services.

The Port is identified as a key freight destination in the South Island for international exporting and domestic coastal shipping. In 2011, the Port handled an import value of $2.9 billion (cost insurance freight value) and export value of $5.1 billion (free on-board value)[68]. This represented approximately 60% of the total value of regional imports and exports and 8% of total national imports and exports.

Freight volumes through the Port have grown steadily over the last decade, and this growth is expected to continue over the next decade, especially with container operations no longer being handled by the Port of Timaru. Containers are primarily transported by road, and the number of containers through the Port is projected to double by 2022.

11.5.2. Network description

A description of the existing transport network, in terms of the existing State highway, local road, freight, public transport, walking and cycling networks is outlined in Chapter 3 of this AEE.

[68] Statistics New Zealand overseas cargo statistics

11.6. Methodology for assessing effects

11.6.1. Traffic models

This assessment has been informed by the use of transportation models, which have been used to provide forecasts of travel demands, road conditions, level of service (LoS) and operational performance of the road network. This has been based on a hierarchical approach involving the following:

- Regional multi-modal modelling using the Christchurch Transport Model (CTM);
- Regional traffic modelling using the CSM2 Project Model (CPM);
- Detailed operational modelling of interchanges using VISSIM; and
- Detailed operational modelling of intersections using SIDRA.

The models have been developed for a historic base year of 2006 and future years of 2016, 2026 and 2041, using demographic forecasts consistent with the UDS growth strategy. The modelled outputs are representative for weekday morning (AM) peak, inter-peak and evening (PM) peak periods. The regional models have been subject to rigorous processes of calibration, validation and peer review to ensure that modelling forecasts are reliable.

As noted previously in Section 11.1, the growth forecasts do not take account of the changes brought about by the recent Canterbury earthquakes. However, post-earthquake growth scenarios indicate a slightly faster rate of development occurring in the Christchurch southwest area, with the long term total level of development in 2041 expected to remain relatively unchanged. This is considered to further support the need for the Project, although no quantitative modelling analysis has been undertaken.

11.6.2. Modelling methodology

The effects assessment on the transport network has been based around the following two typical scenarios:

- Baseline “Without Project” scenario: this represents a realistic future scenario of the road network in the modelled area, but without the Project in place; and
- “With Project” scenario: this is the same as the Baseline network, except that it includes the CSM2 and MSRFL elements of the Project.

11.6.3. Effects based assessment methods

The two scenarios described above have been assessed across a range of criteria which measure the performance of the transportation network. The traffic and transport models have been used to provide quantitative forecasts to assist in this process. The criteria assessed are:

- traffic impacts analysis (traffic volumes, level of service and travel times);
- intersection performance (level of service);
- heavy vehicles (traffic volumes);

- passenger transport services (opportunities and impacts);
- pedestrians and cycling (opportunities and impacts);
- safety (changes in frequency, severity and location of crashes); and
- access to property.

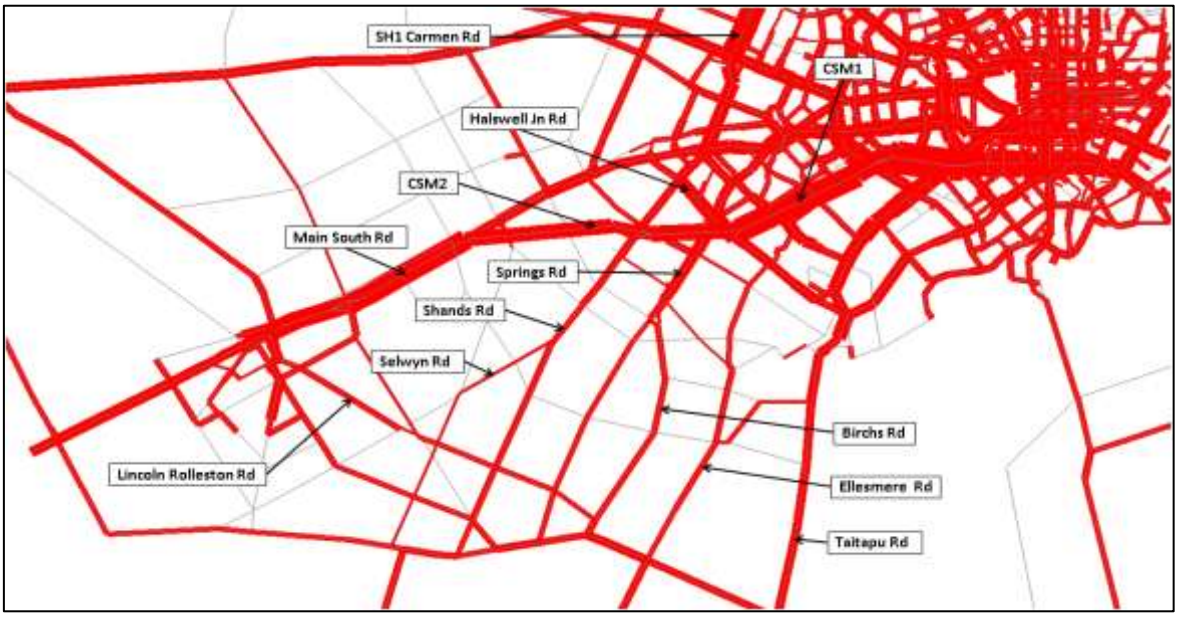
11.7. Assessment of effects

Detailed effects on the transport network are outlined in the following sections.

11.7.1. Effects on traffic volumes

Figure 45 depicts graphically the all day traffic volumes forecast for 2041 for the "With Project" road network. The red lines indicate the relative volume of traffic on each link, with thicker bars representing more vehicles than thinner bars i.e. the "wider" the road link, the more important it is for the movement of people and goods.

Figure 45: CSM2 & MSRFL network average daily traffic volumes – 2041



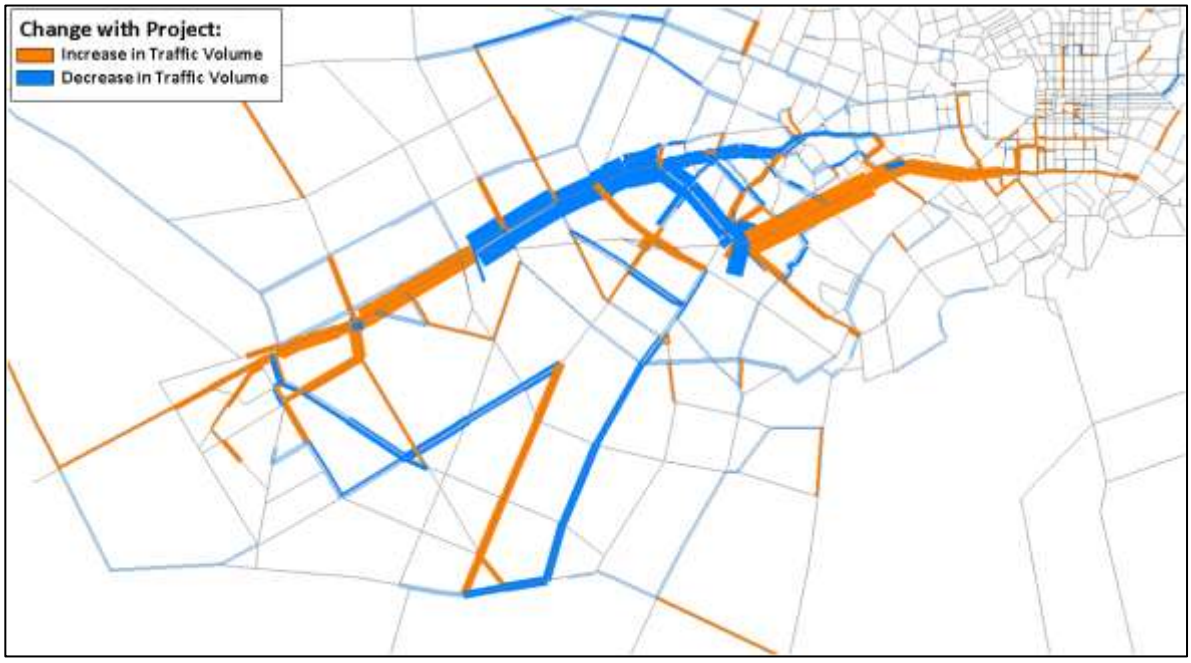
From Figure 45, it can be seen that the main routes for trips to and from the south west area of Christchurch and the southern side of central Christchurch city will be:

- Along the route of the RoNS Southern Corridor (comprising CSM1, CSM2 and MSRFL);
- Main South Road corridor from the CSM2/ Main South Road interchange through to SH1 Carmen Road in Hornby;
- Springs Road, Shands Road and Birchs Road on the Lincoln/Prebbleton corridor;
- Ellesmere Road; and
- Tai Tapu Road.

Figure 46 presents the larger differences in all day traffic volumes expected in 2041 with the Project completed. The orange lines show where traffic is predicted to increase compared to the Baseline "Without Project" scenario. The blue lines indicate where traffic is expected to decrease. The width of lines denotes the level of volume change.

For clarity, traffic volumes on the CSM2 motorway links are not shown, as they would overwhelm the relative differences on other links within the network given the Baseline network does not include these links.

Figure 46: Traffic Difference Plot – 2041 ADT (Project vs. Baseline)



Completion of the Project is expected to have the following effects on the route choices within the south western area of Christchurch:

- CSM2 between Halswell Junction Road and Main South Road will be used in preference to the Baseline routing of Halswell Junction Road and Main South Road;
- the largest reduction in traffic volumes is on the bypassed section Main South Road (between the CSM2 interchange and Halswell Junction Road) and on Halswell Junction Road (between Main South Road and Springs Road);
- there will be a reduction in traffic volumes on Main South Road through Hornby between Halswell Junction Road and Carmen Road;
- south of the CSM2/ Main South Road interchange, the upgraded Main South Road will be used instead of the parallel alternative routes (Selwyn Road, Jones Road and Maddisons Road) as level of service improves and travel times decrease on Main South Road;
- the new interchange on Shands Road will draw traffic from the parallel Springs Road routing, enabling access to the motorway without having to travel through the Prebbleton urban area or the Halswell Junction Road/ Springs Road roundabout;

- the new interchange at Weedons will attract more traffic on Weedons Road, Weedons Ross Road and Levi Road for access into Rolleston;
- more traffic will use Marshs Road between Main South Road and Springs Road to access the new interchange on Shands Road; and
- minor decreases in traffic volumes on Hamptons Road, Trents Road and Blakes Road across Prebbleton.

The key State highway and local road sections where notable changes in traffic volumes are experienced are outlined in Table 17 and Table 18 below. The locations where significant changes (in percentage terms) will be felt are highlighted with green indicating a significant reduction predicted, and red indicating a significant increase predicted.

Table 17: State highway traffic volume changes

State highway section	2041 Baseline	2041 Project	% Change
Brougham St: West of Selwyn St	51,500	54,500	6%
CSM1: Between Barrington St & Curletts I/C	49,250	55,750	13%
CSM1: Between Curletts I/C & HJR	40,750	54,750	34%
CSM2: Between HJR & Shands I/C	N/A	32,750	N/A
CSM2: Between Shands I/C & MSR	N/A	27,000	N/A
HJR: Between Springs Rd & MSR	37,750	28,000	-26%
MSR: South of SH1 Carmen Rd	25,500	21,000	-18%
MSR: South of HJR	40,500	23,250	-43%
MSR: South of Marshs/ Barters Rd	37,750	24,000	-36%
MSR: South of Trents/ Kirk Rd	19,000	35,750	-47%
MSR: Between CSM2 & Weedons I/C	36,750	45,750	24%
MSR: Between Weedons I/C & Park Ln	35,250	40,750	16%
MSR: Between Hoskyns Rd & Rolleston Dr	42,000	43,500	4%

HJR = Halswell Junction Road, MSR = Main South Road

At the northern end of the Christchurch Southern Corridor, the traffic modelling indicates that there will be capacity issues on Brougham Street for both the Baseline and "With Project" scenarios. The NZTA is intending to progress a full corridor study from the City end of CSM1 to the Port of Lyttelton to investigate options for maintaining the efficient operation of this strategic

corridor. Pending the results of this corridor study, the NZTA will continue its normal policy of making incremental operational improvements.

At the southern end of the Project in Rolleston, the end of the four-laning at Park Lane merges traffic back into a single lane in the southbound direction. With the additional traffic drawn to the widened Main South Road and CSM2 from Rolleston, the level of service through this merge is expected to be worse than for the Baseline case, with slightly increased travel times. Although the NZTA does not currently have any specific projects on its 10 year programme to improve this section of the State highway network, it has a strategy for improvements as outlined in the CRETS reports and will continue to monitor the performance of this part of the network. When this monitoring identifies the need for improvements, the adopted CRETS strategy improvements will be developed and implemented to resolve safety or congestion issues. These improvements involve the removal of the traffic signals on the Main South Road intersections with Hoskyns Road and Rolleston Drive, and provision of a grade separated connection between Rolleston and Jones Road.

Improvements to the alternative routes bypassing this section of Main South Road to both the western and eastern sides of Rolleston are being delivered as part of the Project. These are via Weedons interchange to Jones Road and Levi Road.

Table 18: Local road traffic volume changes

Local road section	2041 Baseline	2041 Project	% Change
Springs Rd: North of Halswell Junction Rd	24,250	28,250	16%
Springs Rd: North side of Prebbleton	20,000	18,750	-6%
Springs Rd: Through Prebbleton	17,750	16,250	-8%
Springs Rd: South side of Prebbleton	5,000	2,500	-50%
Springs Rd: South of Robinsons Rd	5,500	3,250	-41%
Shands Rd: North of Halswell Junction Rd	19,500	18,750	-4%
Shands Rd: North side of Prebbleton	14,250	15,500	9%
Shands Rd: South side of Prebbleton	12,000	11,750	-2%
Shands Rd: South of Robinsons Rd	4,750	7,250	53%
Jones Rd: South of Templeton	4,000	2,500	-38%
Selwyn Rd: South of Shands Rd	9,000	6,500	-28%
Marshs Rd: West of Springs Rd	5,500	6,750	23%

Local road section	2041 Baseline	2041 Project	% Change
Marshs Rd: West of Shands Rd	2,000	4,000	100%
Weedons Ross Rd: West of Jones Rd	1,000	1,750	75%
Levi Rd: South of Weedons Rd	3,500	7,000	100%
Hamptons Rd: West of Shands Rd	1,750	1,250	-29%
Trents Rd: East of Main South Rd	2,000	1,000	-50%
Blakes Rd: East of Shands Rd	5,500	3,000	-45%

In summary, the modelling indicates that there will be significant changes in patterns of traffic demands throughout the area served by the Project. Many of the changes are positive, with traffic transferring onto the higher standard Project alignment. The change in traffic volumes on the road also gives an indication of the potential for safety benefits i.e. the number of crashes predicted due to vehicle exposure. Traffic safety is assessed further below in Section 11.7.7.

In terms of local roads, the main changes to traffic flows are summarised as follows:

- many local roads are predicted to experience a decrease in traffic volumes. In particular, Springs Road between Prebbleton and Lincoln, Jones Road between Weedons and Templeton, the Lincoln Rolleston Road – Selwyn Road route to Shands Road and the Hamptons/Trents/Blakes Road connections across Prebbleton;
- traffic volumes on Marshs Road are expected to increase as a result of the Shands Road interchange, with flows on the section between Main South Road and Shands Road predicted to more than double. While significant in percentage terms, the largest increase of 2,250 vehicles per day is not expected to alter the nature of the road environment. The proposed signals at the Marshs / Shands Road intersection will also improve traffic management through this area;
- traffic volumes on Weedons Road, Weedons Ross Road and Levi Road are expected to increase by around 75 – 100% as a result of the Weedons interchange and the alternative access they provide to and from Rolleston. Again, while significant in percentage terms, the increase in traffic volumes is not expected to significantly impact on the operation of these roads;
- traffic volumes are expected to increase by around 50% on Shands Road between Lincoln and Prebbleton. This is a result of traffic transferring from Springs Road to Shands Road to access the motorway via the Shands road interchange. This supports the CRETS strategy to reduce traffic demand on Springs Road through Prebbleton and progressive upgrades are expected to take place on adjoining local roads to cater for traffic using this interchange;
- other local road improvements have been identified through CRETS and UDS partner local roading programmes to service current and future demand from growth to the south and southwest of Christchurch. Current examples include the upgrade of local roads adjoining the Project near Prebbleton and Rolleston and the promotion of a

secondary route between Lincoln and Christchurch using Ellesmere Road connecting to Magdala Place via Wigram Road to further reduce traffic demand from Lincoln on Springs Road. The NZTA will continue to work with the UDS partners to develop complementary local road projects. Such projects, however, would be separate improvement packages and do not form part of this Project.

11.7.2. Effects on road travel times

The travel times on three routes within the area affected by the Project have been assessed. The routes include:

- RoNS Southern Corridor Route: Covers SH73/ SH76/ SH1 from Brougham Street to Rolleston;
- Lincoln/Prebbleton Corridor: Springs Road from Ellesmere Junction Road in Lincoln to Main South Road in Hornby; and
- Main South Road Corridor: Covers Main South Road and Blenheim Road from the CSM2 interchange on Main South Road to Deans Avenue at Hagley Park.

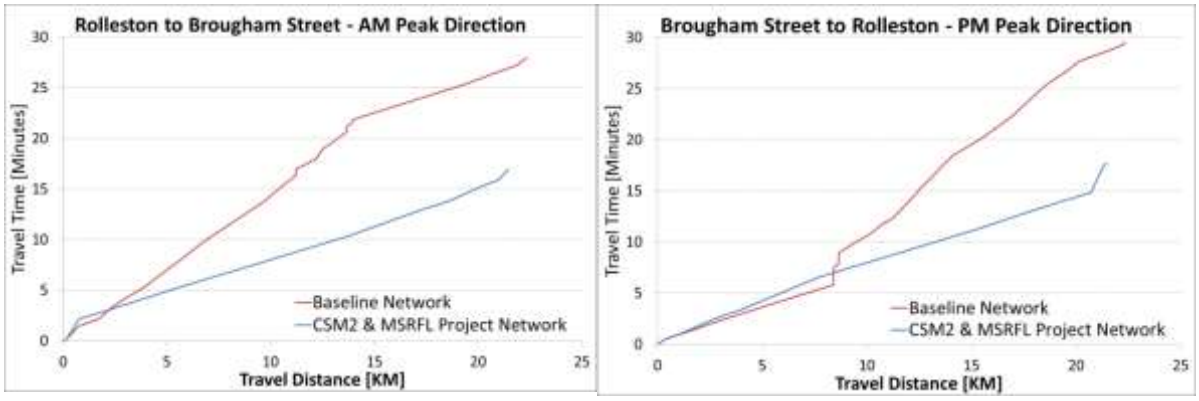
The most significant travel time effects are on the Southern Corridor route and the results comparing the Baseline and "With Project" scenarios are summarised below. There are also moderate positive effects on both the Lincoln/ Prebbleton and Main South Road corridors and these are reported in Technical Report 2.

RoNS Southern Corridor route

Travel times have been assessed for the Southern Corridor journey between the Main South Road / Rolleston Drive intersection in Rolleston and the Brougham Street / Selwyn Street intersection in Christchurch City. The Baseline routing utilises CSM1, Halswell Junction Road and Main South Road, whilst the Project travels via CSM2 and MSRFL.

Figure 47 presents time versus distance plots for the peak direction for the AM and PM peak hours, comparing the travel times on the Baseline route in 2041 against those with the Project in place. It is noted that for the Baseline scenario, travel distances on the route are marginally longer (0.9 km), so the completion of the Project will result in both journey time savings and a shorter travel distance.

Figure 47: Time vs distance plots of travel times between Rolleston and Brougham Street – 2041



The assessment indicates that the completion of the Project will produce significant travel time savings on the Southern Corridor route:

- savings of nine minutes (35%) citybound in the AM peak hour and 10 minutes (40%) Rolleston bound in the PM peak hour are expected in 2026, rising steadily to 11 minutes (40%) and 12 minutes (40%) respectively by 2041; and
- slightly lower savings of approximately five minutes (25%) are expected in the non-peak directions, as well as during the inter-peak period.

Although not quantified in these travel time figures, it is likely there will also be significant benefits in terms of the consistency of travel times for users of the Project. Travel time variability is known to increase as traffic levels become more congested, as is expected on the existing SH1 corridor. Therefore the significant increase in capacity provided as part of the Project, and the ability to avoid passing through a number of at-grade intersections, is expected to improve journey time reliability. This leads to travellers having more certainty regarding their expected arrival times at their destination, especially important for freight movements. This is consistent with the Requiring Authority objective to provide more predictable travel times and connections between the first stage of the Christchurch Southern Motorway and Rolleston for people and freight.

11.7.3. Effects on intersection performance

Existing intersections

The Project will result in significant reductions in volumes of through traffic along the bypassed sections of Main South Road and Halswell Junction Road, which will lead to an improvement in the performance of all intersections along this corridor. An example includes the priority controlled Main South Road/ Kirk Road/ Trents Road intersection in Templeton, where traffic volumes on Main South Road will reduce by approximately 15,000 vehicles per day in 2026 making it substantially easier for movements to and from the side roads. At the Halswell Junction Road/ Shands Road signals, the operation of the intersection will improve with the Project in place.

Specific intersection assessments have been undertaken at the following locations:

- Main South Road/ Rolleston Drive signals;
- Main South Road/ Hoskyns Road signals;
- Main South Road/ Kirk Road/ Trents Road priority intersection;
- Main South Road/ Halswell Junction Road signals; and
- Halswell Junction Road/ Shands Road signals.

Detailed results of these assessments are contained in Technical Report 2. The first two signalised intersections in Rolleston are beyond the southern extent of the Project, and are expected to have future capacity problems in the Baseline scenario. An increase in traffic volumes on the upgraded section of Main South Road is predicted to incur additional delays at these locations from 2026. As noted above in Section 11.7.1, the NZTA has a strategy for improvements at this location as outlined in the CRETS reports and will continue to monitor the operation of SH1 in this area. Alternative routes bypassing this area of Main South Road to both the western and eastern sides of Rolleston are also being delivered as part of the Project. These are via the Weedons interchange to Jones Road and Levi Road.

New intersections

Specific assessments have been undertaken on the proposed intersections forming the connections between the Project and the local road network. These include:

- Weedons Road / Weedons Ross Road interchange;
- Weedons Ross Road / Jones Road roundabout;
- Weedons Road / Levi Road priority intersection;
- Main South Road / Waterholes Road / Dawsons Road roundabout;
- Shands Road interchange including Marshs Road intersection;
- Halswell Junction Road / Springs Road roundabout; and
- CSM1 westbound off-ramp / Halswell Junction Road / John Paterson Drive roundabout.

Detailed results of these assessments are contained in Technical Report 2. All of the intersections were assessed to perform satisfactorily, aside from the Halswell Junction Road/ Springs Road roundabout and the CSM1 westbound off-ramp.

Without the Project, significant delays are expected at the Halswell Junction Road/ Springs Road intersection in the Baseline scenario soon after the opening of CSM1. With the Project in place, the roundabout will perform much better initially, but “level of service” problems are still anticipated during the evening peak from 2026 onwards. However, the availability of a reasonable alternative motorway access at Shands Road is expected to mitigate this effect, with motorists having the opportunity to transfer to this interchange should longer delays become evident at Halswell Junction Road.

The CSM1 off-ramp/ Halswell Junction Road roundabout is predicted to start operating poorly at some time between 2026 and 2041 during the PM peak hour. In particular, the CSM1 off-ramp approach will be affected by the predicted increase in traffic turning right from the CSM1 off-ramp. Two future changes to the layout or the operation of the roundabout have been identified to mitigate this effect and improve its expected operation. These are outlined in Section 11.8.4 below, with further details contained in Technical Report 2.

As noted previously in Section 11.2, the NZTA is currently working with the UDS partners on a short study of wider network operations. This includes the operation of the two Halswell Junction Road intersections described above and will help identify any other complementary improvements required on the local road network. Such improvements, however, will be considered outside of this Project.

11.7.4. Effects on road based freight movements

The Project will enable a faster, more efficient journey on a key freight route which connects the port to the southwest of Christchurch. Heavy vehicle traffic forecasts with the Project in place indicate that an increase in heavy vehicles is expected along the full length of the Southern Corridor, as trucks transfer to the faster, more direct route. By 2026, between 1,950 and 3,600 heavy vehicles are predicted to use the Southern Corridor between Rolleston and Brougham Street each day.

On CSM1 between Brougham Street and Curletts Road, daily truck volumes in 2026 are estimated to increase by approximately 600 vehicles a day with the Project in place. This relative difference increases to 1,100 more heavy vehicles on the section of CSM1 through to Halswell Junction Road, as heavy vehicles do not have to travel along the congested Halswell Junction Road to reach Main South Road.

The alternative routing to the Southern Corridor, using Blenheim Road and Main South Road is expected to see a significant decrease in truck volumes. Between Templeton and Hornby, truck volumes on Main South Road are forecast to halve with the Project in place. The diversion of heavy vehicles from these urban areas will have a noticeable amenity improvement for the Templeton and Hornby communities, as well as improving local access for other road users.

Travel times and travel time reliability will also improve for freight vehicles. This will reduce the cost of the movement of goods and services and help achieve economic growth and improved productivity.

11.7.5. Effects on passenger transport services

Two scheduled passenger transport services operate within the Project roading network.

Route 81 follows Springs Road and will benefit from a moderate improvement in travel time between Lincoln and Hornby. No discernible change in travel times are predicted for Route 88 which travels along Jones Road/ Waterloo Road and then Main South Road through Hornby, although the service will benefit from a reduction in traffic volumes along this route.

The S15 and S20 school bus services use similar routing to Route 88 and 81 respectively and will benefit from minor improvements to travel times.

11.7.6. Effects on pedestrians and cycling

It is expected that the Project will have a positive effect on walking and cycling.

The Project includes a 1.7km dedicated walking and cycling path that will link the CSM1 shared use path (which completes at the Halswell Junction Road / Springs Road roundabout) to the Little River Rail Trail at Marshs Road. This will enhance connectivity between the two facilities in the area. An additional shared use path on the southern side of Halswell Junction Road will connect the southbound off-ramp roundabout to the new CSM1 – Little River Rail Trail path.

On-road shoulders and separate footpaths will be provided at each of the local road crossings and interchanges to facilitate movement across the Project alignment. Access and connectivity will therefore be maintained for pedestrians and cyclists across the local road network.

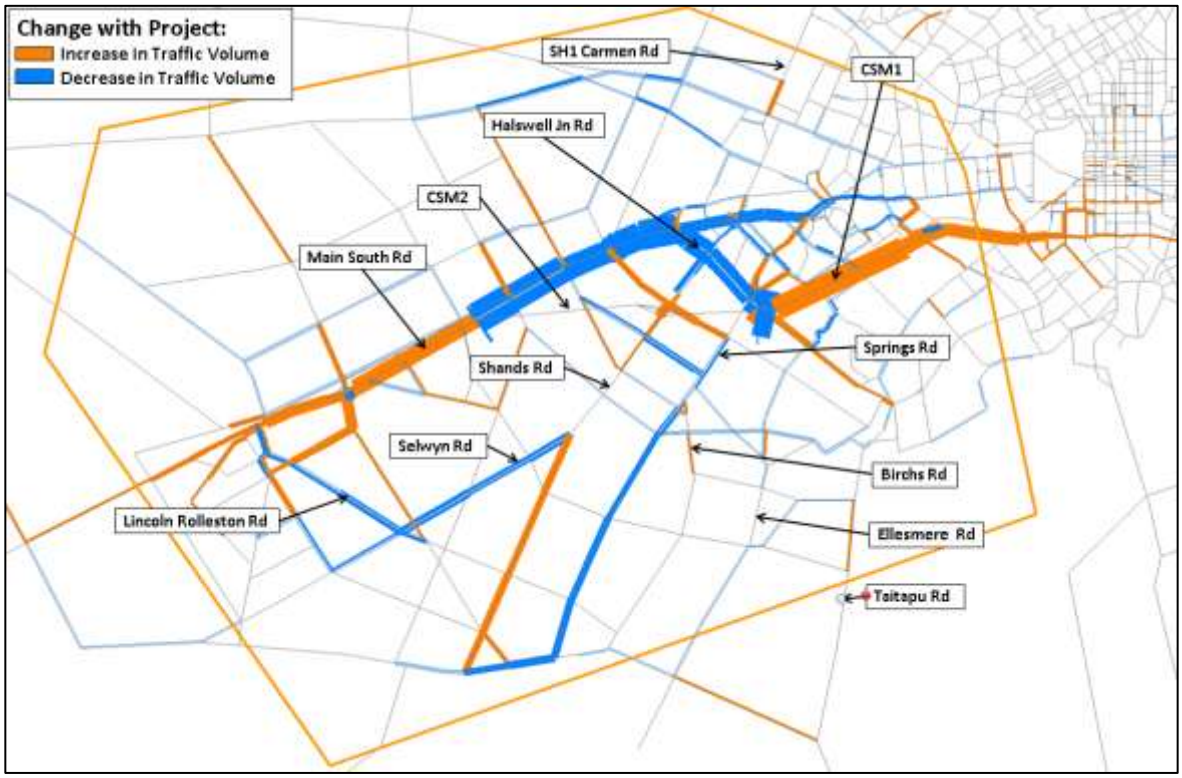
Cyclists will be permitted to ride in the 2.5m outer shoulder on the upgraded Main South Road maintaining connectivity north and south of the highway. The consideration of pedestrian and cyclist needs across Robinsons/ Curraghs Road and Weedons/ Weedons Ross Road will also provide opportunity for less confident cyclists to use either Jones Road, the proposed western rear access road, or a potential future rail corridor facility between Rolleston and Templeton.

The removal of large volumes of traffic from the bypassed sections of Main South Road and Halswell Junction Road, and moderate reductions on some local roads will create opportunities for an improved environment for walking and cycling.

11.7.7. Effects on road safety

Safety effects within the study area were assessed at mid-block sections, intersections and interchanges. This assessment adopted a network type approach in consideration of the area wide travel changes predicted to occur when the Project is in place. Overall, 25 intersections and 37 mid-block sections were analysed totalling approximately 110km of road. The area evaluated is shown within the orange boundary line in Figure 48.

Figure 48: Area of Evaluation for Safety Analysis



These sections were analysed using the outputs from the Basecase modelling scenario and crash rate prediction models in the NZTA Economic Evaluation Manual to calculate the estimated number of injury crashes at the selected locations. Historical crash data was also used to help "calibrate" the estimated crash rates.

These crash rates were then compared with the calculated injury crash rates for the "With Project" scenario. The analysis showed:

- Mid-block: Positive safety effects resulting from a significant amount of traffic transferring from the Main South Road / Halswell Junction Road corridor onto the safer motorway. The four-laning on Main South Road results in further safety benefits savings, due to the higher standard median divided highway and diversion of traffic from surrounding local roads onto this safer route; and
- Intersections: The reduction in traffic volumes along the bypassed Main South Road/ Halswell Junction Road corridor results in positive safety benefits due to reduced exposure at these conflict points. The introduction of MSRFL and associated restricted access also results in positive safety effects due to the reduction in risk of high severity turning /crossing type crashes.

Some intersections will also experience an increase in traffic demand such as at the Weedons Ross Road/ Jones Road and Weedons Road / Levi Road intersections. These locations will be designed to modern geometric standards to more safely accommodate the increased traffic demands and mitigate any potential adverse safety effects.

The four new interchanges included in the Project will introduce new ramp terminal intersections and exposure points to the road network. The interchanges do however, separate potential conflicts between large volumes of traffic travelling at high speeds, and play a key role in improving road safety. They also help to improve traffic flows and support an efficient motorway route.

As noted above in Section 11.7.1, the change in traffic volumes on local roads will affect the number of crashes as a result of changes in exposure to crashes. Several local roads were highlighted where traffic volumes are expected to decrease and therefore have a positive road safety effect.

Some local roads are also expected to experience an increase in traffic including:

- Weedons/ Levi Road route into Rolleston;
- Weedons Ross Road between Main South Road and Maddisons Road;
- Shands Road between Ellesmere Junction Road and Selwyn Road; and
- Marshs Road between Main South Road and Springs Road.

While some of these traffic volume increases are significant in percentage terms, the actual increase in vehicle numbers are expected to be able to be accommodated without any deterioration in safety.

Overall, significant positive safety effects are assessed for the Project. In particular, a 40% reduction in the fatal and serious injury accidents is estimated. This highlights the effectiveness that high standard, median separated, limited access highways have in reducing the risk of high severity crashes.

The Project will therefore have a direct contribution in reducing the number of high severity crashes, which is a key focus in implementing New Zealand's Safer Journeys Strategy.

11.7.8. Effects on access to property

The Project will affect a number of existing accesses to properties. However, the Project has been designed to mitigate any adverse effects on adjoining properties through the provision of alternative access where appropriate. Details of the effects on access to properties are outlined below.

Main South Road – western side

On the western side of Main South Road, there will be no direct access from properties to Main South Road (with the sole exception of Property 181). Alternative access will be provided via a rear access road to the west of the properties, adjacent to the railway line from Weedons Ross Road to just north of Curraghs Road. A summary of the change in access arrangements for the properties on the western side of Main South Road is shown in Table 19.

Table 19: Access to property – Main South Road – western side

Location	Current access	Changed access	#	Change in distance (from/to)			
				North	South	West	East
Hoskyns Rd to Weedons Ross Road	Main South Road	Left-In/Left-Out to Main South Road	1	2.9/-	-/1.9	-/0.3	-/0.2
	Main South Road	Via ROW to Weedons Ross Road	2	0.8/0.5	0.9/1.2	(0.2)/(0.5)	0.1/0.3
	Via ROW to Weedons Ross Road	Via ROW to Weedons Ross Road	1	0.6/0.3	(0.1)/2.3	0.3/-	-/0.2
Weedons Ross Road	Weedons Ross Road	Left-In/Left-Out to Weedons Ross Road	1	0.7/0.6	(0.2)/0.6	-/-	-/0.3
	Weedons Ross Road	No change	2	-	-	-	-
Weedons Ross Rd to Curraghs Road	Weedons Ross Road	Weedons I/C western roundabout	1	-	-	-	-
	Main South Road	Rear access road between Weedons Ross Road and Curraghs Road	15	0.5/0.2	0.3/0.4	(0.1)/(0.2)	0.1/0.1
	Total purchase by the NZTA		1	-	-	-	-
Curraghs Road to Dawsons Road	Curraghs Road	Rear access road off Curraghs Road	1	2.1/1.6	2.7/0.6	-/-	0.1/0.2
	Main South Road	Rear access road off Curraghs Road	1	2.1/1.6	2.7/0.6	(0.1)/(0.1)	-/0.1
	Dawsons Road	No change	1	-	-	-	-
Dawsons Road to Kirk Road	Dawsons Road	No change	1	-	-	-	-

A total of 28 properties are affected, with one of these being totally purchased by the NZTA. For the remaining properties, four properties have no change in their access arrangements and 23 properties have changes to their access arrangements.

For these 23 properties, the majority have their access changed from being directly onto Main South Road to access via the rear access road parallel to the railway line. For the majority of these properties, the changes to access arrangements results in a need to travel further to access properties from most directions. In a limited number of instances, travel distances are reduced, but only by small amounts.

The removal of direct access to Main South Road does produce benefits in terms of reduced crash risks, both for vehicles using these property access points and for the other vehicles travelling on Main South Road. A reduction in the delays associated with access directly onto Main South Road, or crossing Main South Road, is also anticipated, offsetting to an extent the increased travel distance associated with some trips.

Main South Road – eastern side

On the eastern side of Main South Road there will be no direct property access via Main South Road. Alternative access will be provided through a combination of the extension of Berketts Drive to Robinsons Road and via right of ways. A summary of the change in access arrangements for the properties on the eastern side of Main South Road is shown in Table 20.

Table 20: Access to property – Main South Road – eastern side

Location	Current access	Changed access	#	Change in distance (from/to)			
				North	South	West	East
Park Lane to Weedons Road	Park Lane	No change	1	-	-	-	-
	Main South Road	Via new subdivision access to Marlowe Place	2	3.5/3.5	1.0/1.0	1.1/1.1	(0.4)/(2.0)
	Total purchase by the NZTA						
	Weedons Road	No change	1	-	-	-	-
Weedons Road to Larcombs Road	Weedons Road	No change	2	-	-	-	-
	ROW off Paige Place	No change	2	-/4.4	5.7/1.8	3.1/0.9	-/-

Location	Current access	Changed access	#	Change in distance (from/to)			
				North	South	West	East
	Larcombs Road	No change	1	-/4.4	5.7/1.8	3.1/0.9	-/-
Larcombs Road to Berketts Road	Larcombs Road	No change, though Larcombs Rd changed to Left-In only	1	-/5.2	9.9/3.1	9.3/3.2	-/-
	Main South Road	Via ROW from Berketts Rd	3	0.7/6.1	10.0/3.1	9.2/3.4	(0.3)/(0.3)
	Berketts Road	No change, though Berketts Rd changed to Left-In/ Left-Out	1	-/2.3	4.0/-	0.4/0.4	-/-
Berketts Road to Robinsons Road	Berketts Drive	No change	1	-/0.7	-/0.4	-/0.4	-/-
	Main South Road	Berketts Dr	6	2.0/0.7	0.4/0.4	0.4/0.4	0.7/0.5
	Total purchase by the NZTA		1	-	-	-	-
Robinsons Road to Waterholes Road	Total purchase by the NZTA		12	-	-	-	-
	Main South Road	Via new MSR southbound off-slip link to Robinsons Rd	3	0.3/0.6	0.5/0.9	0.1/0.1	(0.4)/(0.4)
	Waterholes Road	No change	3	-	-	-	-
Waterholes Road to Trents Road	Waterholes Road	No change	1	-	-	-	-

A total of 42 properties are affected, with 14 of these being totally purchased by the NZTA. For the remaining properties, eight have no change in their access arrangements, with 20 properties having changes to their access arrangements.

For the 20 properties with changes to their access, again the majority have their access changed from being directly onto Main South Road to accessing them via an extension of Berketts Drive or via a number of rights of ways off the local roads. Changes to how vehicles travel to and from these locations also occur as a result of the change in movements possible at the side road intersections. Again, the changes to property access arrangements results in a need to travel further to access these properties from most directions. In a limited number of instances, travel distances are reduced, but only by small amounts.

Safety benefits are also expected as a result of the removal of direct access to Main South Road. Delays in vehicles entering or leaving these properties are also expected to reduce, as drivers no longer have to wait for gaps between vehicles on Main South Road, instead accessing lower volume local roads.

CSM2 alignment

A summary of the change in access arrangements for the properties along the CSM2 alignment is presented in Table 21.

Table 21: Access to property – CSM2 alignment

Location	Current access	Changed access	#	Change in distance (from/to)			
				North	South	West	East
Waterholes Road/Hamptons Road	Hamptons Road	No change	1	-	-	-	-
	Total purchase by the NZTA		6	-	-	-	-
Trents Road	Trents Road	No change	1	-	-	-	-
	Total purchase by the NZTA		2	-	-	-	-
Blakes Road	Blakes Road	Blakes Rd severed to the west	1	3.7/3.8	-/-	3.7/3.8	-/-
	Total purchase by the NZTA		5	-	-	-	-
Shands Road	Shands Road	No change	2	-	-	-	-

Location	Current access	Changed access	#	Change in distance (from/to)			
				North	South	West	East
	Total purchase by the NZTA		3	-	-	-	-
Marshs Road	Marshs Road	No change	6	-	-	-	-
	Sir James Wattie Drive	No change	0.9 *	-	-	-	-
	Sir James Wattie Drive	Marshs Rd	0.1 *	0.4/0.4	(0.2)/(0.2)	(0.2)/(0.2)	(1.7)/(1.7)
	Total purchase by the NZTA		4	-	-	-	-
Springs Road	Springs Road	No change	2	-	-	-	-
	Total purchase by the NZTA		6	-	-	-	-
John Paterson Drive	Springs Rd via John Paterson Drive	Halswell Junction Rd via John Paterson Dr	7	0.5/0.4	1.2/1.2	1.1/1.1	(0.9)/(0.9)
	Total purchase by the NZTA		1	-	-	-	-
Halswell Junction Road	Halswell Junction Road	Via John Paterson Dr roundabout	2	-	-	-	-
	Total purchase by the NZTA		3	-	-	-	-

*Refers to Calder Stewart property at corner of Shands Road and Marshs Road, which is split by the motorway alignment.

For the majority of properties along CSM2, there are no changes to their access arrangements. At two locations, the severing of Blakes Road and the rerouting of John Paterson Drive will result in extra travel distance being required to travel to or from some directions. For the properties currently using John Paterson Drive, its rerouting from Springs Road to Halswell Junction Road will result in shorter travel distances to and from the east.

11.7.9. Summary assessment of effects

The Project will have a number of significant positive traffic effects, including the following:

- with the Project in place, large reductions in daily traffic volumes are predicted to occur on the strategic road network, including Main South Road through Templeton and Hornby and on Halswell Junction Road;
- the significant reduction in the volume of traffic will reduce intersection delays and improve congestion on the bypassed sections of Main South Road and Halswell Junction Road;
- traffic volumes are also predicted to decrease on a number of local roads as a result of the Project. These include Springs Road between Lincoln and Prebbleton, Jones Road and Selwyn Road south of Shands Road.
- travel time savings will be experienced for the journey between Rolleston and the end of CSM1 at Brougham Street and travel time reliability is also expected to improve;
- the Project provides a new dedicated walkway/ cycleway to connect the CSM1 shared path with the Little River Rail Trail;
- the Project has the effect of improving road safety through the provision of a high standard, median separated, limited access route;
- the reduced traffic volumes, including trucks, will result in significantly improved amenity and accessibility for Templeton and Hornby; and
- the Project supports the function of a National strategic route, providing for inter-regional travel and more efficient road-based freight movements. Many of these benefits will also apply to local traffic movements.

The Project will also have neutral and/or adverse effects, including the following:

- traffic volumes will increase at the northern end of CSM1 and the southbound merge at end of the four-laning near Rolleston. These are expected to result in worse operating conditions when compared to the Baseline case;
- traffic demand will alter at the Springs Road/ Halswell Junction Road intersection. These are expected to initially result in better levels of service when compared to the Baseline case but congestion issues are predicted to occur in the future;
- increasing volumes of traffic from the CSM1 off-ramp is predicted to effect the future level of service on the approach to the Halswell Junction Road roundabout;
- with the Project in place, traffic volumes are expected to increase on certain local roads, including Shands Road between Lincoln and Prebbleton; Weedons Road between Main South Road and Levi Road; Levi Road into Rolleston; Weedons Ross Road between Main South Road and Maddisons Road; and Marshs Road between Main South Road and Springs Road; and
- the Project proposes to close existing property accesses on Main South Road, sever Blakes Road and realign John Paterson Drive from Springs Road to Halswell Junction Road. These changes will result in re-routing and additional travel time and distances for some property owners.

11.8. Measures to avoid, remedy or mitigate actual or potential adverse effects

Overall, the Project will provide significant transport infrastructure that will complete the Southern Corridor of the Christchurch Motorway RoNS package. The Project is predicted to significantly improve travel times for people and freight between Rolleston and Christchurch. The

overall network will operate with significantly improved travel times and journey time reliability, relieving congestion and facilitating planned growth to the south and west of Christchurch and around Rolleston. The higher standard road environment will also lead to improved road safety in the areas served by the Project.

However, there are some actual or potential effects which are adverse to road users as well as residents located in the vicinity of the Project. This section sets out the mitigation measures and features to avoid, remedy or mitigate the identified adverse effects. Some of these measures do not form part of this Project, but have been identified in the CRETS reports as part of a wider package of transportation improvements to accommodate growth in the broad Christchurch to Rolleston area. The NZTA is continuing to work with UDS partners to develop these complementary projects.

11.8.1. Brougham Street

The NZTA is intending to progress a full corridor study from the City end of CSM to the Port of Lyttelton to investigate options for maintaining the efficient operation of this strategic corridor. Pending the results of this corridor study, the NZTA will continue its normal policy of making incremental operational improvements.

11.8.2. Four laning merge north of Rolleston

Although the NZTA do not currently have any specific projects on its 10 year programme to improve this section of the State highway network, it has a strategy for improvements as outlined in the CRETS reports involving the removal of the traffic signals on the Main South Road intersections with Hoskyns Road and Rolleston Drive, and provision of a grade separated connection between Rolleston and Jones Road.

Alternative routes bypassing this section of Main South Road to both the western and eastern sides of Rolleston are being delivered as part of the Project. These are via Weedons interchange to Jones Road and Levi Road, and will enable vehicles to bypass any congestion that occurs at the merge.

11.8.3. Halswell Junction Road / Springs Road intersection

Modelling of the performance of the Halswell Junction Road/ Springs Road roundabout indicates that its performance may become unsatisfactory in the PM peak hour by 2026. The availability of a reasonable alternative motorway access at the Shands Road interchange is expected to mitigate this effect, with motorists having the opportunity to transfer to this interchange should longer delays become evident at Halswell Junction Road. Directional signage will reinforce this option to road users.

The NZTA will undertake on-going monitoring of the performance of this intersection, including crashes, travel time delay and queue lengths. If this monitoring indicates that the operation of this intersection is becoming unsatisfactory, the NZTA will work with Christchurch City Council through the UDS Transportation Group to improve its operation.

Other complementary local road projects have been identified in the CRETS reports to reduce traffic demand at this location. This includes the promotion of a district arterial route between Lincoln and Christchurch using Ellesmere Road, Longstaffs and Whincops Road, connecting to Magdala Place via Wigram Road.

11.8.4. CSM1 off-ramp/ Halswell Junction Road / John Paterson Drive intersection

Two future changes to the layout or the operation of the roundabout have been identified in Technical Report 2, either of which would significantly improve its expected operation. These include installing traffic signals on the Halswell Junction Road western approach to meter the arrival of vehicles at the roundabout, or changing the road marking to allow for right turns from both lanes on the CSM1 off-ramp approach. The underground ducting necessary for metering traffic signals on the Halswell Junction Road western approach will be considered at the time of construction, allowing these signals to be set up with minimal disruption to road users in the future.

11.8.5. Property access

Removal of direct access to Main South Road for properties on the western side will be mitigated by the construction of a rear access road between Weedons Road and Curraghs Road, allowing access to Main South Road via the Weedons interchange or at the new Main South Road/ Waterholes Road/ Dawsons Road roundabout.

Removal of direct access to Main South Road for properties on the eastern side will be mitigated by using the existing local road network, right of ways and the extension of Berketts Drive through to Robinsons Road.

The closure of the John Paterson Drive intersection with Springs Road will be mitigated by the provision of an alternative access from the new roundabout at the CSM westbound off-ramp on Halswell Junction Road.

11.9. Assessment of construction traffic effects and mitigation measures

There will be some adverse effects associated with the Project, primarily of a temporary or short term nature, during construction. This section presents a qualitative assessment of the potential traffic and transportation effects during construction, and outlines the measures identified to avoid, remedy or mitigate these effects. There has been no contractor involvement with regard to the construction traffic management at this stage, so the sequences set out in this section are indicative only.

11.9.1. Construction Traffic Management Plan (CTMP)

In all cases, the Project will utilise a CTMP to manage the potential effects during the construction works. It will outline the procedures for the production of Site Specific Traffic Management Plans (SSTMPs) and the relevant standards that must be complied with. This CTMP will be supported by

multiple SSTMPs detailing the specific traffic management set ups at each worksite as well as any mitigation measures for identified impacts of the works.

The CTMP prepared for this application is included in Specialised Environmental Management Plan No 4, in Volume 4 of the AEE.

11.9.2. Overall philosophy

It has been assumed that the construction of the Project would take three to four years and that the construction activity, as relevant to traffic effects, will take place in the following order:

- the rail sidings in the vicinity of Halswell Junction Road and Springs Road are anticipated to be in the enabling works, along with adjusting the transmission lines at the Shands Road interchange and the relocation of businesses;
- the main alignment of the motorway would be fenced to secure the site;
- local road connections and rear accesses are anticipated to be constructed first, along with the associated structures and embankments; and
- the mainline motorway construction and Main South Road widening would be undertaken last. For the CSM2 section of the Project, it is noted that this Project benefits from having the alignment run through greenfield land for the majority of the route. The widening of Main South Road principally to the western side of the current alignment also enables the existing carriageway to remain operational, so construction of the additional lanes can occur offline.

11.9.3. Summary of construction traffic effects and mitigation measures

For the purpose of traffic management activities, the Project has been split into five work zones based on the currently proposed construction methodology:

- Zone 1 – MSRFL including Weedons Road interchange;
- Zone 2 – Robinsons Road / Curraghs Road;
- Zone 3 – Waterholes Road and Trents Road;
- Zone 4 – Shands Road / Marshs Road; and
- Zone 5 – Halswell Junction Road.

A detailed description of the proposed construction methodology is included in Chapter 5 of this AEE and the Construction Environment Management Plan (CEMP) include in Volume 4 of the AEE.

The potential traffic effects associated with each of the Project work zones are summarised in Table 22 below.

11.9.4. Construction traffic routing

As discussed earlier in Chapter 5 of this AEE, the extent of construction traffic is dependent on the phase of works. The majority of construction vehicle movements are expected to be to/from quarry's located in areas to the west of the airport (north of Main South Road). Construction

vehicles will therefore access Main South Road from the north via left turn movements, predominantly from Weedons Road, Dawsons Road or Curraghs Road.

Other alternative routes will also be required for some sections. For example, for works on MSRFL west of Weedons Road where access is expected to be via a left turn at Hoskyns Road at Rolleston. Movements through Rolleston will however be avoided where possible to reduce any effects on existing traffic through this area.

Access to the Project from the city will be predominantly via Shands Road and Halswell Junction Road. Construction traffic travelling through Templeton will be encouraged to remain on Main South Road, rather than utilizing Jones Road. Travel through Prebbleton will also be minimised whenever practical, in order to limit adverse effects on those businesses and residents. The site specific traffic management plans (SSTMPs) will detail the acceptable routes for construction vehicles and the expected frequency of heavy commercial vehicle movements. Any required mitigation measures will also be assessed and detailed in the SSTMPs. Truck drivers are to be briefed on the appropriate routes and made aware of sensitive areas and points of high pedestrian and cycle usage.

Movements through certain intersections and roads, at locations to be agreed with the Road Controlling Authorities, will be restricted at AM and PM peak periods to reduce the impact of construction vehicles. In these instances, alternative routes will be established or the timing of construction movements adapted to maintain capacity. These will be detailed in the SSTMPs.

Table 22 below outlines the impact of the works and the proposed mitigation measures (in addition to standard temporary traffic management) to minimise the anticipated effects.

Table 22: Summary of Project construction traffic effects

Activity	Road	Impact	Mitigation
Zone 1 – MSRFL including Weedons Road Interchange			
Construction of access road tie-in to Weedons Road and Curraghs Road	Weedons Road and Curraghs Road	Slow traffic through temporary works zone	Effects likely to be minor as these are low volume roads and new access road will link to existing roads.
Construction of roundabout at intersection of Weedons Ross Road and Jones Road.	Weedons Ross Road and Jones Road	Slow traffic through temporary works zone	Effects likely to be minor as these are low volume roads

Activity	Road	Impact	Mitigation
Widening and re-construction on Main South Road	Main South Road	Slow traffic through temporary works zone	Off-line widening expected to minimise length of temporary speed limit zone. In addition, all rear accesses shall be constructed prior to widening works.
Construction of Weedons Road roundabouts, emabnkments and overbridge	Weedons Road and Weedons Ross Road	Slow traffic through temporary works zone. Closure of Weedons Ross Road.	Effects likely to be minor as these are low volume roads and each work site will be relatively short. Detour to utilise Jones Hoskyns Roads
Construction of interchange	Main South Road, Weedons Road and Weedons Ross Road	Slow traffic thrugh temporary works zone.	Majority of works to be undertaken off-line. Use sight screens to prevent 'rubbernecking'.
Zone 2 – Robinsons Road / Curraghs Road			
Construction of Curraghs Road Overbridge	Curraghs Road and Robinsons Road	Requires use of Waterholes Road as a diversion, so additional travel time required.	None proposed as the diversion is not significant. Split works into two parts to reduce impact on Main South Road.
Use of southbound lanes for two-way running	Main South Road	Slow speeds through the works zone, leading to congestion	Congestion and delays to be monitored.
Upgrading of existing Main South Road	Main South Road	Slow speeds through the works zone, leading to congestion	Congestion and delays to be monitored. Undertake works during periods of low traffic volumes
Zone 3 – Waterholes Road and Trents Road			

Activity	Road	Impact	Mitigation
Construction of Waterholes Road temporary alignment	Waterholes Road and Hamptons Road	Reduced speed limit through works zone	Waterholes Road is a low volume road able to remain open to traffic at all times. Therefore, no specific mitigation is proposed.
Construction of tie-in between the existing and proposed alignments	Waterholes Road and Hamptons Road	Reduced speed limit through works zone	Waterholes Road is a low volume road able to remain open to traffic at all times. Therefore, no specific mitigation is proposed.
Construction of Trents Road temporary alignment	Trents Road	Reduced speed limit through works zone	Trents Road is a low volume road able to remain open to traffic at all times. Therefore, no specific mitigation is proposed.
Temination of Blakes Road	Blakes Road	Driver Confusion	Underake advertising campaign and on-site signage
Zone 4 – Shands Road / Marshs Road			
Construction of Shands Road temporary alignment	Shands Road	Reduced speed limit through works zone	These are low volume roads so no specific mitigation is proposed
Construction of Marshs Road temporary alignment	Marshs Road	Reduced speed limit through works zone	These are low volume roads so no specific mitigation is proposed
Construction of Shands Road/ Marshs Road intersection	Shands Road/ Marshs Road	Reduced speed through works zone and reduced capacity at intersection.	These are low volume roads so no specific mitigation is proposed
Zone 5 – Halswell Junction Road			

Activity	Road	Impact	Mitigation
Construction of Halswell Junction Road Roundabout, CSM1 exit and tie-in to John Paterson Drive	Halswell Junction Road	Congestion as traffic travels through the works zone. Not considered to be significant.	Diversion of traffic where required to maintain current flow
Construction of Halswell Junction Road temporary alignment	Halswell Junction Road	Reduced speed limit through works zone	Congestion and delays to be monitored.
Construction of the Halswell Junction Road overbridge	Halswell Junction Road	Additional traffic delay at the Springs Road roundabout because of 'U'-turning traffic from Halswell Junction Road to access CSM1 city-bound. Traffic delay because of speed restrictions on the temporary road	Volume of 'U'-turning traffic expected to be low, so disruption will affect only a small number of drivers. None proposed as length of temporary road is fairly short.
Construction of Springs Road temporary alignment	Springs Road	Reduced speed limit through works zone	Congestion and delays to be monitored.
Construction of the Springs Road overbridge	Springs Road	Traffic delay because of speed restrictions on the temporary road	None proposed as length of temporary road is fairly short.
Duration of the works until CSM2 is open	CSM1 southbound off-ramp	Traffic delay because of reduced capacity (note that there are currently two lanes in each direction between Springs Road and CSM1)	Restrict activities resulting in reduced caacity when possible.
Construction of CSM1 on-ramp	Halswell Junction Road and CSM1	Traffic delays due to use of new off-ramp as temporary on-ramp	Utilise off-ramp as point of entry to motorway

11.10. Conclusion

The Project is reasonably necessary for achieving the Requiring Authority's objectives and will have significant positive traffic effects (i.e. benefits) at a local, regional and national level. This includes providing an important strategic function for inter-regional and longer distance travel and delivering sought outcomes in improved journey times, reliability and safety on a key freight route. There are some localised adverse effects relating to restrictions in access to properties, primarily along the MSRFL section, which will be mitigated by the provision of alternative rear access routes on both sides of Main South Road.

In addition, there will be some adverse construction traffic effects associated with the construction of the Project. A CTMP, supported by individual SSTMPs, will manage as far as is reasonably practicable, the adverse effects on the road network. It is noted that construction traffic effects will be temporary short term effects only.

Finally, the Project is identified as part of a wider package of transportation improvements to manage growth to the southwest and south of Christchurch. The NZTA will continue to work with the UDS partners to develop other complementary local road improvements, as identified in CRETS, to support land use development in the area. These improvements, however, would be separate packages and do not form part of this Project.

12. PROPERTY & LAND USE

Overview

The main property effects of the Project can be separated into four broad categories:

- Properties with land that is directly required for the Project;
- Land that is required to implement rear access roads or ancillary local road improvements;
- Land with an easement or other property right (including rights of way and water rights, for example) that is directly affected by the Project; and
- Properties within close proximity to the Project.

The land holdings range from land already acquired by the Crown, Council owned land, including roads and other land holdings. Private land is by far the largest land requirement. Some properties need to be purchased outright and there are some properties where part acquisition will be required. All property owners whose land is directly affected have been consulted and are aware of the property required.

Where land is partially acquired, some properties may become smaller than the minimum allotment size in the Selwyn District Plan and Christchurch City Plan. This will depend on final arrangements with landowners, options for amalgamation, and/or retention by NZTA.

There are some examples of properties that will be required for construction of the Project, but that will not be purchased. The effects on these properties can also be managed through the Public Works Act 1981 ("PWA") process.

Properties within close proximity to the route that have been identified as being subject to potential adverse effects have been identified through the Technical Reports. Actual and potential effects on these properties have been identified in relation to specific technical areas and appropriate mitigation has been devised. Actual and potential (including perceived) effects on property values are not considered to be a relevant consideration under the RMA.

The Project will permanently take high fertility soils that might otherwise be available for farming purposes. The amount of land to be taken has been minimised as far as possible, and topsoil will be re-used within the Project area.

12.1. Introduction

The Project involves the construction and operation of a major roading link where there is a requirement to consider direct and indirect effects on property owners and occupiers. Actual and potential effects on the environment are key matters that must be addressed under both the RMA, and where land or property interests are required to be purchased, in terms of PWA acquisition processes.

The main property effects of the Project fall into four categories:

- land that is required either directly in whole or in part for the implementation of the MSRFL and CSM2 main alignment;
- land that is required to implement rear access roads or ancillary local road improvements;
- land that is subject to an easement or other property right such as a water permit that is directly affected by the implementation of the Project; and
- properties that are within close proximity to the Project.

The land is contained within both the Selwyn District area and within the jurisdiction of Christchurch City Council. The land holdings range from Crown Land (Rail or already purchased), Council owned land including roads, and private freehold land. Private land is a mixture of large rural holdings with some rural-residential lifestyle blocks and some business land. Chapter 3 outlines the existing land use in the Project area.

Land parcels that are directly affected are shown in Land Requirement Plans 66236-A-C1101 to C1110 for MSRFL and Land Requirement Plans 62236-B-C1101 to C1118 for the CSM2 component of the Project. These plans are contained within Volume 5 of the application documents and the Land Requirement Schedule is attached as Appendix B to this AEE.

12.2. Land acquisition and occupation

Before considering the detail of property related matters for the Project it is important to consider how land for a public work is acquired. As the NZTA is a requiring authority under the RMA it is also classified as a network utility operator for the purposes of the PWA, so may apply to the Minister of Lands to acquire lands on its behalf.

The PWA acquisition process is usefully described in a guide produced by Land Information New Zealand ("LINZ") where as background[69]:

> *"Public works often cannot be carried out without affecting private landowners and their interests in land. For these reasons many governments throughout the world, including New Zealand, provide themselves with legislative powers to compulsorily acquire land for public works so that public works proposals are not unreasonably delayed. A basic principle of our system of government is that no person shall be deprived of land by the Crown without receiving fair compensation.*
>
> *In New Zealand the Public Works Act 1981 provides the power to acquire land for public works and to pay compensation. LINZ, on behalf of the Crown, is responsible for administering this Act.*
>
> *A large number of decisions made by the courts in both the United Kingdom and in New Zealand aid interpretation of the compensation provisions of the Public Works Act. Entitlements to compensation are therefore well settled."*

[69] http://www.linz.govt.nz/crown-property/public-works/guide/background

Further at the page considering landowners rights.[70]

> *"The Public Works Act provides the Crown with the statutory authority to acquire land for a public work. The Crown has the power to acquire or take land for a wide variety of purposes and may negotiate for the land in the same way as a private purchaser. While the Crown's powers are wide, it can only acquire land, whether by negotiation or compulsorily, in accordance with the Act.*
>
> *The acquisition process generally takes place after all required consents for the use of the land have been granted, or a designation has been provided for by the territorial authority."*

The LINZ guide also outlines very useful guidance on compensation and other landowner rights under the PWA.

12.3. Property status

12.3.1. Main South Road land requirements

The Main South Road section of the route extends from Rolleston to Robinsons Road where the widening requires land primarily on the western or railway station side of the existing highway. The remainder of the land required is for:

- the Weedons / Ross interchange and its approaches;
- localised purchases to implement safe access or egress to Berketts Road and Larcombs Road;
- to implement the rear access road adjoining the railway line; and
- to implement safe alternatives to properties that currently have direct access to Main South Road on the eastern side.

There are some 27 land parcels required ranging in size from 89m^2 through to 61361m^2 (6.14 hectares) out of a total of 253,607m^2. In contrast to the CSM2 section there are no property purchases completed for MSRFL with only one being under active negotiation at the time of writing.

12.3.2. CSM2 land requirements

To implement the CSM2 component of the Project including the John Paterson Drive Link, there are in total 77 properties where some 1,042,976m^2 (1041.7 hectares) is required (in whole or in part) for land requirement purposes to undertake the Project. These parcels of land vary in size from 181m^2 through to 126,757m^2 (12.68 hectares). In some cases, this land is considered to be a total purchase with severance, while others require only partial purchase. There are also three parcels of property required to implement the railway turning head realignment north of Marshs Road.

[70] http://www.linz.govt.nz/crown-property/public-works/guide/public-works-acquisition

It should be noted that some of the land is already owned by the Crown for roading purposes particularly at the eastern end of the Project at the "tie in" to the CSM1 project, while other major areas of land between Blakes Road and Main South Road have already been purchased. There are also a number of properties on this alignment that are under active negotiation. The purchased land however comprises less than half of the total land required for the main CSM2 alignment, at the time of writing.

In relation to all other land directly affected by the Project, all property owners have been consulted about the alignment (see Chapter 8 in relation to the consultation process) on at least three occasions. On each occasion there have been opportunities to discuss any matters including the land purchase process. Landowner suggestions and preferences have been able to be taken into account where practicable in terms of mitigation, the reuse of severance land, access issues and the land valuation and compensation processes.

12.3.3. Severed land

Not all land to be purchased is required for the construction or operation of the Project. In some circumstances, entire titles are required with the residual land being termed severance. These parcels of land are of different sizes and configurations, but are generally those areas where no practicable alternatives for reuse can be found. The LINZ guide[71] referred to above explains this situation further:

> *Sometimes taking part of a landowner's land for a public work results in another part of that land being severed from the retained land so that it becomes more costly to retain or less useful to the landowner. In these circumstances the landowner may require the Crown, on behalf of an acquiring authority, to purchase the severed land. The acquiring authority may then rationalise its landholdings by selling this land to an adjoining landowner.*
>
> *An acquiring authority may acquire other land and develop it for the purpose of granting that land as compensation to the person from whom land has been acquired for a public work.*

As part of the overall property regularisation process, the NZTA is investigating the most appropriate method of managing the use of severance land, including options to potentially amalgamate severed land into adjoining titles or create new titles if they are large enough for effective reuse.

12.3.4. Partial acquisition and residual land areas

There are a large number of properties where only partial acquisition is required. As a consequence, this could result in severance of land or a reduction in the size of land below a size that can be utilised for other purposes. An example of this is where the balance land is below the four hectare minimum for a rural lot in the Rural (Inner Plains) area of Selwyn District Plan. Each of these situations is being looked at on a case by case basis, with the potential for some total purchases and some titles being created smaller than the Selwyn District Plan envisages for the

[71] http://www.linz.govt.nz/crown-property/public-works/guide/general

zone in which they are located. The NZTA is continuing to consider the best and most practical method of land configuration, as the legalisation process could potentially create smaller titles, which may not be desirable from an amenity perspective.

However the property valuation process under the PWA takes into account any adverse effects on the value of properties arising from partial purchase, including subdivision rights, and appropriate compensation will need to be provided in these circumstances.

12.4. Access, easements and other property rights

12.4.1. Access and easements

There are two easements affected by the Project in the vicinity of the CSM2/ Main South Road interchange and negotiations are continuing with the relevant property owners. As land is also required, a legal mechanism to provide access is in place through the PWA. There is also one water permit affected by acquisition. The NZTA is considering the PWA property effects on this permit through the acquisition process.

In addition, the NZTA is also progressing the provision of easements over other private land to provide practicable alternative access to properties which will no longer have frontage access to Main South Road.

Provision of alternative access may reduce the net area of existing properties including below the minimum allotment size in the District Plan. Options for alternative access (for example right of way or road to vest on subdivision) will be considered in the acquisition process. While the provision of alternative access may reduce the net allotment area, it will not necessarily increase the opportunity for subdivision or densities greater than provided for in the District Plan for the subject area overall. These matters can be considered when the Council assesses any future application for right of way or subdivision to facilitate the alternative access.

12.4.2. Properties used for construction only

There are some properties that will be required for construction of the Project and designated, but that will not be purchased. Examples include properties that are required for construction purposes, but are not required in the long term for occupation by the road. Construction land requirements that may not be required in the long term include:

- construction yards containing (for example) Project offices, machinery and equipment storage, smoko rooms;
- lay down areas including (for example) storage of precast concrete components; and
- access to stockwater race channels to implement ecological mitigation.

Those properties are shown in the land requirement plans (and eventually shown in the relevant district plans should the NoRs be confirmed) as required for roading purposes in the same way as the land that will be purchased. However, on completion of construction, the requiring authority

will be expected to review the designation, and uplift those parts that are no longer required for roading purposes.

It is considered that the effects on these properties can also be managed through the PWA process, although in some cases alternative arrangements will be made with landowners, such as a lease arrangement. The usual practice however through the PWA process, is that the requiring authority would be required to return the land in its original state, or as otherwise agreed with the landowner.

It is therefore considered that the effects on property have been well acknowledged through the consultation carried out to date, and will be adequately compensated for through the PWA.

12.5. Properties within close proximity

Properties within close proximity to the Project alignment that have been identified as being subject to or particularly sensitive to effects have been identified through the Technical Reports. Actual and potential effects on these properties have been identified in relation to specific technical areas and appropriate mitigation has been devised. These include:

- properties that will be affected by elevated noise levels (during operation of the road) that have been identified though noise modelling. Appropriate noise mitigation measures are proposed in accordance with the relevant noise standard NZS 6806:2010; and
- landscape and visual effects assessments have been carried out from key vantage points where the route will be visible from public places and properties in the vicinity of the alignment. Where required, adverse visual effects will be mitigated.

It is noted that there may also be positive effects on some properties within close proximity to the Project alignment, including improved access.

While it was raised as an issue during consultation (see Chapter 8), actual and potential (including perceived) effects on property values are not considered to be a relevant consideration under the RMA. Effects on amenity values are a relevant consideration. Those that are affected by the Project are considered through assessment of other environmental effects, including those potentially affected by the examples (noise, landscape) given above.

12.6. Change of land use for high fertility soils

Technical Report 18 describes the soil classification of the land traversed by the Project. All of the Project area is on well drained and imperfectly drained soils of high fertility. The Project will take land which might otherwise be used for farming purposes. This land use change will be irreversible.

The Project has minimised the amount of land required to be taken from productive use as far as possible. Furthermore, there is no practicable non-versatile land alternative available on which to site the Project.

Approximately 300,000m^3 of topsoil will be removed for construction of the Project. As outlined in Chapter 5, the current construction methodology is to remove and stockpile all topsoil for re-use. Some of the topsoil will be re-used in the Project area. Surplus top soil will be available for re-use elsewhere.

While the Project will remove an area of productive soils from rural use in the long term, significant benefits have also been identified, including to the local and regional economy.

12.7. Conclusion

The Project will require the land already owned by the Crown, and acquisition of Council land, including roads, and land from other private landowners. Some properties need to be purchased outright and there are some properties where part acquisition will be required. All property owners whose land is directly affected have been consulted and are aware of the property required. The PWA provides the process by which these properties will be acquired.

Properties within close proximity to the route that have been identified as being subject to potential adverse effects have been identified through the Technical Reports. Actual and potential effects on these properties have been identified in relation to specific technical areas and appropriate mitigation has been devised.

Actual and potential (including perceived) effects on property values are not considered to be a relevant consideration under the RMA. Effects on amenity values are a relevant consideration, and those that are affected by the Project are considered through assessment of other actual and potential effects, including noise, landscape/visual and access.

13. NETWORK UTILITIES

Overview

The Project directly affects a number of existing network utilities, including electricity transmission and distribution lines, telecommunications, water supply, wastewater and stormwater disposal utilities, stockwater races and also the rail network. The NZTA has consulted with network utility operators to identify those network utilities that will be directly affected, how they can be protected and /or how relocation can be appropriately undertaken. The outcomes of these initial discussions concluded that all adverse effects on network utilities directly affected by the Project will be able to be appropriately avoided, remedied or mitigated.

13.1. Introduction

This chapter identifies network utilities that are potentially adversely affected by the Project, and how they will be protected or relocated. Initial consultation with network utility providers has included phone conversations, letters, and meetings to discuss the Project and its potential effects on their utilities.

Further, the NZTA has worked closely with network utility providers to seek to ensure that their existing infrastructure is maintained both during construction, and once the Project is operational. Work is also underway to liaise with utility operators to address implications on their planned upgrades in the immediate future.

13.2. Existing environment

Existing network utilities within the Project area include infrastructure for:

- electricity transmission;
- electricity distribution;
- water, wastewater and stormwater;
- stockwater;
- telecommunications facilities; and
- railways.

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

Table 23: Main South Road existing utility services

Location	Orion (overhead)	TelstraClear	Water Races
Main South Road	Eastern side crossing the road periodically	Western side	Eastern side (from Weedons Road)

Location	Orion (overhead)	TelstraClear	Water Races
Jones Road	Western side	Eastern side (south of Weedons Ross Rd)	-
Weedons Ross Road	Both sides	Southern side (south of Jones Rd)	Northern side
Weedons Road	Southern side	Southern side (doesn't extend to Levi Rd)	Northern side
Levi Road	Shown on the plans but not observed on site	-	-

In addition to the services presented in Table 1, there is a Chorus cable running parallel to Main South Road to the east of the railway reserve from around 500 m south of Robinsons Road to around 300 m north of Robinsons Road. The South Island Main Trunk Line (SIMT) runs adjacent to Main South Road, 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.

Table 24: CSM2 existing utility services

Location	Orion (overhead)	Chorus	Water Supply	Water Races
Robinsons/ Curraghs Road	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 Road	Both sides	-	-	Eastern side
Trents Road	Western side	West of Trents Rd and crosses Trents Rd to the north of CSM2	-	Eastern side and west of Trents Rd
Blakes Road	Eastern side	-	-	Western side
Shands Road	Western side	-	-	-

Location	Orion (overhead)	Chorus	Water Supply	Water Races
Marshs Road	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 Road	Western side	-	Both sides	Western side
John Paterson Drive (existing alignment)	Northern side	-	Northern side	-
Halswell Junction Rd	Eastern side	-	Western side	Western side

In addition to the services presented in the table above, there are:

- overhead Orion lines and TelstraClear services run along Main South Road, on the eastern and western sides respectively; and
- sewer pipes on the eastern side of Shands Road and the western side of Springs Road.

Two lines of Transpower pylons intersect just north of the proposed Shands Road / Marshs Road interchange. The alignment of CSM2 crosses under the Islington to Springston (ISL-SPN A) 50/66kV transmission line to the southwest of the Shands Road and Marshs Road intersection. The alignment crosses under the Bromley to Islington (BRY-ISL A) 220kV transmission line just south of the proposed Marshs Road underpass.

The Hornby Industrial Line branches off the main line railway 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.

13.3. Assessment of effects on network utilities

The Project philosophy towards planning for existing network utilities is to avoid disruption to services, where practicable.

13.3.1. Electricity transmission infrastructure

The proposed CSM2 alignment passes under Transpower's ISL-SPN A 50/66kV transmission lines to the southwest of the Shands Road and Marshs Road intersection. Consultation has taken place with Transpower and it was determined that the alignment falls within the transmission line clearance envelope. Transpower is currently undertaking a study for the modification of these lines to achieve the required clearance standards. The preferred option has yet to be determined, with potential solutions including providing an additional tower, tensioning of the lines, raising existing towers or undergrounding the lines.

The preferred solution will be identified when the Project advances to detailed design and it is recommended that the modifications to these 66 kV lines are undertaken prior to the construction of CSM2. This will allow the contractor a clearer and safer working space during the construction of the CSM2 / Shands Road interchange.

The proposed CSM2 alignment also passes under the BRY-ISL A 220kV transmission line. Transpower has not indicated any clearance issues with respect to the road being at grade beneath this line. This is subject to confirmation at the time of writing.

Other potential adverse effects include:

- dust generated during construction could potentially settle on transmission lines and affect their integrity (the management of dust is discussed Chapter 18);
- the presence of existing transmission lines near the proposed alignment presents a potential safety hazard for contractors during the construction period; and
- one transmission tower on the BRY-ISL A line is located in close proximity to the proposed motorway and may be impacted. This may require barrier protection due to the proximity of the proposed motorway.

The remainder of the alignment is clear from substations and transmission lines.

13.3.2. Electricity distribution infrastructure

Consultation has taken place with Orion to identify where the Project will impact on its services and how these services will be maintained during construction and operation of the proposed highway.

Orion has several overhead lines that will be affected by the Project. It is proposed to modify this infrastructure prior to the main works starting to enable a more efficient and safer construction environment. Some of the key Orion infrastructure to be modified includes:

- relocation of the 66 kV overhead lines and 11 kV underground lines in the vicinity of the substation located on Weedons Ross Road adjacent to the railway corridor;
- undergrounding the 11 kV overhead lines that currently run along the eastern side of the SH1 road reserve from Park Lane through to Waterholes Road; and
- relocating overhead lines located along several local roads crossed by CSM2 and MSRFL:

- 11 kV overheads at Jones Road, Trents Road, Blakes Road, Marshs Road, Springs Road and Halswell Junction Road; and
- 33 kV overheads along Shands Road.

During construction, there is potential for dust to settle on insulators which may interfere with the lines. This will be managed through use of dust suppressant measures, as outlined in the CEMP. With the above measures in place, the potential adverse effects on Orion's utilities will be avoided or mitigated to an acceptable level.

13.3.3. Telecommunication infrastructure

Both Chorus and Telstra Clear have services located in the vicinity of the Project. Chorus has underground copper and fibre lines primarily along the CSM2 section and Telstra Clear has numerous underground fibre optic cables located along the MSRFL section. The NZTA has consulted with these organisations to identify the number of cables affected and options for maintaining these utilities during construction and operation of the Project.

The options available are protection of cables and / or relocating the cables so they are not affected. In addition, allowing for access for future maintenance of this infrastructure also needs to be considered. These solutions will be incorporated into the Project's detailed design and will be undertaken in conjunction with Project construction works.

As a result, any adverse effects on telecommunications infrastructure will be appropriately avoided or mitigated.

13.3.4. Water supply, stormwater and sewer infrastructure

There is very minimal existing water supply and sewer infrastructure located in the Project area. This infrastructure is located alongside local roads which the CSM2 alignment will be crossing. The location of this infrastructure has been identified and consultation has occurred with SDC and CCC regarding how these services will be maintained during construction and operation of the State highway. During the construction of CSM2, the sewer pipes will require protection, and in some cases may require relocation to improve longer term maintenance accessibility. The potential adverse effects on this existing infrastructure and any proposed infrastructure will be avoided or mitigated to an acceptable level.

There is little existing formal stormwater drainage infrastructure along the length of proposed works. Swale and soakage systems exist along parts of the Main South Road and formal soak pits can be found on the rural roads in the area and along the existing Main South Road. There is no existing stormwater drainage infrastructure along the proposed CSM2 alignment. On the north west side of the CSM1 alignment and Halswell Junction Road, there are the existing Mushroom Ponds that are being constructed as part of the CSM1 works. In addition, the Owaka Basin stormwater treatment pond (proposed as part of CSM1) has been designed to capture overflows from the Halswell Junction Road Pond (via Montgomery's Drain) and provide additional stormwater treatment. The Project will cross Montgomery's Drain which runs parallel to Halswell

Junction Road and eventually discharges into Upper Knight's Stream (via a pipe and open channel system). Siphoning of this drain beneath the Project alignment will be required, as well as diverting the drain to the CCC proposed Owaka Basin (in order to meet with the CCC design set out in the SWAP). With proposed measures in place, it is considered that there are unlikely to be any effects on existing stormwater infrastructure. The effects on stormwater have been assessed in detail in Chapter 19.

13.3.5. Stockwater race infrastructure

The proposed alignment crosses nine existing stockwater races (seven along CSM2 and two along MSRFL). In addition, a stockwater race runs parallel to Main South Road on the eastern side within the road designation for approximately 2 km.

Discussions in relation to stockwater races were held with SDC and directly affected landowners. SDC provided guidance on required stockwater race dimensions and potential for closure of races. Overall, the function of the race network needs to be maintained, thus wider closures were not considered. Closing sections of some individual races and/ or rerouting of races have been considered where it can minimise the number of stockwater siphons. Some short lengths of water race may be decommissioned where alternatives are available and the landowner and SDC are in agreement.

For the remainder, the stockwater races will be piped beneath the Project alignment, to maintain the function for downstream users. Stockwater races will be passed under the motorway via a siphon system, typically measuring between 300mm and 450mm. At locations where stockwater races are protected against overland flow, e.g. inside the Marshs Road intersection, a second siphon will be required at a similar diameter to the dry weather flow siphon for maintenance. In other cases, stockwater races will be diverted to allow for the construction of embankments and reduce the number of siphons. These diversions will be fully lined to prevent water loss.

As well as impacting the alignment of existing stormwater races, the Project has the potential to affect water quality within the water races. The areas that are most likely to cause issues will be the modification to the stockwater races, where an approach has been adopted to minimise the amount of silt and sediment stirred up into solution and transported along the race. This will be similar to the regular maintenance of the stockwater race network which is currently undertaken using heavy machinery.

The construction of the proposed motorway in this area may result in exposed sediment and associated contaminants being mobilised during construction and entering the water races. Contamination of the water races may lead to nuisance growths of algae and toxicity of biota affecting the utility function of the races.

13.3.6. Rail infrastructure

The Project does not cross the SIMT at any point. Therefore, once the Project is operational there will be no adverse effects on the operation of the Rail corridor.

However, the operation of the SIMT could be adversely affected during the construction period. Potential effects include dust becoming airborne during excavation works. Dust could settle on railway infrastructure and interfere with its operation. Dust control will be managed appropriately in accordance with the CEMP and any adverse effects on the operation of the SIMT will be avoided or mitigated to an acceptable level.

With respect to the proposed rear-access road within the rail corridor between Curraghs and Weedons Ross Road, KiwiRail has advised that in principle it could accommodate the NZTA's preferred option for the placement of such a road partly within the existing rail corridor. The NZTA Project team are currently undertaking a survey to locate the rail tracks to enable KiwiRail to determine a suitable corridor width for future double tracking.

The proposed CSM2 alignment passes across the southern end of the Hornby Industrial Line, which is currently used for shunting trains into the Watties factory. To enable CSM2 to remain at-grade whilst continuing to cater for the shunting of carriages into Watties, it is proposed to turn out the rail tracks to the east. KiwiRail has agreed to allow the Project to pass across the decommissioned railway corridor at-grade on this basis, and as a result the line will need to be reconfigured to allow shunting and access into the existing industrial area. The risks associated with any future rail upgrade of this rail line for commuter rail or similar have been considered. The NZTA confirms it is willing to accept the risk and costs of changes if the rail network were to be extended in the future.

13.4. Measures to avoid, remedy or mitigate actual or potential adverse effects on network utilities

There are a number of existing network utilities within the Project area. Protection and/or relocation of existing utilities will be an important aspect of the Project's construction.

Enabling works will be required prior to construction, in particular to rectify the non-compliance with the clearance standard for the existing electricity transmission lines, and the relocation of electricity distribution lines.

Construction activities may impact on existing network utilities as a result of dust affecting electricity and rail infrastructure operations and sediment entering stockwater races. Potential dust effects will be mitigated through the CEMP.

Protection and/or relocation of existing utilities will generally occur in conjunction with the Project's construction. The NZTA's contractors will work closely with the contractors of the relevant network utilities providers to undertake the necessary protection and/or relocation works to ensure that effects on these networks are avoided or mitigated.

13.5. Conclusion

The Project directly affects a number of existing network utilities. Protection and/ or relocation of these utilities will generally occur in conjunction with the Project's construction. In addition, the CEMP will contain measures to manage effects on existing utilities during construction.

14. URBAN FORM & FUNCTION

Overview

This chapter outlines the potential effects of the Project on urban form and function and discusses the urban design effects of the key features of the Project. It is based on Technical Report 5, the Assessment of Effects on Urban Design.

A separate document, the Urban Design and Landscape Framework (ULDF) (Technical Report 6), describes the urban and rural environment in the project area in detail and sets out key design considerations for the Project, the way in which the design has responded to those matters, and how the detailed design for the Project needs to occur to secure an appropriate urban form and urban design outcome.

The process of assessing effects on urban form and function was carried out throughout the development of the Project and influenced decisions on design. The assessment was also informed by the feedback from consultation undertaken by the NZTA on urban planning and design issues.

In summary, it is considered that overall the Project will have moderate positive effects from an urban design perspective.

14.1. Introduction

The urban form and function issues and effects addressed in this chapter cover:

- land use and urban form compatibility;
- urban design amenity effects – compatibility of the design with the environment; and
- accessibility effects.

14.2. Land use and urban form compatibility

14.2.1. Key matters for assessment

Regional Policy Statement (RPS) Chapter 12A and PC54

The maps associated with Proposed Change 1 (PC1) to the RPS shows the greenfield business expansion areas in the vicinity of the Project area, which features land subject to what is now the operative Plan Change 54 to the Christchurch City Plan (PC54). The Project will sever part of this land between Marshs Road, the Project area and the disused railway track. This will appear as an isolated triangle-shaped pocket of light industrial buildings outside the Project area. The recommended urban design solution was that the Project defines an urban boundary for the PC54 land and the neighbouring parcels of land east to Springs Road. However, CCC's decision approving PC54 has confirmed that this isolated triangle of land is also now zoned Business 5.

South West Area Structure Plan (SWAP)

The SWAP includes a 2041 land use scenario, although this plan predates Proposed Change 1 to the RPS so does not show the greenfield business sites. The Project area is shown slightly further to the north on the SWAP plan than the current proposed alignment with the interchange at the Marshs and Shands Roads intersection. The actual Project area is located further south. The SWAP plan shows a greenfield residential growth area (Knights Stream) to the east of the Project area on Halswell Junction Road. All of the land south of Shands Road interchange is a rural zone with some light industrial ribbon development along Main South Road. With respect to the MSRFL part of the Project, SDC officers have confirmed that while they support inclusion of a rear access lane for properties on Main South Road, they do not want to encourage further non-rural activities along in the rural area.

14.2.2. Assessment of land use and urban form compatibility

The key land use and urban form challenges identified relate to the following locations:

- the PC54 site;
- the Knights Stream residential area; and
- the Main South Road area.

The issue of appropriate land use on the PC54 land severed by the Project is important from a compact urban form and strong urban boundary perspective. Although the potential severance effect is created by the Project, the industrial zoning and buildings that could be erected as of right are an outcome that has arisen as a result of the PC54 decision, rather than the Project. In any event, the Project in conjunction with PC54 re-zoning creates only minor effects in terms of urban form and function. The Project alignment was chosen as it severed less land than the other alternatives that were considered. Further changes to the Christchurch City Plan could address this potential effect, however that cannot be achieved through this Project.

The Knights Stream greenfield residential area is sufficiently separated from the Project area to ensure that adverse urban design effects on this area are avoided. The Halswell Junction Road interchange will offer excellent access for this area, so the Project has a positive effect in terms of implementing this growth area. The extent of greenfield business areas has been extended by PC 1 to the RPS. The Halswell Junction Road and Shands Road interchanges offer much improved accessibility to these business growth areas.

The NZTA supports SDC officer comments made through consultation and would likewise not want to support the proliferation of urban growth along Main South Road. However, this land use effect can only be managed through suitable district plan rules.

14.2.3. Summary of land use and urban form effects

From an urban design perspective, the Project is consistent with regional planning documents and will offer important accessibility to greenfield residential and business areas. As a result, it offers a significant enhancement in terms of land use and urban form.

14.3. Urban design amenity

14.3.1. Assessment of urban design amenity effects

The CSM2 component of the Project is consistent with the Christchurch Southern Motorway RoNS "parkway" design vision contained within the CSM1 Masterplan. The Project has a gently curving alignment that opens to views of the Southern Alps and Port Hills. The parkway design will maintain rural amenity in the rural 'gap' between Christchurch City and Prebbleton. Views from Main South Road are more limited due to it being a widening of the existing road, so a parkway appearance is not appropriate. The Project will provide a significant amenity enhancement for motorists compared to using the existing SH1. The Project will also provide off-corridor positive amenity benefits for Templeton, with a 40% reduction in traffic volumes on SH1.

The industrial urban area north of Marshs Road has a low existing amenity and there are no specific requirements in the RPS or Christchurch City Plan for the Project in this respect. Therefore, with the proposed landscape mitigation, the Project will have only minor urban design amenity effects from this location. The proposed Knights Stream greenfields residential area is sufficiently separate from the Project alignment that there will be no urban design amenity effects on this area.

Development associated with the PC54 site will potentially have an adverse effect on amenity for the entry/exit appearance for Christchurch City for road users, but this potential effect is generated by PC54, rather than this Project. The erection of warehouses 12 to 20m high and only set back 1.5 m is a permitted activity under the Christchurch City Plan. If such warehouses were built, this could result in a line of blank warehouse walls on either side of the motorway, creating a 'canyon-like' effect for road users for approximately 1400 metres (but with a 250 metre long gap immediately east of the rail trail where the area is not zoned "Business 4"). The proposed landscaping for the Project in this area are trees of five metres in height, so 12-20 metre high warehouses would visually dominate the road user's view. However, this urban design issue is not an effect caused by the Project, rather, it is a potential effect on road users of development authorised by PC54. At the time that PC54 was approved by CCC, it was aware of the Project and CSM2 was shown on Chapter 12A of the RPS planning maps. (Note: at that time, Chapter 12A of the RPS was operative as the judicial review had not been filed).

The SWAP includes a southern gateway location for Christchurch City at Halswell Junction Road. Shands Road interchange is preferred by the author of the Assessment of Effects on Urban Design as a southern gateway location rather than Halswell Junction Road, as the interchange will have south and north facing ramps to make it a true gateway. The Project design does not preclude either option if CCC prefers the latter, and both locations in the CSM2 area are included as options

in the Project Urban Design and Landscape Framework (ULDF) as the NZTA is not proposing to build a gateway structure. It is important to note that the southern gateway is a CCC initiative and that the Project design does not preclude CCC choosing Carrs Road pedestrian bridge, Halswell Junction Road interchange or Shands Road interchange when CCC makes a decision on this. Therefore, there are no urban design amenity effects associated with either gateway location.

The assessment of effects on amenity associated with the proposed bridges is outlined as follows:

- the proposed concept for the Weedons, Waterholes, Springs and Halswell Junction Road bridges are simple in construction, appearance and are consistent with the 'parkway design vision'.
- the Trents Road and Shands Road Bridges change to a 'super tee' deck structure, however from an urban design perspective, this change is considered acceptable as the visual difference for the motorist is minimal.
- if the Shands Road Bridge is to form part of a southern gateway, then the bridge structure may require design enhancement. The headstock beam may need to be reviewed to provide less interruption to shadow lines from the cantilevered footpath and enhanced pier designs could be used as part of an enhanced gateway treatment. This issue is raised in the ULDF, but is a potential positive effect rather than an adverse effect of the Project.
- the Main South Road southbound and Marshs Road overbridges have open spill through abutments and pedestrian/traffic barriers that are consistent with other bridges. However the deck structure changes to steel beams due to the long spans over CSM2 at the centreline piers. This introduces another deck soffit and the change with concrete beams at the outside piers results in a different bridge type. Barriers and abutment treatment on these bridges will be consistent with the Project's visual and thematic design concepts.

14.3.2. Summary of amenity effects

Overall, the parkway appearance of CSM1 will be extended through to Main South Road, which is regionally important as a major gateway for Christchurch and the Selwyn District. The Project will result in moderate positive urban design amenity effects.

14.4. Accessibility

As the adverse access effects along Main South Road relate to a limited number of properties that already have compromised access, these effects are considered to be minor. Improvement of the local road cross corridor connections, pedestrian connectivity in Templeton and general access to the Knight's Stream residential area are community wide benefits, so they offer moderate positive benefits. From an urban design perspective, the Project will result in moderate positive effects in terms of accessibility.

14.5. Mitigation measures

No mitigation measures have been recommended in relation to urban form or urban design effects. Conditions are proposed which require that in the design and construction of the Project, the key design principles in the ULDF are taken into account.

14.6. Conclusion

The Project is consistent with the SWAP and regional policy, it maintains existing local road linkages and encourages proposed land uses, and will offer important accessibility to greenfield residential and business areas. The issue of appropriate land use on the PC54 land is important from a compact urban form and strong urban boundary perspective, although any adverse amenity effects arising from buildings on the PC54 land are not direct effects of the Project.

The proposed design will result in the parkway appearance of CSM1 being extended through to Main South Road, and will allow the opportunity for a gateway location to be established. The proposed bridges are generally consistent with the parkway appearance, although the Main South Road Southbound Bridge and Marshs Road overbridge are different to the other bridges visually.

As the Project will improve local road cross-corridor connections, pedestrian connectivity in Templeton, and general access to the surrounding area it will have community wide benefits in this respect. It is therefore considered that the Project will result in positive effects with respect to accessibility.

Based on a combined assessment of the land use, urban form, amenity and accessibility effects, it has been assessed that the Project will result in moderate positive effects with regard to urban design matters.

15. LANDSCAPE & VISUAL

Overview

The Project will be a large roading infrastructure element that will result in changes to the landscape. The main landscape effect will result from the introduction of an extensive area of hard surfacing and engineered landforms into a predominantly rural setting, the removal of residential and commercial buildings, as well as the removal of a considerable amount of vegetation including amenity trees and sections of shelterbelts and hedges. It is considered that the changes will have a moderate to substantial localised effect on the landform and localised effects on land use and land cover.

The most significant changes and resultant effects on visual amenity will arise from the overbridges and associated infrastructure, which will be prominently visible because of their height in a relatively flat landscape setting. These, in conjunction with the MSRFL and CSM2 alignments, will result in changes to the rural character. Visual effects will range in magnitude from negligible to substantial depending on the viewing audience and its proximity to the Project. These effects are not likely to be widespread and restricted in extent to the immediate vicinity (within 500m each side) of the proposed alignment.

Landscape mitigation measures are recommended where the potential adverse effects would be noticeable from dwellings and road users in the viewing catchment of the MSRFL and CSM2. Landscape mitigation is also recommended around overbridges and interchanges to allow these structures to be visually absorbed into their landscape setting. Proposed landscaping is illustrated within Technical Report 7, in particular the Landscape Planting Plans appended in Volume 5.

15.1. Introduction

This chapter summarises the landscape and visual effects arising from the Project and recommends mitigation measures to avoid, remedy and mitigate these effects.

A series of aerial photos, plans and visual simulations accompany the Assessment of Landscape and Visual Effects report (Technical Report 4), which are contained in Volume 5. These sheets identify, among other things, the location and extent of the Project, the landscape character areas and the recommended locations for mitigation measures.

Also included with the full assessment report are panoramic viewpoints which give an indication of the existing landscape character and photosimulations illustrating how the Project will appear, with proposed mitigation planting in place. Viewpoints are also included of the Christchurch Northern Motorway and these show the degree of visibility of a similar constructed motorway from various distances.

Also relevant to this chapter are Technical Reports 6 and 7 within Volume 3, which are the ULDF and the Landscape Concept Report, incorporating the Project landscape plans. Effects on Urban Form and Function have been discussed in Chapter 14, which also considers visual amenity effects.

15.2. Landscape context

The landform is generally of flat topography with the presence of shelter belts, amenity trees, residential and agricultural buildings, transmission power lines, pylons and roads. The Port Hills and distant Canterbury Foothills are an important component of the more distant surroundings. The landscape of the proposed motorway and its environs is quite typical of much of the peri-urban and rural landscape on the southern outskirts of Christchurch.

15.3. Existing landscape values

15.3.1. Natural character

Natural character can be defined by the extent to which the naturally occurring elements, patterns and processes of a place, or resource, remain intact. Natural character is generally understood to occur on a continuum from pristine to totally modified.

The receiving environment has been significantly modified over time, and while natural character varies slightly over the Project area, overall, the receiving environment displays a moderate level of naturalness.

15.3.2. Rural character

The fewer occurrences of human artefacts or buildings present, typically the higher the quality of the rural landscape character. Although predominantly rural in character, in places, the rural character is diminished by the presence of industrial/commercial buildings and higher density of rural residential.

Main South Road is characterised by its road corridor, which alternates between being enclosed by vegetation and built development with occasional glimpses to views of a rural landscape and distant hills. The overall perception of rural surroundings, the reasonably common occurrence of built structures, and enclosed nature of the SH1 corridor reduces existing rural character to low to moderate.

Where CSM2 traverses land that is predominantly rural with some rural-residential land use present, it is more open and expansive, and the rural character is considered to be moderate to high. However, the encroaching subdivision of the land into smaller allotments and the existing and increasing density of rural-residential buildings diminish rural character. Consequently, in some CSM2 areas, the rural character is assessed as moderate.

15.3.3. Amenity values

'Amenity values' in simple terms can be described as those values which create the appeal of a particular place. Such values are often derived from one's response to the character of a landscape and therefore amenity and landscape character are inextricably linked. The existing amenity of the landscape the Project traverses is derived from the green, open space, a general dominance of vegetation over built form, and a low (albeit variable) built density.

The amenity values vary over the receiving environment due to the combination and proportion of natural and built elements.

Amenity values experienced from Main South Road between the intersections of Park Lane and Robinsons Road are reduced by the presence of built development, including Main South Road itself, to a low level.

Between Robinsons Road and Marshs Road, the landscape is generally pleasant and visually coherent, resulting from the abundant green, open space and rural land uses. The green, open space, the patterns of shelter belts, woodlots and paddocks of the receiving environment and the visual proximity to the Port Hills all contribute to a moderate to high visual amenity setting.

Between Marshs Road and the CSM1 connection, the land comprises a greater proportion of built form to open space, mainly because of the presence of large industrial buildings. Consequently this area has a lower level of amenity.

15.4. Landscape and visual effects assessment

15.4.1. Effect definition and viewing catchment

Landscape effects are defined as those that "…derive from changes in the physical landscape, which may give rise to changes in its character and how it is experienced".[72]

In contrast, visual effects are associated with amenity values, such as the pleasantness and aesthetic coherence of an area or view. Visual effects relate to "…the changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity"[73].

Landscape and visual effects have, therefore, been taken to relate to the experience of change in landscape character and visual amenity, respectively.

The Project's visual catchment is nominally within 500m either side of the MSRFL and CSM2 alignment and the viewing audience will comprise:

- local residents who can see parts of the MSRFL and CSM2 corridor from their dwellings and properties;
- road users on adjacent and intersecting local roads;
- users of the surrounding industrial and commercial areas; and
- users of the State highway and motorway and link roads (including pedestrians and cyclists).

[72] The Landscape Institute with the Institute of Environmental Management and Assessment (2002), *Guidelines for Landscape and Visual Impact Assessment,* second edition, Spon Press

[73] Ibid

15.5. Landscape effects

15.5.1. Overview

Potential landscape and visual amenity effects are those that change the appearance of the landscape, including its natural character. Any natural or physical activity has the potential to alter the landscape character and amenity, although a change to the character of a landscape is not necessarily adverse. Whether effects are adverse or not depends to a large extent on public expectation of what can be reasonably anticipated to occur in the landscape. Allied to this is the landscape context in terms of its existing degree of naturalness / modification, patterns, scale, visibility and levels of public appreciation.

Potential landscape effects of the Project will result from changes to landscape character and these will consist largely of changes to landform, land cover and land use. The main landscape effect that may be experienced is that of a change in land cover and use, such as the removal of existing rural land uses through the introduction of built structures.

The overall landscape effect of implementing the Project will be:

- increasing the “visual and physical presence” of the road within the Rolleston to Robinsons Road section of the proposal; and
- a substantial new road from Robinsons Road to Halswell Junction Road , therefore affecting the local peri-urban and rural landscape by introducing a new element into the landscape.

15.5.2. Landform

The effects on landform will be the result of the elevated sections of carriageway due to the construction of the interchanges and overbridges to carry the local roads. The fill formations and construction of these structures will be above-grade. Therefore, the changes will have a moderate localised effect on the landform, due to the changes to the existing flat topography.

The inclusion of embankments around interchanges, overbridges and stormwater detention ponds will contribute to changes in topography, however, where the embankments will be gently sloping with shallow grades, slopes will be grassed to integrate into the surrounding pastoral landscape, and effects on landform will be minimised. In places with steep slopes which will result in obvious landform changes, landscape planting is proposed which will assist in merging the Project with the existing landform to reduce effects.

15.5.3. Land cover

The majority of the landscape that the Project traverses is modified and the landcover mainly consists of a monoculture of exotic pasture grass and exotic amenity tree planting. Notable vegetation in the landscape consists of mature exotic trees along with shelterbelts and hedges. Apart from the removal of pastoral farmland, the removal of trees, in particular along the CSM2

alignment, will result in obvious, but localised, landscape effects. Essentially, the removal of vegetation will give rise to a more open, spacious landscape.

Trees will be retained on either side of the proposed motorway as much as is practicable, in order to retain rural character and visual amenity.

15.5.4. Land use

The provision of infrastructure is generally understood by the public and this is likely to contribute to the acceptability of changes arising from the motorway upgrade. As previously stated, farmland is the most common and expansive land use along the CSM2 alignment although there are also numerous roads and other existing infrastructure within the area. The creation of a 25m wide motorway and its margins, the intersections with local roads, the closure of Blakes Road and the removal of various dwellings and other buildings will be a noticeable change in land use. Within the broader context of the landscape however, a relatively small area of farm land will be removed. Overall, the effects will be localised and contained within approximately 1km of the motorway.

MSRFL will have an effect on a number of businesses and residential dwellings over a distance of 5km. Planting for amenity, shelter and/or screening has been established on many of these properties. The proposed widening on the northern side of SH1 will result in the removal of much of this planting, leaving those properties along this section exposed to the MSRFL alignment, albeit on their southern boundary.

15.6. Visual effects

15.6.1. Overview

The nature and extent of the visual effects arising from the Project will depend on the viewer's proximity to the Project, the viewing aspect, the degree of contrast with the surrounding environment and how the motorway upgrade is perceived by individuals. To assess potential effects on amenity values, it is necessary to consider the visibility of a proposal, who will be affected and how significant any effects will be.

Adverse visual effects on amenity values are not likely to be widespread, but restricted in extent to the immediate vicinity (within 500m) of the proposed motorway corridor.

For the most part, the generic green open space, patterns of shelter belts, woodlots and paddocks and the visual proximity to the Port Hills (which all contribute to the amenity values of the setting) will be preserved. This assumption is based on the fact that the Project will not directly conflict with, or obscure, the existing landscape forms and land use patterns in the long term.

To road users, the benefits of using the motorway may outweigh the partial loss of a rural landscape, in addition to enhanced views to the surrounding landscape and distant hills from elevated sections of the motorway and the local road network.

For some residents who live in close proximity to the motorway, visual effects are likely to impact on the current rural outlook. For the most part, these are specific, localised areas. Where the level of change may be greater than what could be considered acceptable, such as where the location of extensive earthworks and bridge structures are proposed, or where large groups of mature trees are to be removed, specific design solutions are proposed to mitigate the effect of the change. Although effects on amenity values may be moderate, the proposed mitigation will ensure effects are 'acceptable' within the overall scale of the Project.

15.6.2. MSRFL – Existing SH1 corridor

Vegetation removal

The removal of planting, which currently provides amenity, shelter and / or screening for residential properties along SH1 will leave many properties exposed to the proposed MSRFL alignment. This will have an obvious and substantial visual effect for some 5km along the MSRFL for both motorists and property owners. The affected dwellings that are located along SH1 within 100m of MSRFL are identified as H01, H05, H06, H07, H08, H09, H11, H13 and H14 on Sheets 24 and 25 appended to Technical Report 4.

The landscape mitigation for these properties will include the addition of exotic hedgerow planting, which will continue, and be consistent with, the existing hedgerows in the immediate vicinity. The planting will provide effective screening for both the affected residential and commercial properties, as well as softening the appearance of the State highway for State highway users. Visual effects on amenity will reduce to slight as the hedgerows grow and screening becomes effective.

The removal of vegetation, which currently provides shelter and / or screening for several commercial properties along Main South Road, in conjunction with the removal of land due to the widening of the road corridor, will result in the visual exposure of these commercial properties. It is understood that given the type of business associated with these commercial properties, they do not rely on visual exposure to the road for customer attraction. Nevertheless, the removal of vegetation and increase of visible built structures will have a moderately adverse visual impact for users of the State highway.

In order to create a visually cohesive environment for users of the State highway, landscape mitigation is recommended to screen commercial properties from view. For effective screening, exotic hedgerows and areas of extensive native planting are suggested. By default, this will replace the visual amenity affected by the removal of vegetation along the boundaries of the residential and commercial properties required by MSRFL. These have been incorporated on the Project landscape plans appended to Technical Report 7.

Roading infrastructure

The State highway will increase in prominence due to the additional 14m width, accommodating an additional two lanes running parallel to the western edge of SH1 and a central 3.0m median strip.

This will be a substantial change to SH1, however the existing neighbourhood amenity values are not high and consequently, effects on visual amenity will be negligible. This is because the receiving environment is not as sensitive to these changes.

Changes arising from establishing the western rear access road will entail the removal of northerly shelter vegetation and any land use that is occurring within the designation. Where possible, the vegetation along the property boundaries will be retained. Even so, the change to the landscape will initially be moderate, but largely limited in extent to those adjoining properties and views from passing trains. If deemed necessary, mitigation planting along the railway corridor or property boundaries may provide shelter and screening. Overall, the proposed western rear access road will affect views for about 3km but given the visual context that is dominated by existing infrastructure, which is utilitarian in nature, effects on visual amenity are considered to be low.

The introduction of the eastern rear access road will be a substantial change to the rural landscape, providing a new local road where currently pasture exists. The new road will mostly follow land use boundaries and largely avoid the removal of shelterbelt vegetation to minimise the extent of visual effects. Overtime, the local road will be indistinguishable from other local roads in the vicinity and it is likely that although visual effects will be substantial they will not be adversely so, particularly because the road fulfils an essential purpose to those residents in proximity to the Project.

Weedons Road interchange

The introduction of new landforms, in the shape of a full-grade separated interchange, to be built at the Weedons Road intersection will result in a substantial visual effect. The construction of the interchange will change a predominantly flat landscape to incorporate the height and length of the approach embankments to the overpass bridges and to the fill embankment.

The interchange structure will rise approximately 8m above existing ground level, and the lighting will protrude above this. The interchange will have a substantial visual effect from several houses identified as H02, H03 and H04 on Sheet 24, which are located between 80m and 300m and to the east of the structure. The Landscape Plans appended to Technical Report 7 show a substantial amount of planting and the retention of existing vegetation that will afford effective screening.

For houses more than 200m from the interchange, visual effects will be less, although it is likely that the structure will be at least partly visible due to its height above existing ground level. In the broader landscape context, the structure will not have an effect on visual amenity, as existing vegetation surrounding houses will provide effective screening of the structure.

The visual effects on the travelling public using the State highway will be temporarily significant as the interchange structure will briefly dominate the view. However, the structure will be less obvious to those travelling on Weedons Road where expansive views to the surrounding landscape will enhance visual amenity. Substantial planting to the embankments and along the motorway approaches to the overpass bridge will be undertaken for the mitigation of potential adverse visual effects. This will assist in softening and partially screening the built structure to integrate it into the rural landscape.

The proposed realignment to Weedons and Levi Roads, south of the interchange, will be a noticeable change at this intersection and for those properties in close proximity. The realignment will traverse existing pasture essentially rounding off the southeast corner of the paddock. So while the realignment will be a moderate visual effect, it will benefit those adjoining residential properties by increasing the distance between the existing houses and the realigned Levi / Weedons Roads intersection.

15.6.3. CSM2 - Robinsons Road to Halswell Junction Road

Vegetation removal

The removal of farm trees, amenity planting, sections of shelterbelt and hedges along the CSM2 alignment, will have a moderate to substantial localised effect. The vegetation currently contributes to the visual amenity and rural character, and its removal will change the local character within the immediate vicinity.

In the broader landscape context, the loss of these trees will have a substantial impact. However, effects on the landscape and views are to some extent beneficial because an open and spacious quality will be increased. Despite this, mature trees, hedgerows and stands of trees will still remain, providing some screening and to an extent visually compartmentalising the landscape. Over time, the proposed landscape planting along the motorway and interchange will help mitigate the loss of existing vegetation.

Removal of dwellings

The removal of several houses will have a moderate but beneficial effect on the visual amenity of the area. Currently, these buildings are only partly screened by existing vegetation. Consequently their removal is likely to increase visual amenity in the event that the land use changes from residential to open space and a rural land use predominates. Therefore, rural character and amenity will be improved.

Introduction of a new road corridor, engineered structures and landforms

There will be an obvious visual change within the corridor of the Project as rural and semi-rural land uses are changed to the more uniform visual elements of infrastructure. Several local residents who will see parts of the proposal from their dwellings will be affected by this change in visual aspect. These dwellings are identified as H26, H27, and H28 on Sheet 28 appended to Technical Report 4. They are generally located within 500m of the motorway. Where views are

towards those sections of the CSM2 that are at grade, then visual effects will generally be negligible (refer Visual Simulation 10, Sheet 38). There will also be similar visual effects for houses within the Claremont subdivision that are between 200 – 500m from the motorway (see Visual Simulation 4, Sheet 32 appended to Technical Report 4). The unmitigated effects on visual amenity will be substantial in close proximity, reducing over 500m to negligible.

Hedgerows and trees

The many existing hedgerows and trees will provide a degree of screening to most properties, however many dwellings will have uninterrupted views of the motorway. Landscape planting to the southern and northern sides of the motorway adjacent to these properties is required to help mitigate visual effects on them. Landscape mitigation for this area is illustrated in the Landscape plans appended to Technical Report 7 and includes native shrub, hedge and exotic tree planting, which will reduce visual effects from substantial to slight in the long term.

Robinsons Road overpass and CSM2/ MSRFL interchange

The overpass at Robinsons Road incorporates the connection to SH1 and involves significant earthworks to construct the bridge structures and approach embankments. The crest of the overpass bridge will be approximately 8m above grade, and will be a prominent feature at this elevation, above the surrounding flat landscape. These structures will have substantial but localised effects, and these will be screened by existing shelterbelts and hedgerows which reduce expansive views of the structure.

The visual effects on the travelling public using the highway will be slight, as the overpass and overbridge will not be obvious for any great distance, due to the view perspective and the curvature of the road at this point. Extensive planting to the embankments and the approach roads is proposed to assist in 'anchoring' the structure into the landscape. Over time, the planting will improve the visual amenity and reduce the wider visual effects of the overpass on the immediate surrounding area.

Shands Road interchange

The construction of the Shands Road interchange will create a noticeable change due to the height and length of the approach embankments to the underpass. Changes to the landform will also form a localised visual barrier in what is an otherwise flat landscape between properties within the Aberdeen Subdivision and rural land to the north.

Several residents located on Marshs Road within 100 m to the north of the interchange (identified as H19, H20, H21, H22, H23 and H24 on Sheet 27) will experience low visual effects due to the existing shelterbelts and orientation of the underpass (refer Visual Simulation 9 Marshs Road, Sheet 37, appended to Technical Report 4). In comparison, one resident to the south identified as H25, is likely to be substantially affected by the introduction of a built structure into the view that will be exposed by the removal of established vegetation. The proposed mitigation planting will provide a level of screening that will over time reduce visual effects (refer Visual Simulation 8

Shands Road on Sheet 36, appended to Technical Report 4). Residents within the Aberdeen Subdivision are not likely to be affected because of the intervening shelterbelts.

Overbridge structures and associated approach embankments at Waterholes Road, Trents Road, Springs Road and Halswell Junction Road

The surrounding landscape is predominantly flat and the bridge structure will rise approximately 8m above existing ground level. Consequently, the structure will be visually prominent at least when viewed to the north from within 300m. The proposed landscape mitigation involves native planting, exotic hedgerows and groves of exotic trees to provide screening to these residents (refer to Technical Report 4). The combination of earthworks contouring and landscape planting mitigation will allow the structure to sit more sympathetically in the landscape and will successfully reduce effects on visual amenity to moderate.

The visual impacts on the broad open landscape of the existing rural area will arise from the introduction of the overbridge structures and associated approach embankments at Waterholes Road underpass, Trents Road, Springs Road and Halswell Junction Road. Each of these overbridges will be constructed to a maximum height of approximately 8m above ground level.

Dwellings H15, H16 and H17 are within 100 to 200 m of the Waterholes Road overbridge. For these dwellings the visual effects will be substantial as the existing rural character will be replaced by a bridge structure. The Waterholes Road overbridge will potentially present moderate visual effects for several dwellings within the Claremont subdivision. These dwellings lie between approximately 200 – 400m north of the underpass. In order to provide screening for these dwellings, landscape mitigation will include areas of native planting, hedge and exotic tree planting using species consistent with the rural character of the surroundings. In time, effects on visual amenity from the Claremont Subdivision will be no more than slight and negligible.

Because of their close proximity, the visual effects resulting from the presence of the Springs Road and Halswell Junction Road overbridges will have a slight effect on dwelling H28 and a moderate effect on dwelling H27 (refer Visual Simulation 10 Springs Road, Sheet 38, appended to Technical Report 4). Dwelling H18 may be moderately adversely affected by the construction of the Trents Road overbridge. The proposed planting will assist in mitigating visual effects within five years (see Visual Simulation 6 Trents Road, Sheet 34 appended to Technical Report 4). The Trents Winery is located approximately 300 m from CSM2 and the Trents Road overbridge but because of screening afforded by the existing shelterbelts and amenity planting, visual effects will be negligible (refer Visual Simulation 5 Trents Winery, Sheet 33).

In general, the embankments and the overpass bridges will be new and obvious visual elements for the travelling public utilising these local roads. These elements will have a moderate effect on the travelling public due to their visual prominence in an otherwise flat landscape. However, these effects will be minimised through the bridge design which will be relatively narrow and will maintain views beneath the structure, therefore minimising their potential visual impact. In some instances, motorists will gain expansive views to the surrounding landscape from the elevated overpass bridges and this is considered to be a benefit of the Project.

15.7. Visual effects of proposed acoustic fence mitigation

Noise mitigation measures include the use of a low noise road surface and noise control barriers in the form of acoustic fences. Where acoustic fences are proposed and will appear as a new visual element within the landscape, the preference is to minimise their height and use planting to help integrate the structures into the surrounding environment.

Technical Report 8, Assessment of Operational Noise Effects, recommends that acoustic fences generally be constructed of materials that have a surface mass of at least 10 kg/m² and be built with no gaps. Suitable materials can include concrete, fibre cement board, steel and timber. It is important that the proposed fencing is well integrated into the existing landscape. The table below identifies the specific dwellings requiring this treatment and provides suggestions on appropriate visual integration.

Table 25: Landscape considerations for acoustic fences

Dwelling reference *	Landscape considerations for acoustic fences
H01 – 1528 MSRFL / SH1	A 1.8m high acoustic fence is proposed for approximately 75 m along the southern roadside frontage and for 25m along the western boundary. There is a mature macrocarpa hedge along the western boundary that will obscure views of the acoustic fences from the dwelling. It is recommended that planting occurs in conjunction with the fence, facing MSRFL, in order to improve visual amenity.
H10 – 95 Berketts Road	A 1.8m acoustic fence is proposed in this location. This will create a more solid boundary than currently exists. For this reason, dense infill planting beneath the existing rows of trees is recommended to help soften its presence. On the road-side of the proposed fence, the poplar trees will require trimming or be removed in order to construct the fence.
H12 – 1213 MSRFL	A 1.8m acoustic fence is proposed for the northern road-side boundary. It is recommended that the fence be rendered using recessive 'earthy' colours, as well as incorporating simple texturing, patterning or stepped setbacks to break up the extent of the fence. Existing planting along the property boundary will help to mitigate the visual effect of the acoustic fences as seen from the dwelling. Additional planting will offer better screening. Planting is therefore recommended along the length of the fence facing the road.
H27 – 312 Springs Road	Preferred mitigation is a combination of low noise road surfacing and 1.8m high acoustic fences to three sides of the property. Some vegetation will be removed to construct the acoustic fences and will need to be replaced. Mitigation planting is recommended along the length of the fence to the roadside boundary, as well as to the property side of the fence on the northern and southern boundaries.

* Dwelling references refer to locations shown on Sheets 24, 25 and 28 of Technical Report 4.

The landscape considerations and noise mitigation will be further investigated at the detailed design stage in consultation with the affected property owners.

15.8. Temporary construction effects

Temporary landscape and visual effects will also result during construction of the Project. In order to minimise the visual effects during construction, it is recommended that existing vegetation is retained where possible and in the areas identified, the planting of appropriate species is carried out as part of the landscape mitigation. It is also recommended that the area of soil exposed by earthworks is limited, as well as the length of time it is exposed. Consideration should also be given when locating and constructing vehicle accesses and locating stockpiles of excavated material or hardfill, to minimise their visual impacts. For the most part, visibility of the proposed construction works will be limited by the mitigating effect of localised screening of existing shelterbelts, hedges and taller vegetation.

15.9. Visual effects of proposed swales and stormwater basins

The excavation and formation of the stormwater detention basins will have only a minor effect on the immediately adjacent properties. Although the basins will be new features within the landscape, they are to be surfaced with grass and set below grade. The basins will be offset from the carriageway and will appear as a continuation of the existing rural land. They will have minimal effects on visual amenity both on the adjacent properties and on the travelling public utilising the motorway. The proposed small timber walls along stormwater swales, where required in isolated areas of topographic variation, will not be obvious and will have very little visual effect.

15.10. Other visual effects

In addition to the landscape and visual effects resulting from the built form of the motorway, ephemeral effects will result from vehicle movements and lighting associated with the motorway. For the most part the proposed landscape and noise mitigation, along with the existing shelterbelts, woodlots and amenity planting associated with dwellings, will screen potentially affected dwellings from lighting effects.

In general, lighting is not likely to be significantly visually intrusive because of the proposed mitigation and because it is largely confined to the industrial / peri-urban section of the motorway, overpass intersections and interchanges where lighting is an expected part of the receiving environment.

15.11. Landscape and visual effects summary

Overall, the potential landscape and visual effects brought about by MSRFL and CSM2 range from slight through to substantial. The potential landscape and visual effects will result from changes to the local rural landscape due to removal of some existing pastoral land use, the introduction of

manmade structures (roads and bridges), an increase in traffic movement, and glare from car lights and road lights.

To minimise the loss of pastoral land, once construction has been completed, suitable areas of land will be returned to pasture. Sloping embankments where overbridges are constructed will be either grassed or planted and consequently will be consistent with the surrounding rural character.

Landscape effects such as those on rural character will be less obvious where built structures along SH1 are in close proximity to the motorway. The MSRFL proposal increases the prominence of SH1 and introduces a large scale interchange at Weedons Road. This will be a substantial landscape and visual effect, albeit relatively localised however given the existing motorway context and limited positions which can see the interchange. Similarly, the effects of the introduction of the new rear access roads where previously no roads existed will be reduced as the roads are constructed at grade and largely confined to those properties in close proximity. The overall effects are considered to be negligible.

The introduction of raised landforms resulting from the construction of the interchanges and their approaches into a predominantly flat landscape will create a significant and immediately recognisable built element into the landscape that in places will change the existing character of the landscape. However, as previously stated, these effects are not necessarily considered adverse.

Along the CSM2 alignment, where the existing landscape is more open and rural in nature, the elevated interchange and several overbridges will introduce a built feature into the surrounding landscape and consequently, in places, landscape and visual effects will be substantial. The sections of the motorway between these features will be at existing ground level grade and consequently landscape and visual effects will be negligible.

For local residents and motorists, effects on the landscape and visual amenity are likely to be more significant and may be perceived as adverse depending on individual perspectives.

Overall, the proposed landscape mitigation will ensure that the existing rural character will remain dominant. Effects on visual amenity will vary, although over time as pasture establishes and planting matures, adverse effects on amenity will reduce.

15.12. Summary of recommended mitigation measures

The primary landscape and visual mitigation goal is to construct and operate the Project in a way so as to avoid or mitigate adverse landscape and visual effects. This is achieved by limiting vegetation removal where possible, reducing the extent of earthworks and designing structures that can be easily integrated into the landscape.

As discussed in Technical Report 7 (Landscape Context Report), the landscape design approach will include the following considerations to limit effects and integrate MSRFL and CSM2 into the surrounding environment:

- preserving and complementing the existing landscape and rural qualities that characterise the receiving environment, through retaining existing vegetation where possible and replicating existing landscape / planting patterns;
- protecting valued view shafts, such as views to the Port Hills and Canterbury Foothills, by retaining and or providing gaps in existing and proposed vegetation;
- identifying areas where plantings are required for visual screening and improving amenity. The visual screening will be located to control headlight glare, "back dropping" curves and intersections and obscuring views of the motorway from adjoining residential properties;
- the provision of screen planting to ensure a high quality experience for users of the motorway;
- choosing plant species to reflect the local landscape character;
- the selection of native and exotic plant species that are appropriate to and will thrive in the local environment; and
- the development of a visual theme to promote consistency and continuity with CSM1 and other local sections of SH1.

15.13. Conclusion

The introduction of the CSM2 and MSRFL to the rural land south of Christchurch will result in some adverse visual and landscape effects. The CSM2 will traverse rural and peri-urban land which is considered to be generally of moderate rural character and visual amenity.

The visual effects on rural character and visual amenity brought about by the proposed CSM2 alignment and the MSRFL ranges from slight through to substantial. The most obvious visual changes will result from the removal of vegetation, the removal of buildings, the introduction of raised interchanges and overpasses and their approaches in a predominantly flat landscape, especially those proposed in the CSM2 alignment. The MSRFL component of the Project will result in a less obvious change to the existing rural character and visual amenity primarily because of the existing context of SH1.The CSM2 alignment will result in changes to the existing local rural character and visual amenity due to removal of some pastoral land uses and the introduction of new manmade structures, including the motorway itself.

Effects on landscape character and visual amenity may be adverse to a greater or lesser degree on the receiving environment, especially in the short term, however the landscape mitigation will assist in integrating the built structures into the landscape setting. The landscaping will help to soften and integrate the raised built structures / landforms associated with the underpasses and interchanges into the surrounding landscape and over time will enhance visual amenity for neighbouring properties and road users.

16. LIGHTING

Overview

This chapter assesses the potential effects of the proposed lighting for the construction and operation of the Project. The Project is located within a semi-rural environment (with some existing residential and commercial/industrial properties). Therefore, it is not necessary for the proposed motorway to be fully illuminated. On sections where lighting is required for road safety, being conflict points, intersections and on/off ramps, associated local roads, overbridges and underpasses that have significant pedestrian use, there will be an increased level of illumination, which will comply with the relevant road lighting Standard AS/NZS 1158. It is considered that compliance with Standard AS/NZS 1158 appropriately balances the safety of road users and effects on the surrounding environment.

There will be some visual differences to residents as a result of increased light levels. However, it is considered that overall, the lighting effects which include spill light, glare, sky glow and headlight sweep on the surrounding environment, will be minimal. As a result, no specific measures are considered necessary to mitigate potential lighting effects. The operational lighting for the Project will achieve satisfactory illumination for road safety, as well as effective mitigation of light pollution in the immediate surrounds.

Construction lighting effects will be temporary in nature. Potential light spill and glare effects will be managed through the measures outlined in the CEMP.

16.1. Introduction

This chapter assesses the potential effects of the proposed lighting for the construction and operation of the Project on road users and residents. It takes into consideration potential effects such as spill light, glare, sky glow and headlight sweep that may result from vehicle headlights and proposed lighting installations. Some road lighting is essential for road and pedestrian safety reasons, but it will be carefully designed to comply with relevant road lighting standards (as discussed in Section 16.2 below).

This assessment is based on preliminary design concepts only. Some of the finer technical details cannot be included until final construction designs are in place. The final lighting design will be in general accordance with the Lighting Concept Drawings included in the Plan Set (Volume 5). The full assessment of potential lighting effects of the Project is provided in Technical Report 19 (Volume 3).

16.2. Relevant standards and district plan provisions

The series of standards used for designing road lighting in New Zealand is the Australian/New Zealand Standard AS/NZS 1158 Road Lighting ("AS/NZS 1158"). AS/NZS 1158 is considered to be the appropriate standard for lighting roads in New Zealand as it provides design requirements and

recommendations prepared by committees and lighting experts, government bodies, road users and other sectors.

The Australian Standard AS 4282:1997 "Control of Obtrusive Effects of Outdoor Lighting" ("AS 4282") has also been considered in the assessment of lighting effects. It should be noted that this Standard has not been adopted in New Zealand, and it specifically excludes road lighting. However, it provides some guidance on what spill light and glare effects are acceptable.

As notices of requirement for designations are being sought, the Project is not required to comply with any lighting standards or provisions in the Selwyn District Plan or the Christchurch City Plan.

16.3. Description of existing environment

The Project alignment runs largely through 'greenfields' land with no existing road lighting, except where CSM2 merges with CSM1. Once CSM1 is complete, the road lighting in this location will be provided via 12.6m sectional steel lighting columns, installed in a 'Dual Staggered' arrangement.[74]

Given the semi-rural nature of the environment, there is existing road lighting at the following intersections:

- 'Flag lighting' at the intersection of Waterholes and Hamptons Roads;
- Lighting at the intersection of Main South Road, Curraghs and Robinsons Roads; and
- Overhead distribution poles at Shands and Marshs Road intersection.

Residents living near to these light installations will therefore be used to some lighting in their immediate vicinity.

16.4. Proposed lighting

Since the Project is located in a semi-rural environment, it is not proposed to fully light the motorway or Main South Road. Lighting is only required where it is needed for road traffic and pedestrian safety. It is proposed to install lighting at the following sections of the Project:

- Main South Road carriageway from Rolleston and Weedons Road interchange to approximately chainage 3900;
- Intersection lighting will be used at MSRFL, intersections and roundabouts at Weedons Road and Weedons Ross Road;
- Intersection and local road lighting for Weedons Road and Levi Road;
- Intersection flag lighting will be used at MSRFL intersection with Berketts Road;
- Intersection flag lighting will be installed at the intersection of Waterholes and Hamptons Roads;
- Intersection lighting at the roundabout with Robinsons Road / Curraghs Road including lighting within Curraghs Road overpass;

[74] 'Dual Staggered" arrangement means two rows of lighting columns offset from each other either side of the carriageway.

- Intersection lighting at the roundabout with Waterholes Road / Dawsons Road and Main South Road;
- CSM2 carriageway from 0 to 1400 chainage, including all on/off ramps, the MSRFL and CSM2 junction, overbridges, underpasses, link roads and intersections;
- CSM2 carriageway from approximately 4250 chainage to the CSM1 tie-in;
- Shands Road interchange and intersections with Shands and Marshs Roads, including underpass lighting at Shands Road and Marshs Road;
- Springs Road underpass, Halswell Junction Road underpass, and the half-interchange;
- CSM2 off ramp and the new roundabout at the junction of Halswell Junction Road and John Paterson Drive; and
- New local road for John Paterson Drive.

The proposed lighting will be in accordance with AS/NZS 1158.1.1 to a V3 subcategory[75] or the equivalent standard that applies at the time the Project is constructed. In some sections, no lighting is required. Subcategory V3 will generally be applied to all conflict areas, interchange connections, underpasses and interchanges.

The lighting column arrangement for the main carriageway will be designed as "Dual Staggered". The light fixtures will be directed onto the carriageway aimed away from houses to reduce glare and spill light. The Project will use semi-cut off (Type 2) light fittings for the main carriageway, and full cut-off (Type 3) light fittings will be used in more sensitive areas, such as on/off ramps, and overbridges to further reduce spill light effects.

Lighting of adjoining sections of local SDC and CCC local roads will be to V3 or V4 standards, as appropriate. At John Paterson Drive, new lighting will match the existing lights. All underpasses will be lit to comply with the appropriate category of AS/NZS 1158.1.1.

It is not proposed to install lighting at the CSM2 Hamptons and Trents overbridge as this is not a requirement of the applicable standards. However, some ducting will be installed in the event that lighting is needed in the future.

It is proposed to light cycle ways (as described in Section 4.8 of Chapter 4) to comply with AS/NZS 1158.3.1 (subcategory P3).[76] The exception to this is the new section of the Little River Rail Trail cycleway between Marshs Road and CSM2, which like the remainder of the Rail Trail cycleway, will be unlit.

16.5. Assessment of effects

The potential adverse effects typically associated with lighting, being spill lighting, glare, sky glow and head light sweep, have been assessed for each of the key sections and elements of the Project (motorway traffic, interchanges, underpasses, overpasses and pedestrian/cycle ways) against AS/NZS 1158.

[75] Subcategory V3 applies to motorways/roads that are mainly for vehicle use with no or few pedestrians.
[76] Subcategory P3 applies to pedestrian or cycle orientated roads and pathways.

16.5.1. Operational effects

There will be some visual differences to residents due to the increased light levels on existing dark surrounds. For example, the location for the proposed Weedons Road interchange is not currently lit, although there is minimal 'flag lighting' within the area. Therefore, the installation of lighting will alter the overall appearance of the area. Residential houses, farm land and commercial properties in the immediate area will be exposed to greater levels of illumination, where previously there were none.

For some sections of the Project, no lighting is required. Therefore, some residences located adjacent to the alignment will remain unaffected by any adverse lighting effects.

For the Project as a whole, potential spill lighting will be managed through the use of appropriate light fixtures (luminaires or light fittings). These light fittings project light efficiently to the areas where they are needed. Modelling carried out for spill light levels indicate that the effects on nearby residences will be minor or of no effect. The expected light spill levels are compliant with AS/NZS 1158 and detailed in Technical Report 19.

Modelling has also been carried out to assess potential glare effects. The results of this modelling indicate that glare will be kept below the maximum threshold levels specified in Standard AS/NZS 1158.

Any contribution to sky glow that the Project may have will be mitigated through the use of lights that limit 'Upward Waste Light Ratio' (UWLR) in compliance with AS/NZS 1158. The lights proposed for the Project are fully compliant with this Standard.

More specifically, an assessment of the potential adverse lighting effects on sensitive receptors has been undertaken for the following proposed locations:

- Main South Road and CSM2 junction; and
- Shands Road/ Marshs Road Interchange.

The anticipated adverse effects for the Main South Road /CSM2 junction, the Shands Road interchange and the Springs and Halswell Roads underpasses are similar. New on/off ramps and additional general lighting are likely to increase levels of spill and glare lighting onto adjoining properties. Light fittings designed to reduce light spill and glare will be used for these areas to minimise the effects. Lighting columns located near the on/off ramps will be installed on the outside curves facing back towards the main carriageway. This will help minimise the effects of spill and glare lighting. Levels of light spill, glare and upward light will comply with Standard AS/NZS1158.

Because Robinsons Road / Curraghs Road is an underpass at a different grade to the main carriageway, the new lighting effect will be no worse than it is now. In fact, effects are likely to be improved (reduced) due to luminaire selection of full cut-off (Type 3) and / or because of the installed tilt angle of luminaires. The existing lighting on this intersection will either be

removed/relocated or incorporated into the new layout so any lighting effects will not be cumulative to what is there now.

Overall, the effects of operational lighting for the Project will be no more than minor, because the concept lighting design complies with AS/NZS 1158.

Any effects from headlights are considered to be minimal because vehicles will not generally be moving directly towards residential properties. Furthermore, for the majority of the route, the distances between residences and the road provide a sufficient buffer to further minimise any potential for adverse effects from headlight sweep.

16.5.2. Construction effects

Temporary lighting will be required in the main construction areas for any work carried out during the hours of darkness and/or for security reasons. This lighting will be designed to comply with the relevant District Plan rules, along with the requirements contained in Standard AS 4282. Any temporary road lighting required for realignment or construction reasons will be designed to comply with AS/NZS 1158. As a result, spill lighting, glare and upward waste light is not anticipated to cause nuisance to surrounding residents or motorists. The details of these lighting requirements will be contained in the CEMP. Accordingly, any adverse effects from lighting on vehicles or residents will be appropriately managed during construction.

16.6. Measures to avoid, remedy or mitigate effects

16.6.1. During operation

All road lighting has been designed to comply with the requirements of AS/NZS 1158. As a result, the potential effects of the road lighting will be no more than minor and no further mitigation measures are proposed. More specific information on the proposed lighting design can be found in Technical Report 19.

The proposed landscape mitigation planting for the Project will provide an additional visual barrier that will further reduce lighting effects.

16.6.2. Construction phase

Construction lighting is temporary in nature. Any potential adverse effects will be mitigated through the CEMP. The CEMP contains the following mitigation measures in respect to lighting:

- careful location of site offices and equipment in relation to any nearby residential areas; and
- use of lighting fixtures that do not produce spill, glare or upward light above the relevant standards (AS4282).

16.7. Conclusion

Road lighting is essential for road and pedestrian safety reasons. The effects of the proposed lighting for the operation of the Project on the surrounding environment will be no more than minor, provided that the final lighting design is prepared in general accordance with the concept lighting design (set out in the Concept Lighting Drawings included in the Plan Set (Volume 5)), and complies with the requirements of AS/NZS 1158. While no further mitigation measures are proposed, the landscape mitigation planting for the Project will assist to further reduce any adverse lighting effects arising from head light sweep. Construction lighting and any temporary lighting will be designed to comply with the relevant Standards and District Plan requirements, and lighting details will be contained in the CEMP.

17. NOISE & VIBRATION

Overview

Existing ambient traffic noise levels at dwellings along the proposed route are influenced by their proximity to existing roads. Away from busy roads, traffic noise levels are in the order of 50 dB $L_{Aeq(24hr)}$. Dwellings close to Main South, Shands and Springs Roads currently experience noise levels of around 70 dB $L_{Aeq(24h)}$.

An assessment of predicted traffic noise level generation has been conducted in accordance with the requirements of NZS6806:2010 "Acoustics - Road-traffic noise - New and altered roads"("NZS6806 or the standard"). NZS6806 provides a framework by which a number of noise mitigation measures are assessed in line with the best practicable option ("BPO") approach outlined in the RMA. This assessment process has resulted in a number of preferred mitigation options for various sections of the Project, including extending the use of low noise road surface, Open Graded Porous Asphalt ("OGPA"), on the southern approach to the overbridge at Springs Road, and acoustic fences. OGPA has already been nominated for use on the majority of MSRFL and CSM2 as part of the Do-Minimum Scenario for maintenance purposes. Comprehensive design of the proposed noise control measures will be completed during the detailed design phase of the Project.

The operational noise assessment has identified that through the application of the BPO, all Protected Premises and Facilities ("PPFs") will meet the Category A (quietest) noise criteria for new and altered roads. Only two dwellings will have a minor adverse effect. In addition, the risk of adverse operational traffic vibration effects is considered to be minor and can be mitigated through standard road maintenance procedures.

Construction noise has been predicted using noise sources contained in relevant construction noise standards. General noise management and mitigation measures are recommended to be implemented throughout the construction period as a best practice option. Where there is a risk that the limits in construction noise standards will be exceeded, recommendations for specific noise mitigation and management methodologies are provided.

Construction vibration effects have been assessed through on-site measurement of identified machinery, as well as the review of data from relevant standards and previous measurements. This data has been analysed and processed to establish setback distances for building vibration risk assessments. Predictions of construction vibration levels indicate there is a degree of risk for dwellings within 20m of the MSRFL alignment. The effects of construction noise and vibration will require active management through the implementation of a Construction Noise and Vibration Management Plan ("CNVMP").

Overall, it is considered that the Project can be constructed and operated such that adverse noise and vibration effects will be acceptable and not significant by utilising the BPO approach to avoid, remedy or mitigate effects, and achieve compliance with the relevant standards.

17.1. Operational noise

The following matters have been considered in the assessment of operational noise effects:

- relevant traffic noise assessment criteria;
- a description of the existing noise environment and recommended mitigation measures;
- an assessment of the potential traffic noise effects and proposed mitigation measures; and
- a discussion of the potential traffic vibration effects.

Technical Report 8, Assessment of Operational Noise, is appended in Volume 3 and provides full details with respect to the assessment of operational noise.

17.2. Operational noise assessment criteria

17.2.1. New Zealand Standard NZS6806:2010

NZS6806 was published in April 2010 and sets the standard for the assessment and control of road-traffic noise. The standard does not set rigid noise limits, and instead contains categories (A, B and C) of noise criteria, and requires that the BPO be identified to mitigate road-traffic noise.

The criteria contained in NZS6806 have been developed with the intention that they are reasonable criteria for the road-traffic noise from new or altered roads, taking into account adverse health effects associated with noise; the effects of relative changes in noise levels on people and communities; and the potential benefits of new and altered roads to people and communities. The Standard specifies the types of protected premises and facilities (PPFs) which are to be assessed. Category A and B noise level criteria are assessed at the outside façade of a PPF and if it is not practicably achieveable to meet Category A or B, Category C criteria apply inside the PPF. These criteria are differentiated for 'new' and 'altered' roads as outlined in Table 26.

Table 26: Noise criteria NZS6806:2010

Category	Criterion	Altered Roads	New Roads
A	Primary	64 dB $L_{Aeq(24h)}$	57 dB $L_{Aeq(24h)}$
B	Secondary	67 dB $L_{Aeq(24h)}$	64 dB $L_{Aeq(24h)}$
C	Internal	40 dB $L_{Aeq(24h)}$	40 dB $L_{Aeq(24h)}$

These categories have been developed for design and consenting, rather than assessment purposes.

However, in general terms:

- Category A indicates that a reasonable external noise level is achieved that allows for noise sensitive activities being carried out without adverse effects.
- Category B indicates an increased level of noise compared to Category A but noise sensitive activities would generally be able to be undertaken inside a building with windows open.
- Category C indicates that internal building modification mitigation may be required to achieve an acceptable level of noise inside, with windows closed.

The criteria to be used depend on the application of the best practicable option (BPO) test, with the A criterion being met or bettered if this is consistent with the BPO, the B criterion to be met or bettered if criterion A is not achievable with the BPO, and criterion C to be achieved, if criterion B is not achievable with the BPO.

For a road to be assessed as an "Altered Road" under NZS 6806 it must have both physical changes to the horizontal or vertical alignment, and have an effect on the noise environment. For MSRFL, the Altered Road criteria apply to all Protected Premises and Facilities (PPFs) along Main South Road. For CSM2, the Altered Road criteria have been applied at PPFs that are within 200 m of a new road, and which are significantly affected and which are significantly affected by noise from existing roads (e.g. within 100 m of an existing road). For other PPFs along CSM2, the New Road criteria apply. The application of new and altered roads is shown in Appendix C of Technical Report 8.

This process promotes integrated design encompassing a wide range of factors as well as noise levels. The NZTA has adopted this Standard for assessment of road-traffic noise from all new and altered State highways.

As notices of requirements for designations are being sought, it is noted that road-traffic noise is exempt from assessment against District Plan noise provisions in both the Christchurch City and Selwyn District Plans.

17.2.2. Assessment positions

The Standard defines a list of sensitive receivers, known as PPFs, which are assessed in accordance with the provisions of the Standard. PPFs include dwellings, educational facilities, marae, hospitals containing in-patient facilities, motels and hotels in residential zones and playgrounds within 20m of educational facilities.

The assessment position for existing buildings is at the façade. For the Project, each two storey dwelling has an assessment location on each floor, with the worst-affected position at each floor considered. The Standard states that in an 'urban' area, all PPFs within 100m of the alignment shall be assessed. In 'rural' areas, PPFs within 200m of the alignment shall be assessed, with the classifications for 'rural' and 'urban' as defined by Statistics New Zealand. For this Project, the majority of PPFs along the CSM2 part of the Project are characterised by similar noise environments even though they may be classified differently. Therefore, the NZTA has elected to

assess all PPFs within 200m in both urban and rural areas. Where altered roads and new roads intersect in rural areas, altered road criteria typically apply to PPFs within the closest 100m in line with the urban criteria.

Commercial and business uses are not considered to be noise sensitive receivers under NZS6806 and are therefore excluded from the assessment.

17.2.3. Traffic noise modelling

The traffic noise prediction method used takes into consideration multiple factors which affect road noise level. These include:

- traffic volume;
- vehicle speed;
- road gradient;
- angle of view,
- percentage of heavy vehicles; and
- road surface material.

The selection of road pavement has a significant effect on traffic noise generation as road tyre interaction is the major source of traffic noise at open road speeds (40 km/h and above).

17.3. Existing noise environment

The existing noise environment in the vicinity of the Project has been investigated extensively by means of noise level surveys, which have in turn been used to calibrate the computer traffic noise modelling of the existing environment. Traffic is the dominant noise source affecting the ambient noise environment for dwellings close to roads. The further a dwelling is located from a road, the greater the influence of other environmental sounds such as birdsong and rustling leaves.

Noise measurements were generally conducted at positions that are representative of the façades of dwellings. Noise levels at dwellings that are located close to Main South Road, Springs Road and Shands Road are subject to relatively high ambient noise levels in excess of 70 dB $L_{Aeq(24h)}$. Noise levels are in the order of 50 dB $L_{Aeq(24h)}$ where dwellings are set back further from less busy roads. Noise measurements were conducted between 1 to 3 October 2011 inclusive.

17.4. Noise assessment sections and identification of PPFs

In order to assist with the noise assessment, potentially affected locations along the route have been considered in a number of sections as detailed in the table below. The majority of dwellings in the assessment sections are accessed directly from, or are in close proximity to existing roads, most notably Main South Road, Springs Road and Shands Road. Ambient noise levels at these locations are directly affected by traffic flow and by local obstacles such as perimeter fences and other dwellings. Dwellings in these locations are in both *Inner Plains* and *Rural 2* zones under the Selwyn District Plan and Christchurch City Plan respectively. These sections are mapped in

Appendices B and C of the Assessment of Operational Noise Effects, Technical Report 8 (appended in Volume 3).

Table 27: Description of assessment areas with each section

Name	Section	Statistics NZ	Description
CSM2/MSRFL interchange to Weedons Road Interchange	5, 6 & 7	Rural	There are 29 dwellings (and correspondingly 29 PPFs) in these sections that are similarly affected by relatively high existing traffic noise levels. Of these 29 PPFs, one is a two-storey giving a total of 30 assessment positions. These totals do not include the dwellings along the route that have been identified for Crown purchase.
Waterholes & Hamptons Roads	4	Urban (east) & Rural (west)	In this section there are four dwellings, two of which are two-storey. This corresponds to four PPFs and six assessment locations. These totals do not include dwellings that are to be purchased by the Crown.
Trents & Blakes Roads	3	Urban	Trents Rd will pass over CSM2 and Blakes Rd terminates. Four of the eight dwellings that are closest to CSM2 are to be purchased by the Crown. Trents estate has been included in the assessment, but it is not identified as a PPF. A total of four PPFs have been assessed giving a total of five assessment positions.
Shands Road	2	Urban	With CSM2, Shands Rd will be accessed via a grade separated interchange. This section contains three PPFs/ assessment positions,. Three additional dwellings will be purchased by the Crown.
Springs Road	1	Urban	There are five dwellings within this section with access off Springs Road. Two of the dwellings are two storey, however one of these will be purchased by the Crown. A Springs Road bridge will be built over CSM2. This section contains four PPFs and five assessment positions.

In total, 34 PPFs have been identified within the seven sections of the Project route including four that are two-storey dwellings. These PPFs are identified in Appendices C and E of Technical Report 8. Not included in this total are those dwellings located on Crown owned land or those that it is intended the Crown will purchase. The Crown purchase dwellings will be relocated or demolished. Alternatively, they may be on-sold following completion of the construction of the

Project. In this situation, noise mitigation measures may be required prior to sale of those properties with dwellings, to meet the appropriate noise criteria category in NZS 6806: 2010.

17.5. Assessment of traffic noise effects and proposed mitigation

The existing noise situation has been assessed for each section by means of noise level surveys and computer noise modelling. The potential effects on sensitive receivers as a result of traffic noise have also been assessed. Based on the outcome of the assessment, mitigation measures are recommended where necessary.

NZS 6806 requires that several mitigation options be developed and compared in order to determine the BPO in accordance with the RMA, not only in terms of noise level reductions but also in relation to other considerations such as urban design, safety, cost etc. The process of comparing mitigation options is interactive, involving a number of project disciplines. Therefore, the assessment result generally consists of a number of options and a nominated preference developed by the entire Project team. For this reason, the preferred mitigation option may not provide the greatest noise level reduction, but is considered optimal and practicable on balance when evaluated against relevant criteria.

Overall, the two mitigation measures identified as being the BPO for the Project are:

- the use of Open Graded Porous Asphalt (OGPA) surfacing (shown on the pavement drawings and Appendix C of the Assessment of Operational Noise); and
- 1.8 m high acoustic fences (shown in Appendix C of the Assessment of Operational Noise).

Both of these measures are defined as structural noise mitigation measures. With respect to surfacing, the NZTA has determined that the Project will be paved with OGPA for themajority of the mainline carriageway for maintenance purposes. Appendix D of NZS6806 contains extensive discussion of the application of low noise road surfaces and confirms that OGPA, a porous and smooth layered asphalt surface, can reduce noise levels by around six decibels when compared with 'chip seal' surfacing - a noticeable difference. However, in order for this reduction in noise level to be achieved and maintained, OGPA must be laid to a sufficient depth, properly drained and regularly cleaned.

17.5.1. CSM2/MSRFL interchange to Weedons Rd Interchange - Section 5, 6 & 7

The noise environment at dwellings in sections 5, 6 and 7 is dominated by traffic noise from Main South Road, so the Altered Road criteria have been applied (Table 26). There are a total of 29 dwellings in these sections including one that is two-storey. This gives a total of 29 PPFs with 30 assessment positions in these sections.[77] It is also understood that four dwellings along Main South Road are to be relocated to the rear of their respective sites. Whilst these dwellings' final

[77] Note that for each two-storey PPF there are 2 assessment positions

locations are uncertain, traffic noise levels are likely to meet the Category A criteria for Altered Roads without any additional specific noise mitigation.

Existing noise environment "Do-Minimum"[78] scenario

The existing noise environment at the 29 PPFs has been predicted to range between 51 and 71 dB $L_{Aeq(24h)}$, depending on the distance from Main South Road. For dwellings close to Weedons Road and Weedons-Ross Road, only the contribution from the existing traffic noise from Main South Road has been calculated. This has resulted in a conservative estimate (lower) background noise level being used in the assessment of mitigation options.

The Do-Minimum scenario shows that the operation of the Project would have a negligible to slight effect on noise levels at dwellings in these sections. Noise levels would remain similar to existing levels for most dwellings with changes in noise levels ranging from a 5 decibel decrease up to an increase of 4 decibels. Most dwellings will experience a slight decrease in traffic noise levels from Main South Road. In these sections, three of the assessment positions would be within Category B (between 64 and 67 dB $L_{Aeq(24hr)}$). All of the remaining assessment positions would be within Category A (up to 64 dB $L_{Aeq(24hr)}$).

Proposed mitigation

The selection of OGPA as the Do-Minimum surface for the alignment means that traffic noise emissions from the main alignment are much lower than would generally be expected. However, further mitigation in the form of 1.8 metre high acoustic fences is proposed for three dwellings (1528 Main South Road (along 2 boundaries), 95 Berketts Road (along road boundary) and 1213 Main South Road (along road boundary)). Once the selected mitigation is in place, the three Category B assessment positions would meet criterion A, so all assessment positions would achieve Category A for these sections which is considered acceptable[79]. Noise levels are predicted to increase by 2 decibels at one dwelling in these sections (1300 Main South Road). This is considered to be an insignificant change with a less than minor effect. Noise levels at the remainder of the PPFs are predicted to remain the same or decrease.

17.5.2. Section 4 – Waterholes & Hamptons Roads

The noise environment at dwellings in this section is dominated by traffic noise from Waterholes Road, Hamptons Road and SH1. As traffic on the local roads is intermittent and only seriously affects PPFs within 50m of the road, the more stringent New Road criteria has been applied (Table 26). There are five dwellings in this section, of which two are two-storey. It is understood that

[78] The predicted noise level at the design year with the Project implemented, including safety barriers and other structures, which may provide incidental noise mitigation. It also includes the ue of OGPA for the majority of the mainline carriageway. It does not include any other mitigation that would be undertaken for the sole purposes of reducing noise effects.
[79] The criteria contained in NZS 6806 have been developed with the intention that they are "reasonable criteria for the road-traffic noise from new or altered roads taking into account health issues associated with noise, the effects of relative changes in noise levels on people and communities, and the potential benefits of new and altered roads to people and communities" – NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads, Section 1.1.4

one single-storey dwelling is to be purchased by the Crown, giving a total of four PPFs and six assessment positions in this section.

Existing noise environment and "Do-Minimum" scenario

The existing noise environment at the four dwellings has been predicted to be between 51 and 53 dB $L_{Aeq(24h)}$. Therefore, in this section all four assessed PPFs are within Category A. The Do-Minimum scenario shows that the operation of CSM2 would have a negligible to slight effect on the dwellings with noise levels remaining similar to existing levels for most dwellings, with changes in noise levels ranging from a 1 decibel decrease up to an increase of 4 decibels.

Proposed mitigation

The selection of OGPA as the Do-Minimum surface for the alignment means that traffic noise emissions from the main alignment are much lower than would generally be expected from a road of this size. Under the proposed Do-Minimum scenario the noise level at one PPF in this section is predicted to slightly decrease by up to 1 decibel. Noise levels at the other PPFs in this section are predicted to increase by between 1 (16 Devine Drive) and 4 decibels (883 Waterholes Road and 904 Waterholes Road). The 1 decibel increase is considered to be a less than minor effect, while the 4 decibel increase will lead to a perceptible change which is considered to be a minor effect. As all four PPFs in this section are within Category A, no further mitigation is required.

17.5.3. Trents Road and Blakes Roads – Section 3

The noise environment at dwellings in this section is affected by traffic on Blakes Road, Trents Road and SH1. As traffic on Blakes and Trents Roads is intermittent and only seriously affects properties within 50m of the road, the more stringent New Road criteria is has been applied (Table 26).

There are a total of eight dwellings, including three two-storey dwellings. It is understood that four dwellings (including two two-storey dwellings) are to be purchased be the Crown and do not require assessment. This gives a total of four PPFs and five assessment positions in this section. Given the proposed alignment, Blakes Road will not cross CSM2 and therefore will no longer function as a through road. The resulting decrease in traffic along Blakes Road will cause a decrease in traffic noise level from this road for properties close to the road.

Trents Estate Winery lies within this section, although is not considered a PPF as it is a commercial activity. Furthermore, it lies outside the 200m assessment area. However, the potential noise effects of the Project on this property have been considered in the assessment.

Existing noise environment and "Do-Minimum" scenario

The existing noise environment at the five assessment locations has been predicted to be between 52 and 54 dB $L_{Aeq(24h)}$. Therefore, all four PPFs are within Category A. The existing noise environment at Trents Estate Winery has been measured to be 47 dB $L_{Aeq(24h)}$. The Do-Minimum

scenario shows that the operation of the Project would have a negligible effect on dwellings, with noise levels remaining similar to existing levels for most dwellings, with increases in noise levels of up to 2 decibels.

Proposed mitigation

The selection of OGPA as the Do-Minimum surface for the alignment means that traffic noise emissions from the main alignment are much lower than might otherwise be the case if a noisier Do-Minimum surface had been selected (e.g. asphaltic concrete or chip seal. Under the proposed Do-Minimum scenario noise levels at assessed PPFs in this section are predicted to increase by up to 2 decibels (240 Blakes Road increase by 1 dBA, 260 Blakes Road by 2 dBA, 100 Trents Road by 1 dBA and 108 Trents Road by 2 dBA). This is considered to be an insignificant change and a less than minor effect. All PPFs in this section are within Category A under the Standard and therefore no further mitigation is required.

17.5.4. Shands Rd – Section 2

The noise environment at dwellings in Section 2 is dominated by Shands Road traffic and therefore the Altered Road have been criteria applied (Table 26). There are a total of six single-storey dwellings. One dwelling is owned by the Crown and two others are to be purchased by the Crown and do not require assessment. This gives a total of three PPFs in this section and correspondingly three assessment positions.

Existing noise environment and "Do-Minimum" scenario

The existing noise environment at the six dwellings has been predicted to be between 54 and 66 dB $L_{Aeq(24h)}$, depending on the distance to Shands Road.

The Do-Minimum scenario includes low noise road surface material (OGPA) along the main CSM2 alignment. In addition, Stone Mastic Asphalt (SMA) has been proposed for the overbridge and its approaches. In this section, all PPFs achieve the Category A criterion (up to 64 dB $L_{Aeq(24h)}$).

Proposed mitigation

The selection of OGPA and SMA as the Do-Minimum surface means that all three assessment positions are within Category A with the noise levels at all assessed PPFs predicted to decrease by between 1 and 4 decibels which is considered to be a slight positive effect.

17.5.5. Springs Rd - Section 1

The noise environment at dwellings in this section is dominated by Springs Road traffic and therefore, the Altered Road criteria generally apply (Table 26). There are a total of five PPFs with two two-storey dwellings in this section. One two-storey PPF (two assessment positions) is subject to the New Road criteria. The other three PPFs have been assessed against the Altered Road criterion. This gives a total of five assessment positions in this section.

Existing noise environment and "Do-Minimum" scenario

The existing noise environment at the five dwellings has been predicted to be between 52 and 69 dB $L_{Aeq(24h)}$, depending on the distance to and elevation above Springs Road. The Do-Minimum scenario includes OGPA along the main CSM2 alignment. SMA is proposed for the Springs Road overbridge and its approaches. The Do-Minimum scenario shows that the operation of CSM2 would have a negligible to moderate effect on dwellings within 100m of Springs Road and noise levels would slightly increase or decrease depending on the proximity to Springs Road. There are two dwellings within 20 m of Springs Road with lower existing noise levels, and these would experience a noise level increase of up to 7 decibels and would be within Category C (greater than 67 dB $L_{Aeq(24hr)}$). The PPF approximately 50m from Springs Road would be Category A (up to 64 dB $L_{Aeq(24hr)}$ under the Altered Road criteria) and the two remaining assessment positions would be Category A (up to 57 dB $L_{Aeq(24hr)}$ under the New Road criteria).

Proposed mitigation

The selection of OGPA as the Do-Minimum surface for the Project means that traffic noise emissions from the main alignment are much lower than might otherwise be the case if a noisier Do-Minimum surface had been selected (e.g. asphaltic concrete or chip seal). Further to the Do-Minimum approach above, OGPA surfacing of the southern approach to the CSM2 overbridge along Springs Road is recommended as additional mitigation. In addition, a 1.8 metre high acoustic fence on the road boundary of 312 Springs Road is proposed.

With the selected mitigation option in place noise levels at all assessed PPFs in this section are predicted to decrease by between 2 and 11 decibels, which is considered to be a slight positive, to a substantially positive effect.

17.6. Summary of Operational Noise Effects and Proposed Mitigation

Table below provides a summary of Preferred Mitigation Options that have been selected for the Project.

Table 28: Summary of Preferred Mitigation Options

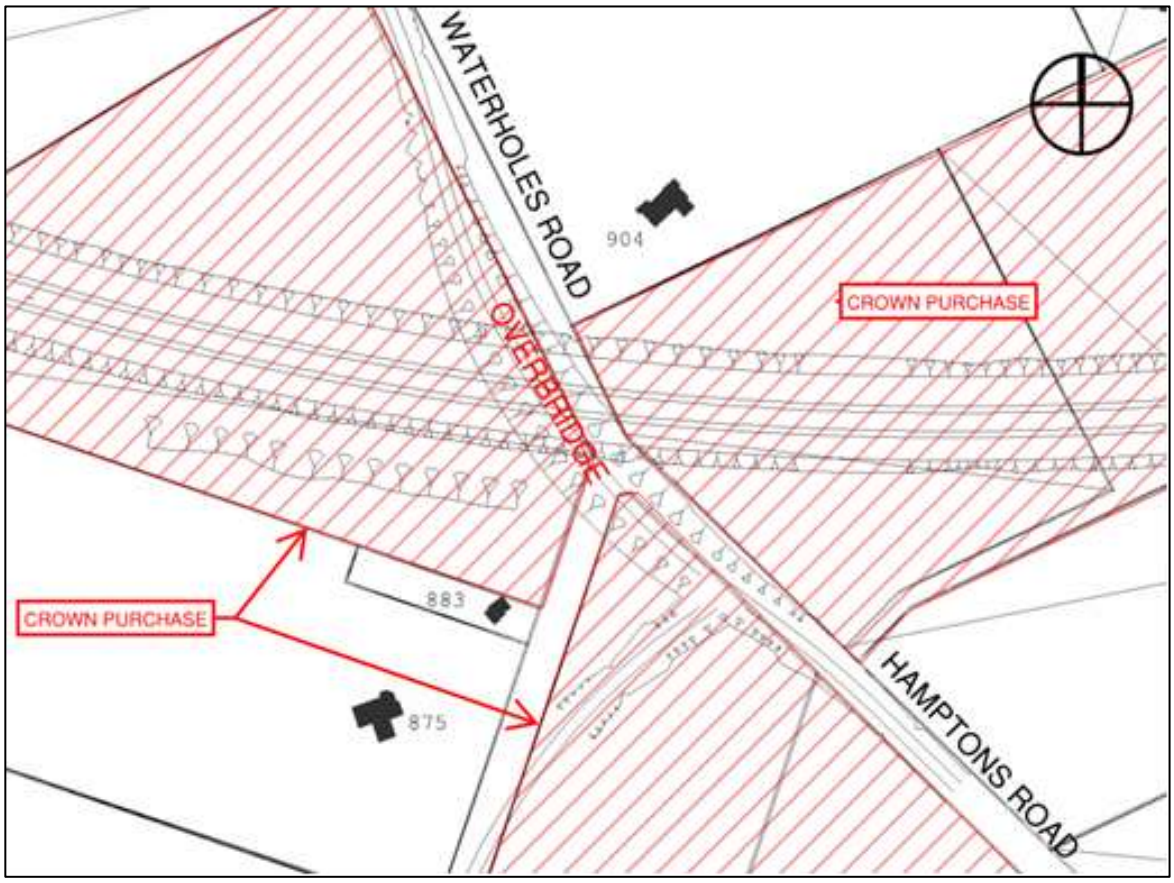
Section	Description of Mitigation Option
7	1.8m high acoustic fence along two boundaries at 1528 Main South Road
6	1.8m high acoustic fence at 95 Berketts Road
5	1.8m high acoustic fence at 1213 Main South Road
4	None (Do- Minimum Scenario)
3	None (Do- Minimum Scenario)
2	None (Do- Minimum Scenario)

Section	Description of Mitigation Option
1	OGPA surface to overbridge southern approach and 1.8m high acoustic fence to road side boundary of 312 Springs Road

The acoustic fences will be subject to detail design. However, fences should generally be constructed of materials that have a surface mass of at least 10 kg/m^2 and be built with no gaps. Suitable materials can include concrete, fibre cement bard, steel and timber. As far as practicable, fences will be located either within or at the edge of the road designation, thereby permitting the NZTA to perform on-going maintenance.

The dwellings located at 883 and 904 Waterholes Road (shown in Figure 49) are likely to experience a change in noise level of 3 decibels or more, corresponding in a minor adverse noise effect. However, in both these locations, road traffic noise levels will achieve the Category A noise criteria of 57 dB $L_{Aeq(24hr)}$ for new roads.

Figure 49: Potentially adversely affected dwellings



17.7. Road traffic vibration effects

Vibration levels from traffic depend primarily on the roughness of the road surface. A smooth road surface results in low levels of vibration being generated by moving traffic.

Historical measurements conducted during detailed analysis of road traffic vibration on other projects has shown that a significant degradation in the surface of a road, or poorly finished road maintenance resulting in bumps or dips in the road surface, are required before vibration from road traffic becomes significant enough to cause even superficial building damage.

Degradation of this magnitude is highly unlikely to occur because standard NZTA maintenance policy requires that that road surfaces are properly maintained. Vibration levels will be acceptable under international standards relating to building damage and human response to transit vibration, such as NS 8176.E:2005 - Vibration and Shock – Measurement of vibration in buildings from land based transport and guidance to evaluation of its effects on human beings.

The risk of adverse effects resulting from road traffic vibration is therefore negligible.

17.8. Construction noise and vibration

The noise and vibration effects associated with construction of the Project have been assessed based on Technical Report 9, Assessment of Construction Noise and Vibration, appended in Volume 3. An assessment methodology for assessing construction noise and vibration effects is set out, and adverse effects have been assessed on a sector by sector basis. Vibration effects have been assessed with respect to the potential for damage to buildings and the effect on people. Based on the assessment, both general and site specific measures are proposed to mitigate the effects of construction noise and vibration.

17.9. Construction noise assessment

17.9.1. Construction noise assessment criteria

Construction noise effects are assessed in relation to the recognised construction noise standard (NZS 6803:1999 Acoustics – Construction Noise), which contains recommended noise criteria that are considered appropriate and applicable to noise from construction operations, excluding blasting.

NZS 6803:1999 provides for higher noise levels during normal working hours for construction noise received in residential areas in order to enable normal construction activity to take place. For commercial and industrial areas, higher noise criteria are allowed during night-time when it is less likely that people or business activity will be affected by construction noise.

The noise criteria in NZS 6803:1999 are widely acknowledged as being appropriate for the control of construction noise, and compliance with these criteria generally ensures acceptability of noise generated by construction activities.

For the purposes of the construction noise and vibration assessment, the Project area has been divided into twelve sections to enable assessment in relation to specific sensitive receptors.

17.9.2. Assessment of construction noise effects by sector

The table below summarises the construction activities and predicted construction noise by sector, with details provided regarding the potential effect on sensitive receptors in each sector. These sectors are shown in the Assessment of Construction Noise and Vibration, Technical Report 9 appended in Volume 3. The table identifies where mitigation is required. The mitigation options available are discussed later in this chapter.

Table 29: Predicted construction noise by assessment sector

Sector	Construction Activities	Location of receivers	Predicted Noise Effects
Sector 12: MSRFL South of Weedons Road	Topsoil stripping, general earthworks, pavement construction. There may also be some Enabling Works, noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the four-laning of Main South Road.	The closest dwelling is located at 1528 Main South Road to the north of the main alignment and is around 10m from the edge of the construction area. See Figure 2 in Technical Report 9.	Some construction activities may exceed the noise criteria in this sector. The day time noise criteria has the potential to be exceeded for short periods of time (for enabling works and topsoil stripping) and are likely to exceed the night time noise criteria for all construction activities resulting in potentially significant adverse noise effects requiring mitigation.

Sector	Construction Activities	Location of receivers	Predicted Noise Effects
Sector 11: Weedons Road Interchange	Topsoil stripping, general earthworks, ground improvements, bridge construction, pavement construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the construction of the Weedons Road interchange.	There are a number of commercial and residential buildings in this Sector (along Weedons Road). See Figure 3 in Technical Report 9.	Construction activities likely to exceed the day time noise criteria in this Sector include enabling works (for short periods of time), topsoil stripping (for receivers within 180 m and for short periods of time), earthworks for bridges (where occurring within 50 m of occupied dwellings), ground improvements, and bridge construction. All construction activities have the potential to exceed the night time noise criteria. These exceedances will result in potentially significant adverse noise effects requiring mitigation.
Sector 10: MSRFL between Berketts Road and Weedons Road	Topsoil stripping, general earthworks, pavement Construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the four-laning of Main South Road.	There are a number of commercial and residential buildings in this sector, including several properties that are intended to be purchased by the Crown. There are two dwellings to be relocated to the rear of the site (1312 and 1310 Main South Road). The closest dwelling is approximately 20m from the edge of the construction area (95 Berketts Road). See Figure 4 of Technical Report 9.	The construction activities which may exceed the day time noise criteria in this Sector include enabling works (for short periods of time) and topsoil stripping (when within 180 m of occupied residential dwellings). The night-time criteria are likely to be exceeded for all construction activities. These exceedances may result in potentially significant adverse noise effects requiring mitigation.

Sector	Construction Activities	Location of receivers	Predicted Noise Effects
Sector 9: MSRFL – Robinsons to Berketts	Topsoil stripping, general earthworks, pavement Construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the four-laning of Main South Road.	There are several properties that are intended to be purchased by the Crown. There are also dwellings which will be relocated to the rear of the site prior to commencing construction (1168 and 1160 Main South Road). The closest other dwelling is around 20m from the edge of the construction area (1213 Main South Road). See Figure 5 of Technical Report 9.	Some construction activities may exceed the day time noise criteria (enabling works for short periods of time and topsoil stripping when within 180 m of residential dwellings) in this Sector resulting in potentially significant adverse noise effects requiring mitigation. All construction activities are likely to exceed the night-time noise criteria.
Sector 8: Robinsons Road	Topsoil stripping, general earthworks, ground improvements, bridge construction, pavement construction. The major construction activities in this Sector relate to the construction of the MSRFL/CSM2 interchange (including overbridge) and the Robinsons Road overpass. The main site compound is also located in this Sector adjacent to Robinsons Road	There are a number of commercial and residential buildings in this Sector. Dwellings are located at 1090 and 1033 Main South Road and 979 Robinsons Road. See Figure 6 of Technical Report 9.	Some construction activities may exceed the day-time noise criteria in this Sector resulting in potentially significant adverse noise effects requiring mitigation. These activities include enabling works (for short periods of time), topsoil stripping when within 180 m of occupied residential dwellings, general earthworks for bridges where works occur within 50 m of occupied dwellings (northern end of MSRFL overbridge), ground improvements and bridge construction. All construction activities are likely to exceed the night-time noise criterion.

Sector	Construction Activities	Location of receivers	Predicted Noise Effects
Sector 7: Waterholes Road	Topsoil stripping, general earthworks, ground improvements, bridge construction, pavement construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the construction of the Waterholes Road overbridge.	The closest dwelling to overbridge construction area is located close to the northern end of the overbridge (904 Waterholes Road). There are two dwellings located to the south of the main alignment, on the eastern side of Waterholes Road (883 and 875 Waterholes Road). See Figure 7 of Technical Report 9.	Some construction activities (enabling works for short periods of time and topsoil stripping when within 180 m of dwelling) may exceed the day-time noise criteria in this Sector. All construction activities are likely to exceed the night-time noise criterion resulting in potentially significant adverse noise effects requiring mitigation.
Sector 6: Trents to Waterholes	Topsoil stripping, general earthworks, pavement construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the formation of the main CSM2 alignment.	There are a large number of dwellings at the subdivision to the north of this Sector (Claremont). The closest dwelling in the subdivision is around 170m from the edge of the construction area. These dwellings include numbers 14 to 30 Devine Drive. See Figure 8 of Technical Report 9.	Some construction activities (enabling works for short periods of time and topsoil stripping when within 180 m of occupied residential dwellings) may exceed the noise criteria in this Sector resulting in potentially significant adverse noise effects requiring mitigation. All construction activities are likely to exceed the night-time criteria.

Sector	Construction Activities	Location of receivers	Predicted Noise Effects
Sector 5: Trents Road	Topsoil stripping, general earthworks, ground improvements, bridge construction, pavement construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the construction of the Trents Road overbridge.	There are five dwellings that are intended to be purchased by the Crown. The closest dwellings to overbridge construction area is located close to the northern end of the Trents Road overbridge (104 and 106 Trents Road). See Figure 9 of Technical Report 9.	Some construction activities (enabling works, topsoil stripping, earthworks for bridges, ground improvements and bridge construction) may exceed the day-time noise criteria in this Sector resulting in potentially significant adverse noise effects requiring mitigation. All construction activities are likely to exceed the night-time noise criteria.
Sector 4: Shands to Trents	Topsoil stripping, general earthworks, pavement construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the formation of the main CSM2 alignment.	There are three dwellings that are intended to be purchased by the Crown. The nearest other dwellings lie to the south of the main alignment and are around 100m to 120m from the edge of the construction area. These dwellings are located at 273, 260 and 240 Blakes Road. See Figure 9 of Technical Report 9.	Enabling works and topsoil stripping construction activities for short periods of time may exceed the day-time noise criteria in this Sector resulting in potentially significant adverse noise effects requiring mitigation. All construction activities are likely to exceed the night-time criteria.

Sector	Construction Activities	Location of receivers	Predicted Noise Effects
Sector 3: Shands Rd	Topsoil stripping, general earthworks, ground improvements, bridge construction, pavement construction, enabling works. The major construction activities in this Sector relate to the construction of the Shands Road Interchange and the Shands Road and Marshs Road overbridges. The main civil/earthworks compound will also be located in this Sector.	There are three dwellings that are intended to be purchased by the Crown in this Sector and other rural dwellings located close to the Marshs Road / Shands Road junction. These are identified as 523 Shands Road and 181, 183, 191 and 197 Marshs Road. See Figure 10 of Technical Report 9.	Enabling works and topsoil stripping construction activities for short periods of time may exceed the day-time noise criteria in this Sector resulting in potentially significant adverse noise effects requiring mitigation. All construction activities are likely to exceed the night-time criteria.
Sector 2: Shands to Marshs	Topsoil stripping, general earthworks, pavement construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the formation of the main CSM2 alignment.	There are two dwellings that are intended to be purchased by the Crown. Other dwellings lie to the south of the main alignment and are around 120m to 150m from the edge of the construction area (along Shands Road). See Figure 10 of Technical Report 9.	The only construction activities that may exceed the daytime noise criteria are top soil stripping within 180 m of dwellings. Other activities are likely to exceed the noise criteria in this Sector if undertaken at night. These exceedances will result in potentially significant adverse noise effects requiring mitigation.

Sector	Construction Activities	Location of receivers	Predicted Noise Effects
Sector 1: Halswell Junction/ Springs Road	Topsoil stripping, general earthworks, ground improvements, bridge construction, pavement construction. There may also be some Enabling Works noise generation associated with small staging areas as required by the contractors. The major construction activities in this Sector relate to the construction of the Halswell Junction Road overbridge and the Springs Road overbridge. There will also be one of the main stormwater pond systems in this Sector.	There are less than 5 dwellings close to the construction zone in this Sector. The critical dwellings are those dwellings on Springs Road to the south of the main CSM2 alignment (312, 314, 318 and 333 Springs Road), as they are close to the overbridge construction area. See Figure 11 of Technical Report 9.	Some construction activities (enabling works, topsoil stripping, earthworks for bridges, ground improvements and bridge construction) may exceed the day-time noise criteria in this Sector resulting in potentially significant adverse noise effects requiring mitigation. All construction activities are likely to exceed the night-time noise criteria.

17.9.3. Summary of effects

In all sectors, construction activities have the potential to exceed recognised construction noise criteria as set out in NZS 6803:1999, resulting in potentially significant adverse effects of a temporary nature for nearby dwellings and residential areas.

17.10. Construction noise measures

17.10.1. General measures to manage effects

The table below provides a summary of general construction noise mitigation measures:

Table 30: Noise mitigation summary

Construction Activity	Mitigation / Management	Sector
Enabling Works	Restrict use of heavy machinery to 0730 - 2000 Monday to Friday and 1730 - 1800 on Saturday.	ALL
Topsoil Stripping	Restrict motor scraper use to 0730 - 1800 Monday to Saturday.	ALL

Construction Activity	Mitigation / Management	Sector
General Earthworks	Restrict use of heavy machinery to 0730 - 2000 Monday to Friday and 1730 - 1800 on Saturday, or ensure minimum setback distance of 900m to any occupied residential dwelling and 50m from any occupied commercial building.	ALL
Ground Improvements	Ground Improvements and Piling Techniques are outlined in Technical Report 9 and include the selection of a "quieter" method where alternative methods are available.	1, 3, 5, 7, 8, 11
Bridge Construction	Noise mitigation and management for night-time work are outlined in Technical Report 9 and include preparation of site specific noise management plans and consultation and communication with sensitive receivers.	1, 3, 5, 7, 8, 11
Pavement Construction	Restrict use of loud construction machinery to 0730 - 2000 Monday to Saturday.	ALL

Further general mitigation measures are proposed to be included in a CNVMP, and as per the measures set out in detail in Technical Report 9. These are summarised as follows:

- training of personnel with respect to implementing the CNVMP;
- maintenance of equipment;
- equipment enclosures to attenuate noise at source;
- selection of low noise plant;
- avoiding night time activities;
- temporary relocation of residents (only where absolutely necessary);
- noise level monitoring;
- alternatives to tonal reversing alarms;
- monitoring and reporting; and
- consultation and communication with sensitive receivers.

17.10.2. Site specific mitigation measures

In addition to the general mitigation measures outlined above, site specific mitigation for operational noise is proposed in the form of acoustic fencing for residential dwellings within close proximity to the Project area. Where practicable, acoustic fencing should be installed prior to construction works commencing, to reduce construction noise to more acceptable levels for these dwellings. The affected dwellings have been identified as follows:

- Sector 1 – one dwelling on the western side at 312 Springs Road close to the overbridge will require a noise control fence;
- Sector 9 – the dwelling situated at 1213 Main South Road will require a noise control fence;
- Sector 10 - the dwelling situated at 95 Berketts Road (on the corner of Berketts and Main South Road) will require a noise fence. The closest dwelling along this section is approximately 20m from the construction area; and
- Sector 12 - the dwelling situated at 1528 Main South road will require noise control fencing.

Furthermore, the Crown will purchase some properties with dwellings within the Project area prior to construction works commencing, therefore avoiding construction effects on these dwellings, which will be removed.

17.11. Construction vibration assessment

17.11.1. Construction vibration assessment criteria

The draft NZTA vibration guidelines provide the basis for assessing vibration effects. The draft guidelines adopt criteria from recognised international standards in a management-based framework designed to address both human response and building damage effects. These international standards include DIN 4150-3:1999 - Effects of Vibration on Structures and BS 5228-2:2009 - Code of Practice for Noise and Vibration Control on construction and open sites.

The Project vibration criteria from the draft NZTA vibration guidelines selected for the construction phase are as follows:

- Category A: adopts criteria from British Standard BS 5228-2:2009 and is designed to practically address the human response effects in dwellings during the daytime and night-time periods, and offices during the daytime. For other building types, and offices during the night-time (i.e. unoccupied), the policy reverts to the residential building damage criterion from German Standard DIN 4150-3:1999.
- Category B: is generally designed to protect buildings against damage and adopts criteria from DIN 4150-3:1999 and BS 5228-2:2009, but retains a higher degree of night-time protection for occupied dwellings at night using human response criteria of BS 5228-2:2009. If measured or predicted vibration levels exceed the Category A criteria then a suitably qualified expert shall be engaged to assess and manage construction vibration and to comply with the Category A criteria. If the Category A criteria cannot be practicably achieved, the Category B criteria shall be applied.

17.11.2. Assessment of vibration effects

The Project's construction phase will involve the use of heavy machinery operating for extended periods during the day in relatively close proximity to some sensitive buildings, namely dwellings. Night-time construction may also be required in some areas, in particular for bridge construction.

The following definitions have been used to classify the vibration risk and potential effect on dwellings:

- 'High Risk' – Dwellings where vibration levels are likely to exceed the risk assessment criteria. This does not necessarily imply damage to the building structure, but these are the receivers subject to the highest vibration levels;
- 'Medium Risk' – Dwellings close to the risk contour with some construction activities producing vibration levels close to the risk assessment criteria with possible intermittent exceedance; and
- 'Others' – No significant risk.

Potentially significant sources of vibration and the most sensitive receivers for each Sector have been predicted. These results are provisional however, and must be refined and supported by site-specific measurements once construction begins, as recommended in the CNVMP. For crucial activities such excavating, vibratory compacting and pile driving, measurements of the initial works are recommended and as the repository of on-site measurements increases, the risk categories can be refined and improved controls can be achieved.

It is unlikely any buildings along the CSM2 alignment have a high risk of suffering from vibration effects, although some buildings have a medium risk of suffering from vibration effects. A detailed assessment of all dwellings along the MSRFL alignment should be undertaken during the preparation of the detailed construction programme, and all dwellings within 20m should be marked on a plan for reference. There is the potential for vibration associated with construction activities to have adverse effects on people.

17.12. Vibration measures

The most effective way to control construction noise and vibration is through good on-site management, with measures to be implemented through the CNVMP.

For crucial activities, such as vibratory compacting and piling where large vibration energy is typically produced, test measurements of the initial works are recommended. As the number of on-site measurements increases, the models can be refined to allow more accurate prediction of the subsequent construction stages and improved controls can be achieved.

17.13. Conclusion

The existing ambient noise environment for dwellings adjacent to existing busy roads (Main South Road, Springs Road and Shands Road) is such that the Project will not result in an appreciable change in noise environment for the majority of residents near the Project. Dwellings adjacent to less busy roads, or set back a significant distance from the carriageway edge, will be largely unaffected by any increase in operational noise. Low road noise surfacing (OGPA) has been nominated for use on the majority of the MSRFL and CSM2 carriageway as part of the Do-Minimum scenario. Additional mitigation measures proposed are acoustic fences for a limited number of dwellings (1213 Main South Road, 95 Berketts Road, 1528 Main South Road and 312

Springs Road) and extending the use of OGPA on the southern approache to the overbridge at Springs Road. With mitigation measures in place only two dwellings will be potentially adversely affected by an increase in noise level (883 and 904 Waterholes Road) but the noise levels at those dwellings will achieve the Category A noise criteria.

Operational vibration levels generated by moving traffic are significantly lower than for construction activities, and will be sufficiently managed through on-going road maintenance.

Construction activities have the potential to exceed recognised construction noise criteria resulting in potentially significant adverse effects of a temporary nature for dwellings situated near the Project area. A range of general mitigation measures are proposed to be implemented through the CNVMP, along with site specific mitigation for affected dwellings in the form of acoustic fencing and the preparation of management schedules outlining site specific construction noise management measures. Overall, it is considered that the Project can be constructed such that adverse construction noise effects can generally be avoided, remedied or mitigated using best practicable options to achieve compliance with the Project criteria.

The most effective way to control vibration is through good on-site management and rigorous monitoring, with mitigation measures proposed to be implemented through the CNVMP. Vibration during the construction phase has a finite timeframe.

18. AIR QUALITY

Overview

This chapter assesses the actual and potential air quality effects arising from the operation and construction of the Project. Operational effects include the potential for adverse air quality effects from vehicle exhaust pollutants. Studies conclude that adverse effects will be very minor/ negligible.

Construction of the Project has the potential to generate dust, particularly during the large scale earthworks. Construction works could have an adverse effect on air quality for sensitive receptors (mainly residential premises) within close proximity to the proposed earthworks.

Dust emissions will be monitored during construction to assist the control and management of construction dust discharges. The monitoring programme will be based on regular visual monitoring and routine inspections to ensure compliance with conditions relating to dust control. Adherence to dust management measures within the Air Quality Management Plan during construction will minimise the potential for adverse effects.

18.1. Introduction

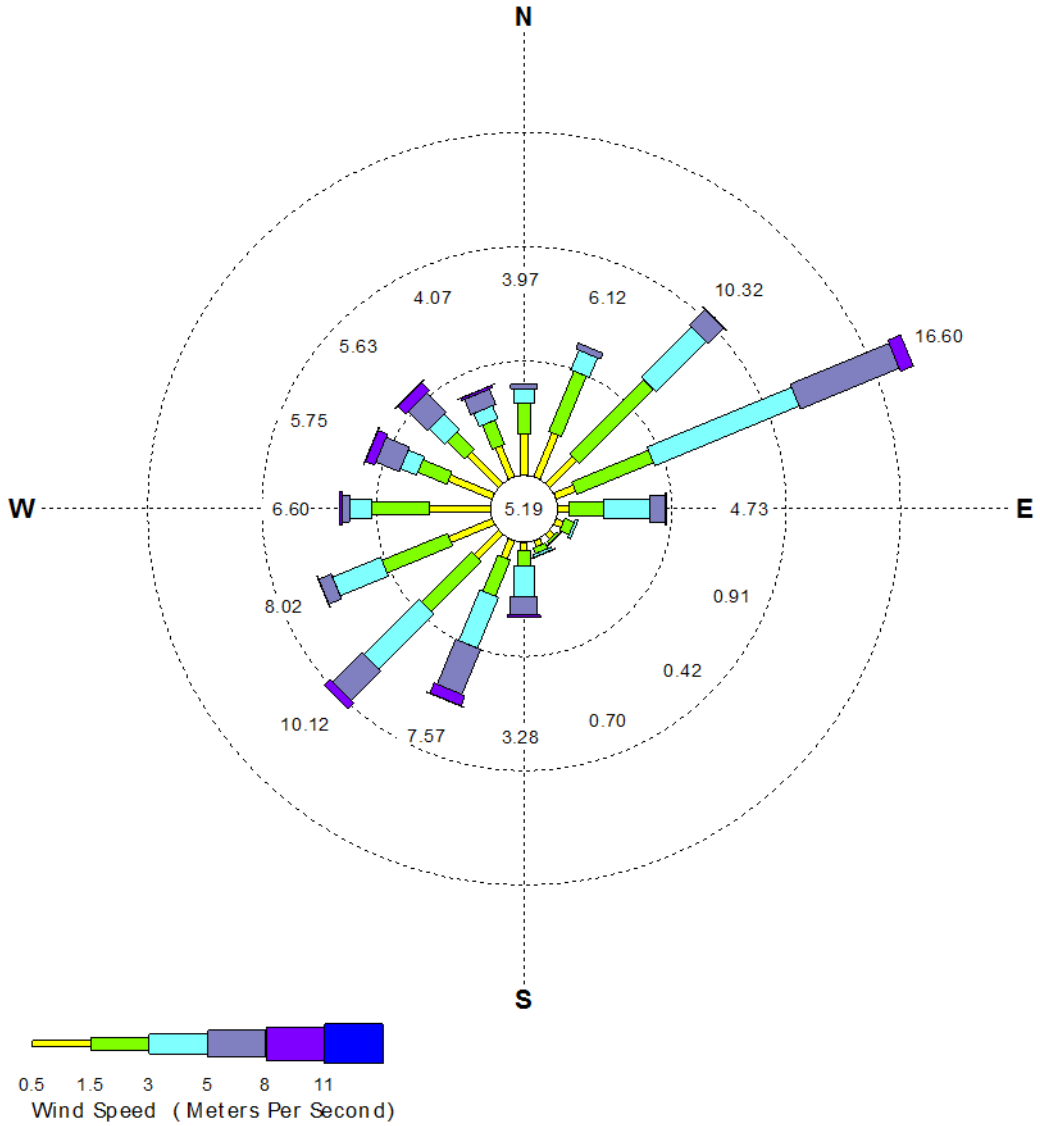
This chapter discusses the actual and potential air quality effects arising from the operation and construction of the Project. Operational effects arise from vehicle emissions from road users, whereas construction effects mainly relate to the generation of dust. The information contained in this chapter is based on Technical Report 10 - Assessment of Air Quality Effects, appended in Volume 3.

18.2. Existing air quality

In order to assess the air quality effects of the Project, information was gathered about existing air quality in the general area of the Project and about the location of potentially sensitive receptors.

Air quality is influenced by the prevailing meteorological conditions of an area, particularly wind speed and direction. Wind directions in the Project area are highly variable, with the predominant wind direction being from the northeast. Figure 50 presents a summary of wind speed and direction that is representative of the Project area and was derived from meteorological data at the Christchurch Airport (where conditions are expected to be comparable to those in the Project area). This information was then used in subsequent dispersion modelling for the Project.

Figure 50: Modelled wind speed and direction for Project area



The easternmost end of CSM2, between Halswell Junction Road and Springs Road, is within Christchurch Clean Air Zone 2 under the NRRP. The main purpose of Christchurch Clean Air Zone 2 is to provide a buffer zone to assist in reducing typical winter concentrations of PM_{10} in the Christchurch Clean Air Zone 1 to below 50 µg/ m^3. Christchurch Clean Air Zone 1, located further towards Christchurch city than the Project area, has been gazetted as an airshed under the National Environmental Standard for Air Quality (NES AQ).

No part of the Project is in any airshed that has been gazetted as an airshed under the NES AQ.

Most of the Project runs through essentially rural areas, with the exception of the southernmost part of MSRFL, which is on the northern edge of Rolleston, immediately adjacent to a residential

area. Therefore, the Lincoln monitoring site is considered to be the most representative of ambient air quality in the Project Area. In contrast, both the Hoon Hay and Hornby monitoring sites are located in established residential areas, within Christchurch Clean Air Zone 1, and are likely to be significantly impacted by emissions from solid-fuelled home heating, as is the Papanui monitoring site.

Table 31 presents a summary of background concentrations of PM_{10}, NO_2 and CO used for this assessment. ECan's Lincoln site was used for PM_{10} concentration and the Papanui site was used for NO_2 and CO, which were not monitored at the Lincoln site. The ambient background concentration of benzene has been assumed to be zero.

Table 31: Summary of background concentrations of PM_{10}, NO_2 and CO

Parameter	Average period	Background concentration	NES threshold
PM_{10}	24 hour	30 µg/ m^3	50 µg/ m^3
NO_2	1 hour	63.5 µg/ m^3	200 µg/ m^3
	24 hour	29.3 µg/ m^3	100 µg/ m^3
CO	1 hour	8.2 mg/m^3	30 mg/m^3
	8 hour	5.4 mg/m^3	10 mg/m^3

18.3. Sensitive receptors

The MfE's Good Practice Guide for Assessing Discharges to Air from Land Transport (2008) recommends assessing the air quality effects of a proposed road on identified sensitive receptors. These are people who are generally regarded to be likely to be more sensitive than the general population to vehicle exhaust emissions. Sensitive individuals are considered to include children and the elderly. Sensitive land use receptors include childcare and early learning facilities, schools, hospitals and residential care homes. In addition, areas of open space or parks used for recreational activities are classified as being receiving environments of high sensitivity.

There no schools, pre-schools, residential healthcare or retirement accommodation) within 200m of any part of the Project, although there are a number of residential dwellings within 100m of several sections of the Project.

All residential premises identified from the rates database within 200m of the Project were considered in this assessment, excluding those located on properties that have been identified for complete purchase by the Crown for this Project, for reasons other than air quality effects. Locations of sensitive receptors in the vicinity of each road section are discussed below, while

maps illustrating the locations of all selected sensitive receptors are included in Technical Report 10:

- Main South Road – 550m north of Rolleston Drive to Weedons Road (interchange):
  - this is the only section of the Project where large numbers of residential receptors are located – residential properties along Marlowe Place and the Living Z zoned land (currently undeveloped) to the northeast of Marlowe Place.
- Main South Road – Weedons Road (interchange) to CSM2:
  - there are a number of sensitive receptors located within 200 m of this section of Main South Road).
- CSM2 – Main South Road to Shands Road interchange:
  - there are a limited number of sensitive receptors located within 200m of this section of CSM2, mainly in the vicinity of Waterholes Road and Blakes Road. The closest of these receptors is located approximately 60m from the edge of the proposed alignment of CSM2. The south eastern corner of the Claremont subdivision is just within 200m of the alignment.
- CSM2 – Shands Road interchange:
  - there are a small number of sensitive receptors located within 200m of this section of CSM2, in the vicinity of Marshs Road and Halswell Junction Road. The closest of these receptors is located on Marshs Road, approximately 30m from the edge of the proposed alignment of CSM2, while a small part of the northern corner of the Aberdeen subdivision is within 100m-200m from the southbound off-ramp.
- CSM2 – Shands Road interchange to Halswell Junction Road:
  - there are a limited number of sensitive receptors located within 200m of the Shands Road Intersection, all in the vicinity of Marshs Road and Shands Road. The closest of these receptors is located on Shands Road, approximately 60m from the edge of the southbound on-ramp.

18.4. Operation of the Project

18.4.1. Dispersion modelling

Dispersion modelling has been undertaken to assess the pollutant levels associated with the operation and changes in the existing road network as a result of Project. The model, which inputs predicted traffic flows from the Project traffic model, predicts future levels of PM_{10}, NO_2, CO and benzene in the Project area for a total of four scenarios– two different scenarios for each of the years 2016 (the assumed year of opening) and 2026, as follows:

- 'Do Minimum' assumes that all other road improvement projects in the surrounding area have been completed except for the Project;
- 'With Project' (CSM2 + MSRFL) assumes that both CSM2 and MSRFL have been completed, along with all other road improvement projects in the surrounding area.

For each of the assessment years, the 'Do Minimum' scenario has been taken to represent the air quality 'baseline' for that year – i.e. ground level concentrations of air pollutants arising from the Project can be compared to predicted ground level concentrations in the absence of the Project, but including the effects of all other roading projects and changes to the vehicle fleet.

18.4.2. Dispersion modelling results

The results of dispersion modelling indicate that only one link within the Project (CSM2 between Shands Road Intersection and Halswell Junction Road) is likely to cause the concentration of air pollutants to exceed any of the MfE Tier 2 significance criteria. This relates to the concentration of PM_{10} at receptors located within 50 m of the centreline of CSM2 which is 2.9 µg/ m^3. This is slightly higher than the MfE Tier 2 significance criteria of 2.5 µg/ m^3. However, it is considerably less than the NES AQ of 50 µg/ m^3. The maximum increase in PM_{10} concentrations at the closest sensitive receptor to this section of the alignment (approximately 60m from the centreline) is 1.4 µg/m^3. In all other locations, the maximum predicted cumulative concentration of PM_{10} at any receptor is less than the MfE Tier 2 significance criterion.

The maximum predicted cumulative PM_{10} concentration is 32.9 µg/ m^3 including background, of which the contribution from the Project is 2.9 µg/ m^3.

While predicted maximum incremental concentrations of NO_2 slightly increase in all of the 'with Project' emission scenarios, at all receptors the concentration will be less than the MfE Tier 2 significance criteria of 20 µg/ m^3 as a 1 hour average and 5 µg/ m^3 as a 24 hour average. Furthermore, NO_2 concentrations at all locations are considerably less than the NES AQ of 200 µg/ m^3.

The maximum predicted increase in 1-hour average CO concentrations at any identified residential receptor is less than the MfE Tier 2 significance criteria of 1 mg/m^3 as an 8-hour average, in all modelled scenarios. Predicted cumulative 1-hour average CO concentrations for each of the modelled emission scenarios are all considerably less than the NZAAQG of 30 mg/m^3, and also less than the 8-hour average NES AQ of 10 mg/m^3.

The results indicate that discharges of air pollutants caused by vehicles using CSM2 and MSRFL will make only minor contributions to concentrations of PM10, NO_2 and CO in the surrounding area. In no case are vehicle exhaust emissions predicted to contribute more than 5.7% of the NES AQ threshold for PM10, 6.9% of the NES AQ threshold for NO_2 the NES AQ, or 2.0% of the NZAAQG for CO.

18.4.3. Regional cumulative effects

Regional scale impacts on the wider airshed will be insignificant, despite a slight increase in vehicle kilometres travelled overall. This is due to improvements in traffic flow through the Project area, combined with the continuing improvements in vehicle emissions generally. The Project will not affect ECan's ability to issue future resource consents within the airshed or to achieve compliance with the NES AQ.

Total heavy commercial vehicle movements within the region are also forecast to increase regardless of whether the Project is built or not (refer Assessment of Traffic and Transportation Effects). Heavy commercial vehicles are higher emitters of pollutants per vehicle kilometre travelled than light vehicles.

18.4.4. Vehicle emissions from traffic on other roads as a result of the operation of the Project

Although vehicle numbers on Shands Road and Marshs Road are predicted to increase significantly for the 'CSM2 only' and 'CSM2 + MSRFL' scenarios (as a consequence of traffic joining and leaving CSM2 at the Shands Road intersection), maximum predicted ground level concentrations of air pollutants at residential receptors located close to these roads will still be well below the relevant health-based assessment criteria.

Changes in traffic volumes on local roads are, including the significant increases in vehicle numbers on some local roads (e.g. Shands Road and Marshs Road) are unlikely to have a significant impact on concentrations of air pollutants at nearby receptors. Where the traffic volumes are expected to decrease on local roads, in consequence there should be a proportionate reduction in in vehicle emissions and reduced exposure to vehicle-related air pollutants for residents in the vicinity of those roads.

18.4.5. Summary of anticipated operational effects

Maximum ground level concentrations of all pollutants are predicted to increase between each of the modelled years (2016, 2026, 2041), as a consequence of increasing vehicle numbers.

Notwithstanding the potential exceedances of the 'acceptable' category in the Canterbury RAAQT, it can be inferred that discharges of air pollutants caused by vehicles using MSRFL and CSM2 are also unlikely to cause more than minor adverse effects on human health or the environment in the surrounding area.

In general, maximum ground level concentrations for any given year are predicted to be highest in the 'CSM2+MSRFL' scenario and lowest in the 'Do Minimum' scenario. This is most probably due to the increased vehicle numbers associated with the 'CSM2+MSRFL' scenario compared to either the 'CSM2 only' or Do Minimum' scenarios.

18.5. Construction of the Project

The following aspects of construction have the potential to cause adverse air quality effects:

- dust from earthworks and road construction; and
- vehicle exhaust emissions.

18.5.1. Dust from earthworks and road construction

The construction of the Project will entail relatively large scale earthworks. Exposed earthworks can be a significant source of dust.

Dust can affect human health and plant life along the edge of the earthworks area, can be a nuisance to the surrounding public, and can contribute to sediment loads by dust depositing in areas without sediment control measures. Sediments deposited on sealed public roads can also result in a dust nuisance. Rainfall, water evaporation and wind speed are meteorological conditions having the greatest effect on dust mobilisation.

Dust discharges from earthworks typically fall into the larger particle sizes, generally referred to as deposited particulates. These generally have minimal physical health impact (particles have only limited penetration into the respiratory tract), but may cause nuisance effects. This includes excessive dust deposits on houses, cars, and washing and excessive dust within houses.

Potential sources of dust which are able to cause nuisance beyond the site boundary during adverse weather conditions if adequate controls and mitigation measures are not adopted include:

- dust from roads and access areas generated by trucks and other mobile machinery movements during dry and windy conditions;
- excavation and disturbance of dry material;
- loading and unloading of dusty materials to and from trucks; and
- stockpiling of materials including material placement and removal.

Dust may be generated from dry undisturbed surfaces at wind speeds greater than 5 -10 m/s (10 – 20 knots). Wind can transport dust mobilised from dry surfaces by machinery or truck movements or mechanical disturbance. Dust generation by truck and machinery movements in dry conditions is a function of vehicle speed, number of wheels and vehicle size. Judder bars or humps to reduce vehicle speed are not recommended as they can cause spillage of load and may damage loaded vehicles.

Unpaved roads and yard areas can be very dusty during dry weather. This can be aggravated if surfaces are allowed to get muddy during wet weather, since these eventually dry out and then become ground-up by vehicle movements.

Carrying out extensive earthworks during dry conditions exposes large areas to the effects of wind while being disturbed by machinery. Excavated areas left exposed during dry windy conditions can be significant sources of dust. Stockpiling of topsoil and subsoil and, in particular, dry dusty materials may also be major dust sources during stockpile formation when exposed to strong winds.

18.5.2. Emissions from construction vehicles

Construction vehicles have the potential to cause adverse air quality effects at neighbouring sensitive locations. Excessive smoke and odour from diesel-fuelled heavy vehicles, generators and other machinery is primarily caused by poor engine maintenance.

The CEMP describes measures to be undertaken to control and monitor vehicle emissions, including requirements to maintain vehicles and equipment in accordance with manufacturer specifications and immediately service units discharging excessive exhaust smoke.

Adherence to the CEMP practices for construction vehicles will ensure that all potential adverse effects associated with emissions will be adequately managed.

18.5.3. Summary of anticipated construction effects

The assessment estimates that only premises within approximately 100m of significant dust sources would be considered as potentially impacted by the effects of construction dust. Active management is required to prevent (if possible) or otherwise minimise the effects of dust emissions on these premises. Machinery emissions are expected to be minor.

18.6. Measures to avoid, remedy or mitigate construction dust effects

Mitigation measures will be required to ensure dust effects are not significant. The following measures are recommended in the Technical Report and proposed by the NZTA:

- **Dust suppression** - Dust discharges from activities can be significantly reduced by using water sprinkler systems during dry conditions. Adequate dust suppression is necessary to provide reasonable working conditions as well as minimising impacts upon sensitive receptors beyond the boundary of the site. Water will be applied to haul roads via water trucks and sprinklers in sufficient quantity to suppress dust but to avoid generating muddy conditions or sediment runoff. Appropriate application is uniform at a rate consistent with the evaporation rate. Detergents or hydrocarbon based liquids will not be used for dust suppression;
- **Water sprinklers** - sprinkler systems will be used during dry conditions. Water will be applied to haul roads via water trucks and sprinklers in sufficient quantity to suppress dust but to avoid generating muddy conditions or sediment runoff;
- **Access road and working area base** - Semi-permanent working areas and construction site access roads will be constructed with an appropriate base, kept metalled or sealed if on site for a significant period, and kept damp using watering

trucks or fixed sprinkler systems. Metalled areas will also prevent the creation of mud in winter;

- **Extent of earthworks** – The extent carried out during dry conditions will be limited as far as practicable to a manageable surface area to minimise dust generation while being disturbed by machinery;
- **Excavated** areas left exposed during dry windy conditions and liable to be dusty will be watered as necessary, or preferably stabilised e.g. through metaling, grassing or mulching;
- **Stabilisation of cleared areas** - Cleared areas not required for construction, access or for parking, if liable to cause excessive dust during windy conditions, will be stabilised e.g. through metaling, grassing, mulching or the establishment of vegetative cover;
- **Stockpile dampening and covering** - sand, soil and other materials liable to dry out and generate significant dust during windy conditions will be monitored and options such as dampening, allowing piles crust over, or covering, will be carried out as appropriate. Stockpile margins will be defined to minimise spread onto access areas;
- **Drop heights** – Stockpile drop heights will also be minimised to the extent practicable during stockpiling activities to minimise dust generation;
- **Plant and vehicle maintenance and management** -Vehicles will be appropriately maintained to minimise exhaust smoke and odour, and tailgates will be secure and all loads covered. Material tracked out from the site onto public roads, if significant, will be removed by suction sweeper;
- **Vehicle and tyre wash-down** - Vehicles leaving site from unsealed surfaces will be washed down to remove dust and/or coagulated material where necessary. This can occur at selected site exits either manually or automatically via the use of high pressure water hoses, jets or water assisted brushing. Detergents or hydrocarbon based liquids will not be used for vehicle cleaning;
- **Vehicle speed limits** -The imposition of vehicle speed limits is a practical measure to minimise dust emissions caused by construction traffic. The maximum speed limit on site will be 10 km/h or less;
- **Truck loading and unloading** - Loading and unloading of trucks will be conducted in a manner which minimises the discharge of dust. This includes the minimisation of drop heights during the loading of vehicles to minimise dust generation;
- **Material spills** – Significant spills of materials that may cause dust when dry will be collected, swept, scraped up or hosed down as soon as practicable; and
- **Wind break fencing** – Temporary wind break fencing of suitable length, height, porosity and orientation reduces prevailing wind speed and therefore the impact of dust on surrounding areas.

These mitigation measures will be implemented through an AQMP. A draft AQMP is included in Volume 4. In addition, these measures will be outlined during contractor induction training.

18.7. Monitoring during construction

A dust monitoring programme will be implemented during the construction and earthworks phases of the development, which shall form part of the AQMP, and will include but not be limited to the following:

- visual inspections of land adjacent to the site, construction exits and adjoining roads for the presence of dust deposits.
- checking weather forecasts for strong winds and rainfall.
- visual inspections of all unsealed surfaces (including earthworks sites) for dampness and to ensure that surface exposure is minimised.
- visual inspections of all sealed surfaces to ensure that they are clean and all spillages have been cleared.
- visual inspections of exposed earthworks sites, stockpiles and other dust generating activities to ensure they have been dampened, enclosed, covered, or stabilised. Ensure stockpile height is less than 3 m.
- inspecting watering systems (sprays and water carts) to ensure equipment is maintained and functioning to effectively dampen all exposed areas.
- inspecting wheel wash equipment to ensure effective operation.

A draft AQMP is included in Volume 4. The recommended method for monitoring deposited dust is visual monitoring. In the instance of strong winds, emissions of dust offsite or following a complaint, additional monitoring may be required.

18.8. Conclusion

Effects on air quality from the operation of the Project have been assessed as very minor, although maximum ground level concentrations of all pollutants predicting to increase between each of the modelled years (2016, 2026), as a consequence of increasing vehicle numbers. It can be inferred that discharges of air pollutants caused by vehicles using MSRFL and CSM2 are unlikely to cause more than minor adverse effects on human health or the environment in the surrounding area. As such, no monitoring or mitigation is proposed.

The assessment estimates that only premises within approximately 100m of significant dust sources would be considered as potentially impacted by the effects of construction dust. Active management will be undertaken to prevent (if possible) or otherwise minimise the effects of dust emissions on these premises. Compliance with proposed mitigation measures set out in section 18.6 and monitoring implemented through the AQMP will mitigate construction effects of the Project to an acceptable level.

19. STORMWATER & GROUNDWATER

Overview

The key stormwater issues addressed through the proposed stormwater design is the collection and disposal of stormwater generated within the Project, the passage of stockwater race flows beneath the Project and the passage of overland flows generated in the upstream catchment beneath the Project.

The proposed collection and disposal system typically consist of roadside swales and stormwater disposal points to land at regular intervals along the Project. Additional first flush basins are proposed in areas identified as requiring treatment in the NRRP. The design standard for the highway drainage system is the 100 year Annual Recurrence Interval (ARI) rainfall event including an allowance for climate change.

Disposal to land has the potential to reduce downstream flooding, due to the reduction in the area, which currently overflows to the stockwater races in heavy rain and the reduction in outflow to Montgomery's Drain and Upper Knights Stream. This will have a positive effect.

The groundwater has been a key influence in the design of the Project, as it has dictated the vertical level for the road, preventing the placement of the motorway into a cutting. The design requires intervention to control the groundwater level at two specific locations. For the Robinsons Road overpass (where the local road passes under the highway), intermittent pumping of groundwater is proposed. Also, where CSM2 connects with CSM1, in extreme groundwater and/or rainfall events or combinations thereof, dewatering may be required, depending upon predicted changes to groundwater levels as a result of future groundwater level increases unrelated to the Project. The design appropriately allows for these dewatering requirements. The resulting environmental effect on Upper Knights Stream will be minor.

Given stormwater arrangements for the existing State highway, the proposed stormwater treatment process will improve the receiving environment water quality. Overall, the effect of the discharges on groundwater quality will be minor. A number of mitigation measures are recommended in relation to stormwater management.

19.1. Background

The information contained in this chapter is based on Technical Report 3, appended in Volume 3. It describes the stormwater infrastructure proposed for the Project and the effect that it will have on the environment.

There is little existing formal stormwater drainage infrastructure along the length of the proposed works. Untreated existing runoff can easily enter the environment in the following areas:

- isolated soak pits along Main South Road;

- the swale and soak pit system constructed adjacent to the passing lanes outside of Rolleston; and
- the stockwater race network;

However as part of recent works there are stormwater treatment facilities as part of, or in conjunction with the CSM1 project, being:

- the pond adjacent to Meadow Mushrooms (known as the Mushroom Pond) and the Lee Pond; and
- the works proposed in the SWAP being the Owaka Basin and the culvert beneath CSM1 to accommodate discharge from the Owaka Basin to the Wilmers Road Quarry Disposal Area.

The proposed design standard for the highway drainage system is the 100 year Annual Recurrence Interval (ARI) rainfall event including an allowance for climate change, as recommended by the MfE in the local body guidance manual[80].

19.2. Existing hydrological environment

19.2.1. Hydrology

The majority of the catchment crossed by the Project does not directly contribute to any natural watercourse. Surface water typically ponds in local depressions on the catchment surface and soaks to land or evaporates. In larger events, overland flows have the potential to flow along surface flow paths. These overland flow paths are often intercepted by field drains, irrigation channels and the existing stockwater race network, which either eventually discharge to the Halswell River or discharge to land via engineered soak pits.

Stockwater races perform a land drainage function during heavy rainfall events. During or prior to such events, the upstream stockwater race intakes are closed or shut off. SDC advises that runoff can exceed water race capacity and some localised flooding does occur.

The section of CSM2 about Halswell Junction Road is part of the Halswell River catchment. This area drains to the Halswell River via Montgomery's Drain and Upper Knights Stream. Upper Knights Stream is permanently dry at the upstream end. There is a history of flooding in the Halswell catchment where the critical duration storm is up to 60 hours in length.

The Project crosses existing water races. Generally, the stockwater races will be piped beneath the Project alignment, to maintain the stock water race function for downstream users and to provide for the secondary land drainage function of the races.

[80] Ministry for the Environment, July 2008, Preparing for Climate Change, A guide for Local Government

19.2.2. Existing infrastructure and natural features

Typically, the existing road drainage for Main South Road is intermittent with sheet flow off the road discharging into adjacent properties and occasionally directed by informal swales. Formal soak pits can be found on the rural roads in the area and along the existing Main South Road.

Park Lane to Weedons Ross Road

The key existing stormwater features in this section include:

- the passing lane between Rolleston and the Weedons Ross Road intersection where a swale and soakage system has been constructed (with gravel soak pits at approximate 200m centres). A series of shallow swales are observed on both sides of the carriageway draining to land.

The catchment of this stretch of SH1 is gently undulating farmland sloping from south west to north east. There are minimal impervious surfaces in the catchment area and the small portion of surface water runoff will be captured by the existing stockwater race at Weedons Ross Road.

Upstream of the rail embankment is a large catchment area. The rail embankment effectively forms a barrier to overland flow and there is little opportunity for this potential flow to pass under the rail in a very limited number of generally small diameter culverts. Overland flow in the land between the railway and SH1 concentrates to a low point some 500 m south of Weedons Road. Initially soakage to land will occur however when exceeded then this eventually overflows and discharges to the highway drainage system. In events exceeding the capacity of the soak pit, flooding of the current stormwater infrastructure would occur.

Weedons Ross Road to MSRFL/CSM2

There are two existing stockwater races in the vicinity of Weedons Ross Road:

- one adjacent to Weedons Ross Road: this race continues to the South-East running parallel to Weedons Ross Road; and
- a second that arrives to the North-West of SH1 chainage 3175 m: this race turns east and conveys parallel to SH1 to chainage 3475 m where it crosses below the existing carriageway heading south into farmland.

Six potential overland flow paths have been identified from the west. These are located in low points in the existing topography and have the potential to convey overland flow in extreme storm events to the highway drainage system.

The catchment of this stretch of SH1 is gently undulating farmland sloping from south west to north east. There are minimal impervious surfaces in the catchment area and a portion of surface water runoff will be captured by the network of existing stockwater races.

There is a super elevation[81] in the highway carriageway adjacent to, and just past, the Weedons Ross Road interchange. Surface water runoff from the existing road surface will flow to the north only, captured by the stockwater race and pass under the existing highway.

MSRFL/CSM2 to Blakes Road

The proposed CSM2 alignment crosses a number of surface flow paths (e.g. old river braids), which are likely to carry overland flows in extreme events.

An existing stockwater race flowing south runs along the west side of Robinsons Road, crossing below SH1 at approximately chainage 350m.

Various stockwater races will be encountered with the new alignment and these will be incorporated into the stormwater drainage design to ensure that their function and performance will not be adversely affected.

The required excavation depths for the Robinsons Road overpass are significant (approximately 6.5 m). The depth of the excavation forms a significant design constraint, especially with regards to stormwater disposal and compliance with the NRRP (1 m clearance between disposal depth and highest inferred groundwater depth).

Runoff from the site on the north west corner of the Robinsons Road intersection (beyond the Project footprint) may be contaminated and therefore should not be allowed to reach any proposed stormwater treatment or conveyance areas within the proposed CSM2 drainage layout.

Existing stockwater races will require diversion or need to be piped below the CSM2 alignment.

Blakes Road to Springs Road

The Marshs Road stockwater race currently intercepts two potential overland flow paths originating from industrially zoned land. Runoff from catchments upstream of the Motorway flow to the Project area. This occurs now and is independent of the Project. The Project proposes to capture these flows and divert these flows to a realigned Marshs Road stockwater race.

Existing stockwater races and intercepted overland flow paths will require diversion or need to be piped below the CSM2 alignment.

Springs Road to CSM1

On the north west side of the CSM1 alignment and Halswell Junction Road, is the existing pond adjacent to Meadow Mushrooms (part of the CSM1 works).

Montgomery's Drain runs parallel with Halswell Junction Road starting near the Halswell Junction Road roundabout and heading south east for approximately 550 m before entering a piped

[81] Super elevation is the raising of the outer edge of the road providing a banked turn, thus allowing vehicles to travel through the curve at higher speeds than would otherwise be possible if the surface was flat or level.

system. The 750 mm diameter pipe heads away from Halswell Junction Road to the south where it discharges to an open channel which continues to the south before heading south-east near the end of John Paterson Drive. This open channel then discharges to the Upper Knights Stream.

The CCC Owaka Basin stormwater treatment pond (constructed concurrently with CSM1) has been designed to capture overflows from the Halswell Junction Road Pond (via Montgomery's Drain) and provide additional stormwater treatment. The normal discharge from the Owaka Basin is to the north (beneath CSM1) to the Wilmers Quarry site in events up to the 50 year design storm. Once the capacity is exceeded, the system will overflow south under Halswell Junction Road into Montgomery's Drain and Upper Knights Stream.

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.

The Project will cross Montgomery's Drain which runs parallel to Halswell Junction Road. The drain collects flows from the existing Halswell Junction stormwater retention basin and eventually discharges into the Halswell River. Siphoning of this drain beneath the Project alignment will be required as well as diverting the drain to the CCC Owaka Basin (in order to meet with the CCC design set out in the SWAP).

19.3. Design philosophy

This section provides a summary of the stormwater design philosophy adopted for the Project. Full details can be found in Technical Report 3.

There are four key stormwater issues which need to be addressed with the proposed infrastructure:

- collection and disposal of stormwater generated within the Project;
- passage of stockwater race flows (both wet and dry weather) beneath the Project;
- passage of overland flows generated in the upstream catchment beneath the Project; and
- adaptation and integration of installed detention and collection systems.

The key elements of the stormwater design philosophy, as outlined in Chapter 4 include:

- separation of the Project drainage system from the surrounding surface water and stormwater systems, and from stockwater races;
- stopping overland flows from entering the Project drainage system and flooding the high speed carriageway;
- design for the 100 year ARI event;
- designing for rainfall intensity as per the Waterways, Wetlands and Drainage Guide (WWDG) (CCC, 2011 update). This update incorporates the effects of climate change as recommended by MfE;

- the Project vertical alignment has only two sag or low points with considerable contributing area, located at Weedons Ross Road and Halswell Junction Road;
- treatment of stormwater will be achieved primarily by via sheet flow over the grassed verge and treatment swales;
- in addition and where required by the NRRP (in the less than 6 m to groundwater zone), first flush basins are also included; and
- detention ponds (Maize Maze pond and Ramp ponds).

The collection and disposal system will typically consist of roadside swales and stormwater disposal points at regular intervals along the Project. Additional first flush basins will be required at the eastern end of the Project. This area is where the NRRP prescribes pre-treatment for stormwater prior to disposal because it is within the zone there is less than 6 m to the groundwater zone (as indicated on the planning maps). There will be two pond areas adjacent to Halswell Junction Road (the Maize Maze Pond and the Ramp Ponds) to collect stormwater from the Project in the immediate vicinity.

The stockwater races will be conveyed beneath the Project via inverted siphons. The siphons will consist of a smaller diameter pipe to convey dry weather or 'typical' flows, with a second larger diameter pipe to pass flood flows beneath the Project.

The Project alignment also crosses a number of adjacent stream channels and depressions. In extreme rain events these have the ability to convey large overland flow. A second series of siphon pipes will convey this flow under the motorway to the downstream side of the motorway.

There are a number of locations where discharge of stormwater to land will occur:

- infiltration through the base of the swales;
- discharge at the Project highway drainage soak pits (after swale treatment);
- discharge through the Project drainage pits following pre-treatment as prescribed in the NRRP rule WQL6 (to be used in areas where it is less than 6 m to the groundwater zone (as indicated on the planning maps);
- in the Project ponds located at Robinsons Road and Halswell Junction Road (the Maize Maze Pond and Ramp Ponds;
- the overland flow soak pits intended to discharge flows which cannot be passed beneath the Project both within and outside of the area mapped with groundwater depths greater than 6m;
- the base of the overland flow siphon inlet and outlet structures; and
- the base of the secondary siphon inlet and outlet structures at stockwater race crossings.

The locations where discharge of stormwater and groundwater to surface water will occur, predominately when the design rainfall and / or groundwater levels are exceeded, have been identified in Figure 51 below, with discharge descriptions and frequency outlined in Table 32.

Figure 51: Stormwater discharge to surface water locations

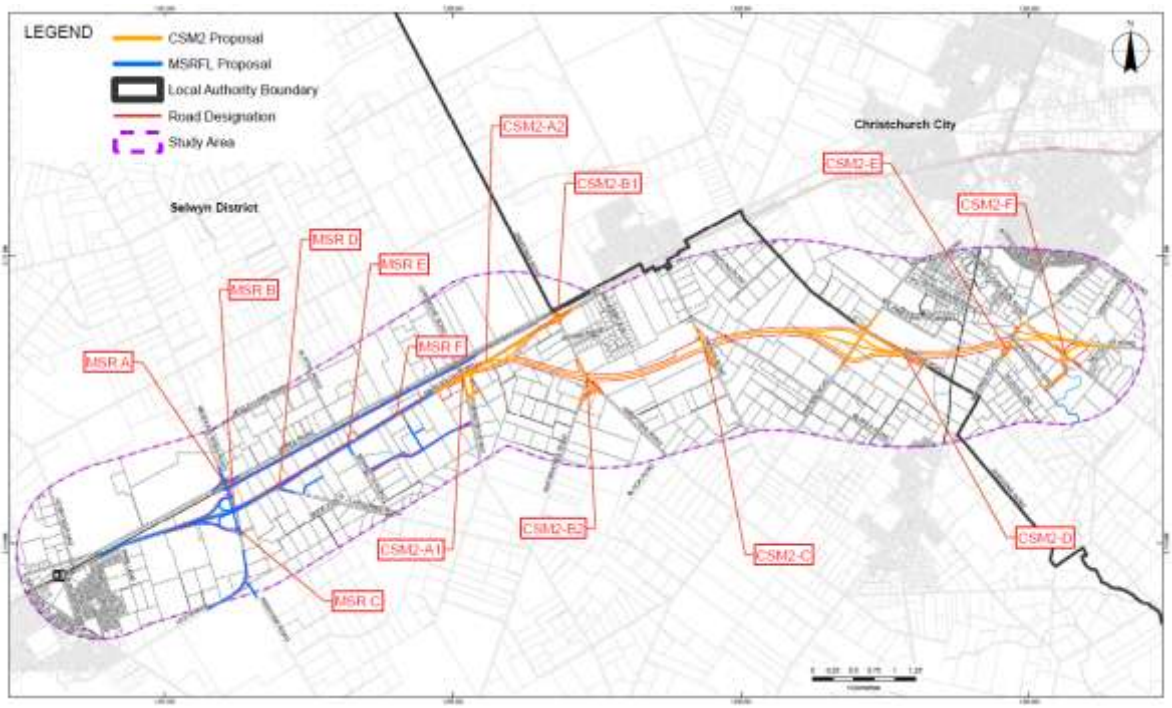


Table 32: Description and frequency of discharges shown in Figure 50

Discharge location number	Description	Discharge frequency
MSRFL		
MSR A	Discharge from local road to stockwater race at Weedons Ross Road	Rare - large storm only
MSR B	Discharge from embankment / swale overflow to stockwater race at Weedons Ross Road	Rare - large storm only
MSR C	Discharge from embankment / swale overflow to stockwater race at Weedons Road	Rare - large storm only
MSR D	Discharge from swale overflow to stockwater race at Larcombs Road	Rare - large storm only
MSR E	Discharge from swale overflow to stockwater race at Berketts Road	Rare - large storm only

Discharge location number	Description	Discharge frequency
MSRFL		
MSR F	Discharge from swale overflow to stockwater race	Rare - large storm only
CSM2		
CSM-A1	Discharge of groundwater to stockwater race at Robinson Road	Intermittent and only after CPWES effects felt
CSM-A2	Discharge from embankment to stockwater race approx 100m north Robinson Road	Rare - large storm only
CSM-B1	Discharge from swale overflow to stockwater race at Waterholes Road (Adj SH1 intersection)	Rare - large storm only
CSM-B2	Discharge from embankment to stockwater race at Waterholes Road (Adj CSM2 intersection)	Rare - large storm only
CSM-C1	Discharge from embankment to stockwater race at Trents Road	Rare - large storm only
CSM-C2	Discharge from existing local road (Blakes Road) to stockwater race at Blakes Road	Rare - large storm only
CSM-D	Discharge from embankment to land drainage race at Marshs Road	Rare - large storm only
CSM-E	Discharge from embankment to land drainage race at Springs Road	Rare - large storm only
CSM-F1	Discharge of pond overflow to Montogomery's Drain adjacent Halswell Junction Road	Intermittent
CSM-F2	Discharge of groundwater to Upper Knights Stream adjacent John Paterson Drive	Regular after effects of CPWES

19.3.1. Design rainfall

Rainfall figures incorporating climate change have been used in the design of the Project. The predicted mid-range effects of climate change were added to the 100 Year ARI rainfall event to ensure that the assessment of effects would be appropriate for the foreseeable life of the asset being constructed (i.e. 2.1℃ to 2090). Subsequent to the initial design work for the Project, CCC released a 2011 update to the WWDG that incorporates the effects of climate change in line with the MfE (2008) recommendations.

For the determination of flows within and across the Project, the 24 hour rainfall depth has been used to determine average flow rates. Further details can be found in Technical Report 3.

19.3.2. Design runoff rate

The design rainfall figures have been used in conjunction with the United States Soil Conservation Service (SCS) method to establish the peak runoff rate from the Project and from the adjacent rural catchment.

The peak discharge for the critical duration event has been established using the unit hydrograph method, as specified in Auckland Regional Council Guidelines for Stormwater Runoff Modelling in the Auckland Region, TP 108, April 1999.

The proposed discharge rates for the Project are set out in Table 33 below.

Table 33: Proposed stormwater discharge rates

Storm Profile	Return Period	Q100	Q100	Q100	Q10	Q2
	Duration	30 min	2 hr	24 hr	24 hr	24 hr
MSRFL						
Runoff rate from 200m typical section of swale	Peak Runoff (l/s)	69	45	9	5	3
(Half carriageway plus berm area incl swale)	Disposal Rate (l/s)	5	5	5	5	5
	Discharge Volume (m^3)	160	300	750	470	280
CSM2						
Runoff rate from 300m typical section of swale	Peak Runoff (l/s)	118	85	12	7	4

Storm Profile	Return Period	Q100	Q100	Q100	Q10	Q2
	Duration	30 min	2 hr	24 hr	24 hr	24 hr
(Half carriageway plus berm area incl swale)	Disposal Rate (l/s)	33	33	33	33	33
	Discharge Volume (m^3)	290	560	1030	630	370
Local roads	Peak Runoff (l/s)	50	33	5	3	2
Runoff rate from 200m typical section of swale	Disposal Rate (l/s)	5	5	5	5	5
	Discharge Volume (m^3)	120	220	480	290	170

19.3.3. Overland flows

Site design will aim to reduce the effect of the Project on overland flow and runoff conditions. The natural and existing drainage network will be utilised as much as possible and only diverted or re-formed should it be absolutely necessary.

The area around the inlets to the overland flow siphons will be lowered to construct a settlement area (to reduce the volume of silt entering the system) and to limit the elevation of the inlet. The motorway cross drainage will be designed to capture overland flows and to pass this flow beneath the alignment.

In addition to the overland flow siphons, cross drains will be provided within the Project drainage system at a higher level, with entry sumps just below the height of the top of the bund in the swale.

It is expected that during the detailed design process and/or the construction phase there may be opportunity to rationalise the number of newly identified and/or currently proposed crossing points. It is proposed that any modifications to the design adhere to the following criteria:

1. an investigation into the upstream effects is made in conjunction with the design of siphons under the Project alignment;
2. a design process is undertaken to avoid any increase in upstream habitable floor level flooding in events up to the 50 Year ARI 24 hour event; (i.e. zero afflux);
3. a design process is undertaken to avoid any increase more than 250 mm in flooding depth for events up to the 100 Year ARI event (i.e. max afflux level of 250 mm);

4. an investigation of the downstream effects is made as a consequence of concentrating flow to a point discharge; and
5. a design process is undertaken to avoid any increase in downstream habitable floor level flooding in events up to the 50 Year ARI 24 hour event.

There are some isolated locations where siphon arrangements are not practical, such as the Shands Road and Weedons Ross Road interchanges. Soakage areas for disposal of overland flows have been proposed at these locations.

19.3.4. Stockwater races

Nine stockwater races cross the Project alignment. Many or all of these races are piped under the existing SH1 and local road network. Some of the races are in pipes at grade, with the balance depressed under the carriageway in pipes using the (inverted) siphon principle.

A series of proposed siphons will be used to convey stockwater races from one side of the MSRFL and CSM2 alignments to the other. A second parallel pipe has been proposed to maintain the land drainage function of the races and to prevent flooding immediately upstream of the crossing points.

A 'spillway' is proposed near the crest of the existing water race to allow the activation of the second, normally dry pipe. Thus after a significant rainfall event has passed, the secondary siphon pipe will drain to a short soakage trench and drain away leaving a dry pipe.

Closure of stockwater races is proposed in a limited number of locations. Given the likelihood of penetrating the porous subsoil layers, the races may have to be lined to prevent water loss.

19.4. Stormwater effects

19.4.1. Water quality

The disposal points proposed for the Project can be divided into two types:

- Road drainage disposal, where the catchment is limited to the road corridor (typical contaminant sources include: vehicle emissions, pavement wear, tyre wear, litter, spills and brake wear) and where runoff will be treated within the system prior to discharge; and
- Overland flow disposal, where the catchments are much larger but mostly rural (typical contaminant sources include: agricultural chemicals and fertilisers, animal faeces and silage leachate) and where runoff will be untreated prior to discharge but will likely to occur only in large rainfall events.

Vehicle emissions include volatile solids, hydrocarbons and pollutants generated by the everyday passage of vehicles. Tyre wear and vehicle corrosion all contribute, together with substances released from the wear of the paved surface.

The design philosophy includes separation of runoff from the Project, from the surrounding environment (overland flows, stockwater races and supply wells). The stormwater runoff from the Project will be treated as it flows through the grass verge and along the treatment swale, prior to soakage to land. This stormwater treatment process will improve the receiving environment water quality.

Estimated contaminant loads

The type and level of contaminants expected in the Project swales is assessed in Appendix F, Technical Report 3. The key findings from this assessment are set out below.

Contaminant loads have been assessed using two methods, the Auckland Council's Contaminant Load Model, 2006 and an approach recommended in the Moore's study[82] that is specific to zinc and copper load generation from motorways. The Moore's study approach is considered more accurate for these metals than the Auckland Council's version as that version has contaminant loads determined from central Auckland streets, which would be expected to be considerably higher relating to continual accelerating and braking, contributing to greater contaminant loads than is likely to arise from this Project.

Using these approaches, estimates for total suspended sediments (TSS), zinc, copper and total petroleum hydrocarbons (TPH) loads/year are as follows:

- TSS – 92,880 kg/year;
- Zinc (normal traffic) – 67.9 kg/year;
- Zinc (congested traffic and intersections) – 150.3 kg/year;
- Copper (normal traffic) – 11.2 kg/year;
- Copper (congested traffic and intersections – 23.01 kg/year; and
- TPH – 5,832 kg/year.

Assuming a mix of congested traffic (25%) and normal traffic (75%) the annual loads for the Project are (from the Moore's study) the following:

- Zinc – 89.12 kg/year; and
- Copper – 14.2 kg/year.

It is noted that pH has been measured on a number of projects internationally and while there can be variations from about 5.1 – 8 pH units, pH is generally a nearly neutral solution from highways, so should not be a concern for this Project.

Swales have been the subject of numerous studies both in New Zealand and internationally. The Moore's study determined removal rates for total copper and zinc. Contaminant removal of TSS by swales was done using the Auckland Council's TP 10, which is 75%. The NZTA stormwater

[82] Moores, J., Pattinson, P., Hyde, C., March 2010, Enhancing the control of contaminants from New Zealand's Roads: Results of a road runoff sampling programme, National Institute of Water and Atmospheric Research Ltd., New Zealand Transport Agency research report 395.

treatment standard uses a similar design approach and should achieve the same treatment expectations.

Table 34 provides removal expectations for the proposed swales for the contaminants listed above.

Table 34: Contaminant removal estimates for proposed swales

Contaminant	Load (kg/year)	Load reduction factor	Load potentially exported (kg/year)
TSS	92,880	0.75	22,220
Zinc	89.12	0.8	17.8
Cooper	14.2	0.8	2.8
TPH	5,832	0.57 (AC contaminant model)	2,506

The potential for contamination is of greatest concern in areas with well-drained soils, typically sand with low organic content, and where the water table is shallow. The TSS load discharged is not an important issue for this Project, as sediment will be effectively trapped in the soil matrix. This results in a maintenance issue rather than a groundwater discharge issue. The effects of zinc, copper and TPH relate to groundwater and are discussed below in Section 19.5.3 in relation to groundwater effects.

The design of the Maize Maze and Ramp ponds further mitigates the effects of contaminants generated in road runoff prior to discharge to the receiving environment. Utilisation of total storm detention in the 100 year 24 hour rainfall event will ensure that spilling to Upper Knights Stream in the Halswell River catchment, via Montgomery's Drain, will only occur in extreme rainfall and/or groundwater events where dilution will be significant.

The Project will also have an effect on the traffic volumes along the existing road network with some traffic predicted to shift off SH1 onto CSM2 and increase along MSRFL. The change in traffic volume as a result of the Project will alter the quality of the stormwater runoff being disposed to land. Traffic volumes will reduce on the existing, untreated length of SH1 north of the CSM2 connection point, so effects here will reduce as a result of the Project.

Treatment objectives will be met with a treatment train approach incorporating sheet flow across grass, water quality swales, first flush basins (where required) and controlled percolation rates (where required). The NRRP allows untreated road runoff to be disposed to land for much of the

proposed alignment and the entire Project will receive some treatment in the swale system prior to discharge to land. The design details for these features are discussed in the next sections.

First flush treatment

The principle of first flush capture and treatment is that many of the contaminants accumulate on surfaces such as roads and roofs during dry periods. These contaminants are then removed by small storms or during the first part of longer duration, larger storms.

A conservative first flush treatment depth of 25 mm has been chosen to ensure compliance with local design guidance.

Design criteria for swales

The design criteria used for swales design to improve water quality are set out in Table 35 below:

Table 35: Design criteria for swales

Parameter	Criteria	Comment / Source
Longitudinal slope	Typically 0.5% to 1% Minimum 0.3%	Flatter than standard, but acceptable given permeable subsoil and considered to be Best Practicable Option (BPO) to minimise road corridor
Maximum velocity	0.8 m/s	NZTA Standard [83]
Design vegetation height	100 – 150 mm	NZTA Standard
Typical water depth above vegetation	Should not exceed design vegetation height under the treatment design storm	NZTA Standard
Bottom width	0.6 to 2 m	NZTA Standard
Hydraulic residence time	9 minutes (minimum)	NZTA Standard
Maximum catchment area served	4 ha	NZTA Standard
Minimum length	30 m	Typical spacing is 300 m

[83] NZTA Stormwater Treatment Standard for State Highway Infrastructure, May 2010

Parameter	Criteria	Comment / Source
Side slope	1 V : 4 H on road side. 1 V : 4 H target on back of MSRFL swales, however localised steeper sections at transitions to culvert entrances and at pinch points	Steepened rear faces to MSRFL swales to minimise road width and impacts of land purchase on adjacent property owners. 1:4 enables the swale to be mown safely.

Organic filter layers

The NRRP specified permissible disposal rates range between 20mm/hr and 50mm/hr for the organic filter layer in the first flush basin where infiltration is the design treatment.

The proposed treatment solution in the less than 6 m to groundwater area for the Project includes swale treatment and first flush capture and treatment.

The first flush flows will be disposed through an organic filter media with a specification for the soil properties (material size and organic content) rather than percolation rate. The same specification for laying the filter material has been approved by ECan for the CSM1 project and was determined in accordance with the Stormwater Biofiltration Systems, Adoption Guidelines: Planning, Design and Practical Implementation, Version 1, (Facility for Advanced Water Biofiltration, Monash University, June 2009).

Soak pits

Soak pits are proposed at the ends of swales where the mapped depth to groundwater level is greater than 6m, as for these areas, the NRRP indicates that treatment of stormwater prior to discharge to land is not required.

In this area the swales, will drain to 1050 mm diameter manholes with domed steel cage inlets 300mm above the invert of the swale. The area immediately surrounding this “scruffy dome” will be constructed of coarse free draining material (with a null or low organic content). An outlet pipe from the dome manhole will convey flow to a soakage field which extends beneath the beginning of the downstream swale (and includes a flushing pit for ease of maintenance) and this pipe will be perforated to ensure spread disposal of runoff to land. The swales have been designed to the methodology outlined in the NZTA Stormwater Treatment Standard for State Highway Infrastructure[84].

A fully kerbed/piped solution was not considered economic nor in keeping with the rural environment which the proposed alignment passes through. Roadside swales also provide water quality treatment.

[84] NZTA Stormwater Treatment Standard for State Highway Infrastructure, May 2010

Swales first flush basin and soak pits

Outside of the pond areas, up to 300 m long swales will collect and treat stormwater runoff from the carriageway. These swales will flow to small basins at the end of each 300 m long swale that will contain a specified organic filter media. Below the organic media, there will be a drainage media, collection system and discharge to ground trench to be constructed in similar manner to that described above for soak pits.

Dry ponds

Adjacent to the CSM1 connection point at Halswell Junction Road, there is potential for elevated groundwater, and a reduced Project cross-section is desirable (due to proximity to SWAP and CSM1 stormwater infrastructure). As per the treatment areas, capture of the first flush and disposal via an organic filter media is proposed. In addition to this, the storage area will be divided by bunds to ensure that any spill from the pond is water which has been retained for the greatest duration. The design percolation rate applied for the dry ponds is 12 mm/hr.

When the groundwater level rises, this has the potential to inflow to the ponds and reduces pond capacity and the ability of the ponds to drain to ground. An intervention strategy is proposed to intercept rising groundwater and to maintain groundwater at or below pond invert level. A drainage system is proposed to allow drainage of groundwater to the Upper Knights Stream by gravity. The intervention strategy will result in no increase to the existing flow rates in the Upper Knights Stream or Halswell River. The outlet to the stream is some 500 m downstream of the Maize Maze pond.

Summary of water quality effects

The NRRP rules are prescriptive with regards to water quality effects. As such, compliance with the rules infers adequate treatment and effects being less than minor. Soakage design on this Project is generally above the water table as per NRRP conditions ensuring that water quality objectives will easily be met for much of the alignment. Where water quality treatment is required, first flush basins will be constructed with organic filter media included in the road drainage system prior to disposal. The residual risks of this approach are:

- inappropriate maintenance of the system leading to reduced percolation rates and flooding;
- contaminant loads being generated in excess of the ability of the organic filter layer to absorb contaminants; or
- bypass of the organic filter layer by inappropriate maintenance or accident.

These risks are addressed through the proposal to develop an Operation and Maintenance Plan for the stormwater system at the detailed design phase.

Overall the treatment proposed is beyond that sought in the NRRP and is considered best practice. Notwithstanding the residual risks outlined above, the effects of the quality of road runoff are considered to be minor.

19.4.2. Surface water quantity

There is potential for rainfall to exceed the minimum percolation rate assumed in the design, which could lead to runoff from limited areas. These flows would have the potential to overtop or exceed the bunding and conveyance mechanisms designed. This would induce spilling of stormwater from the Project into Montgomery's Drain, potentially affecting water quality and quantity in this surface water body, as well as potentially allowing stormwater (including any contaminants) to directly enter groundwater.

The various components of the stormwater and drainage system have been designed for the 100 year ARI event. This includes the conveyance capacity of swales and pipes and the required storage within the disposal system. This standard is required as the vast majority of the stormwater collection and treatment system will be constructed below the existing ground level, limiting the ability to 'spill' out of the system in large events. The 100 year ARI standard required by the NZTA exceeds the requirements of the WWDG (CCC, 2003) and the SDC Code of Practice and the NZ Building Code.

The amount of storage required in the system is a function of runoff (i.e. inflow) and the disposal rate (i.e. outflow), as defined in the hydrological equation (total inflow – total outflow = storage). The maximum amount of storage is typically set by the geometry of the swale or the pond.

Given that the Project runoff is being disposed exclusively to land, effects from the following are not considered as significant, as subsequently outlined:

- intermediate design storm events, e.g. 2, 5, 10 and 50 year ARI events;
- downstream effects;
- receiving waterway sedimentation /erosion; and
- attenuation of flows / hydraulic neutrality.

An assessment of potential flooding effects and risk arising from the Project is provided in Chapter 21, which covers natural hazards. In addition, a Surface Water Modelling assessment is presented in Appendix D to Technical Report 3. This addresses flood risk within the Halswell River catchment associated with the Project's stormwater ponds and confirms that there will be no increase to the existing flow rates in the Upper Knights Stream or Halswell River.

In the event of an over-design rainfall event across the entire alignment, the storage in the system will be filled. Stormwater will fill the intermediate storage and overflow to the next storage basin or swale downstream.

This has potential for large stormwater volumes to accumulate at the lower or sag points in the Project, namely the Maize Maze Pond. Water will flow to the low points in the system, most

notably the sag points adjacent to Halswell Junction Road and Weedons Ross Road. There may be potential to spill out of the system to existing overland flow path downstream of the alignment.

The existing railway embankment upstream of the alignment has the potential to block overland flow from upstream and to cause the overland flow to dam and pond. There are only a limited series of small culverts and only one large culvert (750mm diameter) under the rail embankment. The possibility of overtopping the rail embankment is remote. The Project alignment will be another potential overland flow blockage and therefore the design needs to provide for the passing of overland flow paths appropriately. The proposed design for overland flows is discussed in detail in Technical Report 3.

19.4.3. Effects on existing infrastructure

The proposed CSM1 connection ramps have an effect on existing stormwater infrastructure, in particular the pond storage for CSM1. CSM1 infrastructure will be impacted by CSM2, most notably by:

- construction of the southbound off-ramp will partially fill the Lee Pond; and
- construction of the northbound on-ramp will require backfill of approximately one tenth of the CSM1 Mushroom Pond.

Allowances for modifications to the infrastructure have been made in the design of CSM2 to integrate stormwater treatment to ensure the CSM1 system still operates as intended. With the Lee Pond, a proportion of the existing alignment will in future drain to the new Ramp Pond. For the Mushroom Pond, the remaining 90% of the pond volume will be sufficient to service the 30% reduction in catchment area. The on-ramp and CSM1 contributing areas will be diverted to the Maize Maze Pond which will be designed to have the capacity to capture this shortfall.

19.5. Groundwater effects

In terms of groundwater effects, there is potential for elevated groundwater levels to affect the stormwater disposal system and reduce its effectiveness. Runoff from the motorway will be collected and diverted to infiltration structures consisting of grassed swales, ponds and soakpits. Water infiltrating at these structures will percolate downward to the water table where it will cause the underlying groundwater to rise and spread out as a “mound”. The increase in groundwater level has the potential to affect local wells by causing the water levels in the wells to rise, resulting in a decreased lift and lower energy costs for pumping. Consideration of groundwater level rises is also required in relation to existing structures.

Subsurface drains and/or wells are planned to limit the future elevation of the water table beneath the ponds proposed for near the Halswell Junction Road interchange. Wells are planned for a similar purpose for the Robinsons Road overpass where the carriageway of Robinsons Road is to be completed approximately 6.5 m beneath current ground level. The lowering of groundwater levels from beneath the Robinsons Road overpass through pumping for up to 25

days at a time at 100 L/s with discharge to a stockwater race along Robinsons Road and the lowering of groundwater levels via under-drains from beneath the Halswell Junction road ponds with gravity drainage and discharge to Upper Knights Stream are groundwater diversions or takes with the potential to affect existing well water levels.

19.5.1. Water level rises

Before an assessment of effects could be carried out, the maximum high groundwater levels expected after the implementation of the CPWES were calculated using historical data from two long-term ECan monitoring wells together with assessments made by others as part of the consent applications for the CPWES. Maximum high levels of 39.6 mRL (beneath Robinsons Road overpass) and 19.4 mRL (beneath Halswell Junction Road) were calculated. These levels are above the planned roadway at the low point of Robinsons Road overpass and above the bottom of the proposed ponds at Halswell Junction Road.

Robinsons Road overpass

The infiltration of stormwater is predicted to cause small water level rises in the shallow unconfined aquifer. The rise beneath the Robinsons Road overpass is expected to be in the order of 1.5 m directly beneath the structure. When groundwater levels are near their maximum predicted high of 39.6 mRL, this rise could lead to short-term flooding of the local road. The model indicates that with pumping used to maintain the groundwater level below the base of the infiltration structure beneath Robinsons Road, flooding may be eliminated or may only last for a few hours. Without pumping, the roadway would remain flooded for a period which is unable to be specified at this stage, due to the uncertainty of groundwater mounding from the CPWES.

Rises in water levels in Aquifer 1 from the 24-hour, 100 year rainfall event are expected to be much smaller away from the Robinsons Road overpass. A rise (mounding of the water table) of about 25 mm is modelled 100 m from the Robinsons Road overpass infiltration structure with no measurable mounding at distances greater than 250 m. Pumped water would be directed to a stockwater race along Robinsons Road. Field inspection of the stockwater race indicates that the bottom is coated with clays and fines that have settled out from the water carried by the race. This material would limit seepage such that the additional water introduced to the stockwater race is unlikely to result in a significant increase in seepage from the race to the groundwater system.

As an alternative to groundwater lowering, the local road would be allowed to flood for periods of time, in consultation with the road controlling authority. In this situation, diversions for local traffic would be put in place.

Mounding would be offset by groundwater abstraction well pumping prior to stormwater infiltration. Any pumping would likely to be started when groundwater levels rose to within 1 m of the base of the infiltration trench below Robinson Road and would be directed to the stockwater race along Robinsons Road.

Halswell Junction Road Interchange and CSM2

Water level rises beneath the Halswell Junction Road interchange are expected to be small because of the under-drain system planned for construction beneath the Maize Maze, and Ramp ponds and the Owaka Basin. The relatively low hydraulic conductivity of the surficial deposits beneath Halswell Junction Road will limit the ability of the ponds to infiltrate stored stormwater to the underlying Aquifer 1. As such the primary purpose of the ponds will be storage to limit peak discharge.

The results of the modelling of infiltration indicate the groundwater beneath the proposed ponds would rise by 1.4 m to 2.6 m in the absence of an under-drain. The modelling also indicates that it may take up to two weeks for the pond to fully drain without intervention in the form of pumping, gravity drainage or an under-drain system. Such rises under high water level conditions would cause groundwater to rise above the bases of the ponds, reducing storage capacity and may cause lifting of pond liners (where these occur). The under-drain system proposed to limit the maximum water level rises beneath the Project ponds will both assist in limiting mounding in Aquifer 1, maintain the full storage function of the ponds, and prevent any increase in flow rates in the Upper Knights Stream and the Halswell River.

Summary

Seasonal variations in groundwater levels recorded in ECan wells range from 2 m to 6 m. Such variations would mask local mounding effects. The effects of mounding beneath the facilities on groundwater are therefore considered to be less than minor.

19.5.2. Operational dewatering

Pumping at the Robinsons Road overpass and gravity drainage from the under-drains for the proposed Project ponds at Halswell Junction Road will only occur when groundwater levels are 1.3 to 2.5 m higher than they have been in the past. The frequency and duration of pumping cannot be accurately predicted using the available data. However, statistically, the maximum groundwater level is predicted to rise up to within 1 m of the low point of Robinsons Road (39.5 mRL) less than 5 % of the time after the CPWES is in full operation and more likely closer to 1% of the time. Because of this uncertainty, allowing Robinsons Road to flood occasionally may be a viable alternative to the pumping and water level control system and is proposed as an alternative option.

Effects of operational dewatering on other groundwater users

The removal of groundwater from the Project ponds at Halswell Junction Road by gravity drainage (estimated to produce less than 50L/s) through a manifold system would not affect any existing groundwater user because it would not lower groundwater below current levels. Only higher groundwater levels that might occur in the future would be lowered through this self-limiting system. Future groundwater users would also not be limited by this set up. The drawdown “cone

of depression" of the water table induced by any well pumping hard enough, would lower the water levels beneath the ponds meaning that the gravity drainage would cease and the aquifer would respond as if the under-drains or dewatering wells did not exist.

When the Robinsons Road overpass wells are pumped at a total of 100 L/s to limit the water level rise, the drawdown effects are estimated to be a drawdown of 10 mm at a distance of 1 km and about 1 m at a distance of 100 m from Robinsons Road overpass. Nearby wells would also not be affected because if such a well was to pump at a rate high enough to lower levels at Robinsons Road, pumping from the Robinsons Road overpass system would cease and allow the nearby well to pump at its consented rate.

Effects of dewatering on surface water

Surface water will be little affected as the discharge from the gravity drainage system will be directed to Upper Knights Stream, its local discharge point without the dewatering system.

Pumping from beneath the Robinsons Road overpass facility would be discharged directly to the adjacent stock water race, with minimal effects.

Summary

The effects of water level limitation at the Robinsons Road overpass and Halswell Junction Road facilities are considered to be less than minor. The effects of the reduced water levels beneath Robinsons Road overpass and Halswell Junction Road under high water conditions are considered to be less than minor. These systems will only be operated occasionally when water levels are near their maxima and will not lower groundwater levels below those that occur today or have occurred in the past.

19.5.3. Groundwater quality

An assessment of effects of stormwater discharge on groundwater quality has been undertaken and is contained within Appendix G of Technical Report 3.

This assessment has modelled the effect on groundwater quality of stormwater contaminants produced from road runoff during operation of the Project (i.e. a contaminant modelling assessment). The model used to assess the effects comprised a series of Microsoft Excel worksheets developed by the UK Environment Agency. These worksheets allow contaminants to be modelled as they migrate from the soil source zone to groundwater and then within groundwater to a selected point where the groundwater is utilised or discharges into a sensitive environment. The contaminants modelled were copper, zinc and the polycyclic aromatic hydrocarbons (PAH), pyrene and fluoranthene.

The estimated concentrations of copper and zinc in stormwater are less than their NZ Drinking Water Standard values. Therefore, copper and zinc in stormwater discharged from the proposed alignment pose low risk to groundwater used for potable supply.

Risk assessment of pyrene and fluoranthene has indicated that when dilution in groundwater beneath the alignment and attenuation along the groundwater flow path is considered, these contaminants pose low risk to groundwater used for potable supply. This is valid for wells that are located 30m or more from the designation boundary. The contaminant modelling assessment identified 17 wells within 30m of the study boundary that may be affected by stormwater discharge. The study boundary within the Assessment of Effects on Groundwater Quality (Appendix G of Technical Report 3) includes the area between the western rear access road and Main South Road where the wells may be located within the designation footprint, within 30 m of the designation boundary and outside a 30m buffer.

Appendix 3 of this AEE includes a list of 47 wells potentially affected by stormwater discharges and the Project (i.e. those wells located within 30m of the designation boundary and those wells located within the designation footprint). These wells (if active) may require relocation clear of the Project designation footprint and areas potentially affected by stormwater discharges. Bores that are not used would not need to be relocated. Bores listed as being within the designation may be decommissioned and/or relocated following specific consultation on this matter with affected land owners. The bores listed as outside of the designation, are those located within 30m of the designation boundary and potentially affected in terms of the contaminant modelling work carried out, although, it is noted that this modelling is conservative in terms of identifying actual effects. These bores outside of the designation may be decommissioned and a new bore established, if required by the landowner, in an alternative location. Only three of the bores, M36/2231, M36/3875 and M36/4353, are associated with irrigation consents, the remainder are assumed to relate to permitted activity water takes, or are not used.

19.6. Land use activities affecting water

19.6.1. Installation of outfall structure to Upper Knights Stream

A 300 mm diameter outlet pipe will be installed in Upper Knights Stream (at the end of the existing John Paterson Drive) to discharge the gravity drainage groundwater from beneath the Maize Maze and Ramp Ponds located at the Halswell Junction Road interchange. There will be no works in water for the installation, as they can be carried out when the stream is dry. Sediment and erosion control measures will be implemented in accordance with the erosion and sediment control plan. Scour protection will be installed in a way that does not reduce the carrying capacity of the stream. At this location the stream is typically a dry semi-vegetated channel and it will be reinstated to this upon completion of the stream bed works. As the works will be carried out in dry conditions, and vegetation reinstated, the effects on aquatic values will be less than minor.

The outlet and its installation will have less than minor effects on amenity, flooding, erosion and water quality.

19.6.2. Former stream bed reclamation

The realignment of John Paterson Drive affects an old stream bed identified in the NRRP which has been infilled completely and is currently farmed. The water appears to have been diverted in the past, to the nearby land drainage race, which will be realigned slightly to allow for the construction of the extension to John Paterson Drive.

The proposed local road extension will have no effect on the former stream bed, given the nature of the environment affected by this work.

19.6.3. Effects of storage of hazardous substances on soil and groundwater quality

Approximately 5,000 litres of fuel may be stored on site at any one time. Inadequate handling and storage of fuel, oil and hazardous substances may lead to localised spills and leakages and potential contamination of the underlying soils and aquifer.

To manage this risk, it is important that the CEMP describes measures to avoid, remedy or mitigate the effects of the use and storage of hazardous substances during construction of the project and the transport, disposal and tracking of materials taken away. The CEMP will include details on the types and volumes of substances stored, measures to minimise risk of spills and spill containment equipment and procedures, procedures to identify the sources of leaks and prevent recurrence. With these measures in place, the effect of the storage and use on soil and water quality will be less than minor.

19.6.4. Effects of excavation and deposition on groundwater quality and aquifer pressure

The longitudinal sections included in the Drainage Details in Volume 5 of the application documents identifies areas where the interception of groundwater may occur. The sections show an assumed high water level which includes the contribution from the CPWES. On the basis of these levels it would be prudent to carry out the excavation works at the eastern end of the alignment and at Robinsons Road before the full implementation of the CPWES, if possible. Alternatively works in these areas may be carried out in summer or other times of lower water levels. Piling activities are also likely to intercept groundwater. The longitudinal sections highlight the areas where the contractor would need to be aware of groundwater levels to implement methods to protect groundwater.

Interception of aquifers in piling or other excavation work might result in floating of piles, loss of pressure in the artesian aquifer or mixing of water between aquifers if depressurisation of the aquifers occurs. Interception of artesian aquifers in excavations that is uncontrolled might result in piping of sands into the excavation or heave of silts; require excessive pumping, drawdown and potential ground settlement beyond the excavation.

Mitigation measures are proposed to address the effects of excavation on groundwater quality and pressure. Where artesian aquifer is encountered, or where the unanticipated interception of large non-artesian inflow enters an excavation, an Accidental Aquifer Interception Management

Plan (AAIMP) will be implemented. A Draft AAIMP (SEMP006) is attached in Volume 4 of the application documents, which contains the draft management plans for the Project. The effects on aquifer pressure can be mitigated through appropriate sealing of any interceptions. These mitigation measures are included in the Draft AAIMP.

The Draft AAIMP provides an overall framework for the control of accidentally intercepted groundwater. It outlines the construction, operation and implementation steps to be taken to control, stop and seal groundwater flow during construction. With the measures proposed in the AAIMP the effect of excavation on aquifer pressure will be minor.

Other mitigation measures are proposed for typical interception works in the unconfined water table aquifer. This includes measures to minimise the seepage of groundwater into the excavation, management of water within the excavation and / or measures to reduce the volume of water reaching the excavation.

Where the rate of seepage is low, water can be managed in the excavation by pumping. This water may need to be pumped to the sediment ponds before being discharged, depending on levels of sedimentation.

Reducing the seepage reduces the amount of sediment-laden water that needs to be managed during works and means that excavation works can proceed more easily. While not expected to be necessary for this Project if construction is prior to future predicted groundwater level increases, dewatering to lower the surrounding water table may potentially be employed to reduce seepage to an excavation. This would allow clean and sediment-laden water to be kept separate reducing the need for sediment control measures. Dewatering may be carried out via bores or linear dewatering using spears with the method dependant on the aquifer characteristics.

Groundwater quality could also be at risk if excavations expose groundwater and contaminants are allowed to enter the excavations. The presence of contaminants on the site is predominantly limited to vehicle fuels and soil materials. Materials used to seal a breach of the confining layer are from the excavations or the materials outlined in the Draft AAIMP.

Best practicable measures will be adopted to prevent the discharge of sediment and contaminants into excavated land including the installation and maintenance of sediment and erosion control measures, stabilising or re-grassing. The storage of fuel and refuelling of machinery will not be carried out within 50m of excavations and measures will be taken to prevent oil and fuel leaks from machinery.

Deposition of material will be the result of creating embankments, stormwater ponds and swales. The deposition will not result in the limitation of future land uses in terms of soil quality. Deposited material will consist of clean fill materials only.

19.6.5. Effects of well construction on groundwater quality

Bores will be drilled outside the zone of influence to replace wells that may be affected by the proposal. Groundwater may become contaminated by drilling of bores for water or geotechnical exploration, or as a result of open, uncased, old or damaged bores or wells. Bores and wells therefore need to be constructed and managed to acceptable standards to avoid, remedy or mitigate adverse effects on groundwater quality.

Well construction will be carried out to limit the movement of water between water-bearing layers, sealing any other layers encountered during drilling. A concrete pad surrounding the well headworks will be installed with each well to prevent the ingress of contaminants into the underlying groundwater.

19.7. Erosion and sediment control during construction

Consideration has been given to erosion and sediment control during the construction of the Project. The management of stormwater during construction expressly requires resource consent (in relation to Rule WQL6 of the NRRP) due to the large areas of soil which will be exposed.

The options for disposal are limited by the absence of suitable surface water disposal points, as regular disposal to stockwater races is not permitted by the SDC. Key issues for this site are:

- control of stormwater and isolating runoff from the stockwater network;
- separating clean from dirty water;
- protecting adjacent landowners from surface flows;
- minimise sediment leaving the site; and
- disposal to land.

Further details are provided in the Draft CEMP and the Draft Erosion and Sediment Control Plan ("ESCP" or SEMP002) which has been prepared in accordance with the ECan Erosion and Sediment Control Guidelines, 2007 and the NZTA Stormwater Treatment Standard for State Highway Infrastructure, May 2010. The CEMP and the ESCP are contained within Volume 4 of the application documents. The temporary erosion and sediment control measures will be designed to discharge to land for most rainfall events. The design standards used in the Draft ESCP are as follows:

- Clean water diversions – these are designed to cater for the 10 minute - 5% AEP event (1:20 year Return period event) and cater for overland flow only. Overflows may occur above this event and will discharge into the works, until such time as the Project siphons are installed. Siphons will be constructed early in the construction period to mitigate this risk.
- Sediment retention ponds - designed to cater for the 10 hour - 20% AEP event (1:5 year return period event).
- Overflow spillways from the sediment retention ponds will be designed to cater for the 10 minute 2% AEP event (1:50 year return period event flow). As there are no

watercourses available to discharge overflows from the ponds, a site specific assessment will be carried out prior to construction in accordance with the ECan Erosion & Sediment Control Guideline. This will follow the following general principles:

  - Size sediment retention ponds to cater for a larger storm event;
  - Provide additional bunding at edge of site to prevent flood water from leaving the construction site;
  - Adjust and monitor site operations to reduce flow to sediment retention ponds (i.e. reduce / stop pumping to ponds, stop working in inundated areas);
  - Provide additional soakage areas.

- Decanting earth bunds (mainline carriageway) - designed to cater for the 10 Hour - 20% AEP Event. As the road is in cut along the carriageway edges, any overflows from the decanting earth bunds will be contained within the road corridor.

When the above measures are exceeded and the erosion and sediment control are inundated by a large storm event, the discharges may reach surface water. The locations where this may occur are similar to those illustrated in Figure 51, with the exception of the location labelled “CSM2-F2”. Further detail on these locations and the nature of the potential construction discharge is provided in the Draft ESCP (SEMP002).

The risk of a failure of the erosion and sediment control measures leading to discharge of sediment laden water to the nearby stockwater races is considered to be low, given the flat topography. It is likely that the contractor would be able to remediate a failure within the Project footprint, in order to avoid discharging sediment laden water to surface water.

Any construction discharges to surface water associated with a failure of an erosion and sediment control device will potentially contain high levels of suspended sediment, potentially affecting water quality and aquatic habitat. Any discharge to surface water would only occur during a major storm event, when the SDC typically shut off the stockwater races, to allow them to perform a land drainage function anyway. Because the races are likely to be carrying runoff and sediment from throughout the district, the effects on the surface water body from any Project discharge, will be minor. Aquatic habitat species within the stockwater races are tolerant of sedimentation and increased turbidity so on-going adverse effects are not anticipated in this situation. Further discussion on the potential effects on aquatic values is provided in Chapter 20.

19.8. Mitigation

The design standard applied in sizing the stormwater infrastructure is a 100 year return period. This is the primary tool used to mitigate the effects of the increased runoff generated by the Project and reduce the residual risks of spilling from the highway drainage system or potential failure of the disposal system.

In addition, the proposed disposal system is dispersed (regular soak pits as opposed to large disposal facilities), so failure of one component will not result in catastrophic failure of the whole system. This provides some inherent redundancy in the system and allows a more passive maintenance programme whereby localised flooding can be used to identify failure in soakage devices (rather than by regular testing).

In order to mitigate for high groundwater, a series of groundwater inception trenches and/or groundwater inception bores are proposed to be connected to a gravity drainage system that will discharge to the Upper Knights Stream. This system will ensure that future groundwater level rises will not impact on the capacity or performance of these ponds.

A number of other key components of the highway drainage design have been implemented to mitigate the effects on the receiving environment, including:

- pumping of stormwater or groundwater has been eliminated from the permanent works design to ensure reliability of the system and lowering residual risk. The notable exception is the proposed pumping at Robinsons Road;
- the placement of the proposed soakage devices has been to maximise the distance between the devices and any stockwater races or overland flow siphons; and
- additional soakage devices and larger soakage areas have been proposed on the upstream side of the Project to facilitate the disposal of any overland flows which may overtop the stormwater bund protecting the highway drainage system.

The risk of groundwater levels rising above the maximum predicted levels can be reduced by a groundwater intervention strategy to intercept the groundwater and to discharge this groundwater away from the facilities and outside the zone of influence. This groundwater level intervention can be achieved through design at Robinsons Road overpass and the Halswell Junction Road ponds.

Technical Report 3 provides recommendations for further mitigation through proposed consent conditions and other measures. These are relevant to the consideration of the regional consent applications and are summarised below.

Table 36: Mitigation recommended in Technical Report 3

Aspect	Commentary	Recommendation
Soak Pits	The soak pits form an essential element for the disposal of stormwater along the route. The on-going operation of the soak pits is an essential element in the design, as there is no alternative disposal mechanism. The design is to achieve an adequate level of redundancy to ensure that progressive failure of individual elements in the Project design does not affect the users of the road system or cause negative off-corridor effects, such as additional surface flooding in the Halswell catchment.	Development of field testing programme to confirm soakage rates of receiving ground should the detailed design vary from rates specified in Technical Report 3. Further full scale field testing at critical locations including sag points. Drafting an Operation and Maintenance Plan during detailed design for soakage devices.
Stormwater Treatment	The first flush basins rely on organic filter media to achieve the water quality objectives. These devices have the potential to concentrate contaminants and sediments. In order to ensure that they perform adequately a monitoring programme is proposed.	Specific soil parameters of first flush filter media replacing percolation rates are set in NRRP. Monitoring of soil contamination at disposal sites. Conditions on replacement of soakage filtration media. Monitoring of percolation rates through soil media to ensure these are similar to design rates.
Stockwater Races	The stockwater races form two distinct functions: a) as a conveyance mechanism for stockwater and irrigation and b) as a land drainage function during extreme weather conditions. The on-going operation of the stockwater races are an essential element in the Project design. The design is to achieve an adequate level of redundancy to ensure that individual elements in the Project design do not affect the stockwater race functions as set out above.	Considering the nine stockwater races during the detailed design stage covering a) on-going operation of the supply of water during and post construction, b) passage of flood and land drainage function of the races, c) any deviation or alternative route, d) any consequential effect of spill from storm events, e) the construction of deviations to be completed off line before the new deviation is made live, f) limiting the time and occurrence of over pumping to emergency and limited period occasions (e.g. tie ins).

Aspect	Commentary	Recommendation
Overland Flow Paths	The overland flow paths form an essential element for the passage of stormwater across the route. The on-going operation of the overland design is an essential element in the design, as there is no alternative. The design is to achieve an adequate level of redundancy to ensure that progressive failure of individual elements in the Project design does not affect the users of the road system or cause negative off corridor effects.	Consideration of the major overland flow paths during detailed design covering a) the assessment of discharge beyond the Project area, b) how flow paths will be managed during construction, c) operation and maintenance of the siphon structure. Conditions on how additional flow paths identified following detailed topographical survey will be dealt with and how additional crossing points identified during the detailed design will be managed. Adherence to the design criteria outlined in Technical Report 3 for designing alternative locations for the crossing points under the Project alignment, potentially including a) a full assessment of the upstream and downstream flooding, b) ponding and effects of discharge of concentrated flow on property and habitable floor levels downstream of the Project area.

Aspect	Commentary	Recommendation
Owaka Basin, pond adjacent to Meadow Mushrooms and Maize Maze Pond	The Maize Maze Pond and its associated disposal to land system form an essential element for the disposal of stormwater adjacent to the CSM1 - CSM2 - Halswell Junction Area. The on-going operation of the soakage to land and protection of groundwater quality is an essential element in the design. The design is to achieve an adequate level of redundancy to ensure that progressive failure of individual elements in the soakage system does not affect the users of the Project system or cause negative off corridor effects such as additional surface flooding in the Halswell catchment during events of lesser magnitude than the critical 100 year storm event.	Development of an Operations and Maintenance Plan to consider the normal and emergency flow of all the SW pond structures in the vicinity. Inclusion of a liner system that prevents the direct connection of surface water to land in the forebay section of the pond. The design of the pond shall include a) an ability to receive and store the entire 24 hour 100 year storm runoff from the Project, b) groundwater intervention to maintain groundwater equilibrium and maintain current flow rates in Upper Knights Stream and Halswell River, c) an ability to draw down the level of the pond level following a large rain event and discharge this flow to the Upper Knights Drain or Montgomery's Drain. A process for the controlled release of water from the Maize Maze Pond to the Halswell River system (including discussion with the ECan and the CCC).
Robinsons Road	The potential for Robinsons Road overpass to be inundated by groundwater has been identified with the predicted CPWES in place. Given the uncertainties with the CPWES implementation and effects the above conditions are designed to allow the uncertainties to be mitigated with future action.	On-going monitoring of groundwater levels at the site undertaken to establish the appropriate mitigation for this. Development of an Operation and Maintenance Plan for any pumping and disposal system.

Aspect	Commentary	Recommendation
Erosion and Sediment Control	Erosion and Sediment Control form an essential element for the protection of the environment along the route. The on-going operation of the soakage design is an essential element in the design as there is no alternative. The design is to achieve an adequate level of redundancy to ensure that progressive failure of individual elements in the Project design does not affect the users of the road system or cause negative off corridor effects such as additional surface flooding in the Halswell catchment.	Development of an Erosion and Sediment Control Plan for each work section along the Project covering a) clean and clear water diversions, b) diversion drains for sediment laden runoff, c) use of permanent swales and the ability to rehabilitate the swale to its final purpose during the construction process, e) specific disposal to land soak pits which are not to form part of the final soak pit system, f) methods to prevent discharge of sediment laden water off site or to land, g) cover the issues addressed in other plans such as overland flow path construction, stockwater race construction, existing bores/wells and the works required at each intersection, h) on-going maintenance requirements, i) disestablishment criteria

19.9. Conclusion

The NZTA accepts the recommended mitigation set out above and the means by which it proposes to incorporate these matters into the Project are outlined in Chapter 27 – Mitigation and Monitoring.

The Project design, this assessment and the recommended conditions of consent appropriately provide for the avoidance and mitigation of any adverse effects of the Project on water resources.

20. TERRESTRIAL & FRESHWATER ECOLOGY

Overview

The Project traverses a highly modified landscape characterised by agricultural land and lifestyle blocks with few localised areas of naturally occurring indigenous vegetation remaining. The designation area (study area) contains no natural waterways or wetlands but does contain a number of manmade water races of limited ecological value. There are also no sites of conservation significance such as ecological heritage sites, recommended areas for protection ("RAPs") or significant natural areas within the Project area.

Potential adverse effects on terrestrial ecology will be most pronounced during construction when sections of shelterbelt, stands of trees and areas of pasture are removed. The disturbances associated with construction, coupled with loss of habitat, will lead to a localised displacement of resident bird populations and may lead to loss of potential resident lizard populations. The effect of vegetation removal on indigenous fauna arising from the loss of those habitats is considered to be no more than minor given the similarity of nearby habitats, wide ecological tolerances and adaptability of the affected indigenous bird species.

Potential adverse effects on aquatic ecology during construction relate to potential sedimentation (and contamination) of water races; and habitat disturbance, with mitigation measures proposed to ensure these effects are avoided, remedied or mitigated. Long term effects on aquatic ecology primarily relate to habitat modification associated with the closure, piping and realignment of water races; and stormwater runoff once the Project is operational.

The Project provides an opportunity to enhance terrestrial and aquatic ecology through appropriate mixed indigenous and exotic plantings within the Project area. This includes along the riparian margins of water races. These plantings will enhance habitat quality for indigenous birds, lizards, invertebrates, fish and aquatic life and will assist in offsetting the loss of habitat arising from the Project.

20.1. Introduction

This chapter outlines the findings of investigations undertaken to determine the likely effects of the Project on terrestrial and freshwater ecology. It also contains measures to avoid, remedy or mitigate any potential adverse effects that have been identified.

Further details on the methodologies carried out for these ecological investigations and assessments are contained in Technical Report No. 17 and Technical Report No. 18, appended in Volume 3.

20.2. Existing terrestrial receiving environment (baseline ecological character)

The Project is located within pastoral farmland used primarily for grazing sheep and horses and has been largely cleared of indigenous vegetation cover. The Threatened Environments

Classification ("TENZ") helps identify land where much reduced and poorly protected terrestrial indigenous habitats/ecosystems are more likely to occur. This includes land within the Project area that is classified as acutely threatened with little indigenous vegetation remaining[85]. This is reflective of this intensively managed environment.

There are no natural water courses or sites of aquatic ecological significance noted within the Project area. The study area contains no land administered by the Department of Conservation or any designated areas of natural significance.

An ecological heritage site exists on the corner of Wilmers and Springs Road. This includes an area of semi-natural Danthonia grassland and a recommended area for protection ("RAP"). The RAP encompasses an area of flax and swamp kiokio (*Blechnum minus*) by a water race adjacent to Marshs Road. However, both these areas lie outside the designation footprint and as such will not be adversely affected by the Project.

20.2.1. Terrestrial habitat categories

In general terms, the current land cover could be described as farmland habitat. However, within this habitat, further categories exist which reflect the different land uses and vegetation types encountered along the Project alignment. These are:

- improved/developed pasture;
- rough pasture;
- market gardens and other cultivated areas;
- orchards;
- rural-residential gardens/amenity plantings;
- small plantations/woodlots (radiata pine, Eucalyptus spp., macrocarpa);
- shelterbelts (radiata pine, Eucalyptus spp., macrocarpa, Leyland cypress, willow, poplar);
- stands/groves (radiata pine, poplar, crack willow, silver wattle);
- hedgerows (gorse); and
- road, shelterbelt, fence and water race margins (rank sward grasses and herbaceous vegetation).

These habitats are of varying quality in terms of the shelter, roosting, feeding and breeding opportunities they provide for indigenous and exotic avifauna, herpetofauna and invertebrates.

20.2.2. Indigenous vegetation

Naturally occurring indigenous vegetation affected by the Project is confined to very localised areas, where individual specimens or small groups of indigenous plants occur. These include

[85] Refer to Technical Report 18 for more details

kohuhu (*Pittosporum tenuifolium*), ferns such as swamp kiokio (*Blechnum minus*) and sedges (*Carex spp*.) which grow along the edge of the water race beside Weedons Road.

Some sections of the water races are overtopped by shelterbelts which create favourable microclimate conditions. In conjunction with an absence of grazing, this has enabled the establishment of pioneer vegetation.

20.2.3. Avifauna values

At least thirteen indigenous and seventeen exotic bird species are likely to be present in the Project study area between 1999 and 2004, as recorded in the Atlas of Bird Distribution in New Zealand.

Only two of these species are classified as nationally endangered or at-risk through decline. During the site inspection conducted in September 2011, seven indigenous and eight exotic species were observed along the Project route. All of these species are categorised as either "not threatened" or "introduced and naturalised".

The majority of the indigenous bird species recorded in the study area are common and have wide habitat preferences such as farmland, orchards, gardens and urban areas.

The water races that intersect the alignments provide suitable food sources, such as aquatic vegetation and invertebrates, for waterfowl. The races along Weedons Road and Robinsons Road provide some degree of tree and shrub cover which may additionally afford suitable nesting conditions for these ducks. Other freshwater birds that have been recorded in the study area are pukeko, white faced heron and New Zealand kingfisher.

Farmland generally suits the wide dietary requirements of pukeko, white faced heron and kingfisher. However the population sizes of these birds within the Project area are likely to be lower than in surrounding pastoral areas due to limited water environments

20.2.4. Herpetofauna values

Investigations identified two species of skinks: Common skink (*Oligosoma polychrome*) and McCann's skink (*Oligosoma maccanni*) as being potentially present within the Project footprint. The current Threat Classification rank for both is 'Not Threatened'. However, lizard populations within the Project footprint represent relictual populations[86]. This is a result of large scale land use changes, habitat losses, and introduced predatory mammals.

Overall, the Project development footprint consists of low value habitats for lizards, due to the vast tracts of highly-developed pasture land. However, the proposed alignment runs parallel with

[86] The term "relictual" is used for local species that would have once been very widespread and well-connected across the Canterbury landscape. However extensive land development into a predominately agricultural and horticultural landscape has led to considerable habitat fragmentation of available habitat patches, whether native or exotic; this may have population abundance, persistence and genetic consequences.

some communities of riparian vegetation and rank exotic grasslands which may support lizard populations.

20.2.5. Invertebrate values

The terrestrial invertebrate fauna (including soil fauna) inhabiting the Project area is dominated by introduced species typically encountered on farmland and suburban gardens. The range of vegetation types in this area provides habitat for a variety of invertebrates, such as bees, dragonflies and damselflies, moths, beetles and spiders and a diverse assemblage of beetles, arthropods and amphipods .

20.3. Assessment of effects on terrestrial ecosystems

20.3.1. Operational effects

The on-going effects on terrestrial ecology from the operation of the Project are relatively limited and considered to be minor. The potential and actual effects are limited to the direct impacts on terrestrial fauna from the road and vehicular traffic.

Mortality or Injury from Traffic

Pukeko and introduced mammals that naturally forage over a wide area are most vulnerable to being injured or killed by vehicles using the Project. This includes brush tailed possums, hares and rabbits. Other birds at risk of mortality or injury from motorway traffic are the Australasian Harrier and Southern black-backed Gull as these birds regularly scavenge road killed animals.

Pukeko territories are generally restricted to within 50 metres of a waterbody or wetland. The absence of naturally occurring waterways on either side of the Project suggests that the potential risk to pukeko is low. Higher quality habitat is considered to exist in the Heathcote River headwaters and the interconnected stormwater retention areas and drains in that area, several kilometres to the east of the Project. However, pukeko may traverse the motorway in search of seasonally favoured areas of pasture. Pukeko can also be attracted to the wide stormwater swales and detention ponds established as part of the Project. However, the risk to pukeko is considered to remain low even with new swales and detention ponds. The land surrounding the motorway supports low numbers of pukeko due to a lack of suitable habitat. While the swales and detention ponds will create feeding habitat they will not be suitable as breeding habitat.

20.3.2. Construction effects

The potential effects on terrestrial ecological values will be most significant during construction. The two direct impacts on terrestrial ecology are:

- loss of habitat through clearance and earthworks; and
- disturbance, displacement, injury and mortality of birds and lizards.

Loss of habitat

Sections of shelterbelt, hedgerows, stands of trees, areas of pasture and rank grassland cover occurring along pasture, roadside and water race margins will be removed to accommodate the Project construction. This will result in a loss of habitat for birds, lizards and invertebrates.

The loss of habitat for common native and introduced passerines will be more pronounced for those species with small territories and home ranges. This includes fantails and grey warblers. The overall adverse effects of the construction activities and associated habitat loss is considered minor for indigenous and visitor bird populations.

Lizards will be affected by habitat loss or habitat fragmentation. This is notably pronounced due to the relictual nature of the lizard populations and their habitat preferences, particularly within a highly developed landscape. The quality of lizard habitat adjacent to the Project footprint could be adversely affected through increased exposure to edge effects. Due to the relictual nature of the common skink and McCann skink, there is the potential for adverse effects on these populations to be more than minor.

Habitat loss will result in a minor loss of connectivity or ecological functionality at a local level. This habitat loss is considered to be minor due to the small proportion of woody and grassland vegetation that would be lost, compared to the extent of similar habitat that exists in adjoining areas of farmland. However, the proposed plantings as identified in Technical Report No. 7 will provide new areas of habitat for the terrestrial ecosystem.

Disturbance, displacement, injury and mortality

Loss of habitat in conjunction with disturbances arising from construction activities will lead to displacement of the affected bird populations into the surrounding countryside. It could also lead to mortality and injury to lizards due to their sedentary nature. Native and introduced insects will be similarly affected.

Displacement of resident bird populations will lead to an increased amount of competition between displaced individuals and resident populations in adjoining areas. The effects of competition may lead to some low-scale mortality. This is considered to be of low-scale due to the large area of similar habitat that exists beyond the motorway footprint and wide habitat preferences of the species. Therefore the adaptability of the affected species is noted.

There are low populations of freshwater birds due to the absence of any naturally occurring waterways (e.g. streams, ponds or wetlands) and lack of suitable riparian vegetation. This reduces the likelihood that species such as pukeko, white faced heron, kingfisher and waterfowl would be adversely affected to any significant degree during construction.

Potential indirect impacts

Construction activities and particularly, heavy machinery, present an opportunity for problem weed species not currently present in the area to become established. Seeds of problem weed species can be introduced inadvertently when machinery has been previously working in locations where these plants exist. These species could potentially pose a threat to the indigenous plantings proposed along the motorway corridor and to surrounding farmland.

20.4. Proposed mitigation measures – terrestrial ecology

20.4.1. Indigenous and exotic plantings

The Project presents an opportunity to enhance the ecological value of the affected and surrounding land, which is highly modified and contains little in the way of naturally occurring indigenous vegetation. The proposed landscape measures will also mitigate the adverse effects of the Project resulting from habitat loss and disturbance.

Extensive landscape enhancement measures[87] are proposed as part of the Project. These incorporate a large component of totara/matai forest and shrubland plantings. In conjunction with mixed indigenous/exotic woodland plantings, this will significantly enhance ecological values within a highly modified landscape. Species selection and composition of the plantings conform to ecological principles, reflecting the original vegetation cover of the area and the underlying ecological conditions. Low plantings of Purei (*Carex secta*), jointed rush and coastal flax proposed along sections of stockwater races will improve the habitat value of the riparian margins and their connectivity at a landscape scale[88].

The landscaping will also incorporate the development of boulder fields and boulder strips that include plantings of *Copromsa crassifolia, C. propinqua, Muehlenbeckia astonii, Corokia cotoneaster* and silver tussock (*Poa cita*) to mitigate against the habitat loss as a result of the development, and encourage natural re-colonisation by resident lizards.

20.4.2. Minimising vegetation clearance

To minimise the loss of woody and rank grassland vegetation, it is recommended that the extent of vegetation to be cleared is defined on the ground using stakes, pegs and tape in advance of construction. This would include definition of the boundary of the construction zone and any accessways required from existing roads. These markers will assist in minimising damage to surrounding vegetation and should remain in place until construction has been completed.

[87] Refer Technical Report 7 – Landscape Design Report
[88] Refer Technical Report 18 – Aquatic Ecology Assessment Report

20.4.3. Weed management

A preventative measure involving water blasting of all machinery at a suitable facility prior to entry on site is recommended to minimise the risk of problem weed species establishing. Such measures are included in the CEMP.

20.4.4. Lizard recovery

Given the potential adverse effects that construction may have on resident lizard habitat, there is a potential requirement to capture and translocate affected lizard populations to suitable habitat prior to construction works commencing.

In order to meet the legislative requirements of both the Wildlife Act 1953 and the mitigation recommended in Technical Report 18, it is proposed to undertake the following activities:

- prior to construction at least one season of lizard monitoring is to be undertaken to determine the extent of lizards present within riparian vegetation and rank exotic grassland habitats. If lizards are present in numbers and locations that put them at risk, a Lizard Management Plan will be prepared to avoid, remedy or mitigate the identified motorway impacts on lizards; and
- if required, a Wildlife Permit will be sought from the Department of Conservation for the capture and relocation of affected lizards prior to the commencement of earthworks; and for the unintentional killing or injury of lizards as a result of the earthworks.

20.4.5. Monitoring

Over a period of two years following construction it is proposed that monitoring is undertaken to detect any new problem weed species that may have been accidentally introduced to the site. Should plants of these species be detected, a programmed round of eradication would need to be implemented, involving a combination of spraying and hand-pulling depending on the species involved and extent of the infestation.

20.5. Existing aquatic environment (baseline ecological character)

There are no natural water courses or sites of aquatic ecological significance noted within the Project area, although there is a network of stockwater races, with several running adjacent to the existing roads that intersect with the CSM2 alignment, and along parts of SH1.

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 and watercress being the dominant observed species in the races.

Three species of fish have been observed within the Project area; the native common and upland bullies and brown trout. Both common and upland bullies are found 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[89] and within the SWAP ecology study[90]. In addition, the waterways, wetland and drainage guide developed by CCC[91], identifies these species as being common in Christchurch waterways.

20.5.1. Existing downstream receiving environment

Although outside the Project area, consideration is still required of the downstream receiving environment. Montgomery's Drain is within the Halswell catchment, flowing into Upper Knights Stream which then flows into the Halswell River.

Knights Stream

Knights Stream headwaters are situated to the south of Halswell Junction Road, just downstream of Springs Road. 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[92].

In a survey carried out by EOS Ecology et al.93, 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 strands of filamentous algae and at the confluence with the Halswell River, emergent watercress dominates.

Halswell River

The Integrated Catchment Management Plan [94] 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

[89] EOS Ecology, 2008, Assessment of Environmental Effects: Christchurch Southern Motorway: Aquatic Ecology
[90] EOS Ecology et al., 2005, Appendix 4: Aquatic Values and Management. South-west Christchurch Integrated Catchment Management Plan. Technical Series. Report Number 3.
[91] Christchurch City Council. 2003. Waterways, Wetlands and Drainage Guide, Part B – Design.
[92] EDS Ecology, CSM1 Assessment of Environmental Effects.
[93] EOS Ecology et al. 3 July 2005. Appendix 4: Aquatic Values & Management. South-west Christchurch Integrated Catchment Management Plan Technical Series. Report No. 3.
[94] Golders Associates (NZ) Limited on behalf of Christchurch City Council. May 2008. Integrated Catchment Management Plan for South-West Christchurch

abundance, average taxa richness was present. In addition, freshwater crayfish have been caught in the middle reaches of the river[95].

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.[96]

20.5.2. Existing aquatic environment within the Project area

Five main water races were selected to be sampled (referred to as sites 1 to 5), chosen as they will remain (in an altered form) with the construction of the Project. In addition, observations were made of four smaller races (referred to as site A to D) that flow into the five main races. These were not sampled as they were considered to be representative of the five main races sampled.

Summary of sampled water races

The races sampled included Weedons Road water race, Robinsons Road water race, Hamptons Road water race, Trents Road water race and Marshs Road water race. All five sites are located within the designation area.

All sampled water races had a marginal overall habitat, with a poor catchment area dominated by rural/rural residential and intensive horticulture/pastoral land use and poor riparian vegetation of approximately 6 m width (although relatively complete cover of what was there). The riparian cover at Marshs Road (site 5) was only about 2 m wide. In addition, being a modified environment, the races has poor reach scale features typical of a race such as constant width (approximately 1 m), depth (approximately 0.2 to 0.3 m deep) and flow (0.1 to 0.4 m/s, bank edge to mid race) and a straight channel. In-stream habitat parameters were marginal with a substrate dominated by silt and fine sediment.

Weedons Road (site 1) had some cover available for fish in undercut banks and limited overhanging vegetation. Hamptons Road (site 3) and Trents Road (site 4) had some available habitat in the way of overhanging vegetation and in-stream macrophytes. However Robinsons Road (site 2) and Marshs Road (site 5) had minimal cover available. Whilst shading was available by way of riparian planting at two of the sites (Robinsons Road and Hamptons Road, sites 2 and 3), the three other site exhibited little in the way of shading.

Three fish species were observed during the sampling including brown trout, upland bully and common bully, although no fish were observed at Marshs Road (site 5). All three species are common in other water races and streams around Christchurch. Upland bullies are non-migratory and therefore do not require access to the sea, although it is important to maintain access for

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

other fish species. The common bully is a migratory species so requires access to the sea, although brown trout can also spend their entire lives in freshwater.

Macro-invertebrate presence at four of the sites was dominated by snails and a taxonomic richness dominated by pollutant tolerant species. However, macro-invertebrate presence was dominated by the caddisfly and hudsonema, at Hamptons Road (site 3).

Water quality parameters measured were within the relevant guideline limits except for two exceedances, turbidity and total phosphorus, both recorded at Marshs Road (site 5).

In summary, the overall aquatic ecosystem of the water races was quite poor and reflective of other race systems within Christchurch and the Canterbury Plains.

All sites had a relatively complete vegetation cover, but actual canopy and water race cover was minimal, providing little or no shading to the in-stream environment. In addition, in-stream cover (e.g. from logs, vegetation) was minimal and substrate diversity was very low, consisting largely of silt and mud. Further, water width and depth and flow varied little across all the races surveyed.

Macro-invertebrate species diversity in the five sites was reasonably high, however all sites were dominated by pollutant tolerant species as is reflective of the low EPT taxa numbers observed. Fish species presence and diversity was depauperate and only common fish species observed in other water races in the area were observed. No rare or threatened species were identified within any of the water races.

Summary of observed water races

The four sites where general observations were made included the race running along Main South Road (site A), Blakes Road water race (site B), Montgomery's Drain (site 3) and Springs Road open channel (site D).

Observations showed that these sites were similar in width to the five water races surveyed (about 1 m wide). Riparian cover consisted predominantly of a narrow strip (about 1 to 2 m wide) of mown grasses on the road side of the race. Residential dwellings provided more extensive riparian cover on the other side of the road at sites A and to a lesser extent site B. In areas not adjacent to residential dwellings, the non-road side bank consisted of rank pasture grasses. This was typical of three of the sites. However, Springs Road open channel (site D) showed evidence of bankside spraying with areas of no cover (grasses) present, just dirt.

Both Montgomery's Drain (site C) and the Springs Road open channel (Site D) were dry on all occasions they were visited and are not known to contain flow.

Montgomery's Drain is piped along Halswell Junction Road between SH1 and Springs Road for a distance of approximately 2 km. From Springs Road it runs along an open channel for a distance of approximately 500 m before going through an elevated inlet structure into another piped section (about 100 m) until it discharges into Upper Knights Stream (also dry in this stretch). The

inlet structure and long lengths of piped sections of the drain would form a barrier to fish passage if the drain did sustain a consistent flow.

20.6. Assessment of effects on aquatic ecology

20.6.1. Operational (on-going) effects

The two main potential on-going effects from the operation of the Project are:

- habitat modification associated with the closure, piping and realignment of water races; and
- sedimentation and contamination.

Habitat modification

The Project will result in the permanent modification (to varying degrees) of some water races within the Project area. Some sections will be terminated, realigned or piped. Where a new structure (i.e. culverts and piped sections of the water race) is constructed within a water race, there is the risk that it will reduce the carrying capacity of the water race.

The proposed piped sections will result in a reduction in light and riparian vegetation along these sections and may reduce spawning habitat, reduce bank stability, increase suspended sediments, alter the existing biological communities and reduce the availability of food sources. Associated loss of riparian vegetation may impact upon water temperature and flow regimes (i.e. water volumes and velocities).

The most significant habitat loss will occur with the piping of the race along SH1. The water races within the Project area provide a low value aquatic habitat that supports pollutant tolerant macro-invertebrate species and limited fish species. Nonetheless it is a significant length of aquatic habitat that is proposed to be piped in this location. From an ecological perspective, Technical Report 17 recommends that it would be preferable if this was retained. Technical Report 17 recommends that during the detailed design phase, the NZTA should investigate diverting the race into lateral races to eliminate the need for piping. If no alternative is possible, then light wells and resting areas should be included along the pipe lengths to assist with fish passage.

The proposed piping represents a net loss to the aquatic habitat within the Project area. However, there are other areas where new sections of race are being created. These areas provide an opportunity to enhance the riparian and in-stream habitat thus mitigating losses as set out in the proposed mitigation section below. With recommended mitigation it is considered that effects will be minor.

Effects on fish passage

The piping of water races is likely to form a barrier to fish passage. However it also has the potential to create a safe haven for fish on the upstream site of the barrier.

It is noted that the race network is extensive. Therefore if sections of race are un-accessible and passage along them is lost, there are numerous alternative routes available up and downstream of the network. It is also noted that there are already sections of piped water races, drains and physical barriers (weirs) to fish migration within the Project area. Existing piped sections along Trents Road and Marshs Road are much longer than those proposed for the crossing under CSM2. With recommended mitigation it is considered that effects will be minor.

Effects on water quality

The water races currently perform a land drainage function during heavy rainfall events, taking stormwater runoff from the surrounding roads and land thus affecting water quality. In addition, the races can be controlled and shutoff as required to perform this function, altering the flow in the system.

In addition, maintenance activities carried out by SDC and landowners disturbs the bed and banks of the races and contributes to sedimentation, with bank-side spraying reducing riparian cover for in-stream ecosystems.

There is no direct discharge of road stormwater to any water race or drain except in exceedance of a 100 year ARI design storm event, e.g. pond emptying into Montgomery's Drain. However this discharge will be infrequent and is of treated stormwater. As such, the water quality is expected to be of a quality that will not impact on the receiving environment. In addition, de-watering water (clean water) may be discharged into the Drain however as this is clean water it is not expected there will be any effect to water quality of this discharge.

The downstream reaches of the Halswell River have the potential to be positively affected by the quality of the proposed discharges from the Project. With the proposed stormwater treatment system in place (which is an improvement on the existing "no treatment" situation), there is potential for the downstream water quality to improve over time.

With recommended mitigation it is considered that effects will be minor.

20.6.2. Construction effects

Construction effects relate primarily to earthworks required for construction. This includes the realignment and construction of the piped sections of races. The two primary potential impacts of construction are:

- the effects of sedimentation and other contaminants on aquatic ecosystems; and
- habitat disturbance.

Sedimentation and other contamination

Activities such as works to divert and realign the water races and any stormwater discharged during construction from the Project area has the potential to contain high loads of sediment if

not controlled and managed appropriately. This can lead to negative impacts on macro-invertebrates and fish

Stormwater runoff or accidental spills may also contain a range of contaminants including nutrients, heavy metals and hydrocarbons, which can also negatively impact the aquatic ecosystem Measures will be in place as part of the CEMP to ensure that sediment and erosion and stormwater runoff is managed so as not to enter the water races. Therefore contamination from this source is considered unlikely and effects are considered to be minor. However it is noted that in extreme 100 year flood events there may be some discharge of treated stormwater or discharges of de-watering water. As both these discharges will be of treated or clean water, it is not expected that there will be any effects on the water quality.

The water races are highly modified environments that are already subject to activities that create sedimentation and increase turbidity in the water column. Biological communities in these environments are tolerant to a wide range of environmental events including increased flood flows and turbidity. Accordingly they have a good tolerance of a variable habitat. With the measures detailed in the CEMP and associated Erosion and Sediment Control Plan, it is considered that effects will be minor.

Habitat disturbance

Construction activities have the potential to affect aquatic habitats and fauna by degrading the habitat through physical disturbance and permanent and temporary closure of water races. As mentioned above, the habitat is currently disturbed by routine water race maintenance.

Construction of any water race diversions is recommended to be carried out in the dry bed to minimise disturbance to the aquatic environment. Observations should be made of the old race channel to ensure no fish are trapped in the confined section. Where fish are located, they should be captured and relocated into the diverted race channel.

Creation of new habitat in the diverted sections can be achieved by including instream features such as rocks and cobbles that provide instream variety. Remediation of race banks to encourage the colonisation of a healthy instream community can be achieved by riparian planting.

Culverts and piping which are proposed for sections of the water races, can potentially impede fish passage by creating velocity traps for upstream migratory fish. The reduction in light and riparian vegetation along the culverted/piped sections may reduce spawning habitat, reduce bank stability, increase suspended sediments, alter the existing biological communities and reduce the availability of food sources.

With recommended mitigation it is considered that effects will be minor.

20.6.3. Aquatic effects summary

It is considered that over time, areas of both new and existing water race habitat can be enhanced and water quality improved and a more natural character achieved. Some areas of aquatic ecosystem habitat will be lost but alternative routes along the race network will ensure that fish passage is maintained. Proposed plantings by way of mitigation will improve the existing environment in the areas that remain, such that the effects of the proposal will be minor on aquatic ecology values.

Overall, with appropriate culvert and pipe design, ensuring alternative routes along the race network are provided, implementation of sediment and erosion control measures and riparian planting, it is considered that the effects on this already modified environment will be minor.

20.7. Proposed mitigation measures – aquatic ecology

A number of mitigation measures are proposed to mitigate potential effects of the Project on aquatic ecology. Many of these will be implemented through the CEMP and associated Erosion and Sediment Control Plan and the remaining are recommended to be included as conditions of consent.

20.7.1. Prior to construction

The following measures are proposed in Technical Report No. 17, to be carried out prior to construction:

- development and implementation of a CEMP including Erosion and Sediment Control Plan (Volume 4);
- the alignment of the piped sections will be consistent with the water race environment and should not include any steep drops or perched sections; and
- during detailed design, provide for the inclusion of light wells, resting areas and baffles along the piped sections of water races to assist with fish passage.

20.7.2. During construction

The following measures are proposed to manage the effects of construction activities:

- implement the CEMP and ESCP during the works, which will include:
  - programming construction activities to avoid where practicable excavation of soils adjacent to freshwater environments during heavy rainfall and flood events;
  - establishing appropriate access corridors and ensure employees and vehicles do not leave the designated corridors;
- until impacted riparian margins have been stabilised and works completed on the piped sections, culverts and any realigned sections, erosion control mechanisms, such as silt fencing and straw mulching, should be maintained to limit sedimentation of waterways arising from the works in accordance with the CEMP and ESCP;

- works shall not affect the passage of fish or cause stranding of fish in pools or channels. If a section of water race requires dewatering to enable the pipe to be installed, then the section of race should first be closed off at one end and time allowed for fish to move down the system before works commence.;
- carry out all instream works in the dry bed, with water to the race network being shut off or bunds being put in place around the works area and water diverted around it;
- culvert inverts should be designed to be at or below bed level so as not to form a barrier to fish migration during low flows;
- construction activities related to the water races to be limited to designated areas within the culvert/pipeline construction sites. Where possible, heavy machinery should be kept away from the banks to minimise potential for bank collapse;
- works to install culverts and pipes should avoid unnecessary modification of the water race bed and channel. Avoid large areas of concrete channelling as this reduces the connectivity of the water race and eliminates instream habitat and potential food sources for instream organisms;
- re-vegetation plans to be underpinned by ecological principles and scientific advice ensuring stream quality and habitat integrity is maintained and effects mitigated; and where appropriate, riparian planting should promote ecological linkages and provide potential fish spawning habitat. This is included as part of Technical Report No. 7, associated Project landscape plans (Volume 5) and the Landscape Management Plan (SEMP005);
- all disturbed areas adjacent to the water races should be re-grassed as soon as practicable. If it is outside of the growing season, the disturbed areas should be covered with mulch; and
- no planned refuelling or maintenance of construction equipment to occur adjacent to a waterway, nor equipment to be parked adjacent to freshwater environments for a significant time. Readily available spill kits for land and water to be kept on site with trained personnel.

20.7.3. Site specific mitigation

The Aquatic Ecology Assessment, Technical Report 17 outlines site-specific riparian planting to potentially enhance in-stream habitats and mitigate effects with regard to habitat loss and disturbance. These water race sections are located adjacent to the Hamptons Road realignment, the Waterholes underpass, Weedons Road, the Trents Road underpass, the Marshs Road underpass and Springs Road / Halswell Junction Road. This planting is illustrated within the landscape plans (Volume 5) accompanying the Landscape Context Report, Technical Report 7. Riparian planting will be consistent with the SDC Planting Guide for water race margins.

It is also recommended that in-stream features such as rocks and boulders should be included where feasible. These would provide flow variation and enhance habitat.

20.8. Conclusion

Potential adverse effects are associated with both construction and operational activities. The Project provides an opportunity to enhance terrestrial and aquatic ecology through appropriate mixed indigenous and exotic plantings within the Project area, recommended as mitigation. This includes along the riparian margins of water races. These plantings will enhance habitat quality for indigenous birds, lizards, invertebrates, fish and aquatic life and will assist in offsetting the loss of habitat arising from the Project.

Overall, it is considered that with suitable mitigation measures in place, as recommended, the effects on terrestrial and aquatic ecosystems will be minor.

21. NATURAL HAZARDS

Overview

The key natural hazards relevant to the Project area relate to seismic activity and flood risk.

Seismic activity, including ground shaking and liquefaction, is a significant geological hazard in the Canterbury area. There are several active and known faults around Canterbury, with the Greendale Fault terminating approximately 1km north of Rolleston. Propagation and extension of this fault eastwards would result in active fault crossing the Project area east of Weedons and trending towards Prebbleton. However, recently generated data and interpretation from GNS is indicating that seismic activity is moving eastwards and north, away from the Project area.

Ground movement associated with the recent earthquake events commencing in September 2010 have recorded horizontal movement up to 900mm and vertical movement of up to 320 mm in the Project area. No liquefaction was recorded in the project area during any of the recent earthquake events, however, geological investigations have proven that liquefiable soils do exist at depth.

In terms of flood risk, the design standard for the highway drainage system is the 100 year Annual Recurrence Interval ("ARI") rainfall event including an allowance for climate change, as recommended by MfE in the local body guidance manual. It has been assessed that disposal to land has the potential to reduce downstream flooding due to the reduction in contributing area (i.e. the area draining to the highway drainage system). This has the potential to have a positive effect on reducing flooding of the existing environment.

Utilisation of total storm detention in the 100 year 24 hour rainfall event will ensure that spilling to Upper Knights Stream in the Halswell River catchment via Montgomery's Drain will only occur in extreme rainfall and/or groundwater events where flood risk can be appropriately managed.

21.1. Introduction

Events such as earthquakes and flooding are natural hazards that can have adverse effects on people, property and other parts of the environment. When designing and constructing roading projects it is important that reasonable steps are undertaken so that the activities do not cause or exacerbate natural hazards while ensuring these events will not become a hazard for people utilising the Project.

The information contained in this chapter is based on the Geotechnical Engineering and Geo-Hazard Report (Technical Report 11) and Assessment of Stormwater Disposal and Water Quality Environmental Effects (Technical Report 3), appended in Volume 3.

The geological and hydrological characteristics of the Project area were assessed to identify elements that require particular recognition at the detailed design stage. The reports also identify measures that will minimise effects of natural hazards on the Project.

21.2. Existing environment

21.2.1. Geological hazards

A geological hazard is an adverse geological condition which is capable of causing damage or loss of property or life. The following geological hazards were assessed:

- Seismicity;
- Liquefaction; and
- Landslips.

Seismicity

Seismicity relates to the frequency or magnitude of an earthquake in a given area. A summary of the seismicity assessment, including ground shaking and ground deformation from the recent earthquake events, of the Project area is provided below. A detailed assessment can be found in Technical Report 11, Section 6.

The route lies within the Canterbury Region south of the Marlborough Fault Zone and to the east of the Alpine Fault. The September 2010 Darfield Earthquake was centred on the previously unmapped Greendale Fault located to the west of the route. The earthquakes that have occurred since September 2010 lie with a localised region centred around Christchurch and to the west of the city. The Greendale Fault has been mapped with its eastern end terminating approximately 1km north of Rolleston. Propagation and extension of this fault eastwards would result in the active fault crossing the Project area east of Weedons and trending towards Prebbleton. However, recently generated data and interpretation from GNS is indicating that seismic activity is moving eastwards and north away from the Project area, becoming centred offshore in near Pegasus Bay. The highest current risk is from a significant aftershock from the current sequence, but both the Marlborough Fault zone and the Alpine Fault are capable of generating large earthquake events which could result in significant ground shaking in the Christchurch area.

The movement on the fault that generated the September 2010 earthquake was accompanied by extensive ground rupture. Subsequent mapping has disclosed subsurface rupture, one extension of which approaches the route immediately north east of Rolleston.

In the Project area, significant ground movement occurred following the September 2010 event. Horizontal displacements of up to 900 mm towards the west occurred on Main South Road near Rolleston with horizontal displacements reducing further east e.g. 300 mm at Berketts Road. To the east of Berketts Road, the vector of displacement changes direction to the north east with displacements of 190 to 230 mm being measured. The vertical displacements measured are all negative (i.e. movements downwards with respect to previous levels). The maximum movements noted were 230 mm west of Weedons Road and 320 mm near the Larcombs Road intersection. Smaller negative displacements of 20 mm to 40 mm were noted around the Main South Road/CSM2 intersection.

Unusually high levels of ground shaking were noted in the 22 February 2011 and 13 June 2011 earthquakes with maximum peak ground accelerations of 2.2 g recorded in the Heathcote Valley and 1.6 g in parts of the Eastern suburbs. In the Project area, peak ground acceleration values were in the order 0.2 g arising from both the 4 September and 22 February events. The interaction of the subsurface strata is significant with respect to the Project area. In the Heathcote Valley and Eastern Suburb's soft alluvial sediments overlying harder basement rock (the subsurface extension of the Lyttelton Volcano) has resulted in the amplification of the arriving earthquake waves i.e. they refract and "bunch up". The subsurface conditions underlying the Project area are somewhat different, with stiff soils to some considerable depth. There are unlikely to be any amplification effects within the Project area.

Liquefaction

ECan had previously (to 2010) carried out liquefaction susceptibility studies in Christchurch to identify areas of particular risk. The Project area was identified as having a low risk of liquefaction. The earthquakes of 4 September 2010, 22 February 2011, 13 June 2011 and 23 December 2011 generated liquefaction in the Christchurch area. The effects included extensive "sand boils", discharge of groundwater, lateral spreading of liquefied soils and associated cracking of overlying soils and settlement of ground and structures founded on surficial soils. Little or no liquefaction was observed in the Project area. This was due to:

- lower Peak Ground Accelerations in the Project area;
- lower ground water levels (4-5m below surface); and
- dominant soils e.g. gravels which are not particularly susceptible to liquefaction.

Based on the site investigation data obtained, and the observed effects, and data from the recent earthquakes, the susceptibility of the soils within the Project area to liquefaction is low and limited to particular horizons of more silt and fine sand rich material.

Slope Stability

With the relatively flat topographical relief of the Project area and natural slope stability, general land instability issues do not pose a significant constraint to construction or long term serviceability of the motorway.

21.2.2. Climatic Hazards

The majority of the catchment crossed by the proposed MSRFL and CSM2 route does not directly contribute to any natural watercourse. This conclusion was reached in discussion with staff of ECan and SDC and is illustrated by the absence of natural watercourses in the vicinity of the Project. Surface water in the Project area typically ponds in local depressions on the catchment surface and soaks to land or evaporates. In larger events overland flows have the potential to flow along surface flow paths. These overland flow paths are often intercepted by field drains,

irrigation channels and the existing stockwater race network, which either eventually discharge to the Halswell River or discharge to land via engineered soak pits.

The SDC advises that stockwater races perform a land drainage function during heavy rainfall events. During or prior to such events, the upstream stockwater race intakes are closed or shut off. SDC advises that runoff can exceed water race capacity and some localised flooding does occur.

The natural catchment upstream of the proposed MSRFL alignment is intercepted by SH1 and the railway embankment. Both of these structures form impediments to overland flows, particularly the railway embankment, and there is little existing stormwater infrastructure in place to allow for the passage of flood flows through or under Jones Road and the rail embankments. There is significant capacity for ponding upstream of these embankments.

The section of CSM2 about Halswell Junction Road is part of the Halswell River Catchment. This area drains to the Halswell River via Montgomery's Drain and Upper Knights Stream. Upper Knights Stream is permanently dry at the upstream end. ECan has stated that the Halswell River is sensitive to any increases in peak discharge rate or volume as there is a history of flooding. The Project alignment cuts diagonally across the flood plain and has the potential to divert surplus overland flow back to the Upper Knights Stream and hence into the upper reaches of the Halswell River. There is a history of flooding in the Halswell catchment where the critical duration storm is up to 60 hours in length.

21.3. Assessment of natural hazard effects

21.3.1. Geological hazards

From a geological perspective, the design and construction of the Project is relatively straight forward with few inherent risks associated with geological hazards.

The change in seismic activity and setting for the Canterbury region as a consequence of the earthquake events from September 2010 onwards does pose an element of risk in terms of elevated peak ground accelerations, ground shaking, ground rupture and liquefaction (at depth in the soil horizon).

The major effects from liquefaction, if it were to occur on site, would be concentrated on the structures. It is unlikely given the site soils of sands and gravels that liquefaction would disrupt either the pavement or buried services such as occurred in the eastern suburbs of Christchurch. Based on this analysis it is concluded that there is little risk from liquefaction to major structures at the site, and therefore adverse effects on the public using the State highway, that prudent design would not mitigate.

21.3.2. Climatic hazards

The Halswell River has a history of flooding. The South West Area Plan (SWAP)[97] and its associated Stormwater Management Plan (SMP)[98] have considered limiting the effects of flooding through a series of stormwater storage facilities. These include ponding and detention basins and a recommendation to encourage discharge to land.

Events below the design storm event should be completely contained within the Project corridor reducing potential flooding effects downstream. The stormwater design will reduce the contributing area to any existing flooding locations (through re-contouring land and the creation of embankments and bunds), thereby reducing flooding to adjacent landowners. It is considered there will be a slight increase in total volume to land but a negligible change during and immediately after a large storm event (by taking into consideration the time to soak away following that storm event).

Events in exceedance of the ARI event have the potential to cause flooding upstream of the Project and of the Project itself. These events will also result in the spilling of flood water into Montgomery's Drain. These flows will eventually reach the Halswell River (via Upper Knights Stream)

It is anticipated that there will be an increase in base and flood flows in Upper Knights Stream and Halswell River. The increase in flows in these water bodies will be a result of the new highway impervious area increasing, and as such, there will be more runoff water that would otherwise be soaking directly to land (ignoring the effects of evaporation and evapotranspiration).

During future periods of high groundwater, the expected base flow and flood flows are likely to increase. The time of elevated flow in the Halswell River is currently expected to occur over a period up to 60 hours in length following a storm. However, during the recession curve, the River and Upper Knights Drain are expected to have some surplus capacity.Overland flows in excess of the notional full capacity of the stockwater race have the potential to arrive upstream of the Project alignment. The extent of development immediately adjacent to the proposed alignment is currently limited; therefore effects on flooding of habitable floors are likely to be less than minor. However, the current extent and frequency of inundation of pasture upstream of the alignment is not known.

On the downstream side of the Project alignment, the siphons will discharge stormwater. This is also aided by distance between the Project alignment and the downstream properties. Natural dispersion of flows is likely to occur in the distance between the siphon outlets and the downstream properties.

There may be overland flood flow exceedance events at Halswell Junction Road. The Owaka Basin has been designed to accommodate overflows from Halswell Road detention basin (which collects

[97] South West Christchurch Area Plan, Christchurch City Council, April 2009.
[98] Stormwater Management Plan for South West Christchurch, Christchurch City Council, 2011.

flows from the Hornby Industrial Area). The outlet from the Owaka Basin is to the old quarry pit on Wilmers Road. However, when this is full or there is insufficient hydraulic gradient, an overflow discharge from the basin will discharge to Montgomery's Drain and on to Upper Knights Stream via a pipe and open channel system. It will be necessary to maintain the connectivity and capacity of this overflow through the construction sequence of CSM2.

More detail on the effects of geological and climatic hazards is provided in Chapter 19 and Technical Reports 3 and 11, Volume 3.

21.4. Measures to avoid, remedy or mitigate actual or potential effects on or from natural hazards

21.4.1. Geological hazards

Mitigation of risks associated with geological hazards will be largely addressed through detailed and commensurate investigation for the detailed design of the structures and implementation of the appropriate geotechnical parameters which will ensure the risk is 'designed out'. It is considered that the Project will not affect the rate or likelihood of a geological hazard, however while an earthquake event may affect the proposed State highway it will be designed in such a way so there are minimal effects on the highway and users of the highway.

21.4.2. Climatic hazards

The design standard for the highway drainage system is the 100 year ARI rainfall event including an allowance for climate change. This includes the conveyance capacity of swales and pipes and the required storage within the disposal system. Disposal to land has the potential to reduce downstream flooding due to the reduction in contributing area (i.e. the area draining to the highway drainage system) and reduced flows to Montgomery's Drain and Upper Knights Stream. This has the potential to have a positive effect on reducing flooding of the existing environment. Events in exceedance of the ARI event have the potential to cause flooding upstream of the Project and of the Project itself. These are explained in detail below:

MSRFL

Flooding may occur upstream of the existing SH1 alignment. The highway drainage system has not been designed to dispose of the flows generated in the catchment between the State highway and the railway. In order to mitigate the effects of overland flows on the disposal system, bunds will separate the 'engineered' and 'natural' systems. The effect on the 'natural' system is that the 'engineered' system will occupy flood volume, but the effect of this is partially mitigated by a reduction in runoff volume contributing to the 'natural' system (i.e. discharges from the existing highway will be diverted to the disposal system). The effect of the reduction in flood plain volume will be minor.

There are two locations where overland flows may exceed the runoff from the local catchment downstream of the large railway embankment culvert and the Digga-link site. In both these

instances, specific infrastructure is proposed to mitigate any potential flooding effects by providing conveyance beneath the Project. More specifically:

- a culvert with a high level entry at a level near the existing road crest is proposed downstream of large diameter railway crossing culvert; and
- extension and/or replacement of the existing Digga-link culvert is proposed.

CSM2

There is significant uncertainty with the occurrence and size of the overland flows generated in the catchments upstream of the Project. In order to mitigate this uncertainty, bunds have been included upstream of the Project drainage system. As CSM2 is a greenfield development without any existing restriction to overland flows, siphons have been included to pass flows beneath the Project. Key aspects of their design to mitigate environmental effects are listed below:

- the overland flow siphons have been included in locations where the natural overland flows occur;
- consideration has been given to all topographic data presently available to minimise the effects of any concentration of overland flows on downstream properties;
- increases in flood level upstream of the siphons is intended to be limited 250 mm in events up to the 50 Year ARI event and with no increases in habitable floor level flooding;
- the land adjacent to the siphon is slightly dropped to minimise sedimentation of the siphon (reducing the chance of blockage and upstream flooding); and
- soakage at the base of the inlet and outlet manholes has been included to allow the siphon to drain and remain dry between events, thus easing maintenance and reducing flood volumes.

In addition to the siphons the overland flow paths have influenced the highway drainage disposal system. As described above, the disposal points in the highway drainage system have been located and sized with consideration given to overland flow path locations. Further to the additional soakage devices and their location, cross drains have been included in the design to permit two functions:

- activation of the disposal systems on both sides of the Project; and,
- facilitate pumping down of the system (using temporary pumps) to downstream overland flow paths after exceedance events.

In locations where overland flow siphons will be impractical (given length or geometric constraints) surface water soakage areas have been proposed.

A network of drainage measures under the Ponds that discharge to Upper Knights Stream will operate when groundwater rises above RL 17.5m. This will create a new groundwater equilibrium and maintain current flow rates to Upper Knights Stream and Halswell River.

In order to manage the effects on the drainage system, a period of monitoring of the discretionary discharge from the stormwater pond is recommended under controlled conditions. A process for the controlled release of water from the Maize Maze Pond to the Halswell River system is recommended.

Potential for blockage or partial blockage of the siphons is a risk, but one which can be managed by:

- raising the upstream inlet above the immediate adjacent ground in order to allow settlement of solid particles and gravels from entering the siphon;
- installing scruffy dome type devices to limit larger floatables and branches from entering siphon;
- oversizing the capacity of the siphon in order to cater for limited over design events;
- attending to good engineering practice on the downstream end of the siphon to ensure effects of concentrated flow discharge are mitigated against on a case by case basis; and
- ensuring there is an adequate and functioning maintenance programme.

Stockwater races

The design of the secondary pipe system at each of the stockwater race crossings will provide sufficient conveyance to pass flood flows. This will mitigate any potential upstream flooding effects arising from the proposed alterations to the stockwater races.

21.5. Conclusion

Overall, it is considered that the Project has appropriately considered natural hazard effects. A number of mitigation measures are proposed and natural hazards will be further considered at the detailed design stage of the Project.

22. CONTAMINATION

Overview

Soil Contamination investigations have been undertaken along and adjacent to the proposed MSRFL and CSM2 alignment. The alignment passes over greenfields and orchards, and adjacent to railway and landfill sites. The investigations included a route inspection, the development of a soil sampling plan, soil sample collection, laboratory analyses and the assessment and reporting of laboratory results against the soil contaminant standards ($SCSs_{(health)}$) of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the "Soil NES").

A total of 33 soil samples were collected from near-surface depths and analysed for a range of contaminants based on past or current land uses. The results were assessed on a land use basis including risks to human health.

The concentrations of contaminants in all soil samples collected within the project area were less than the $SCSs_{(health)}$ for industrial land use. A Tier 1 Risk Assessment of the investigation results demonstrates that contamination arising from historic land use activities along the alignment has had little or no measurable effect on human health or the environment.

Several locations along the alignment are identified as HAIL (hazardous activities and industries list) sites. Accordingly, Regulation 9 of the Soil NES, identifies soil disturbance at these locations as a controlled activity requiring resource consent. Soil disturbance must be managed under a site management plan, and be monitored and reported on, including the transport, disposal and tracking of materials taken away in the course of the activity. The results of this investigation conclude that contaminants do not exceed the land use $SCSs_{(health)}$ and the activity therefore remains a controlled activity under this regulation. Under the Soil NES remedial action resulting from soil contaminant concentrations is therefore not required.

22.1. Introduction

This chapter summarises the presence of contaminated land within the alignment of MSRFL and CSM2, discusses the likely impacts of potential contamination and recommends mitigation measures.

The presence of contaminated land can potentially pose a risk to the environment and to construction workers. Through understanding the potential for contaminated land, appropriate mitigation and management measures can be implemented to control the potential risks (e.g. health and safety plans to reduce exposure to contaminants and environmental management plans to control movement and re-use of soils). Furthermore, the presence of contaminated land can be incorporated into the design of the Project to avoid disturbance of contaminated sites

where possible. The Contaminated Land Assessment Report, which outlines the scope of the investigations undertaken, is presented in Technical Report 16 appended in Volume 3.

22.2. Site sampling and analysis

22.2.1. Identification of potentially contaminated sites

The investigation of past and present land uses identified a number of potentially contaminated sites within the Project area (HAIL sites). These sites are summarised in the table below, and a sampling and analysis plan was developed with the primary aim of investigating the sites listed.

Table 37: Potential Sources of contamination – HAIL sites identified within the study area

Site ID	Description	Route	Potential Primary Contaminants of Concern	Extent of Impact	Potential to impact Project[99]
NA	Majority of CSM2 and MSRFL – Agricultural Land (Greenfield Soils)	MSRFL/ CSM2	Arsenic, lead, copper, mercury and organochlorine pesticides	Whole site potentially	Low
1	Larcombs Vineyard	MSRFL	Arsenic, lead, copper, mercury and organochlorine pesticides	Northern boundary	Low
2	Evergreen Garden Centre and Southern Woods Nursery	MSRFL	Arsenic, lead, copper, mercury and organochlorine pesticides	Northern boundary	Low
3	North east corner of Main South Road and Curraghs Road (Former Landfill)	MSRFL	Heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), petroleum hydrocarbons, Pentachlorophenol (PCP) and asbestos.	Southern boundary	Low/ Moderate

[99] Includes people and the environment.

Site ID	Description	Route	Potential Primary Contaminants of Concern	Extent of Impact	Potential to impact Project[99]
4	Former Applefields Orchards	CSM2	Arsenic, lead, copper, mercury and organochlorine pesticides	Northern corner	Low
5	Former Southbridge Branch Railway Line	CSM2	Heavy metals, PAHs, creosote and herbicides	Intersects	Moderate
6	Former Quarry (Springs Road)	CSM2	Heavy metals, PAHs, petroleum hydrocarbons, PCP and asbestos	Intersects	Moderate / High
7	McVicars Site – Timber Treatment (Halswell Junction Road)	CSM2	Arsenic, copper, chromium, boron, dioxins and furans, PCP	Southern boundary	Moderate / High

22.3. Site sampling

A site sampling investigation plan was put in place to guide the investigation of potentially contaminated sites. Some of the areas identified above were not investigated, primarily due to more detailed information becoming available on the proposed route resulting in lesser impact on some of the potentially contaminated sites. A sampling plan, sample identification and analytical suite was then applied to each remaining potentially contaminated site indicated in Table 38:

Table 38: Sampled sites

Site ID	Description	Sample ID	Analytical suite
'Greenfield Soils'	Rural/agricultural land throughout CSM2 and MSRFL	BG01 to BG15 (15 samples)	OCPs, HMs
4	Former Applefields Orchard	AS1 to AS3 (3 samples)	OCPs, HMs
5	Former Southbridge Branch Railway Line	RW1 to RW5 (5 samples)	PAHs, AH, HMs

Site ID	Description	Sample ID	Analytical suite
6	Former Quarry (Springs Road)	Q1 to Q9 (9 samples)	PAHs, HMs

Notes: Greenfield soils – relates to sites with no known use, apart from agricultural land use, based upon information reviewed during the Preliminary Site Investigation, April 2011.

OCPs – Organochlorine Pesticide Screen; HMs – Heavy Metals Screen (Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc); PAHs – Polyaromatic Hydrocarbons; AH – Acid Herbicides

22.4. Sampling results

Based on the findings of this investigation, for the majority of the route of the CSM2 and MSRFL, concentrations of contaminants in soil are comparable to published background soil concentrations and all are less than the $SCS_{(health)}$ of the Soil NES. Land disturbances in these areas are unlikely to result in any significant risk of adverse effects from contaminant discharge to the environment.

Apart from greenfield locations, a number of specific areas were identified as being potentially contaminated based on past or current land use. Parts of the selected study areas lie outside of the final Project designation boundaries (shown in the annotated drawings C62236-B-C1011 and C62236-B-C1012 appended to Technical Report 16). These areas are discussed in the following sections.

The potential environmental effects from contaminated soil were also evaluated by comparing the soil results with international based ecological guideline criteria (the USEPA Ecological Soil Screening levels or EcoSSLs). The EcoSSLs were derived to protect ecological receptors such as plants, soil invertebrates and wildlife (birds and mammals) that commonly come into contact with soil or ingest biota that live in or on soil.[100]

22.5. Background sampling

Soil samples were collected along the northern verge of Main South Road between Robinsons Road and Rolleston and along the CSM2 alignment. There were no indicators of contamination in soils and no potential sources of contamination were identified. The concentrations of heavy metals in soils were generally consistent with published background concentrations, and concentrations of organochlorine pesticides were generally lower than published background concentrations.

[100] USPA (2005) Guidance for Developing Ecological Soil Screening Levels. OSWER Directive 9285.7-55. United States Environmental Protection Agency Office of Solid Waste and Emergency Response. November 2003; revised 205. Note: additional EcoSSIs were released by USEPA in 2007 for contaminants including DDT and PAHs.

A number of specific areas were targeted during the investigations that were deemed to be potentially contaminated based on past or current land use including:

- former Applefields Orchard (Shands Road);
- former Southbridge Branch Railway; and
- former Quarry on Springs Road.

22.5.1. Former Applefields Orchard (Shands Road)

The proposed Shands Road underpass will require earthworks adjacent to the former Applefields Orchard which has been redeveloped as a subdivision (Aberdeen Subdivision), located on the eastern corner of Shands Road and Blakes Road. Sampling results revealed no concentrations of contaminants above guideline values. Concentrations of organochlorine pesticides were below laboratory detection limits.

22.5.2. Former Southbridge Branch Railway

The proposed CSM2 alignment passes to the south of the former Southbridge Branch railway line which runs in a roughly north-south direction from Hornby towards Prebbleton.

Samples were analysed for heavy metals, PAHs and acid herbicides and the concentrations of heavy metals were below guideline values for the samples analysed within the designation boundaries.

22.5.3. Former Quarry on Springs Road

The former quarry site is located south of the CSM2 alignment, where filling had been known to occur. The soil contamination investigations focused on this area of the site, and elevated concentrations of some soil contaminants where identified. However, as this area is located outside of the designation area, it is not necessary to consider them further.

22.6. Mitigation and contingency planning

22.6.1. Risk register

A register outlining the risk assessment of the contamination results was developed. It was concluded that there were no areas where soil contamination would trigger remedial action.

22.6.2. Effects

Whilst the likelihood of presence of contaminated ground is considered to be minimal, contingency planning is required in the event of contamination being discovered during construction, particularly adjacent to the Springs Road quarry site and at the Curraghs Road landfill site.

it is considered that the risk to the health of workers involved in the construction of the Project is likely to be minimal. No special precautions are considered necessary.

The risk of adverse environmental effects arising from contaminated land is considered to be minimal as measured contaminant concentrations within the designation of the Project alignment are generally consistent with background concentrations.

Furthermore measured concentrations along the Project alignment were compliant with the adopted US EPA risk based ecological acceptance criteria. This indicates that an adverse effect from concentrations of contaminants measured in soil is unlikely. This is with the exception of one sample from the former Southbridge Branch Railway that falls outside the proposed alignment and will not be subject to earthworks for the Project.

Most of the land traversed by the alignment is agricultural in nature, which has been used for pasture and cropping. As such, while there are detectable traces of pesticide and fertiliser residues, this land is no different from any other area within the Canterbury Plains. The contaminants identified in some discrete areas of the Project alignment have concentrations of several contaminants that are elevated above natural "background" levels. The contaminants (trace elements and PAH hydrocarbons) partition to the soil particles because they are sorbed strongly to the mineral and/or organic fraction of the soil. These contaminants also have limited solubility so again they stay "stuck on" to the soil particles. These contaminants will be found in the topsoil because they are derived from surface spraying/fertiliser applications and because any cultivation is limited to about the top 30cm of the land. Furthermore, these agricultural contaminants sorb to the topsoil which is organic rich, and they do not "leach" downward in the soil profile. This is also true for contaminants like DDT which was detected in soil but measured within the background range for Christchurch soils. DDT is essentially ubiquitous in the topsoil of agricultural land throughout the country and particularly in Canterbury where it was used for grass grub control.

The fate of the contaminants is therefore controlled by the topsoil management for the Project. Topsoil will be stripped and stockpiled/stabilised as part of normal earthworks procedures. Erosion and sediment controls will effectively isolate this material from water bodies, meaning that there will not be contact between water and topsoil during construction. Upon completion of the earthworks, topsoil will be reused on site and stabilised with grass and landscaping. Erosion and sediment control devices will remain on site until the disturbed soil is stabilised, mitigating the risk of contaminants interacting with stormwater. During operation of the Project, the stormwater discharged will be from paved surfaces, so there will be no on-going risk.

22.6.3. Construction Environmental Management Plan

A draft CEMP has been prepared (refer to Volume 4) for this Project. The CEMP outlines details required to enable the NZTA and the Contractor to construct the Project with the least adverse environmental effects.

While this assessment demonstrates that hazardous contaminated land is not expected to be encountered during the construction of the Project, the CEMP details the management of emergencies, incidents and complaints insofar as they relate to the risk of unexpectedly encountering contaminated land during the construction phase. The CEMP also comprises the site management plan required by the Soil NES for the Project, and will monitor and report on contamination risk, including the transport, disposal and tracking of materials taken away in the course of the activity. Provided the CEMP is adhered to, adverse effects associated with contaminated land are expected to be less than minor.

22.7. Conclusion

It is concluded that concentrations of contaminants in all soil samples collected within the designated zone for the Project were less than the $SCSs_{(health)}$ of the Soil NES for industrial land use.

The investigation results demonstrate that contamination arising from historic land use activities along the proposed route has had little or no measurable effect on human health and ecological risk to the environment is minimal.

As several locations along the route are identified as HAIL sites (Table 37), Clause 9 of the Soil NES, identifies soil disturbance as a controlled activity subject to the results of a soil investigation stating that the soil contamination does not exceed the applicable standard (the $SCSs_{(health)}$) of Regulation 7. As a controlled activity, a resource consent has been sought and the activity will be managed under a site management plan, monitored and reported on, including the transport, disposal and tracking of materials taken away in the course of the activity (via the CEMP). It is confirmed that excess soils arising from the construction are likely to be cleanfill.

23. CULTURAL IMPACTS

Overview

The relationship between tangata whenua (Ngāi Tahu) and South-West Christchurch is culturally and historically significant.

A Cultural Impact Assessment ("CIA") has been prepared as part of a consultation method, whereby a consultant has drafted the report, which Mahaanui Kurataiao Ltd ("MKT") is peer reviewing and completing on behalf of Ngāi Tuahuriri, as mana whenua. The completed CIA is not yet available.

Impacts on cultural values have been recognised during the design of the Project and mitigation or management measures are proposed to avoid, remedy or mitigate effects on cultural sites and values.

23.1. Introduction

This chapter provides an overview of the NZTA's engagement with Ngāi Tuahuriri and Te Runanga o Ngāi Tahu in identifying and assessing the impacts of the Project on cultural heritage values to inform the AEE for the RMA approvals required for the Project, and identifies potential mitigation measures.

During the consultation process, Ngāi Tuahuriri as tangata whenua has been recognised as having a special status as kaitiaki of resources in those areas affected by the Project. As part of the consultation undertaken in preparation of the CIA, Ngāi Tuahuriri were identified to be the most affected by the Project and therefore the NZTA has, and will continue to consult with them further during the Project through information, hui, and updating them on the Project.

A draft CIA has been prepared and is with MKT for review and completion. This assessment of cultural impacts is based on the draft CIA, published material on cultural values in the Project area, and discussions to date with Ngāi Tahu and Ngāi Tuahuriri.

23.2. Existing cultural environment

23.2.1. Background

Prior to European settlement, Ngāi Tahu and before them, Ngāti Mamoe and Waitaha maintained permanent and temporary occupancy in the wider Christchurch area. This historical association is outlined in further detail in Chapter 24, which assesses effects on archaeological sites, including cultural sites. Ngāi Tahu's relationship with the land in the Christchurch area remains integral to Ngāi Tahu and forms a fundamental part of on-going cultural identity and wellbeing.

Ngāi Tūāhuriri is one of the five primary hapū of Ngāi Tahu whānui, whose takiwā (territory) includes Christchurch.

23.2.2. The cultural landscape

There are two recorded cultural archaeological sites (middens/ ovens) within the wider study area. None of these identified archaeological sites are located within the proposed Project footprint.

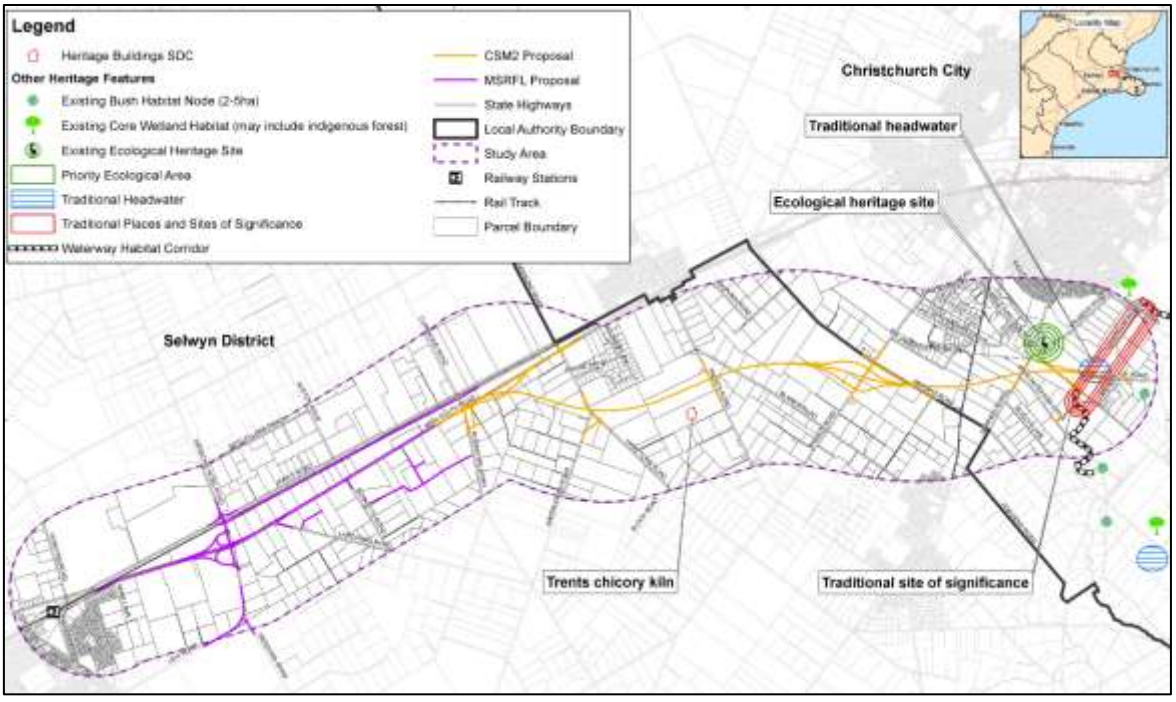
23.2.3. Maori settlement history

The Project falls within the takiwā and customary interests of Ngāī Tūahuriri, which centres on Tuahiwi and extends from the Hurunui River in the north to the Ashburton River/Hakatere in the south, sharing an interest with Arowhenua Rūnanga northwards to Rakaia and then to the Main Divide. Prior to Ngāi Tūahuriri, this area fell with the domain of Ngāi Tūhaitara and its descendent hapû generically referred to as Ngāti Hine-matua.

23.3. Cultural values and effects

The SWAP identifies a 'Traditional Headwater' and 'Traditional Site of Significance' located near the head of Knights Stream at the easternmost end of the CSM2 alignment as illustrated on Figure 52.

Figure 52: Location of heritage sites and traditional sites of significance in proximity to CSM2



The proposed alignment where CSM2 connects with CSM1 north of Halswell Junction Road passes through these sites. These sites are specific to the CSM1 Project and beyond the scope of this Project. Impacts on identified cultural values were assessed in the development and approval of CSM1. A CIA was prepared for CSM1. As part of the CSM1 project, the link between the Halswell and Heathcote catchments was maintained, as proposed in the SWAP. This link is the 'Traditional

Site of Significance' identified in the SWAP. A walkway under CSM1 maintains a link between the catchments. The Runanga have been involved in artwork and interpretation for the walkway.

The impact on the sites identified in the SWAP has been considered and mitigated as part of CSM1. No additional mitigation of effects is considered necessary for these features as part of this Project.

CSM1 has implemented a monitoring programme during construction. No unrecorded cultural or archaeological sites have been discovered.

Ngāi Tūāhuriri and Ngāi Tahu have identified the values of Whakapāpā, Rangatiratanga, Taonga, Kaitiakitanga, Mauri, Manaakitanga, Mahinga Kai, Wāhi Tapu/Wāhi Taonga and Urupā. These values have been identified as having particular cultural significance for consideration and appropriate provision within the construction of the Project.

In addition to the protection of cultural heritage, further issues identified by Te Ngāi Tūāhuriri with regards to the potential for adverse effects on Ngāi Tūāhuriri values were:

- water quality; and
- effects to native bird, fish and aquatic species and their habitat.

An archaeological assessment carried out for the Project identified two recorded midden sites within the vicinity of the proposed CSM2 and MSRFL. It has been assessed that these middens will not be affected by the Project as they are located outside the road alignment. At this stage, there are no other known sites of cultural significance to Maori within the CSM2 and MSRFL Project area.

23.4. Measures to avoid, remedy or mitigate actual or potential adverse effects on tangata whenua

Consultation has been, and will continue to be undertaken with Te Ngāi Tūāhuriri Runanga and MKT. A meeting with Ngāi Tahu has confirmed that MKT undertake resource management consultation on behalf of Te Runanga o Ngāi Tahu. This on-going consultation will ensure that correct measures are implemented to avoid, remedy and mitigate any actual or potential effects on tangata whenua.

As a result of the initial CIA findings, the following recommendations have been made to avoid remedy or mitigate adverse effects on tangata whenua values:

- implementation of the Accidental Discovery Protocol covering the NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast);
- adoption of the Ngāi Tahu Koiwi Tāngata Policy 1993;
- adoption of a planting regime within the Project area that is consistent with principles of the South West Area Plan, and that enhances native bird, fish and aquatic species

habitat and enhances bio-diversity in the Project area – it is confirmed that the Project landscape plans contained within Technical Report 7 conform to the SWAP principles;

- adoption of a Stormwater Treatment Regime that is consistent with principles of the SWAP, and that delivers superior quality treated stormwater to its final receiving environment – it is confirmed that the design philosophy adopted for the Project will deliver quality treated stormwater which aligns or exceeds the requirements of the NRRP; and
- installation of interpretation features to inform pedestrian and other non-vehicular users of the area of cultural values such as Ngāi Tahu whānui traditional use of, and on-going relationship with the natural environment. It is suggested that acknowledgement could be made of the traditional trail linking Kaiapoi with pā at Waikakahi, Wairewa and Taumutu. Similar to acknowledgement (as part of CSM1) of the use of the O Waka Road area as a causeway to haul canoes from the Heathcote River into the Halswell River and then on into Te Waihora/Lake Ellesmere.

These measures have been adopted by the NZTA and /or incorporated into the Project as a result of the consultation with iwi and other technical assessment work undertaken by the Project consultant team.

23.5. Conclusion

The effects of the Project on tangata whenua values are expected to be less than minor, as measures to mitigate effects have been incorporated into the Project during design. During construction of the Project, measures will be in place to manage accidental discoveries which may have cultural significance. On this basis, it is considered that the Project will avoid, remedy or mitigate adverse effects on matters of significance to tangata whenua.

24. ARCHAEOLOGY & BUILT HERITAGE

Overview

There are no known archaeological or built heritage sites within or adjacent to the Project designation boundaries.

There is a history of both Māori and European land use around the Project area. Therefore, there is the potential for unidentified archaeological sites to be exposed during earthworks for the new State highway. Accordingly, appropriate protocols will be used, in the event of the accidental discovery of potential archaeological material. As a precaution, an archaeological authority to destroy, damage or modify an archaeological site will be sought from the NZHPT prior to earthworks commencing.

24.1. Introduction

Detailed investigations have been undertaken to profile the existing environment in relation to archaeology and built heritage. These investigations are discussed in Technical Report 12 - Assessment of Archaeological Effects, appended within Volume 3 of this application.

Technical Report 12 presents an archaeological assessment of the Project and includes sites of Māori origin. It does not constitute an assessment of Māori cultural values, as there can potentially be sites of significance to Māori for their spiritual and traditional values that have no physical remains and therefore cannot be assessed in terms of archaeological value. Information relating to potential sites of cultural value has been obtained through a Cultural Impact Assessment. This information is contained in the associated Cultural Impact Report (Technical Report 15, Volume 3) and discussed in Chapter 23 of this AEE.

This chapter summarises the existing archaeological and built heritage environment and establishes the historical context of the Project area. It provides an assessment of the actual and potential effects on archaeology and built heritage and outlines measures to avoid, minimise or mitigate any such effects.

24.2. Historical background

24.2.1. Maori occupation

Māori are known to have used this general area when they carried their waka between the headwaters of the Heathcote and Halswell Rivers (roughly in the area of Owaka Road), as they journeyed between the settlements around Christchurch and Banks Peninsula / Lake Ellesmere. The Assessment of Archaeological Effects identifies the presence of two mahinga kai near Rolleston, but the exact location of these is not known. The waterholes at Templeton are marked on an early European map as Ruapuna, indicating that Māori knew of the existence of these, and no doubt used them.

24.2.2. European occupation

The first European use or occupation of the land between Prebbleton and Templeton came with the take up of runs in the early 1850s. The available information makes it difficult to determine exactly which runs covered the area in question. The Coringa run appears to have done so, and Prebbles run may also have covered part of the area, as presented in Figure 53.

Figure 53: The runs taken up in the immediate vicinity of Christchurch

Runs 27 and 102 made up Coringa and were taken up by Charles Church Haslewood in May 1852 and August 1853 respectively. Coringa was notable for being the site of the first known public sheep dip in Canterbury.

Run 10, which was known as Prebbles run, was taken up by William James Prebble. The Prebble's undertook some work on their land, building a one mile long sod wall on the northern boundary. A track from this boundary led to the city and was initially known as "Prebble's". After it was extended towards The Springs run it became known as "Springs Track".

The proximity of Coringa and Prebble's run to the burgeoning settlement of Christchurch was the reason for the rapid freeholding of the land, as new settlers sought to establish small farms of their own. The increasing density of settlement in the area led to the development of roads, with Springs Road and what would eventually become the current State highway 1 surveyed by 1866. Closer settlement also led to the construction of a railway line from the city to Rolleston. This line was completed in 1866.

Within a decade, another railway line had been built through the area. This was the Southbridge branch, which ran from Hornby to Southbridge. The line was built to service the increasing number of crop farms in the district, enabling farmers to get their product to market efficiently. The line opened on 13 July 1875 and carried passengers until 12 April 1951. The stations along the line were at Southbridge, Doyleston, Ellesmere and Prebbleton. By December 1967, only a small section of line was operational, between Hornby and Prebbleton. This is still used and is known as the Hornby Industrial Line.

Templeton, named for Edward Templer, developed around an area known as Waterholes, on account of the springs in the area. This reliable water supply meant that bullock wagon trains often camped here for the night. The first freehold purchase (a block of 50 acres) in this area was by Arthur Charles Knight and included the waterholes. The waterholes lay to the south of the Great South Road. In 1863 Templer donated two acres for a school, which opened by the end of 1863. Around this school, the settlement of Templeton grew, although town sections were not surveyed off until 1877.

Most of the land around Templeton and Prebbleton has been rural since the arrival of Europeans, although more recent years have seen the development of commercial areas. One interesting industry in the area during the 19th century was Trent's chicory farm. This was located in the southern part of the study area. This farm was established in 1866 and by the early 1870s there was a substantial complex at the farm, reflecting the success of William Trent's business.

24.3. Existing environment – archaeology and built heritage

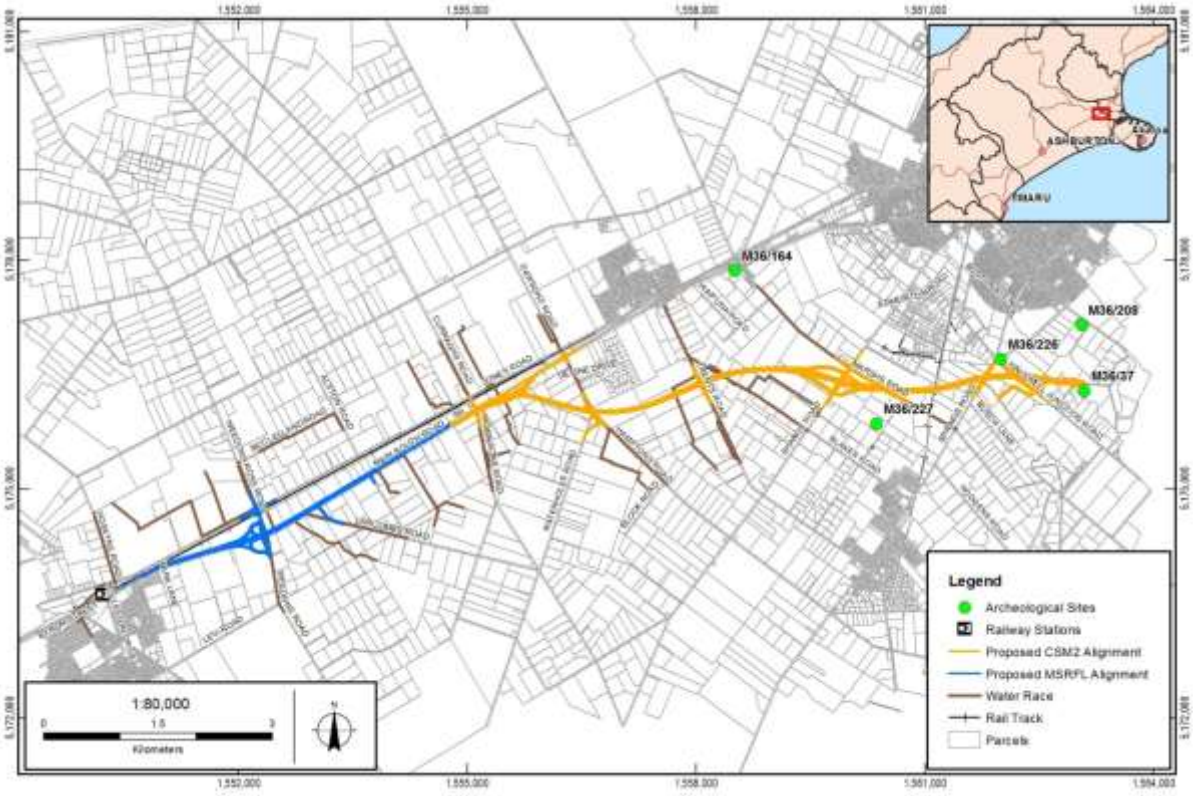
Within the wider Project area, seven recorded archaeological sites and one built heritage structure have been identified. However, none of the identified archaeological sites are located within the proposed designation footprint. In addition, the land required for the Project and its construction is not in close proximity to the listed heritage building.

24.3.1. Archaeology

The recorded archaeological sites (shown in Figure 54) noted in the broader archaeology study area have been identified as two middens / ovens (M36/34 and M36/37), three historic houses (M36/164, M36/226 and M36/227), a religious institution (M36/237) and an agricultural / pastoral site of undefined type (M36/208). The two midden / oven sites are indicative of past Māori activity in the area. One of the historic houses no longer exists (M36/226) which would have

otherwise been located adjacent to the designation. The next closest recorded site is 55 m from the proposed alignment.

Figure 54: Recorded archaeological sites with an overlay of road corridor



While it is possible that there are other archaeological sites (particularly fences) within the proposed road corridor; historical research suggests that there are no significant archaeological sites within the immediate vicinity of the Project.

None of the identified archaeological sites will be adversely affected by the proposed works.

24.3.2. Built heritage

The Selwyn District Plan identifies the Trents chicory kiln as a heritage building on Planning Map 13. This heritage item is located at Trents Road (Lot 2 DP 19955) on a property adjacent to the proposed road corridor. This building is listed as Category II by the NZ Historic Places Trust. The land required for the Project and its construction is not in close proximity to this building. Therefore it is considered that there will be no adverse effects on this heritage item.

No other built historic site noted in the Christchurch City Plan or the Selwyn District Plan has been identified in Technical Report 12 as being potentially affected by the Project.

24.4. Assessment of effects on archaeology and built heritage

No archaeological sites within the Project corridor have been identified. Accordingly there are no anticipated adverse effects on archaeology and built heritage.

However it is possible that archaeological sites not identified during the assessment may be uncovered during earthworks for the new road, such as middens, ovens, Māori occupation sites, building sites and/or rubbish dumps. Measures to manage this potential occurrence are addressed below.

24.5. Measures to avoid, remedy or mitigate adverse effects on archaeology and built heritage

The Project will not affect any known archaeological or heritage sites. They have been 'avoided,' consistent with section 17 of the RMA and accordingly, no specific mitigation measures are necessary.

24.5.1. Accidental discovery protocol

Although there are no sites of archaeological significance that have been identified within the immediate area of the proposed Project corridor, there is the possibility that such sites have not yet been discovered, or identified. As such, it is important that a precautionary approach is taken, as there may be unknown sites present and adversely impacted on, especially during construction. If an archaeological site was discovered during works, an authority from the NZ Historic Places Trust (NZHPT) would also be required under the Historic Places Act 1993.

Measures are proposed to ensure correct protocol is followed in the event of an accidental discovery of potential archaeological material. The accidental discovery protocol drawn up by Te Runanga o Ngai Tahu, Transit (now the NZTA) and the New Zealand Historic Places Trust will be put in place, and all contractors involved in earthworks will be briefed on the accidental discovery protocol and receive training in the recognition of an archaeological site. This accidental discovery protocol is contained in Appendix 1 of Technical Report 12.

As a precaution, an archaeological authority to destroy, damage or modify an archaeological site will be sought from the NZHPT prior to earthworks commencing. This is likely to contain conditions relating to on-site briefings and the preparation of a management plan which includes monitoring requirements.

If archaeological sites are exposed during the earthworks, they will need to be excavated, recorded and analysed in accordance with standard archaeological techniques.

The NZHPT is likely to require that an archaeological management plan is prepared as a condition of the authority. The exact requirements of the management plan will be determined by the NZHPT but are likely to include details about where and when monitoring and site briefings are required, procedures and protocols for any stand-down periods for archaeological work to take place, the role and level of authority of the archaeologist and procedures for dispute resolution.

24.6. Conclusion

No archaeological sites within the road corridor of MSRFL or CSM2 have been identified, although there is a history of both Māori and European use of the area. Given that it is possible that archaeological sites not identified during this assessment could be exposed during earthworks for the Project, an authority to destroy, damage or modify an archaeological site should be sought from the NZHPT prior to earthworks commencing. This will avoid any delays during construction, should an archaeological site be exposed. An accidental discovery protocol will be in place to manage the possibility of exposing a previously unrecorded archaeological site.

25. ECONOMIC

Overview

This chapter addresses the main economic effects of the Project. The Project will have potentially far reaching economic benefits in terms of providing for the efficient movement of goods and people, and will help facilitate economic growth. The Project will also have local economic impacts and these are assessed as being broadly positive, recognising that there will be some individual adverse economic effects, specifically businesses which have frontage to Main South Road that will be either bypassed by CSM2 or have their highway frontage access removed.

Overall, it has been assessed that although there may be some adverse effects on individual businesses, the overall economic benefits to the region outweigh these individual business impacts.

25.1. Introduction

This chapter addresses economic effects as they relate to the RMA's focus on enabling economic wellbeing and achieving efficient resource use. The potential economic effects of the Project upon the local population and for businesses are also assessed. This assessment is based primarily upon the economic assessment (Technical Report 14, Volume 3) that has been carried out for the Project.

This chapter does not specifically address the Project's overall economic assessment, which involves cost benefit analysis and the calculation of a benefit/cost ratio ("BCR") for the Project using the NZTA's Economic Evaluation Manual ("EEM") procedures. However, the BCR is discussed as part of the concept of economic efficiency.

The remainder of the assessment concentrates on the economic consideration of effects at the regional and local levels.

25.2. Canterbury economic context

25.2.1. Population

Christchurch City, being the economic hub of the South Island, has the second largest population in the country with an estimated 2011 residential population of 368,000[101]. The neighbouring districts of Selwyn to the south and Waimakariri to the north have 2011 population estimates of 41,100 and 48,600 respectively. Selwyn District was the fastest growing district in New Zealand (up 3.9% from 2010), and Waimakariri was the fourth fastest (up 2.0% from 2010). This is important, as in order to contribute economically, many of these residents need to travel to work, to study and to shop in a diverse range of locations many of which are in the City. Therefore, increasing traffic on key arterial roads in and out of Christchurch is anticipated.

[101] Statistics New Zealand subnational population estimates

Within the UDS (referred to in Chapter 2), the Greater Christchurch area is defined by drawing a line around Christchurch City that takes in the communities within the "commuter belt" (approximately half an hour drive from the Central City) in Selwyn and Waimakariri Districts. Positive population growth is projected in the Greater Christchurch area, with the 2006 population base expected to grow from 414,000, to 501,000 in 2026 and 549,000 in 2041[102]. This represents an increase of approximately 135,000 (or around 30%) over the 35 year period from 2006 to 2041.

25.2.2. Households and employment

For most transport projects, projected growth in population is considered as growth in households and employment. The growth in these two land use variables is then used in traffic models to determine the growth in the number of trips on the transport network. This is further explained in Technical Report 2[103] in terms of the overall modelling approach.

Projected post-earthquake household (HH) and employment (Empl) data for the Greater Christchurch UDS area is presented in the table below. This is based on a "Rapid Recovery" scenario.

Table 39: UDS household projected growth

Area		2011	2016	2026	2041	2011-2041
Christchurch City inside UDS	HH	146,600	152,600	176,000	196,000	49,400
	Empl[104]					
Waimakariri District inside UDS	HH	15,700	18,200	21,000	23,200	7,500
	Empl					
Selwyn District inside UDS	HH	9,800	11,800	16,000	19,700	9,900
	Empl					
Total	HH	172,200	182,600	212,900	238,800	66,600
	Empl	195,800	204,800	231,200	243,700	47,900

Over the 30 year period between 2011 and 2041, it is projected that there will be an approximate 40% increase in total households and 25% increase in employment.

[102] Greater Christchurch Urban Development Strategy 2009 Demographic Update. Projection is based on Statistics New Zealand medium/high growth scenario.
[103] Technical Report 2 section 3.2
[104] It should be noted that a disaggregation of this data to Local Authority boundaries has not yet been carried out.

25.2.3. Key economic hubs

Lyttelton Port and Christchurch International Airport are identified as key import and export hubs for the area, the region and the South Island. They make large contributions to the Canterbury economy and both are essential infrastructure upon which significant amounts of regional economic activity are based. The Airport is New Zealand's second largest, and in 2011, handled 5.6 million passengers. Lyttelton Port is the South Island's largest port and the third largest port in New Zealand.

Recent trade figures (2011) for the two facilities are presented in Table 40. These include the free-on-board (fob) value of exports and cost insurance freight (cif) value of imports.

Table 40: Value of Lyttelton Port and Christchurch International Airport Imports and Exports - 2011

	Exports (fob $billion)	Imports (cif $billion)	Total ($billion)
Lyttelton Port	5.1	2.9	8.0
Christchurch Airport	3.4	0.6	4.0
Total Canterbury	9.3	3.9	13.1
Total New Zealand	50.4	46.3	96.8

Together, the Port and Airport contributed approximately 90% of the total value of regional imports and exports and nearly 12% of total New Zealand imports and exports. In addition to this, the Airport generates significant regional and national tourism benefits, contributing to approximately 7% of Canterbury's Gross Domestic Product[105].

Both of these facilities are expected to grow over the next 30 years with associated growth in freight movements, and from an economic perspective, it is recognised that efficient access to, from and between these two facilities must be maintained and enhanced if possible.

On the basis of expected growth, the efficient movement of people and freight needs to be considered and addressed. As is explained in Technical Report 2, the Project is an important component to achieving the economic benefits sought nationally through the LTMA 2003[106] and the Government Policy Statement on Land Transport Funding July 2012[107]. On a regional strategic basis the Project is also supported by the Regional Policy Statement, the Regional Land Transport Strategy and the Urban Development Strategy. Both Chapter 2 of the AEE and Chapter 2 of the Assessment of Traffic and Transportation Effects discuss the strategic context further.

[105] Christchurch International Airport Ltd website
[106] Technical Report 2: Section 2.6.1
[107] Technical Report 2: Section 2.6.2

25.2.4. Canterbury earthquake effects

It is also appropriate to consider the effects of the Christchurch earthquake from an economic perspective. While some data is emerging, the wider economic effects are not yet clear[108]. However, some 8,000 existing residential properties, primarily on the east of the city, are now unsuitable for housing because of their susceptibility to liquefaction and rockfall in future earthquakes. Therefore residents in these properties have relocated or are going to need to relocate. While there is considerable debate as to likely changes in medium term population[109] and where those that remain will live, there is, as yet, no strong evidence as to what the final outcome will be. One likely outcome is that there will be faster-than-forecast growth on the southern fringes of the city (e.g. Wigram and Halswell Junction Road area) and in Selwyn district, particularly in Rolleston.

Based upon the above assumptions, it is reasonable to expect that transportation improvements in the southern corridor post-earthquake are even more important economically to Greater Christchurch.

25.3. Benefits and costs

Outside of the RMA assessments, an economic evaluation of the Project has been carried out in accordance with the latest version of the NZTA EEM. The economic analysis provides a comparison between the 'Do minimum' (baseline)[110] and the preferred option. In terms of benefits assessed these include

- travel time savings;
- congested travel time savings;
- vehicle operating cost (VOC) savings;
- trip reliability savings;
- accident cost savings; and
- reduction in Carbon Dioxide (CO_2) emissions.

In terms of costs assessed through the EEM process, these constitute:

- property costs;
- design and project documentation costs;
- management, surveillance and quality assurance; and
- physical works.

[108] Technical Report 14: Section 2.5

[109] Expectations for the medium term range from losses of several per cent (compared to the forecast growth path), as residents who have left do not return, to gains of several per cent as there is an influx of construction labour to rebuild the city.

[110] Technical Report 2: Chapter 4

On the basis of this assessment, the BCR for the Project is assessed at 1.5 i.e. for every dollar of cost there will be $1.50 of benefits. As has been outlined in Technical Report 14,[111] there are also other factors that influence the BCR.

> *"The RoNS projects, which include CSM2 and MSRFL, have been scored against Strategic Fit, Effectiveness and Efficiency. The inclusion of the first two categories is an implicit acknowledgement that the standard economic analysis framework does not take into account some intangible costs and benefits associated with improvements in economic growth[112] that is believed will flow from a better transport network with increased connectivity. These benefits are described as WEBs (Wider Economic Benefits), and they include:*
>
> - *agglomeration impacts – the productive advantages that arise from close spatial concentration of economic activity, most likely to arise within major urban areas; and*
> - *the impacts on employment levels experienced both within urban areas and more widely throughout the area of influence of the road project."*

The Christchurch RoNS projects are expected to generate intangible benefits which are equivalent of 60 to 80% of the EEM benefit cost ratio, implying that the BCR of the Project is in the order of 2.6 unless there are significant non-market dis-benefits.

The alternative northerly alignment that was considered by the NZTA, bisects the large block of industrial zoned land (Alignment C in Chapter 7 Consideration of Alternatives) in relation to property costs. The alternative northern route required a total purchase of future business land, while the preferred option only requires a partial purchase.

On property costs alone, the preferred alignment is preferable in an economic sense for a number of reasons. These equate to an estimated additional Alignment C property cost of $14 to $34 million. This additional cost reflects the importance of industrial land that has been considered through Proposed Change 1 to the RPS, the lesser degree of severance, restrictions on the potential shape of subdivision possibilities and possible length of negotiations.

25.4. Property value effects

Changes to the value of individual properties are a reflection of a combination of tangible and intangible effects on matters such as amenity values that are addressed elsewhere in the AEE.

The major changes in property values will accrue to all those properties that now have better access on the improved network. However, since these benefits have already been reflected in the reduced operating costs and travel costs which are included in the economic evaluation, it is important not to double count these effects by treating likely changes to individual property values separately.

[111] Technical Report 14 section 2.2.

[112] "Second order effects on wider economic activity, including agglomeration benefits, labour productivity and supply, and the impacts of improved competition. There may be additional effects at a macro-economic level resulting in GDP changes.

For some properties adjacent to the Project, property values will already include a market allowance for the fact that development of a major road of some form has been flagged for a number of years and certainly since the start point (Springs Road) and end point (in the vicinity of Robinsons Road) of the CSM2 preferred option has been firmed up through strategic planning processes since the production of the CRETS Final Report in 2007.

Project design and mitigation measures aim to mitigate adverse effects (including amenity effects). Mitigation includes the NZTA seeking a reasonable separation distance from properties, the design quality of structures, provision of landscaping, noise barriers, and the use of noise reducing surfacing.

25.5. Business impact and transfer effects

Section 3.6 of Technical Report 14 outlines that there are about 30 businesses which have frontage to Main South Road that will be either bypassed by the Project or have their highway frontage access removed. To the extent that casual stops will be less, this may affect some businesses. The Social Impact Assessment (Technical Report 13) however did not reveal any expected significant loss in Templeton shops, while other businesses are assessed as not relying on passing trade. Two exceptions to this are Knitworks and the Blue Gum Lodge Motel which are proposed to be purchased by the NZTA in their entirety.

Further in terms of effects on businesses, Technical Report 14 at section 3.7 states:

> *"Any business effects will almost inevitably be transfer effects within the regional economy. That is, any loss in trade for existing businesses will be offset by increases in trade for competing businesses, and the overall efficiency effects and economic impacts are expected to be trivial from a wider community viewpoint.*
>
> *Generally under the RMA, retail or business redistribution effects, also known as trade competition effects, are not relevant insofar as they impact on individual business. They are only relevant to the extent that they are of such significance that they threaten public amenity values of city, town or suburban centres. There is no expectation that there will be any such loss of amenity in the case of CSM2.*
>
> *The dynamics of business rises and falls are an inevitable part of commercial life, and over time businesses must address changes in their environment and their future viability is not assured. Smaller business effects over time do not imply that CSM2 should be declined."*

Generally under the RMA, retail or business redistribution effects are not relevant insofar as they impact on individual businesses. Such impacts are only relevant under the RMA if, cumulatively, they are of such significance that they threaten the public amenity values of city, town or suburban centres. This is through the loss of critical mass, sustainability, vibrancy and vitality.

It has therefore been assessed that the effects on businesses, while in some individual circumstances may be noticeable the overall economic benefits to the region outweigh individual business impacts.

25.6. Other economic effects

Other economic effects include:

25.6.1. Construction activity

A temporary boost to local economic activity and employment is likely to occur, with positive overall benefits for Christchurch and the wider region, including businesses and people prepared to relocate from other centres. However, it is predicted that the construction sector will be at full capacity utilisation during the next decade as a result of the Christchurch rebuild. Hence, construction activity is likely either to be a substitute for other construction activity in the region with no overall increase, or will be undertaken by labour and companies from beyond the Christchurch area. While this may generate increased economic mass and resultant economies of scale for the regional economy as a whole, any benefit will be "second order" and is unlikely to be significant.

25.6.2. Traffic related effects for local residents and businesses

Positive economic effects are likely to arise from the reductions in travel times and accident costs and improvements in trip time reliability for local residents and businesses (for example, freight movement and employee travel). These effects are likely to occur when both (a) making journeys from Hornby to Rolleston and (b) making journeys to the city, to the Port and Airport and other destinations within Christchurch City and to the south more reliable. However there will also be some individuals for whom access is severed or restricted, and for whom trips will be slightly longer than they are currently (see section 11.7.8).

25.6.3. Increased economic activity

Once the Project is operational, net positive economic benefits are predicted to occur. Associated with increased levels of economic activity can be economic benefits from increased economies of scale, increased competition, and reductions in unemployment and underemployment of resources. While the extent of these benefits may be difficult to predict, they are likely to be noticeable in Hornby, Rolleston and potentially both Prebbleton and Templeton.

25.6.4. Managing potential economic effects during construction

During construction, there will be some adverse temporary effects from construction activity and traffic. The specific routes and locations that will be affected have been identified and assessed and measures to address these are detailed in the Construction Traffic Management Plan ("CTMP") included in Volume 4. While these measures will not totally avoid effects on some

businesses from construction activity, they should assist in reducing such effects and in providing business operators with sufficient information to plan appropriate responses.

25.6.5. Managing operational economic effects

As with any significant highway project, there will be some inevitable redistribution of economic activity, as some businesses take advantage of the changes in the roading network, while some others respond to the disruption of the current dynamics of passing traffic. As part of the construction Project, directional signs can be used to assist travellers in way finding. In addition, opportunities will be available through standard NZTA State highway management processes for appropriate directional signage.

25.7. Economic wellbeing

Within section 5 of the RMA the definition of sustainable management means:

> *"Managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety."*

Therefore, a fundamental part of the purpose of the RMA is to provide for social, economic and cultural wellbeing. From an economic perspective, it can be demonstrated that the Project can realise tangible economic benefits at reasonable costs. In particular, people and freight will move more efficiently than they do currently, therefore achieving wider economic benefits for Greater Christchurch.

In terms of local economic impacts, these are assessed as being broadly positive recognising that there will be some individual economic effects. The avoidance, remedy or mitigation of any adverse effects from the construction and operation of the Project are considered in other parts of this AEE.

The other two components of Part 2 of the Act that are relevant to economics are:

- *s7(b) the efficient use and development of natural and physical resources: and*
- *s7(ba) the efficiency of the end use of energy.*

It is considered that the Project is an efficient use of natural and physical resources in that it enhances the development of the State highway system and aligns with the overall strategic direction for the Christchurch RoNS projects. In terms of efficient use of energy, vehicles will be able to travel at a more consistent speed particularly those that are utilised for freight.

25.8. Conclusion

The Project will have potentially far reaching economic benefits in terms of providing for the efficient movement of goods and people, and will help facilitate economic growth. The Project

will also have local economic impacts and these are assessed as being broadly positive, recognising that there will be some individual adverse economic effects, specifically businesses which have frontage to Main South Road that will be either bypassed by CSM2 or have their highway frontage access removed.

Overall, it has been assessed that although there may be some adverse effects on individual businesses, the overall economic benefits to the region outweigh these individual business impacts.

26. SOCIAL

Overview

From a social perspective, the communities of the Project area have experienced increasing population growth, particularly post-earthquake displacement of residents from Christchurch City, increasing housing demand in the main settlements and for small allotments in other rural and peri-urban areas. The Project will add to these changes currently underway, and encourage further urban development in Templeton, Prebbleton, Lincoln and more particularly Rolleston by extending the commuter belt and metropolitan labour market, creating demand for further rural subdivision.

From the point of view of the people and identifiable communities in the Project area, MSRFL and CSM2 should bring significant social benefits. These include reduced congestion, improved travel times and greatly enhanced safety along an otherwise dangerous stretch of main highway. In addition, there will be improved access to work and a range of services including education, health and emergency services, and retail and commercial services.

The Project design sought to mitigate a number of potentially negative social effects, including; property access and displacement effects on individuals. Many of the negative social effects would occur during construction and involve temporary disruption and amenity effects such as noise and vibration and dust emissions.

The aspect of social severance was carefully considered and it was found that even in the short term (post-construction), community severance is unlikely to be a significant issue for any of the existing rural communities and town-based communities in the project area. In addition, in the long term it is anticipated that the Project will reinforce the identity of Prebbleton and Rolleston as the focus of urban development. The State highway will cut through the Weedons area, however change in social boundaries of small communities is common and the existing social boundaries are notably blurred.

Active transport, considered an important component of social wellbeing, will be enhanced through proposed links through CSM2 and the Little River Rail Trail which has been achieved through design features. While the cycleway will not extend along all of the CSM2, there is still likely to be an increase in commuter cycling to Lincoln, and there is the opportunity for a new cycling commuter route between Rolleston and Hornby.

26.1. Introduction

This chapter sets out an assessment of the social effects of the Project. The information in this chapter is drawn from the Social Impact Assessment ("SIA") (Technical Report 13, Volume 3), as well as the findings of other technical assessments which are relevant in considering social effects.

Planning, construction and operation of the Project could potentially cause social effects on people throughout the impact area. Social impacts include the 'human' experiences of other effects, individually or in combination. As such, there may be overlaps with other AEE specialist

assessments, and these have been acknowledged in this chapter where relevant. However, an assessment of those effects has been kept to a minimum, with the social effects assessment focusing on concerns raised in respect of people's living experiences and day-to-day lives.

The Project has been assessed in terms of its overall implications on the social and economic wellbeing of the communities in the Project area. The assessment also included proposals for mitigating any negative social effects, which have been considered in the Project design process.

26.2. Existing social environment

26.2.1. Investigation and assessment process

The description of the existing social environment provides the basis upon which social effects are considered. The assessment used a standard SIA approach, which typically involves scoping the assessment, developing a profile of the affected area, assessing effects, and considering ways to mitigate negative effects and enhance Project benefits from a social perspective.

The SIA was informed by:

- records of consultation undertaken by the NZTA;
- preliminary SIA findings;
- site visits and observations at meetings; and
- interviews with key stakeholder groups.

26.2.2. NZTA policies on social effects

The NZTA has policies for the social and environmental management in the planning, construction and operation of State highway projects. Matters that must be addressed include:

- access and mobility, the ability of State highway projects to connect users to community educational, health and recreational facilities;
- community cohesion, particularly effects from accessibility and severance;
- environmental externalities, including air quality, noise and vibration;
- effects on culture and heritage, e.g. archaeological sites and people's customs;
- visual quality and urban design, the aesthetics of the built environment; and
- public health.

26.2.3. Description of the existing social environment

At a district scale, Selwyn's social environment is transforming through population growth. The post-earthquake displacement of residents from Christchurch City has increased housing demand in the main settlements and for small allotments in other rural and peri-urban areas. This has changed employment dynamics and commuter modes and routes.

For the purposes of profiling the existing social environment and assessing social impacts, the SIA identified the main community settlements affected by the Project, local impact areas, and areas directly affected by the Project. Therefore, the assessment area extended from south west Christchurch, where Hornby is the dominant commercial centre, to the towns of Rolleston and Lincoln, including the towns of Templeton and Prebbleton. In the rural or peri-urban area between Templeton and Rolleston, Weedons is the main rural community and there are other residential communities at Aberdeen and Claremont. The social environments of these areas were assessed as follows:

South-west Christchurch/ Hornby: Bounded by the Port Hills, Lyttelton Street, Blenheim and Main South Roads and the City boundary. This area has experienced a number of residential developments in recent years, particularly in Halswell, Wigram and Hornby. Population in 2006 was 35,241 and it is projected that there will be 10-12,000 new households and 200-300 hectares of business land developed in next 35 years. Both the Main South Road and SH75 become congested with traffic at peak periods. Residents have access to a diverse range of health and social services as well as the commercial centre at Hornby Mall which serves a wide catchment area, and is having associated growth issues.

Templeton: This town on the outskirts of Christchurch, 14 km west of the city on SH1 had a population of 1,572 in 2006, only a four percent rise over the previous ten years. It has a higher rate of unemployment than the district average, lower household incomes, higher dependence on income from government and lower access to motor vehicles. Residents have access to education and community facilities and there are businesses that service the local area and customers from further afield, which rely on passing traffic to a limited extent.

Prebbleton: One of the earlier settlements in Canterbury, this town is located 15 km south west of central Christchurch and 7 km south of Hornby on the arterial route between Christchurch and Lincoln. Population increased rapidly during the first decade of this century with new residential subdivisions trebling the extent of the settlement, having a population of 3,024 in 2006. This was an increase of 81 percent over the previous ten years and more than twice that of the Selwyn District (36%). It has a younger population with higher proportions of employers and self-employed persons than that of nearby towns. Many commute to work in Christchurch and other parts of the Selwyn District, due to proximity to job opportunities. The town has a good range of local amenities, with a commercial centre and other businesses. It is predicted that the population is likely to reach 4,775 by 2026, requiring the construction of 1300 dwellings.

Rolleston: Rolleston is 22 km south of Christchurch on the Main South Road at the junction of the South Island Main Trunk and Midland rail lines. Recent population growth has far exceeded that of the Selwyn District and recorded 3,822 residents in 2006. The population was younger than the district's population in 2006. Many residents commute to Christchurch to work, with over three fifths employed full time. It is anticipated to grow strongly over the next 3 years, from 7000 currently to about 20,000, as it attracts young couples wanting a large section on stable land.

Rural and peri-urban areas: Adjoining Prebbleton is an area of 70 residences at Aberdeen, comprising large homes on large sections. Residents use the Prebbleton town centre and services as their local centre. They also make use of Hornby, Lincoln and Halswell for community facilities. East of SH1 is a residential subdivision known as Claremont which was established six years ago. With no clear community affiliation residents travel to Rolleston, Templeton and further afield to Hornby, Lincoln and Halswell for services.

Weedons: Established on the Main South Road from Christchurch with about 297 rate paying residences, Weedons forms a community of around 700 residents but does not have clear social boundaries.

Area adjoining MSRFL, eastside of SH1: This area involves properties along the alignment from the intersection with the CSM2 alignment just north of Robinsons Road. The area has a combination of farming areas, lifestyle blocks and businesses, which vary in the degree to which they derive custom from passing motorists.

Land between SH1 and Jones Road: This narrow strip of land is bounded by SH1/ Main South Road, Jones Road to the north-west and extends from Curraghs Road to Weedons Road. All properties within it are currently accessed from SH1/ Main South Road. It is isolated further by an existing NZTA designation and the South Island Main Trunk.

26.2.4. Description of existing social services, networks and movements

The assessment undertook social mapping in order to understand school zones, participation in sports and community organisations, and access to employment in relation to SH1. This information was important for assessing potential for social severance. Assessment of social services, local networks and movements is summarised below:

Health services: There are a range of health services that service the people living and working in the impact area, with services principally located at the main centres of Templeton, Rolleston, Lincoln and Hornby, with people travelling by vehicle to access them at these centres.

Education services: There are pre-school education and childcare providers in multiple locations. With no kindergarten in Rolleston, the Templeton kindergarten has children from the rural area across SH1 including Aberdeen and Claremont. There are two high schools servicing the impact areas. Lincoln High School has an enrolment zone reaching from West Melton and Prebbleton in the north to Little River in the south. Hornby High School services the Hornby area. There are also a number of primary schools, most with enrolment zones. Templeton's zone stretches from West Coast Road in the north to Shands Road in the south east. Rolleston's zone is bounded by Kerrs, West Melton and Hoskyns Roads on the north side of SH1 and bounded by Weedons, Boundary and Lowes Roads on the south side of SH1. Clearview School is also located in Rolleston and its zone is bounded by Brookside, Selwyn and Boundary Roads. Nearly all families living in the Weedons School zone send their children to this school and most travel by car. Broadfield Primary School has no zone and pupils come from Rolleston, Burnham, Templeton, Lincoln and

Prebbleton, mostly by car. Prebbleton School has an enrolment zone bounded by Hamptons, Main South and Marshs Roads with most pupils living within walking distance.

Emergency services: These are widely dispersed over the Selwyn District, with those based in smaller towns relying primarily on volunteers. Some emergency services are available from Christchurch City. In addition, the rapid response team is based in Sydenham. Volunteer fire brigade services are at Darfield, Lincoln and Rolleston. Police stations are located in these areas as well. Ambulance stations operated by volunteers are located at Leeston, Darfield and Rolleston. The St Johns station is based in the IZONE complex in Rolleston and covers an area from Hei Hei to Methven and The Old West Coast Road to Lincoln.

Community services: Rolleston Community House operates several health and social service agencies and provides a meeting space for community groups. There are also "One Stop Shops" at the library/ service centre facilities of Selwyn District Council at Darfield and Leeston providing office space for agencies to come to the district. There are also a range of services available from Hornby Heartlands.

Active transport: Walkers and cyclists in the Selwyn District face a number of challenges including some areas without footpaths, lack of safe space along rural roads, few off-road walking tracks, lack of facilities connecting subdivisions and towns, and low levels of street lighting. For cyclists, challenges include lack of cycle lanes and space on rural roads, narrow roads in newer residential areas, speed on rural roads, insufficient cycle stands, potholes and rough surfaces on the shoulders of roads, narrow brides and cycle unfriendly roundabouts. While there is some commuting of long distances, the use of active transport modes in the District was falling steadily, according to census data, from 1996 to 2006. The Little River Rail Trail was established for recreational users and tourists, but is also now used by school children and as a commuter route with commuter cycling to and from Lincoln increasing in recent years. The Selwyn District Council has developed a Walking and Cycling Strategy and Action Plan to address these challenges and promote a transport system that supports active transport and recreational uses. Christchurch City also has a Cycling Strategy.

Sport and recreation: There is an events centre at Lincoln and Rolleston has a community centre, and a recreational complex including an aquatic centre which is being developed. Prebbleton has a community hall and several sports clubs, Templeton has a golf club and community centre. The Weedons Domain and Golf Club are focal points and the cricket club is the biggest in the wider area. As mentioned above, there is the Christchurch to Little River Rail Trail - a combined cycle and walkway.

26.3. Assessment of social effects during construction

Construction activity, although temporary, will affect the local communities and particularly those near construction activities.

The main social effects arising from construction activities are disruption to communities relating to:

- construction noise and vibration effects;
- air quality effects;
- property access effects; and
- local road network and road safety effects.

Some of these effects will be consequent on environmental effects that are assessed in specific Technical Reports, including noise and vibration, dust emissions and traffic. In practice, these sorts of amenity effects can also have social consequences as they reflect the amenity values and perceptions of affected people.

26.3.1. Construction noise and vibration

Construction noise and vibration will have an effect on local community wellbeing and quality of life, especially those living, working or gathering in proximity to the construction works. Day time construction noise will generally not affect residents beyond some nuisance / disturbance during particularly noisy works, although people who stay at home during the day (including people who work from home, are sick, or who work night shifts) could be disproportionally affected by long periods of noisy works. A proportion of noisy works will be undertaken during the night, in particular during bridge construction. This will have an effect on local communities within close proximity to these sites. Effective noise management is therefore essential to reducing these noise effects as far as practicable.

Chapter 17 of this AEE provides the assessment of Construction Noise and Vibration of the Project, drawing on the Noise and Vibration Assessment (Technical Report 9).

26.3.2. Dust effects

Dust can affect human health and be a nuisance to the surrounding public by causing deposits on and in houses, cars and washing. Dust may also impact on people's enjoyment of outdoor areas and cause perceived or actual health impacts. The assessment of air quality effects (Refer to Technical Report 10, Volume 3 and the summary in Chapter 18 of this AEE) describes potential sources of dust factors influencing dust generation. Management measures will be designed to minimise adverse dust effects on the local community, and in particular, ensure that the adverse effects of dust will be acceptable at sensitive receptors in the community, such as schools, pre-schools, and residential healthcare or retirement facilities.

26.3.3. Property effects

For the MSRFL, there is a land take to create the expanded roadway, with a loss of property access for some property along this stretch. With CSM2, a number of properties are required for the new highway, local road changes, landscape work and mitigation activities. This is likely to create

a disruption in peoples' patterns of movement, creating a level of disturbance, nuisance and stress. Of the 40 properties affected, some have been acquired by the Crown as mitigation and some landowners have already moved.

The negotiation around the properties has included outright purchase, partial purchase with reconfiguration of land and access ways in some instances, and relocation of activities such as horse training and business activity.

To avoid some properties becoming 'landlocked' the proposed solution includes a new rear access road that utilises existing local roads and private right of ways and a proposed extension of Berketts Drive. On the west side of Main South Road, there are a number of properties in a relatively narrow area between Main South Road and Jones Road between Weedons-Ross Road and Curraghs Road, 18 of which will lose their existing access. A new road is proposed along the railway line to provide new access to these properties from the west.

26.3.4. Construction effects on local road networks and road safety

During the construction process, some suburban and rural roads will be used for construction-related traffic. This can cause an inconvenience for those travelling by road in the vicinity. Concern from interviewees was raised about a possible increase in volume and number of heavy trucks accessing SH1 via Kirks Road, especially if the local quarry company gained contracts on the Project (outside the Project area). Construction works may also cause delays for commuting parents picking up children from schools or childcare. In addition, during construction there will be local road closures. It will be important that local people and schools are included in communication and liaison processes over the construction period. In addition, a Construction Traffic Management Plan will be prepared to manage the effects of construction traffic.

26.4. Assessment of social effects from the operation of the highway

The operation of the Project could potentially cause both adverse and positive social effects on people throughout the impact area. As with construction effects above, some of these effects will be consequent on environmental effects that are assessed in Technical Reports, including noise, air quality, visual effects, and traffic assessments. Other effects result from changes in patterns of activity and the movement of people to and through localities adjoining the highway. Also, social effects relate to the physical changes from the State highway that requires the acquisition of properties or parts of properties. The State highway also can cause social severance by cutting through social boundaries. These operational consequences fall under the following social effects:

- effects on physical and living environments;
- effects on community health, safety and wellbeing;
- effects on leisure and recreation values; and
- severance effects.

26.5. Effects on physical and living environments

In terms of the effect of the proposed Project on the sense of place and local character, the SIA considered the likely changes in urban development, commuting patterns and employment as a result of changes in congestion and travel times. In addition, the SIA briefly comments on the long term visual and landscape effects and operational noise effects.

Effects on urban development and form

The SIA assesses the effects of the Project on urban development and form within the context of the UDS. The UDS seeks to promote compact urban settlements rather than unconstrained urban sprawl, and also to give more emphasis to mixed-use urban environments, reducing to some extent the need for commuting at the local level. The Project will have the effect of encouraging urban development in some directions and also of forming a strong boundary to some activities.

In combination with earthquake effects already apparent, the Project will have an effect of further stimulating urban development in South West Christchurch (particularly Hornby) and Templeton, Prebbleton, Lincoln and Rolleston. These communities will benefit from the stronger transport linkages.

There is also very likely to be pressure for further development of lifestyle blocks and rural residential development, as far south as Leeston and Rakaia, as travel times lessen and with improved access to the airport. Furthermore, the development of Ashburton may be advanced as the improvements will cumulatively bring Ashburton closer to Christchurch and vice versa.

Effects on commuting patterns and employment

Reduced congestion on principal commuter routes will result in reduced travel times, which can be expected to influence individuals' future choices about opportunities for employment in relation to place of residence, increasing the range of possibilities within a unified metropolitan labour market area.

The Project is expected to attract significant volumes of traffic away from the existing main traffic corridors thereby reducing congestion and intersection delays along these routes. The changes in levels of congestion have been estimated to result in peak-hour time savings of 10-12 minutes when travelling by car from Rolleston to Brougham Street (in 2041). The potential social significance of this level of time saving was assessed by comparing the time saving with other activities on a daily basis. A reduction in the average daily time spent commuting could make a significant difference to the amount of time available for other activities. In addition, it was confirmed that commuters between Rolleston and Christchurch are already spending well above the national average (16 minutes daily) time commuting to work.

The gains to users of public transport services will be in terms of faster and more reliable travel times, as a result of substantially reduced congestion along Jones/ Waterloo Roads (with a proportion of commuter traffic diverted onto MSRFL/CSM2) and the possibility for 'express' bus

services using the MSRFL/CSM2 with correspondingly reduced travel times. In addition, school bus runs from Rolleston, Templeton and Burnham Schools to Breens Intermediate for technical classes will run faster with less traffic on the roads.

Visual effects

The Project will result in a visible change to the environment, resulting in a change in the amenity value and 'look and feel' of the area. The visual effects of the Project are outlined in Chapter 15 of this AEE and Technical Report 4, within Volume 3 of this application. This report acknowledges that travellers using the State highway/motorway and residents who live in close proximity to visually prominent sections of the Project will experience different kinds of effects. The visual report points out that in some specific locations close to the existing SH1 "*the existing neighbourhood amenity values are not high and consequently effects on visual amenity will be negligible because the receiving environment is not sensitive to these changes*". Although it is acknowledged that in some areas effects on amenity values may be moderate.

Given the extent of change in the rural landscapes of the study area over the past decade, with considerable rural residential development all introducing built structures and night lighting, the visual effects of this Project post construction are not exceptional for an area so close to an urban boundary. The visual assessment identifies particular properties where mitigation planting is recommended to reduce visual effects of the Project in general and visual effects of acoustic fences. *"It is considered that the proposed mitigation will ensure effects are acceptable within the overall scale of the Project*".

Operational Noise effects

The operational noise effects of the Project will have an effect on the quality of life of those living in close vicinity to the main alignment of the highway. The effects of operational noise levels (traffic) are outlined in Chapter 17 of this AEE and in Technical Report 8, Volume 3.

The expected changes to the noise environment are that 39 dwellings or "Protected Premises and Facilities" (PPFs) will experience reductions of between 1 and 5 decibels, while 11 PPFs will experience increases of between 2 and 4 decibels. The noise report describes the changes in operational noise levels of 1-2 decibels as "insignificant" and changes of 3-4 decibels as "perceptible". Therefore, most dwellings near the existing Main South Road are likely to experience considerable improvements in their ambient noise environment. While 11 dwellings near the proposed CSM2 will experience increases in ambient noise levels, these are unlikely to be particularly noticeable. In order for these dwellings to fall within Category A of the relevant noise standard, noise mitigation is proposed comprising noise barriers (fences of 1.8 m in height) and the use of Open Graded Porous Asphalt surfacing where appropriate.

26.5.1. Effects on community health, safety and wellbeing

The Project will result in noise and air emissions that will have a minor effect of the health and general wellbeing of those living in close proximity to the Project. However, the Project will also bring about significant improvements to road safety in the district and will improve access for emergency services to communities.

Air emission effects

Vehicle emissions and the potential adverse health impacts associated with these emissions are a potential impact relating to the operation of the Project. Air quality effects are outlined in Chapter 18 of this AEE and in Technical Report 10. The report on air quality indicates discharges of air pollutants from vehicles using the CSM2 and MSRFL are unlikely to cause instances exceeding national air quality standards. People living close to the proposed CSM2 alignment or the existing Main South Road corridor will have a slightly increased exposure to vehicle related contaminants, but will still be well below the relevant health based assessment criteria. The air quality assessment concludes that no mitigation or monitoring of air effects from vehicle emissions is required.

Road safety and local road network effects

According to Technical Report 2 (contained in Volume 3 of this application) the combination of grade-separated intersections and substantially reduced traffic volumes, will reduce the high crash rates along Main South Road (which have been recorded as 10% higher than typical) and address the temporary road safety concerns along Halswell Junction Road that result from a partially completed motorway project (CSM1). In addition, the intersections on Main South Road that currently experience the highest numbers of crashes will in future have less than half the current levels of traffic passing through them. The intersections on Halswell Junction Road will have a third less traffic passing through them. This reduction in death, injury and damage from crashes is potentially a significant contribution to enhanced social and economic wellbeing.

In addition, there are several areas where access onto busy roads will be improved, resulting in improved safety including Main South Road through Templeton (stretch between Islington and Robinsons Road). Reduced vehicle volumes on Main South Road through Templeton will also reduce the risks to cyclists and pedestrians wishing to cross Main South Road.

There could be an effect of an increase in the use of some local roads. In particular, there will be a moderate increase in traffic on Weedons Ross Road (50 to 100 vehicles per day in the short to medium term). Consultation with Weedons School has identified safety concerns regarding traffic passing the school. However, this increase is considered relatively insignificant and manageable in traffic terms.

Effects on Emergency Services

With the reduced congestion and traffic delays, it is expected that there will be improved time for emergency services attending to emergency events. Back up support from the City would be able to get to the rural areas more quickly. In addition, four-laning is safer overall for emergency vehicles, as drivers tend to stay in their lanes more and it is easier for an emergency vehicle to pass when compared to a two lane highway.

The rapid response team coming from Sydenham will benefit from the proposed over and underpasses which will help improve access and reduce response times for emergency vehicles. The highway will also support policing in Rolleston from officers based in Christchurch and for local police to respond to a major emergency in the City.

Safety exits and barrier gaps will be provided every 3 km to allow for emergency "u turns", and is an important safety improvement in itself. A reduction in accidents will positively affect emergency services and the new layout with median barriers should help emergency services also.

26.5.2. Effects on leisure and recreational values

As outlined above, the Project is expected to reduce congestion and intersection delays along these routes resulting in estimated peak-hour time savings of 10-12 minutes. A reduction in the average daily time spent commuting could make a significant difference to the amount of time available for other activities, including leisure and recreation. The time saving will also assist those participating in sports activities.

The Project has both strengths and weaknesses when assessed in terms of effects on active transport (cycling and walking). The CSM2 will strengthen the connection between CSM1 and CSM2 and the Little River Rail Trail, as a cycle link has been designed from CSM1 along part of CSM2 to link with the Rail Trail at Springs Road, benefiting recreational cyclists and walkers. Weaknesses include no off-road route options for cyclists and pedestrians along the final part of the CSM2 alignment however alternatives are available on the local road network. In addition, the decrease in vehicular traffic along Springs Road will be offset to some extent by the corresponding increase in traffic along Shands Road.

26.5.3. Social severance effects

Social severance effects occur when patterns of movement of people are affected. People living, working, running a business, or recreating on either side of a State highway are potentially separated by the highway, creating a reduced ability for vehicles, pedestrians or cyclists to move safely and conveniently from one side of the highway to another. The effects of severance can flow into social and economic life as people change their patterns of relationships, from meeting each other informally to do business or recreate. Over time, the immediate effects of severance will change as communities adapt and new patterns of movement and social and economic life emerge.

The Project has potential both to cause social severance and reduce it. Social boundaries in the area of assessment are soft, with different boundaries for different networks and social facilities, so it is likely that the Project will lead to some redefinition of boundaries rather than cause severance. Social boundaries in peri-urban areas are typically dynamic with population changing and growing rapidly. In these instances, communities can adjust to change over time. It is possible however, that some older, longer term residents with a strong sense of place will experience a cumulative negative effect in respect to their sense of place and social identity.

In addition, the potential for severance is likely to be offset to a great extent by the proposed under/ overpasses of the Project, which provide safe vehicle, walking and cycling crossing points. Overall, in this respect and due to the closure of only one road, the potential for social severance is considered to be low. Furthermore, there is no evidence that there will be any long-term effect of social or economic disparities emerging either side of the State highway as a result of the Project.

26.6. Measures to avoid, remedy or mitigate actual or potential adverse effects on the social environment

A number of mitigation measures are outlined below to avoid, remedy or mitigate adverse effects on people and communities. These can be implemented at Project design stage, during the approval process, through construction traffic management and upon completion of construction.

26.6.1. Mitigation of construction effects

Once the construction methodology has been finalised, a CEMP will be developed to address the effects of noise and vibration, air quality (dust), property access and local road network and road safety effects along with a communications plan. A Draft CEMP has been prepared and is included in Volume 4 of the application documents.

Construction noise and vibration effects, although temporary in duration, will be proactively managed to achieve acceptable social outcomes by utilising the best practicable option approach and the relevant criteria of Construction Noise Standard NZS 6803:1999. These will be implemented through a CNVMP. Other management measures such as proactive community liaison, communication management will be undertaken.

Effects on air quality during construction works will be managed under an AQMP, as part of the overall CEMP, which will outline measures to manage dust.

Effects of changes to the local road network and construction traffic will be managed through a CTMP. It will be important that people affected by construction traffic are addressed in the Communications Plan.

26.6.2. Mitigation of loss of property access off Main South Road

To mitigate against loss of property access off Main South Road, an access road on the western side of the Main South Road from Weedons Ross Road to Curraghs Road is proposed. In addition, on the eastern side of Main South Road it is proposed to form access through a new rear access road that utilises existing local roads and private right of ways and a proposed extension of Berketts Drive.

26.6.3. Mitigation of amenity effects

Amenity effects to be mitigated include noise (construction and operation), visual and air quality (dust from construction and vehicle emissions from operations). Mitigation measures proposed in the relevant technical assessments are summarised here:

Noise: Options for mitigating operational noise effects include, the type of asphalt used and acoustic fences. Construction noise effects, as identified above, will be addressed in a CNVMP, which will identify particular dwellings and locations where particular attention is needed to ensure relevant construction noise limits are met. Where these limits cannot be met, after implementing best practicable mitigation measures, site specific noise management plans will be developed.

Visual: Twenty dwellings require mitigation of the visual effects of the Project, while six dwellings require mitigation of the visual effects of acoustic fences. The mitigation will include limiting vegetation removal, minimising earthworks and designing structures integrated into the landscape. Other aspects include protecting valued viewshafts, planting for visual screening of the motorway and to avoid headlight glare; choosing plant species to reflect local landscape character and management of light spill from highway lighting.

Air quality: No mitigation or monitoring of vehicle emissions will be required as there are unlikely to cause exceedances of any relevant air discharge assessment criterion or to cause adverse effects on human health or the environment. Dust will be managed in accordance with an AQMP, as outlined above.

26.7. Monitoring and Management

Communication will be the key tool to manage social effects, and key communication components of this Project will include a community liaison group (CLG), a Project liaison person, a Communications Plan, a public reporting/ feedback mechanism and excellent information systems. These matters are addressed in the proposed conditions for the designations in Chapter 30 of this AEE.

26.8. Conclusion

From the point of view of people and identifiable communities in the impact area, the Project should bring significant social benefits. There will, however, be some localised negative social

effects experienced by a number of individuals and businesses and one small rural community (Weedons). However, most of the negative effects can be mitigated to ensure the effects will be no more than minor.

The positive benefits include reduced congestion, improved travel times and greatly enhanced safety along an otherwise dangerous stretch of main highway, along with improved access to work and a range of services. In addition, effects on active transport are an important component of social wellbeing, and the Little River Rail Trail will likely be enhanced by proposed links with the Project. Even in the short term, community severance is unlikely to be a significant issue for any of the existing rural communities and town-based communities.

On the negative side are direct effects on individuals and businesses who will be displaced or experience temporary disruption. There also will be some amenity effects experienced along the new highway but they are manageable with proven mitigation techniques. It is considered that the residual effects will be minor and communities are likely to adjust relatively quickly.

Longer term, the new State highway will add to current changes already underway in urban form and further encourage urban development in Templeton, Prebbleton, Lincoln and Rolleston.

PART H: MITIGATION AND MONITORING

27. MITIGATION & MONITORING

Overview

Where practicable, potential adverse effects have been avoided or reduced through the integrated design process. Potential adverse effects that are not able to be fully avoided will require careful management throughout the construction and operation of the Project. The delivery framework sets out the overall framework in which the Project will be delivered through to commissioning. This discusses where management plans and other key mitigation will occur. The overall management plan framework has two tiers of construction management plans proposed:

- an overarching CEMP; and
- a series of SEMPs (e.g. noise, air quality etc.).

A draft CEMP and drafts of seven topic specific management plans have been prepared and are contained in Volume 4. These provide indicative details about how potential environmental effects will be managed. The management plans also cover proposed environmental monitoring which will be undertaken prior to, during and following construction to monitor potential effects, and provide a mechanism through which additional measures can be implemented during construction and operation if necessary. Some management plans which extend through to the operational phase of the Project are also proposed as conditions of consent.

As a result of the mitigation proposed including that in proposed conditions of the designations and resource consents, it is concluded that the potential adverse effects of the Project will be appropriately avoided, remedied or mitigated.

27.1. Introduction

The assessment of environmental effects in Part G identified a wide range of positive and adverse actual and potential environmental effects predicted to result from the construction and operation of the Project.

While many potential adverse effects have been able to be avoided completely or at least significantly reduced, the effects assessment identified a range of adverse effects that will require remediation and/or mitigation to ensure that they are appropriately managed. This chapter provides a discussion of the environmental management measures proposed to be implemented before, during and after construction, in order to manage potential environmental effects of the Project.

The remainder of this chapter provides the following information:

- the Project delivery framework identifying how conditions and management plans will be implemented through the further (detailed) design and construction phases of the Project;
- the proposed management plan framework; and
- a summary of the measures proposed to adequately manage potential adverse effects.

Where relevant, the proposed mitigation, remediation and monitoring measures summarised here have been included as recommended conditions for the designations and /or resource consents. Suggested conditions are set out in subsequent chapters:

- proposed conditions of the designations (Chapter 30); and
- proposed conditions of the resource consents (Chapter 31).

27.2. Project delivery framework

Key to the future management of effects is the development and implementation of a suite of measures that include conditions, management plans, and monitoring and maintenance. This is referred to as the Project delivery framework. This includes the need to manage areas of environmental sensitivity, to recognise environmental risk issues, and to identify the mechanisms to avoid, remedy or mitigate these actual and potential effects.

This chapter identifies the methods and plans that will be developed by the NZTA (or its nominated contractors/consultants) at the time detailed design and construction occurs, associated monitoring and the processes for verification.

27.2.1. Principles for Project delivery

The following principles form the basis for the development of the plans and conditions that have and will dictate the delivery of the Project, including its construction, operation and maintenance:

- all works are to be undertaken in compliance with current New Zealand standards and legislation;
- the construction and operation of the Project will use the best practicable options to avoid, remedy or mitigate adverse effects;
- an integrated team approach to development of the design and the methods to avoid, remedy or mitigate actual and potential effects means that no one particular discipline is more important than another; and
- each technical specialist, consultant, or contractor involved in the Project has equal responsibility to use best endeavours to avoid, remedy or mitigate adverse effects.

In addition to these principles, the methods used will seek to:

- maintain on-going communication with the local authorities who will be responsible for monitoring and enforcing conditions placed on the designation and resource consents sought;

- maintain strong communication links with the directly affected landowners, Tangata Whenua, key stakeholders, affected landowners and the wider community; and
- mitigate adverse effects during design and construction of the Project through which the above environmental principles will be implemented.

27.2.2. Methods to avoid, remedy or mitigate

The assessment of alternatives (Chapter 7) discussed how the integrated approach to design has already led to the avoidance and mitigation of effects which will result in the best environmental outcome.

The following methods to avoid, remedy and mitigate the remaining actual and potential adverse effects are proposed:

- designation conditions;
- consent conditions; and
- management plans.

Mitigation measures are summarised in this chapter. Section 27.4 sets out actual and potential adverse environmental effects, methods proposed to manage them, and proposed conditions.

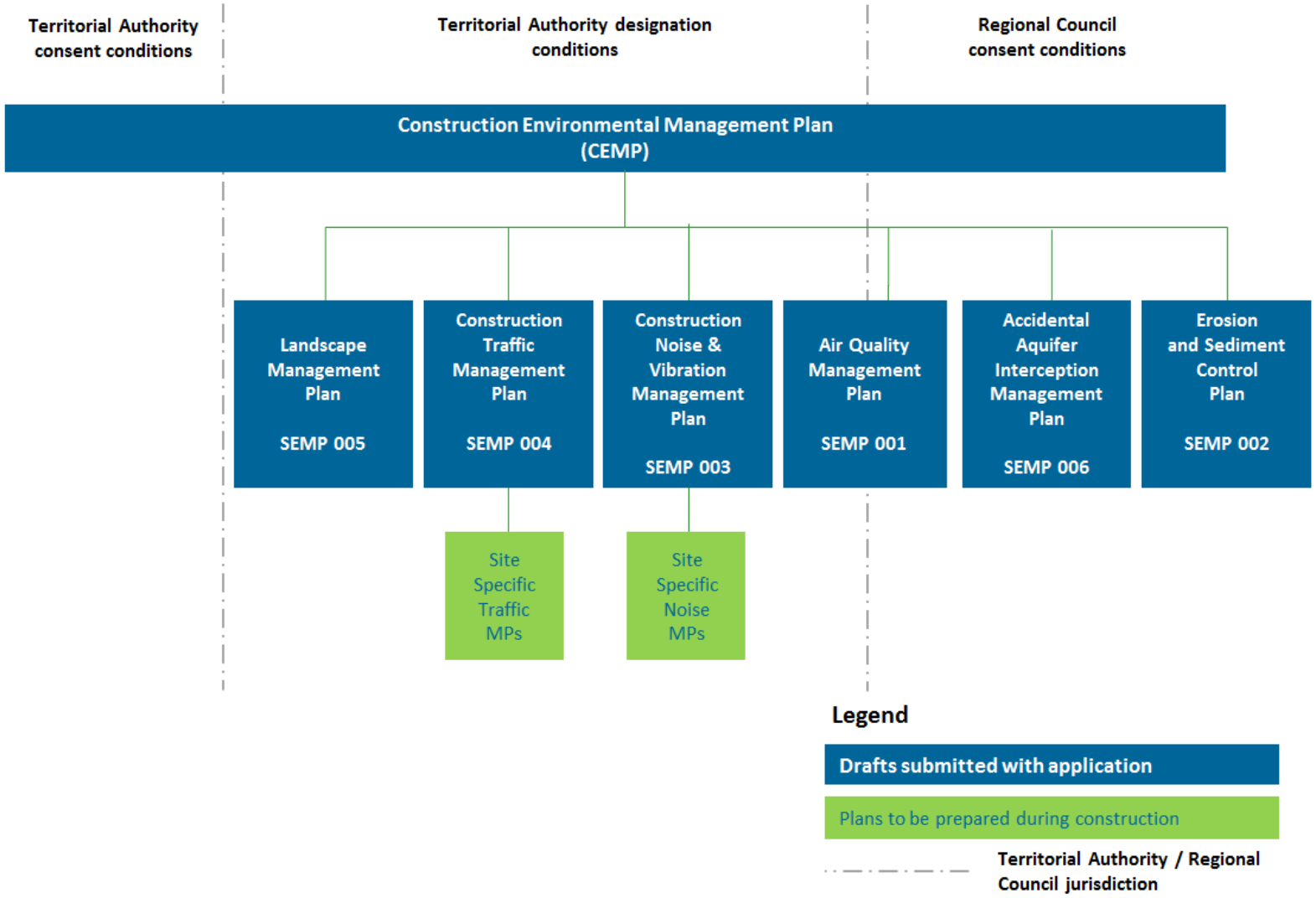
27.3. Management plan framework

The management plan framework for this Project is set out in the draft CEMP, which can be found in Volume 4 of the application documents. The CEMP is the umbrella document for environmental management of the construction phase of the Project. It is supported by a range of Specialised Environmental Management Plans (SEMPs) which are attached as appendices to the CEMP. The following Draft SEMPs have been provided in Volume 4 of the application documents:

- SEMP001 Air Quality Management Plan
- SEMP002 Erosion and Sediment Control Plan
- SEMP003 Construction Noise and Vibration Management Plan
- SEMP004 Construction Traffic Management Plan
- SEMP005 Landscape Management Plan
- SEMP006 Accidental Aquifer Interception Management Plan

In addition to management plans for the construction phase of the Project, there will be management plans for the operational phase of the Project, in particular for the operation and maintenance of stormwater systems. This operational phase management plan is not attached as an appendix to the CEMP. The framework around these management plans is shown in Figure 55.

Figure 55: Management plan framework



27.4. Summary of mitigation, monitoring and other measures to manage adverse effects

A range of mitigation, remediation, management and monitoring measures have been developed for the Project, in order to avoid, remedy or mitigate potential adverse effects. These measures are summarised in Table 41. References to the relevant technical report are provided, where applicable.

Table 41: Proposed mitigation and monitoring

Construction effects
Operational effects

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Traffic and transport				
Increased construction traffic movements of both light vehicles and heavy vehicles are likely to have adverse amenity and safety effects on local roads.	CTMP to outline: appropriate construction sequencing, hours of operations, construction vehicle movements and routes, and use of temporary connection routes. Site specific traffic management plans (SSTMPs) to be prepared for specific locations to control construction vehicle movements and routes.	Monitoring requirements will be specified in the CTMP	Designation: • Finalise and implement CTMP (SEMP 004) – DC.25, DC.26 & DC.28 • Prepare and implement SSTMPs to set out detailed requirements – DC.27 & DC.28.	Technical Report 2

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Removal of direct access to Main South Road for properties on the west and east of the road.	On the western side, access removal will be mitigated by the construction of a rear access road between Weedons Road and Curraghs Road. For properties on the eastern side the existing local road upgrades and an extension of Berketts Drive through to Robinsons Road will be used to provide access. These rear access roads form part of the Project.	N/A	No condition – the rear access roads form part of the Project (shown on the designation plans). The NZTA is required under Government Roading Powers Act to provide an alternative access.	Technical Report 2
Property and land use				
Private land will be required to accommodate the Project alignment, rear access roads and ancillary local road improvements	Private properties will be purchased outright or partially acquired. Property acquisition and compensation will be managed through the Public Works Act.	N/A	No condition. Addressed through Public Works Act	-
Some partial land acquisition may result in land severance or a reduction of land area below a useable size. This may have implications for amenity.	Potential amalgamation of severed land to create titles large enough for effective reuse. Property acquisition and compensation will be managed through the Public Works Act.	N/A	No condition. Addressed through Public Works Act	-

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Provision of alternative access may reduce the net area of existing properties including below the minimum allotment size in the District Plan.	Options for alternative access (for example right of way or road to vest on subdivision) will be considered in the acquisition process. These matters can be considered when the council assesses any future application for right of way or subdivision to facilitate the alternative access.	N/A	No condition. Addressed through Public Works Act.	-
The Project will take land comprising high fertility soil which might otherwise be used for farming purposes. This land use change will be irreversible.	Once construction is complete suitable areas of land will be returned to pasture. During construction, some of the topsoil will be re-used in the Project area. Surplus topsoil will be available for re-use elsewhere.	N/A	Designation: • Require uplift of surplus designation – DC.2	-
Services / network utilities				

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
The Project alignment falls within the clearance envelope of a Transpower transmission line.	Clearance will be required to be maintained. The preferred solution will be confirmed at the detailed design stage. Potential solutions include the provision of an additional tower, tensioning of the lines, raising existing towers or undergrounding the lines. This will be undertaken in collaboration with Transpower.	N/A	Designation: • Require compliance with NZECP 34:2001 – DC.34	-
The Project alignment will directly affect some overhead electricity distribution lines.	This infrastructure will be relocated or undergrounded. These enabling works will be carried out prior to construction in consultation with the utility providers. The CEMP shall outline methods to address the safety, integrity and protection of existing network utilities.	N/A	Designation: • Finalise and implement CEMP which shall address network utility works – DC.12 & DC.13	-
Dust from construction activities has the potential to adversely affect electricity infrastructure and rail infrastructure.	AQMP to include measures to adequately manage dust during construction.	Dust monitoring requirements to be specified in the AQMP	Designation: • Finalise and implement AQMP (SEMP 001) – DC.14 & DC.15	-

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Potential for construction to cause damage to telecommunications infrastructure.	This infrastructure will be protected or relocated. These enabling works will be carried out prior to construction in consultation with the utility providers. The CEMP shall outline methods to address the safety, integrity and protection of existing network utilities.	N/A	Designation: • Finalise and implement CEMP which shall address network utility works – DC.12 & DC.13	-
Potential for construction to cause damage to sewer infrastructure.	This infrastructure will be protected and in some cases relocated to improve longer term maintenance accessibility. This will be undertaken in collaboration with the network utility provider. The CEMP shall outline methods to address the safety, integrity and protection of existing network utilities.	N/A	Designation: • Finalise and implement CEMP which shall address network utility works – DC.12 & DC.13	-

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Potential for construction to cause damage to water and stormwater infrastructure.	This infrastructure will be protected and in some cases relocated to improve longer term maintenance accessibility. This will be undertaken in collaboration with the network utility provider. The CEMP shall outline methods to address the safety, integrity and protection of existing network utilities.	N/A	Designation: • Finalise and implement CEMP which shall address network utility works – DC.12 & DC.13	-
During construction, sediment has the potential to enter stockwater races.	ESCP to describe erosion and sediment control measures to be undertaken during construction to manage effects on the quality of water races.	N/A	Regional consent: • Require ESCP to address effects on stockwater races – G.14 & G.15	Technical Report 3 Technical Report 17
Urban form and function				
The Project has no adverse urban design effects.	No mitigation is proposed	N/A	Designation: • Take into account the design principles of the ULDF – DC.31	Technical Report 5
Landscape and visual				

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Temporary visual effects resulting from construction activities such as construction yards, laydown areas and equipment.	CEMP to include measures to mitigate areas of soil exposure from earthworks and the length of time exposed will be limited. Vehicle accesses and stockpiled materials will be located to minimise their visual impacts. Landscape Management Plan to include provisions to retain existing vegetation where possible	N/A	Designation: • Finalise and implement CEMP – DC.12 & DC.13 • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC.30	Technical Report 4 Technical Report 7
Adverse amenity value effects from motorway structures (e.g. interchanges and noise mitigation barriers) and lighting.	Landscape Management Plan to include provisions to retain existing vegetation where possible, replicate existing planting patterns where possible and retain valued view shafts. Planting will be in accordance with the Landscaping Plans with new vegetation planted to provide screening of structures and lighting effects.	N/A	Designation: • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC 30	Technical Report 4 Technical Report 7
The loss of pastoral land will have an effect on rural amenity and character.	Once construction is complete suitable areas of land will be returned to pasture.	N/A	Designation: • Require uplift of surplus designation – DP.2	Technical Report 4 Technical Report 7

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Amenity effects from the removal of planting, such as sections of shelterbelts.	Planting in accordance with Landscaping Plans and Landscape Management Plan which promotes replication of existing planting patterns where possible, limiting vegetation removal and retention of existing planting.	N/A	Designation: • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC.30	Technical Report 4 Technical Report 7
The proposed swales and stormwater basins may have an adverse visual effect on adjacent properties and travelling public using the motorway.	The stormwater detention basins are designed to be set below grade, surfaced with grass and set back from the carriageway. These will appear as a continuation of the existing rural land.	N/A	No condition. Addressed through design.	Technical Report 4
Lighting				
Construction yard and activity lighting, while temporary, has the potential to cause light spill effects on nearby residents and glare on drivers of vehicles.	The CEMP will manage the potential impacts of temporary lighting during construction. The location of site offices will be carefully considered in relation to nearby residential dwellings. The contractor will be required under the CEMP to use lights that do not produce environmental spill light above that required by relevant standards.	N/A	Designation: • Require CEMP to address effects of construction lighting – DC.12 & DC.13	Technical Report 19

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
There is the potential for intermittent lighting effects from vehicle movements to impact upon existing residents in the vicinity of the motorway.	Potentially affected dwellings will be partially screened from possible lighting effects by landscaping in accordance with Project Landscaping Plans.	N/A	Designation: • Finalise and implement Landscape Management Plan which include Landscaping Plans (SEMP 005) – DC.29 & DC.30	Technical Report 4 Technical Report 19
Lighting installed at intersections and interchanges has the potential to adversely affect residents and vehicle drivers primarily through spill light and glare.	All road lighting has been designed to Standard AS/NZS 1158 to minimise spill light and glare.	N/A	Designation: • Lighting to be designed in accordance with AS/NZS 1158 – DC.35	Technical Report 19
Noise and vibration				

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Temporary construction noise and vibration has the potential to cause disturbance to residents and occupiers of commercial properties in close proximity to the Project alignment.	CNVMP to require compliance with construction noise and vibration NZ standards, where practicable. CNVMP to outline measures to mitigate construction noise including hours of operation to be restricted for the use of heavy vehicles and loud construction machinery, or in some instances minimum setback distances from occupied buildings will be employed. Other general mitigation measures for noise and vibration will also be described in accordance with best practice. Further mitigation measures will be investigated where potential exceedance of noise standards has been identified (site specific construction noise management plan in accordance with the CNVMP). Proactive management of community liaison and communications.	Monitoring of noise and vibration as required by NZ standards or CNVMP	Designation: • Finalise and implement CNVMP (SEMP 003) – DC.16 to DC.20 • Appoint Communications Liaison Person – DC.4 • Require Communications Plan – DC.5 • Maintain Feedback Register – DC.38	Technical Report 9

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Operational traffic noise has the potential to cause disturbance to residents and occupiers of commercial properties in close proximity to the Project alignment.	Project design includes traffic noise mitigation where necessary. Methods to be employed are low-noise road surfacing (OGPA), and acoustic fences where necessary. Comprehensive design of the noise control measures will occur during the detailed design stage of the Project.	N/A	Designation: • Require implementation of the preferred mitigation options for road traffic noise (acoustic fencing and low noise road surfacing) – DC.21 to DC.24	Technical Report 8
Air quality				
Dust and fumes generated by earthworks and other construction activities has the potential to adversely affect air quality and amenity for residences within close proximity to the works (within 200m).	AQMP to outline mitigation measures which will include the use of dust suppression, water sprinklers and the stabilisation of areas liable to excessive dust. Stockpiling and spillage will be appropriately managed, as will the use and maintenance of construction vehicles. Access roads and working areas will be constructed from appropriate materials.	An air quality monitoring programme will be implemented to assist the control and management of construction dust discharges. This will be outlined in the AQMP.	Designation: • Finalise and implement AQMP (SEMP 001) – DC.14 & DC.15 Regional resource consent: • Finalise and implement AQMP (SEMP 001) – G.12 & G.13	Technical Report 10
Terrestrial ecology				

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Disturbances from construction activities (in conjunction with habitat loss) may lead to lizard mortality or injury.	Survey extent of existing lizard populations. If lizards are present in numbers and locations which puts them at risk during construction a Lizard Management Plan shall be prepared to determine actions to minimise adverse effects, which may include a lizard recovery programme to capture and translocate affected lizard populations.	Monitoring as outlined in the Lizard Management Plan.	Designation: • Undertake lizard monitoring and prepare and implement Lizard Management Plan if required – DC.36	Technical Report 18
Construction activities and particularly heavy machinery presents an opportunity for problem weed species not currently present in the area to become established.	Water blasting of all machinery at a suitable facility prior to entry on site is proposed and weed monitoring.	Landscape Management Plan to outline weed monitoring requirements (monitor construction site over a period of two years to detect introduction of weed species and eradicate if required).	Designation: • Require water blasting of machinery – DC.37 • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC.30	Technical Report 18

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Bird, lizard and invertebrate habitat will be lost to accommodate on-off ramps and local road connections. The road may also obstruct movement of wildlife and pose a hazard to mobility of some species. This may result in a minor loss of ecological functionality at a local level.	Extensive landscape mitigation measures are proposed. This will include the planting of species that will enhance the ecological value and connectivity at a landscape scale. Restoration planting along the motorway may provide suitable habitats in time for other native wildlife. To minimise the loss of vegetation and damage to surrounding vegetation, the extent of clearance will be carefully managed in the Landscape Management Plan.	Lizard monitoring	Designation: • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC.30 • Lizard monitoring and prepare and implement Lizard Management Plan if required – DC.36	Technical Report 7 Technical Report 18
Freshwater ecology				

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Potential sedimentation and contamination of surface waterways, including stockwater races, from stormwater discharge during construction which may adversely affect ecosystems.	The CEMP will contain comprehensive ESCP which shall outline erosion and sediment control measures to avoid contamination of waterways. The CEMP will include measures to address effects related to potential contamination during construction (e.g. fuelling stations, wash-down facilities and potential spills). All works to carry out diversions of stockwater races shall be completed off line and prior to flows being diverted to the new channel. Disturbed areas adjacent to water races to be stabilised and planted as soon as practicable following completion of works.	Monitoring as outlined in the ESCP.	Regional resource consent: • Finalise and implement CEMP which shall include hazardous substances management procedures – G.10 & G.11 • Finalise and implement ESCP (SEMP 002) – G.14 & G.15 • Diversions undertaken off line and completed prior to flows being diverted to the new channel – D.3 & D.6 • Stabilise adjacent disturbed areas upon completion of works – D.8	Technical Report 17 Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Potential habitat degradation and blockage of fish passage through physical disturbance and temporary closure of stockwater races during construction.	Care will be taken to ensure that construction works do not affect the passage of fish or cause stranding of fish in pools or channels. ESCP will contain measures to prevent sedimentation of waterways. All works to carry out diversions shall be completed off line and prior to flows being diverted to the new channel. All disturbed areas adjacent to water races will be stabilised and planted with suitable riparian margin vegetation.	N/A	Regional resource consent: • Finalise and implement ESCP (SEMP 002) – G.14 & G.15 • Diversions undertaken in a manner to prevent stranding of fish – D.2 & D.5 • Diversions undertaken off line and completed prior to flows being diverted to the new channel - D.3 & D.6 • Stabilise adjacent disturbed areas upon completion of works – D.8	Technical Report 17 Technical Report 7

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Stormwater run-off during operation may contain contaminants that can result in nuisance growths in water races.	Stormwater design will ensure appropriate treatment of stormwater runoff prior to discharge. Careful riparian planting will ensure that sediment and contaminants runoff does not reach the water races. Inspection and maintenance of stormwater treatment systems.	N/A	Designation: • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC.30 Regional resource consent: • Require treatment of stormwater prior to discharge – DP.8-DP.12. • Design of stormwater systems to meet specific requirements – DP.8 to DP.16 • Inspect and maintain stormwater systems – DP.17 to DP.21	Technical Report 17 Technical Report 7 Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Potential habitat modification as a result of water race piping, realignment and permanent closure.	Culverts will be designed and constructed to provide for fish passage and will not include steep drops or perched sections. During detailed design, provide for the inclusion of light wells, resting areas and baffles along the piped sections to assist with fish passage. Riparian planting will be carried out in consultation with SDC.	N/A	Designation • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC.30 Regional resource consent: • Design water race diversions to provide for fish passage – D.2	Technical Report 17
Stormwater and groundwater				
Adverse flooding and water quality effects from highway stormwater.	Adopt proposed stormwater design, which provides appropriate protection via the design standard applied in sizing the stormwater infrastructure (100 year return period) and appropriate swale and pond-based treatment, prior to disposal to land.	N/A	Regional resource consent: • Design of stormwater systems to meet specific requirements – DP.8 to DP.16 • Require Stormwater Operation and Maintenance Plan – G.18	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Failure of soak pits leading to progressive failure of individual elements in the Project and negative off corridor effects such as additional surface flooding in the Halswell catchment.	Development of field testing programme to confirm soakage rates of receiving ground should the detailed design vary from rates specified in Technical Report 3. Further full scale field testing at critical locations including sag points. Preparing an Operation and Maintenance Plan during detailed design for soakage devices.	As per Stormwater Operation and Maintenance Plan	Regional resource consent: • Require Stormwater Operation and Maintenance Plan – G.18 • Design of soak pits to meet specific requirements – DP.10	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Concentration of contaminants and sediments in stormwater first flush basins.	Use of specific soil parameters/ media to be used in construction of first flush filter media replacing percolation rates set in NRRP. Regular replacement of soakage filtration media.	Monitoring of soil contamination at disposal sites Monitoring of percolation through soil media to ensure these are similar to design rates	Regional resource consent: • Design of first flush basins to meet specific requirements – DP.11 • Inspection and maintenance of stormwater treatment systems – DP.17 to DP.21 • Monitoring of percolation through soil media – DP.22 • Monitoring of soil contamination at disposal sites – DP.23 & DP.24 • Require Stormwater Operation and Maintenance Plan – G.18	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Failure of stockwater race infrastructure to carry design flows across or adjacent to the Project due to modifications undertaken as part of the Project.	Development of management measures addressing each of the 9 stockwater races during the detailed design stage covering a) on going operation of the supply of water during and post construction, b) passage of flood and land drainage function of the races during and post construction, c) any deviation or alternative route, d) any consequential effect of spill from storm events, e) the construction of deviations to be completed off line before the new deviation is made live, f) limiting the time and occurrence to over pumping to emergency and limited period occasions (e.g. tie ins), g) ensure losses through base of new stockwater race similar to existing to manage overall loss to ground.	Inspect and maintain stockwater race siphons as per the Stormwater Operation and Maintenance Plan	Regional resource consent: • Design diversions of stockwater races to meet specific requirements – D.2 • Require Stormwater Operation and Maintenance Plan – G.18	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Overland flow paths impeded by the Project leading to additional flooding due to modifications made as part of the Project.	Consideration of the overland flow paths that are crossed by the Project alignment during detailed design, covering a) the assessment of interception of these flows on property upstream of the Project, b) the assessment of discharge beyond the Project area, c) how flow paths will be managed during construction, d) operation and maintenance of the siphon structure. Additional flow paths identified by detailed topographical survey will be managed and crossing points identified during the detailed design will be provided.	Inspect and maintain overland flow siphons as per the Stormwater Operation and Maintenance Plan	Regional Resource Consent: • Design overland flows to meet specific requirements relating to afflux – DP.13 • Require Stormwater Operation and Maintenance Plan – G.18	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Failure of individual elements in the stormwater soakage system affects users of the Project or causes negative off corridor effects such as additional surface flooding in the Halswell catchment during events of lesser magnitude than the critical 100 year storm event at Owaka Basin, Ponds adjacent to Meadow Mushrooms and Maize Maze Pond.	• Development of a Stormwater Operation and Maintenance Plan to consider the normal and emergency flow of all the stormwater pond structures in the vicinity. • Inclusion of a liner system that prevents the direct connection of surface water to land in the forebay section of the pond. • The design of the pond shall include a) an ability to receive and store the entire 24 hour 100 year storm runoff from the Project, b) an ability to draw down the level of the pond level following a large rain event and discharge this flow to the Upper Knights Drain or Montgomery's Drain. • A process for the controlled release of water from the Maize Maze Pond to the Halswell River system (including discussion with the ECan and the CCC).	N/A	Regional resource consent: • Design of ponds to meet specific requirements – DP.12 • Require Stormwater Operation and Maintenance Plan – G.18 • Require liaison with CRC and CCC prior to the controlled release of water to the Halswell River system – DP.26	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Robinsons Road overpass may be inundated by groundwater with the CPWES in place.	Design and implementation of the intervention system to lower groundwater levels. Development of a Stormwater Operation and Maintenance Plan for the pumping and disposal system.	Monitoring of groundwater levels at the site to establish the appropriate time for installation and commissioning of primary and secondary groundwater lowering systems.	Regional resource consent: • Require groundwater monitoring and annual reporting – GT.2 & GT.4 • Establish appropriate time for implementation of intervention strategy – GT.6 • Require Stormwater Operation and Maintenance Plan – G.18	Technical Report 3
Dewatering to lower groundwater levels may have adverse effects on other groundwater users	Dewatering at Halswell Junction Road is gravity based and will not operate at levels lower than present. Dewatering at Robinsons Road overpass is via pumping and gravity. Pumping initiation is set by trigger levels, other wells cone of depression intercepting take will reduce dewatering.	N/A	No condition.	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Dewatering to lower groundwater levels may have adverse effects on the flow within surface waterbodies	Dewatering water will be discharged to water races or directly to Upper Knights Stream	N/A	Regional Resource Consent: • Require Stormwater Operation and Maintenance Plan – G.18	Technical Report 3
Stormwater discharges may affect water quality of nearby groundwater wells/takes	Install new wells outside the zone of influence or relocate discharge points away from well	N/A	Regional Resource Consent: • Identify affected wells and either relocate discharge points or decommission existing well and install a replacement well – DP.14	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Groundwater mounding beneath the stormwater treatment ponds at Halswell Junction Road will affect the performance of the ponds	Design and implementation of the intervention system to lower groundwater levels	Monitoring of groundwater levels at the site to establish the appropriate time for installation and commissioning of groundwater intervention system.	Regional Resource consent: • Require groundwater monitoring and annual reporting – GT.3 & GT.4 • Outline trigger level for implementation of intervention strategy – GT.5 & GT.7 • Require Stormwater Operation and Maintenance Plan – G.18	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Progressive failure of individual stormwater elements in the Project design due to sediment and erosion effects.	Development of an Erosion and Sediment Control Plan for each work section along the Project covering a) clean and clear water diversions, b) diversion drains for sediment laden runoff, c) use of permanent swales and the ability to rehabilitate the swale to its final purpose during the construction process, e) specific disposal to land soak pits which are not to form part of the final soak pit system, f) methods to prevent discharge of sediment laden water off site or to land, g) cover the issues addressed in other plans such as overland flow path construction, stockwater race construction, existing bores/wells and the works required at each intersection, h) on-going maintenance requirements, i) disestablishment criteria.	Monitoring as required within the ESCP	Regional resource consent: • Finalise and implement ESCP – G.14 & G.15 • Design of erosion and sediment control measures to meet specific requirements – DP.1 • Inspection, maintenance and monitoring of erosion and sediment control measures – DP.4 to DP.6	Technical Report 3

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Effects on groundwater quality from bore installation	Bores to be installed in accordance with good practice. Concrete cap to be installed around well head works. Bore sealed to prevent fluid movement down casing.	N/A	Regional resource consent: • Construct in accordance with the New Zealand Environmental Standard for Drilling of Soil and Rock – BC.1 • Concrete pad constructed around the bore head to prevent leakage and any material or surface water entering the bore or annulus – BC.3 & BC.4 • Sealing of the exterior of each bore – BC.2	N/A
The installation of the pipe outfall in Upper Knights Stream may have effects on ecological and other values within the stream	The pipe shall be installed in dry conditions. The ESCP shall outline measures to prevent sedimentation of the waterway.	N/A	Regional resource consent: • Finalise and implement ESCP (SEMP 002) – G.14 & G.15	N/A

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Use and storage of hazardous substances may affect soil and water quality	The CEMP shall outline measures to avoid, remedy or mitigate the effects of the use and storage of hazardous substances during construction.	N/A	Regional resource consent: • CEMP to include measures to avoid remedy or mitigate effects of hazardous substance storage and use during construction – G.10 & G.11	N/A

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Excavation and deposition over an unconfined/ semi-confined aquifer may affect groundwater quality	Refuelling and fuel storage to be located away from excavation areas. Installation of erosion and sediment control measures around earthworks sites.	N/A	Regional resource consent: • No storage of fuel or refuelling within 50 metres of excavation and requirements for spill kits on site – E.4 & E.5 • Erosion and sediment control to prevent discharge of sediment and contaminants into the excavated land – E.3 • Open excavations that expose groundwater are to be closed with clean fill within 24 hours of the completion of construction – E.6	N/A

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Excavation of material may affect aquifer pressure	Follow procedures of AAIMP regarding sealing of aquifer and controlling flow and pressure. Ensure there is no seepage upon completion of backfilling.	Monitoring as required by AAIMP	Regional resource consent: • Follow procedures of AAIMP if aquifer intercepted – G.16, G.17 & E.1 • Ensure no seepage upon completion of backfilling – E.2	N/A
Natural hazards				
Seismicity in the region carries the risk of elevated PGAs (peak ground acceleration), ground shaking, ground rupture and liquefaction. This may result in displacement or damage at ground level.	The design will adhere to Standards that apply at the time of detailed design. This design standard will mitigate effects on the road and users in a seismic event.	N/A	No condition required. Addressed in design.	Technical Report 11
Flooding from impeded overland flow or failure of the stormwater system.	The design standard for the highway drainage system is the 100 year ARI rainfall event including an allowance for climate change.	N/A	No condition required. Addressed in design.	Technical Reports 3
Contamination				

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Contaminant risk to human health and/or ecological values during land disturbance activities, and potential for hazardous materials to be discovered during construction resulting in human health risk (largely for workers).	Site management plan measures included in the CEMP relating to contaminated land risk, and associated monitoring and reporting, including the transport, disposal and tracking of materials taken away in the course of the activity (via the CEMP). If contaminant indictors are discovered in the construction zone, contingency action is included in the CEMP.	Monitoring as specified within the CEMP	SDC and CCC land use consents under Soil NES: • Require CEMP to address contaminated land – CL.7	Technical Report 16
Cultural impacts				

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
The Project has the potential to adversely affect unrecorded sites of cultural significance or koiwi remains.	Implementation of the Accidental Discovery Protocol covering the NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast). Adoption of the Ngāi Tahu Koiwi Tāngata Policy 1993.	N/A	Designation: • Require implementation of Accidental Discovery Protocol covering the NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast) – DC.32 • Require adoption of Ngāi Tahu Koiwi Tāngata Policy 1993 – DC.33 Regional resource consent: • Require implementation of Accidental Discovery Protocol covering the NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast) – G.19 • Require adoption of Ngāi Tahu Koiwi Tāngata Policy 1993 – G.20	-

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
The Project has the potential to adversely affect water quality and aquatic ecological values, which are important to local iwi.	Landscaping of riparian areas and the design for stormwater treatment and management.	N/A	Designation: • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC.30 • Design stormwater treatment to meet specific requirements – DP.8 to DP.12	Technical Report 7 Technical Report 3
The Project could further erode cultural landmarks.	Installation of interpretation features to inform pedestrian and other non-vehicular users of the area of such things as Ngāi Tahu whānui traditional use of, and on-going relationship with the natural environment.	N/A	No condition required, will be addressed through direct consultation with iwi	-
Archaeology and built heritage				

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
There are no identified sites of archaeological significance affected by the Project. However there is the possibility that such sites have not yet been discovered, or identified.	Measures are proposed to ensure correct protocol is followed in the event of an accidental discovery of potential archaeological material. All contractors involved in earthworks will be briefed on the accidental discovery protocol and will receive training in the recognition of an archaeological site. As a precaution an archaeological authority will be obtained, which is likely to contain conditions relating to on-site briefing and the preparation of a management plan outlining proposed monitoring.	N/A	Designation: • Require implementation of Accidental Discovery Protocol covering the NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast) – DC 32 Regional resource consent: • Require implementation of Accidental Discovery Protocol covering the NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast) – G.19	Technical Report 12
Economic				
Construction activity and traffic will cause temporary negative economic effects on some businesses in localised areas.	Measures to address identified routes and locations are detailed in the CTMP.	N/A	Designation: • Finalise and implement CTMP (SEMP 004) – DC.25 & DC.26	Technical Report 14

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Disruption of current dynamics for passing traffic to be aware of business offerings.	As part of detailed design, directional signs may be used to assist travellers in finding their way to specified economic hubs.	N/A	No condition required. Addressed in detailed design.	Technical Report 14
Social impacts				
Construction noise and vibration will cause disturbance to those living, working and gathering in proximity to the works.	Refer to "Noise and Vibration" above. Proactive management of these social effects will include community liaison and communication management.	Monitoring as required within the CNVMP	Designation: • Finalise and implement CNVMP (SEMP 003) – DC.16 to DC.20 • Require Communications liaison person – DC.4 • Require Communications Plan – DC.5 • Establish Community Liaison Group – DC.6	Technical Report 13 Technical Report 9
Disturbance to human health and nuisance caused by dust produced by construction.	Refer to "Air Quality" above.	As per AQMP	Designation: • Finalise and implement AQMP (SEMP 001) – DC. 14 & DC.15	Technical Report 13 Technical Report 10

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
The use of local roads for construction traffic may cause delays for people accessing community facilities (such as daycare or schools) and increase road safety concerns.	The CTMP will include measures to manage the adverse effects of construction traffic. Communication and liaison processes over the construction period will include parents of school children and other such affected people.	N/A	Designation: • Finalise and implement CTMP (SEMP 004) - DC.25 & DC.26 • Require Communication liaison person – DC.4 • Require Communications Plan – DC.5 • Establish Community Liaison Group – DC.6	Technical Report 13
Visual and amenity effects caused by the motorway and associated interchanges.	Refer to "Landscape and Visual" above.	N/A	Designation: • Finalise and implement Landscape Management Plan (SEMP 005) – DC.29 & DC.30	Technical Report 13 Technical Report 4

Actual or potential adverse environmental effect identified	Mitigation/ management measures	Monitoring	Condition proposed	Report name(s) / reference(s)
Operational noise may have an effect on the health and wellbeing of people living near the alignment.	Project design includes traffic noise mitigation where necessary. Methods to be employed are low-noise road surfacing (OGPA) and acoustic fences where necessary. Comprehensive design of the noise control measures will occur during the detailed design stage of the Project.	N/A	Designation: • Require implementation of the preferred mitigation options for road traffic noise (acoustic fencing and low noise road surfacing) – DC.21 to DC.24	Technical Report 8 Technical Report 10 Technical Report 13

PART I: STATUTORY ASSESSMENT

28. STATUTORY ASSESSMENT

Overview

The objectives and policies that are relevant to the Project span national, regional and district planning documents. An analysis of these is provided in this chapter, the conclusions of which are as follows:

- the Project will enable the Government's national policies for transportation: the Project will upgrade the Canterbury Motorways RoNS, the Project will provide better access to and from the south of Christchurch, the City Centre and Lyttelton, by improving the capacity, safety and alignment of the Christchurch Southern Corridor;
- overall, the Project is generally consistent with the objectives and policies of the relevant national, regional and district statutory planning documents;
- the Project directly contributes to the transport related policies in the Regional Policy Statement, Proposed Regional Policy Statement, the Regional Land Transport Strategy, and the Selwyn District and Christchurch City District Plans;
- the Project will enable communities at a local, regional and national level to provide for their social, economic and cultural wellbeing. The Project will meet the growing transportation needs of the Region, including freight, and does not preclude future opportunities for other land transport development, such as public transport; and
- as set out in Chapter 27 of this AEE, the adverse effects of the Project on the environment will be adequately avoided, remedied or mitigated to sustain the potential of natural and physical resources for future generations and safeguard the life supporting capacity of air, soils, water and ecosystems.

Consequently, the Project is consistent with statutory planning documents, particularly when the benefits of the proposal are considered alongside the proposed measures to avoid, remedy and mitigate any actual or potential adverse effects.

28.1. Introduction

The assessment of the Project against relevant statutory documents generally follows the hierarchy of applicable planning documents shown in Figure 56 below. An assessment of the Project against Part 2 of the RMA is discussed in the following chapter. Further detail regarding the specific provisions within the statutory documents relevant to the Project is contained in Technical Report 20 – Statutory Provisions Report appended in Volume 3.

Figure 56: Hierarchy of relevant planning documents

National	
National Policy Statements • National Policy Statement for Freshwater Management (NPS FM) • National Policy Statement for Electricity Transmission (NPS ET)	**National Environmental Standards** • National Environmental Standards for Air Quality 2004 (NES AQ) • National Environmental Standard for Sources of Human Drinking Water 2008 • National Environmental Standards for Electricity Transmission 2010 Activities (NES ETA) • National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011
Canterbury Regional Council	
Regional Policy Statements • Canterbury Regional Policy Statement (1998) • Proposed Change 1 to the Regional Policy Statement 1998 • Proposed Canterbury Regional Policy Statement (2011)	**Regional Plans** • Canterbury Natural Resources Regional Plan (NRRP) • Proposed Land and Water Regional Plan (PLWRP)
Territorial Authorities	
• Selwyn District Plan • Christchurch City Plan	

In addition to the statutory planning documents set out in the above table, the "Recovery Strategy for Greater Christchurch" came into effect on 1 June 2012. Under the Canterbury Earthquake Recovery Act, the Recovery Strategy is to be read together with, and forms part of, the statutory RMA documents. The statutory part of the Recovery Strategy (sections 3-8) are therefore part of the RPS, NRRP, PLWRP, the Selwyn District Plan and the Christchurch City Plan and must be given regard in considering the NoR and resource consent applications.

28.2. National Policy Statement for Freshwater Management

The National Policy Statement for Freshwater Management (NPS FM) is relevant to the Project. The NPS FM is primarily relevant in developing regional plans but is a matter to be given regard in the consideration of regional resource consents involving water takes and discharges, and is

relevant to the consideration of the proposed water takes and diversions and stormwater discharges.

The NPS FM contains policies and objectives grouped into the following topics:

- water quality;
- water quantity;
- integrated management; and
- Tangata whenua roles and interests.

28.2.1. Water quality

Of particular relevance to the Project are the following provisions concerning water quality.

Objective A1: To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water, in sustainably managing the use and development of land, and of discharges of contaminants.

Objective A2: The overall quality of fresh water within a region is maintained or improved while:

(a) protecting the quality of outstanding freshwater bodies

(b) protecting the significant values of wetlands and

(c) improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.

The NPS FM provides for a staged implementation programme over which time councils are required to include objectives and policies in their plans to reflect the stated objectives. The NPS FM also requires immediate inclusion of the stated transitional policy into regional plans (no further RMA Schedule 1 process is required, they are deemed to be automatically included from 1st July 2011). This policy is:

Policy A4 and direction (under section 55) to regional councils …

(1) When considering any application for a discharge the consent authority must have regard to the following matters:

(a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of fresh water including on any ecosystem associated with fresh water and

(b) the extent to which it is feasible and dependable that any more than minor adverse effect on fresh water, and on any ecosystem associated with fresh water, resulting from the discharge would be avoided.

(2) This policy applies to the following discharges (including a diffuse discharge by any person or animal):

(a) a new discharge or

(b) a change or increase in any discharge –

of any contaminant into fresh water, or onto or into land in circumstances that may result in that contaminant (or, as a result of any natural process from the discharge of that contaminant, any other contaminant) entering fresh water.

(3) This policy does not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management takes effect on 1 July 2011.

The Project involves the discharges of stormwater to land and to land where it may enter water both during construction of the Project and during Project operation. Chapter 19 outlines the methods available to treat stormwater prior to discharge, which will be achieved primarily by sheet flow over the grassed verge and treatment swales. In addition, first flush basins and treatment ponds are included where required. The CEMP will include provisions for management of stormwater during construction. With these mitigation measures in place, adverse effects of the Project on water quality will be adequately avoided, remedied and mitigated to ensure effects are no more than minor (Technical Report 3).

Overall, it is considered that the Project will be consistent with Policy A4 and with the overall intent of the NPS FM in relation to water quality.

28.2.2. Water quantity

The NPS FM sets out objectives for water quantity, the relevant ones are aimed at:

- sustainably managing the taking, using, damming, or diverting of fresh water to safeguard the life-supporting capacity, ecosystem processes and indigenous species (Objective B1); and
- improving and maximising the efficient allocation and efficient use of water (Objective B3);

The NPS FM policy that is most relevant to the Project is the stated transitional Policy B7 which is deemed to be a policy in the regional plan:

1. When considering any application the consent authority must have regard to the following matters:

(a) the extent to which the change would adversely affect safeguarding the life-supporting capacity of fresh water and of any associated ecosystem and

(b) the extent to which it is feasible and dependable that any adverse effect on the life supporting capacity of fresh water and of any associated ecosystem resulting from the change would be avoided.

2. This policy applies to:

a) any new activity and

b) any change in the character, intensity or scale of any established activity –

that involves any taking, using, damming or diverting of fresh water or draining of any wetland which is likely to result in any more than minor adverse change in the natural variability of flows or level of any fresh water, compared to that which immediately preceded the commencement of the new activity or the change in the established activity (or in the case of a change in an intermittent or seasonal activity, compared to that on the last occasion on which the activity was carried out).

The Project will necessitate both temporary and permanent diversion of water from water races used for stockwater supply. It will also necessitate the removal of water for site dewatering.

While the Project will result in the piping and diversion of 2.1km of stormwater race adjacent to Main South Road, in the longer term, the Project will result in an improvement of the area's ecology as it provides an opportunity to integrate landscaping and ecological enhancement through appropriate mixed indigenous and exotic plantings along the motorway margins and seeks to avoid highway runoff entering the races. As outlined in Chapter 19 and Technical Report 3, the Project proposes a range of measures to safeguard the life-supporting capacity of fresh water and of the associated ecosystem during water diversion and taking of water, including the provision for fish passage when stockwater races are piped.

Overall, it is considered that the Project is consistent with the Policy B7 and the overall intent of the NPS FM in relation to water quantity.

28.2.3. Integrated management

Part C of the NPS FM emphasises the importance of integrated management. Objective C1 is:

1. To improve integrated management of fresh water and the use and development of land in whole catchments, including the interactions between fresh water, land, associated ecosystems and the coastal environment.

While this objective and corresponding policies C1 and C2 are particularly relevant for local authority policy development, this Objective is to be given regard to in considering resource consent applications and Notices of Requirement. The development of the Project followed an integrated process, by which the interrelationships of various aspects of the proposed Project and its effects were assessed and considered in the alignment and design of the Project.

Overall, it is considered that the Project achieves the objective of improving integrated land use and development with freshwater management.

28.2.4. Tangata Whenua roles and interests

Part D of the NPS FM has the following Objective:

> *To provide for the involvement of iwi and hapu, and to ensure that tangata whenua values and interests are identified and reflected in the management of fresh water including associated ecosystems, and decision-making regarding freshwater planning, including on how all other objectives of this national policy statement are given effect to. (Objective D1)*

Part D requires local authorities to take reasonable steps to work with iwi and hapu and to reflect tangata whenua interests (Policy D1). Whilst the NPS FM requires actions to be taken by councils to develop policies (rather than requiring actions by requiring authorities and applicants for consents and approvals), it is relevant to highlight that this Project has been developed in consultation with tangata whenua, including in terms of how the Project may affect freshwater systems and ecology.

28.3. National Policy Statement on Electricity Transmission

The National Policy Statement on Electricity Transmission (NPS ET) sets out one objective and a number of policies for managing the electricity transmission network under the RMA. Local authorities are required to, within 4 years of the gazetting of the NPS ET, to give effect to its provisions. The NPS ET gives guidance to the drafting of plan rules and decision-making on resource consents.

There is one objective in the NPS ET:

> *To recognise the national significance of the electricity transmission network by facilitating the operation, maintenance and upgrade of the existing transmission network and the establishment of new transmission resources to meet the needs of present and future generations, while:*
>
> - *managing the adverse environmental effects of the network; and*
> - *managing the adverse effects of other activities on the network.*

Policy 1 seeks to have the national benefits of sustainable, secure and efficient electricity transmission recognised. Policies 2 – 9 manage the environmental issues generated by transmission infrastructure. Policies 10 and 11 manage the adverse effects of third party activities on the transmission network.

The alignment of the Project crosses under the Islington to Springston (ISL-SPN A) 50/66 kV transmission line to the southwest of the Shands Road and Marshs Road intersection. Any

changes that may be required to the line in this section to ensure the continued safety and capacity of the line are anticipated to be minor (for example, raising the height of conductors through increasing tower height/ tower relocation), and will occur prior to the construction of the Project. In addition, one of the towers on the Bromley to Islington (BRY-ISL A) 220 kV transmission line adjacent to the proposed roadway is located in close proximity and may require a protection barrier. This work would be undertaken in liaison with, and with the agreement of Transpower. Accordingly, it is considered that the Project is consistent with the NPS ET.

28.4. National Environmental Standards for Air Quality

The relevant regulation of the National Environmental Standards for Air Quality (NES AQ) includes Regulation 13 which sets the ambient air quality standards and the requirements for management of air quality within identified air sheds. It is the responsibility of Regional Councils to manage air quality and to comply with the Regional Air Quality targets for their airshed(s).

No consents relating to this NES are required as the operational pollutant concentration is below the NES AQ standards, but the relevant regulations in the NES have informed the assessment of construction and operational air quality effects and proposed mitigation measures outlined in Chapter 18 and Technical Report 10. The assessment concluded that adherence to dust management measures during construction will ensure adverse air quality effects would be suitably avoided or mitigated. Therefore, the Project complies with the NES AQ.

28.5. National Environmental Standard for Sources of Human Drinking Water

This NES requires regional councils to ensure that effects on drinking water sources are considered in decisions on resource consents and regional plans.

No consents relating to this NES are required for this Project. The potential effects of the Project on the District's groundwater resources that are used for water supply are addressed in Chapter 19 and Technical Report 3. Stormwater discharge points are not located within any Community Water Supply Protection Zone. In addition, closing of any potentially affected wells adjacent to the Project area is proposed to minimise any potential effects on domestic water supplies, for example should a large oil/chemical spill enter the groundwater system via a disposal point. Therefore, the Project will be consistent with this NES.

28.6. National Environmental Standards for Electricity Transmission Activities

The National Environmental Standards for Electricity Transmission Activities (NES ETA) contains regulations relating to the operation, maintenance, upgrade, relocation or removal of existing transmission lines and permits or controls these activities. The NES ETA applies within one section of the Project where the proposed CSM2 alignment passes beneath the ISL-SPN 50/66 kV transmission line to the southwest of the Shands Road and Marshs Road intersection. Minor work on the transmission line is likely to be required to ensure safety standards are met, in particular

achieving clearance distances. Depending on the proposed modifications, consents relating to this NES may be required and will be sought. Any work on the transmission line would be undertaken in liaison with Transpower with reference to the provisions of the NES ETA. Accordingly, the Project will achieve consistency with the NES ETA.

28.7. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

This NES provides a mix of permitted activities and resource consent requirements for certain activities on land affected or potentially affected by contaminants in soil. The Contaminated Land Assessment (Technical Report 16) has had regard to the relevant standards in the Soil NES.

Several locations within the vicinity of the MSRFL and CSM2 route are identified as HAIL sites. Soil contamination (arsenic and lead) was identified in one sample from the former Southbridge Branch Railway Line and one sample from a soil stockpile in the former quarry (Springs Road) contained a concentration of hydrocarbons above the background guideline values. Both of these locations fall outside the Project designation boundaries. Soil contamination above guideline values was not identified in any of the other HAIL site samples analysed. Soil disturbance within the Project designation boundaries will be a controlled activity in accordance with Clause 9 of the Soil NES given the soil contamination recorded within the HAIL sites does not exceed the applicable standard (the $SCS_{(health)}$) of Clause 7.

As a controlled activity, the activity must be managed under a site management plan, monitored and reported on, including the transport, disposal and tracking of materials taken away in the course of the activity. The construction of the Project is not a restricted discretionary activity under Regulation 10, and does not require remedial action.

Measures to mitigate against the effects of accidental discovery of contaminated soil on human health will be addressed in the CEMP. The CEMP will also contain all information relevant for a site management plan. It is considered the Project is consistent with the outcomes sought by the Soil NES.

28.8. Canterbury Regional Policy Statement (RPS)

The objectives and policies of the Operative RPS are broad and reflect the purpose and principles of the RMA. The RPS identifies the regionally significant issues around the management of the Region's natural and physical resources and sets out objectives for Canterbury and the way in which they are sought to be achieved (policies and methods). The RPS is a key statutory instrument that regional and district plans are required to give effect to. A full assessment of the Project has been undertaken against the relevant objectives and policies of the RPS and is provided below.

28.8.1. Tangata whenua

Chapter 6 of the RPS recognises the need for Tangata Whenua to exercise their cultural and traditional relationship, which includes kaitiakitanga and rangatiratanga, with their ancestral lands, water, sites, wahi tapu and other taonga. Objective 1 recognises the need to take into account the Treaty principles of partnership and active protection of Tangata Whenua in the use of their lands and waters to the fullest extent practicable. Policy 3 outlines the relationship of Tangata Whenua, their culture and their traditions with their ancestral lands, water, sites, wahi tapu and other taonga should be recognised and provided for through resource management and planning including provisions in plans, decisions on resource consents and monitoring the state of the environment.

Prior to undertaking Project-specific iwi consultation, the Project team prepared a Statement of Identified Maori Interest (SIMI) as an initial appraisal of iwi consultation carried out through previous studies and investigations relating to the Project based on existing written reports and documentation.

The NZTA has sought to engage with Te Runanga o Ngai Tahu, as the predominant iwi group with Mana whenua over the area so as to inform and update iwi on the Project. As the Project alignment lies within the boundaries of the Taumutu Runanga and Ngai Tuahuriri Runanga, engagement has also been sought with these Runanga via Mahaanui Kurataiao Ltd (MKT). In addition to this consultation, a draft Cultural Impact Assessment (CIA) has been prepared (and is currently being finalised) to inform matters important to Tangata Whenua. The outcomes of the assessment to date were presented in Chapter 23.

Policy 4 also promotes the protection of any site or activity that yields evidence of koiwi tangata (human bones) or artefacts (taonga) from violation or desecration. It is proposed that an accidental discovery protocol is established to address circumstances pertaining to protection of sites that are discovered during the course of the construction works.

28.8.2. Soils and land use

Objective 2 of Chapter 7 of the RPS seeks to minimise the irreversible effect of land use activities on land comprising versatile soils with the corresponding Policy 6 protecting such land from irreversible effects that may foreclose some future land use options that benefit from being located on such land. Technical Report 18 confirms the Project is on well drained and imperfectly drained soils of high fertility. The Project will take land which might otherwise be used for farming purposes, which will be irreversible. It is considered that the Project is not inconsistent with the RPS objective and associated policy, in that the proposal has minimised the amount of land required, consistent with Objective 2. Furthermore, there is no practicable non-versatile land alternative available on which to site the Project, which would enable the proposed activity to better achieve the purpose of the RMA.

28.8.3. Landscape, ecology and heritage

Landscape

Objective 2 and Policy 3 of Chapter 8 of the RPS promote the 'protection or enhancement of the natural features and landscapes that contribute to Canterbury's distinctive character and sense of identity, including their associated ecological, cultural, recreational and amenity values'. Chapter 15 and Technical Report 4 have summarised that overall, the potential landscape and visual changes brought about by the proposed Project range from slight through to substantial. The potential visual effects would result from changes to the local rural landscape due to modification to the existing pastoral land uses, introduction of manmade structures (road and bridges), increase in traffic movement, and glare from car lights and street lights. These changes will affect aspects of rural amenity, particularly for local residents.

Potential landscape mitigation measures are recommended where the adverse visual effects would be noticeable from dwellings and road users in the viewing catchment of the motorway alignment. Landscape mitigation is also proposed around overbridges and interchanges to assist in anchoring these structures into the landscape. Where it is deemed practicable, trees will be retained either side of the proposed motorway alignment, in order to retain the character of the rural landscape. There are also identified positive effects including panoramic views from overbridges obtained from the viewshaft of the road users, that are likely to heighten travel experience on the motorway and local roads.

It is considered that with the proposed mitigation in place the Project can be implemented in a manner that is not inconsistent with the relevant objective and associated policy.

Ecology

Objective 3 and Policy 4 of Chapter 8 of the RPS address the 'protection and enhancement of indigenous biodiversity'. Terrestrial and aquatic ecology assessments have been undertaken for the Project (Technical Reports 17 and 18). The assessments conclude that with very limited areas of naturally occurring indigenous vegetation and lack of natural waterways within the Project area and the nearby presence of habitat for commonly occurring indigenous birds with wide habitat preference, the effect of vegetation removal on indigenous fauna arising from the loss of those habitats is considered to be no more than minor. In the longer term, the Project will result in an improvement of the area's ecology as the Project provides an opportunity to integrate landscaping and ecological enhancement measures through appropriate mixed indigenous and exotic plantings along the motorway and water race margins. As such, it is considered that the Project is entirely consistent with this objective and the associated policy.

Heritage

An Assessment of Archaeological Effects (Technical Report 12) was undertaken to ascertain whether the Project would affect archaeological or built heritage sites which Objective 4 and

Policy 5 of Chapter 8 of the RPS seek to protect and enhance. In particular, Policy 5 seeks to protect regionally significant sites from adverse effects of use and development.

Chapter 24 outlines that there are no known archaeological or built heritage sites within or adjacent to the alignment. Accordingly, it has been assessed that the Project will result in no adverse effects on heritage.

It has been recommended that appropriate accidental discovery protocols be implemented should sites be exposed during the construction of the new roadway. As there are no effects on any historic sites, it is considered that the Project is consistent with this objective and the associated policy.

28.8.4. Water

Objective 3 of Chapter 9 of the RPS seeks to 'enable present and future generations to gain cultural, social, recreational, economic, health and other benefits from the water quality in Canterbury's water bodies and coastal waters, while:

(a) safeguarding the existing value of water bodies for efficiently providing sources of drinking water for people;

(b) safeguarding the life-supporting capacity of the water…

Policies 9 and 11 address this objective through the management of discharges to ensure that adverse effects on water quality are avoided, remedied or mitigated and through the promotion of land use practices which maintain and enhance water quality.

The majority of the catchment crossed by the proposed Project alignment is not considered by ECan or SDC to directly contribute to any natural watercourse. Chapter 19 and Technical Report 3 outline the potential effects on water quality associated with the Project as a result of contaminants discharged from stormwater and from the realignment of the water races within the Project area. In addition, earthworks undertaken adjacent to stockwater races during the course of constructing the Project may result in the temporary discharge of "contaminants" such as sediments to water. Stormwater is proposed to be discharged to ground during both the construction and operational phases of this Project, so potential effects on groundwater quality are relevant as well.

The overall stormwater philosophy is to separate the road drainage system from the surrounding surface water and stockwater systems both during the construction phase and in the long term. This limits the size of the disposal system and reduces the effect of the runoff on the environment. It is proposed that the conveyance, treatment and disposal for the main carriageway run-off will be through the use of grass filter strips (verge edge and swale batter), swales, first flush basins (where required under the NRRP) and infiltration devices. As part of its regular maintenance regime, the NZTA or its approved contractor will need to ensure that the

treatment devices are regularly cleaned, to remove any build-up of organic material, sediment and other debris. In addition, the CEMP will include provisions for management and treatment of stormwater during construction.

It has been assessed in Chapter 19 that any actual or potential effects of discharge of sediments to water during earthworks is likely to be no more than minor, on the basis that activities are temporary, therefore any discharge of sediments associated with the activities are likely to be short term and temporary in nature. In addition, the on-going stormwater discharge will be adequately avoided or mitigated through stormwater treatment prior to discharge and designing soakage which is above the groundwater table. Overall the treatment proposed is beyond that sought in the NRRP and is considered best practice. The effects of the quality of road runoff are considered to be minor.

It is considered that the effects of discharges on water quality associated with the Project construction and operation will be appropriately avoided, remedied or mitigated in a way that is consistent with the objective and the associated policies.

28.8.5. Settlement and the built environment

Objective 1 of Chapter 12 of the RPS seeks to enable urban development and the physical expansion of settlements and the use and provision of network utilities to occur while avoiding, remedying or mitigating adverse effects on the environment. The specific parts of the environment that the Objective focuses on include water quality, air quality, ancestral land and heritage values.

The RPS recognises that the pattern of urban development and settlement in the region has a strong influence on the demand for transport and that this is an essential resource. Policy 1 under this Objective promotes 'settlement and transport patterns and built environments that will minimise the adverse effects of emissions into the atmosphere resulting from the use of motor vehicles and building heating.'

The growing populations of Hornby, Prebbleton, Rolleston, Lincoln and West Melton will benefit from improved inter-connections as a result of this Project. In addition, it has been concluded that discharges of air pollutants caused by vehicles are unlikely to cause more than minor adverse impacts on human health or the environment in the surrounding area. As such, it is considered the Project is consistent with this objective and the associated policy.

28.8.6. Development of Greater Christchurch

In October 2011, the RPS was amended by the Minister for Earthquake Recovery (the Minister) using his powers under the Canterbury Earthquake Recovery Act to include Chapter 12A (Development of Greater Christchurch). This is consistent with the intention of the earlier Proposed Change 1 (PC1) to the RPS but updated as a result of the Canterbury earthquakes. The Minister's decision was successfully challenged by judicial review and the updated Chapter 12A

has been set aside. Accordingly, the earlier version of PC1 is now relevant (at the time of lodging this application). The Canterbury Regional Council's decision on PC1 was released in December 2009 and was subject to a number of appeals. As a result of the judicial review, those appeals are still to be resolved by the Environment Court.

PC1 provides direction for future growth within greater Christchurch by setting out land use distribution, in particular identifying areas available for urban development including specifying residential densities and provision for businesses. Although PC1 promotes intensification of land use within existing urban areas it also identifies appropriate areas for greenfield developments to accommodate projected growth and population relocation. The associated objectives promote the efficient use of network infrastructure to support this development and promote integration of infrastructure with development and settlement patterns.

Of particular relevance to this Project is the Urban Limits boundary along Marshs Road (between Meadowlands Road and the Hornby industrial rail line west of Springs Road) and the inclusion of undeveloped land to the immediate north of the boundary as a greenfield business area.

Policy 9 seeks to ensure that *'Canterbury Regional Council, territorial councils and transport infrastructure providers ensure that the transport networks within Greater Christchurch provide for the safe, sustainable, integrated movement of goods and people both within the sub-region, and to and from locations outside the sub-region'.*

The identified benefits of the Project include:

- improved traffic flows will reduce journey times and enhance travelling efficiency reducing congestion;
- improved access to and from Lyttelton Port, in particular for freight, the City Centre and industrial areas in the south of Christchurch;
- reduced traffic on many local roads will make access easier and safer;
- the growing populations of Rolleston, Lincoln and West Melton will benefit from improved inter-connections;
- reduced vehicles on local roads around Templeton, Hornby and Prebbleton, making these roads safer for local residents, particularly school children and the elderly;
- local roads through Templeton and into Christchurch will be safer for cyclists due to reduced traffic volumes;
- introducing a raised median and safety barrier on MSRFL will improve safety by separating oncoming traffic;
- restricting right-hand turns across MSRFL will also improve safety;
- with additional lanes on Main South Road north of CSM2 connection and less traffic through Templeton, Hornby and Prebbleton, there will be increased opportunities for bus priority;

- less traffic travelling through the Templeton, Hornby and Prebbleton communities is expected to reduce noise, vibration, air pollution and other effects of high volumes of traffic, resulting in a more pleasant environment for residents; and
- retaining connections for pedestrian and cyclists along local roads, and enhancing access to the Little River Rail Trail by providing a connection to CSM1 shared path pedestrian/cycleway.

These benefits are considered to contribute to the safe, sustainable and integrated movement of goods and people so it is considered the Project is consistent with this policy.

28.8.7. Air quality

The life-sustaining capacity of air depends on it being safe to breathe. Objective 1 of Chapter 13 of the RPS seeks to encourage ambient air quality such that it is not unpleasant to live with through the nuisance effects created by low ambient air quality. Emissions from motor vehicle exhaust systems include carbon monoxide, carbon dioxide, oxides of nitrogen, lead compounds, hydrocarbons, sulphur dioxide, suspended particulate and products of incomplete combustion contributing to an increasing source of suspended particulate in ambient air in Christchurch. Policy 2 promotes measures that reduce emissions from the use of carbon based fuels.

The results of dispersion modelling for the Project, outlined in detail in Technical Report 10, have indicated that discharges of air pollutants caused by vehicles are unlikely to cause exceedances of any standards in the NES AQ or the New Zealand Ambient Air Quality Guidelines (NZAAQG) at any nearby receptor. However, the results do indicate that concentrations of PM10 may slightly exceed the 'acceptable' category (33 $\mu g/m^3$) in the Canterbury Regional Ambient Air Quality Targets (RAAQT) at residential receptors at two locations. Notwithstanding the potential exceedance of the 'acceptable' category in the Canterbury RAAQT, given current background and the small additional emissions, the air quality assessment concludes that discharges of air pollutants caused by vehicles are unlikely to cause more than minor adverse impacts on human health or the environment in the surrounding area.

The Project has the potential to affect air quality during construction where sources of dust and other air contaminant discharges are able to cause nuisance beyond the site boundary during adverse weather conditions if adequate controls and mitigation measures are not adopted. Objective 2 seeks to 'avoid, remedy or mitigate the adverse effects on people, flora and fauna, and other natural and physical resources resulting from discharges of contaminants into the air'. Chapter 18 outlines a range of mitigation measures to ensure dust effects are not significant. These will be included in the CEMP. In addition, an air quality monitoring programme will be implemented to assist control and management of dust discharges.

Overall, it is considered that the proposal will be consistent with the relevant objectives and policies that relate to air quality.

28.8.8. Transport

The transport objectives set out in the RPS (Chapter 15) are:

- enable a safe, efficient and cost-effective transport system to meet regional, inter-regional and national needs for transport; and
- avoid, remedy or mitigate the adverse effects of transport use and provision.

The associated policies are outlined in the Statutory Provisions Report (Technical Report 20) and promote the protection of Canterbury's existing transport infrastructure and land transport corridors necessary for future strategic transport requirements by avoiding, remedying, or mitigating the adverse effects of the use, development or protection of land and associated natural and physical resources on the transport infrastructure; while ensuring that in the provision of transport infrastructure, adverse effects on natural resources of regional significance are avoided, remedied or mitigated.

The Project is part of the Christchurch Motorways RoNS Project, one of seven sections of the roading network that are linked to New Zealand's economic prosperity in the Government Policy Statement on Land Transport Funding. The Project will improve access to Christchurch City, the International Airport and the Lyttelton Port of Christchurch (Lyttelton Port). Therefore the Project is important both nationally and regionally as it serves the South Island's largest economic centre.

As discussed in Chapter 11 and Technical Report 2 the Project will reduce congestion, improve safety and support economic growth ensuring Christchurch remains a great place to live and do business. Greater connectivity, increased road safety and a more reliable and resilient transport network would promote and facilitate positive economic growth and prosperity, as concluded within Chapter 25 and Technical Report 14, within the Canterbury region.

The benefits achieved by the Project need to be balanced alongside adverse effects. The relatively localised adverse effects of the proposal are outweighed by the positive effects it would have well beyond the immediate area and nationally. A number of the lesser effects on the environment would either be limited to the construction phase of the Project or mitigated through design, construction and remediation methods outlined. Recommended mitigation measures have been identified throughout this assessment and in the technical reports. Chapter 27 provides a summary of these measures. It is considered that the Project is consistent with the Transport objectives and associated policies.

28.8.9. Natural Hazards

The RPS recognises the importance of ensuring effects of natural hazards are addressed. Policy 3 of Chapter 16 of the RPS recommends taking a 'precautionary approach to the potential for a natural hazard to be created or increased as it relates to the applicant or any other person or property. This may be achieved by giving priority to the principle of avoidance'.

Chapter 21 summarises the effects of geological hazards, including seismicity and liquefaction in the Project area. Technical Report 11 outlines the geotechnical design philosophy of the Project where it was identified that mitigation of risks associated with ground conditions and geological hazards will be largely addressed through detailed and commensurate investigation for the detailed design of the structures and implementation of the appropriate geotechnical parameters which will ensure the risk is 'designed out'.

Chapters 19 and 21 address the effects associated with climatic hazards such as stormwater and flooding. There is little anecdotal evidence of flooding in the vicinity of the proposed alignment. The design standard for the highway drainage system is the 100 year ARI rainfall event including an allowance for climate change. Stopping overland flows from entering the road drainage system is essential to preventing flooding of the road. In addition, bunds running outside of the swales along low points in the existing topography will protect the roadside swales and disposal points. It was assessed that the design of stormwater systems will provide sufficient conveyance to pass flood flows. Furthermore, the disposal to land has the potential to reduce downstream flooding having a positive effect on reducing flooding in the environment.

Due to the Project design and the above mitigation measures it is considered that the effects of natural hazards will be avoided or mitigated in a manner that is consistent with the objective and the associated policies.

28.8.10. Hazardous substances

Chapter 17 of the RPS outlines objectives and policies addressing the prevention or mitigation of adverse effects on the environment from the storage, use, disposal and transportation of hazardous substances. Hazardous substances such as diesel, petrol or oil may be stored temporarily during construction. These substances will be managed in such a way as to seek to prevent their unintended release and associated effects on the environment, such as not locating substances on known faults or within flood areas or near bores. Hazardous substances will be addressed in the CEMP. It is considered that the activity will be consistent with objective and the associated policies for hazardous substances.

28.9. Proposed Canterbury Regional Policy Statement (PRPS)

The PRPS was notified on 18 June 2011. Submissions and further submissions have been received and hearings completed. The Independent Commissioners' decision was released on 20 July 2012. Four appeals have been received. The following objectives and policies as listed in the PRPS, as per the decisions version, are of particular relevance to the Project.

28.9.1. Land use and infrastructure

The likely medium to long term return to continued growth of the region as a whole will result in an on-going need for more houses, jobs, regionally significant infrastructure, transport facilities,

and other services, with cumulative effects on the land and water resources of the region, and on its air quality. The need for flexible, yet formative provisions to manage land use and infrastructure integration is important given the uneven spatial growth patterns within the Region as a whole. In Chapter 5 of the PRPS, the objectives and policies mainly relate to the 'Wider Region', which excludes the Greater Christchurch area. The Project falls entirely within the 'Greater Christchurch' area. The achievement and implementation of the objectives and policies in Chapter 6 – Development of Greater Christchurch, take precedence within Greater Christchurch. As such, the only relevant objective within this chapter that is relevant to Project is Objective 5.2.1.

Objective 5.2.1 seeks to ensure that development is designed and located in a manner which achieves consolidated, well designed and sustainable growth and enables people to provide for their social, economic and cultural wellbeing and health and safety while avoiding adverse effects and maintaining and enhancing the quality of the natural environment of the Canterbury Region. It is considered that the Project is consistent with the urban growth aim and avoids impacts such as community severance, and mitigating against localised amenity effects.

Therefore, it is considered that the Project is consistent with the relevant objective in Chapter 5 of the PRPS.

28.9.2. Development of Greater Christchurch

PC1 will be incorporated into the PRPS as Chapter 6 at the time PC1 becomes operative after the Environment Court appeals are resolved. See section 28.8.6 above for an assessment of the Project against these objectives and policies.

28.9.3. Freshwater

Chapter 7 of the PRPS addresses adverse effects of activities on freshwater, the need for high quality fresh water for drinking and efficient use of water.

Objective 7.2.1 promotes the sustainable management of freshwater to safeguard its life-supporting capacity, to provide drinking water, to enable the exercise of customary uses and to preserve the mauri and natural character values of fresh water. Objective 7.2.3 sets further goals for how water will be sustainably managed in an integrated way to provide for these values, in particular and of relevance to this Project with respect to the effects of land uses on demand for water and on water quality.

Policy 7.3.5 seeks to avoid, remedy or mitigate adverse effects of land uses on the flow of water in surface water bodies or the recharge of groundwater while Policy 7.3.7 seeks to avoid, remedy or mitigate adverse effects of changes in land uses on the quality of fresh water.

As has been discussed above, the majority of the catchment crossed by the Project does not directly contribute to any natural watercourse. Potential effects on water quality will arise as a

result of temporary discharge of sediment during earthworks and realignment of water races and contaminants discharged from stormwater during the operation of the Project. It is considered that any actual or potential effects of discharge of sediments to water during construction will be no more than minor as the works are temporary. In addition the effects of the operational stormwater discharges will be no more than minor as a result of the proposed treatment.

The temporary and permanent diversion of water from water races and the water takes during construction will be managed in a way so that the life supporting capacity of freshwater is sustained.

It is considered that the Project will be consistent with the objectives and associated policies of Chapter 7 of the PRPS.

28.9.4. Ecosystems and indigenous biodiversity

Chapter 9 of the PRPS addresses issues associated with the on-going loss and degradation of ecosystems and indigenous biodiversity. Objective 9.2.1 is to halt the decline in the quality and quantity of Canterbury's ecosystems and indigenous biodiversity and their life-supporting capacity and mauri is safeguarded.

The Project does not fall within any significant natural areas and is located within pastoral farmland in an area of the Canterbury Plains that has been largely cleared of indigenous vegetation cover. The ecological assessment in Technical Report 18 concludes that with very limited areas of naturally occurring indigenous vegetation and presence of habitat for commonly occurring indigenous birds with wide habitat preference, the effect of vegetation removal on indigenous fauna is considered to be no more than minor. In addition, the Project is likely to result in an improvement of the area's ecology as the Project integrates landscaping and ecological enhancement measures through appropriate mixed indigenous and exotic plantings. As such, it is considered that the Project is consistent with Policy 9.3.4 which promotes ecological enhancement where appropriate.

28.9.5. Natural hazards

The hierarchy approach that Chapter 11 of the PRPS sets out for dealing with natural hazards is threefold in the following order of priority: avoidance, mitigation, and response and recovery. The relevant objectives are to avoid new subdivision, use and development of land that increases risks associated with natural hazards (Objective 11.2.1) and recognise and provide for the effects of climate change and its influence on the frequency and severity of natural hazards (Objective 11.2.3).

Policy 11.3.3 seeks to ensure that new subdivision, use and development of land on or close to an active fault trace or in areas susceptible to liquefaction shall be managed in order to avoid or mitigate the adverse effects of fault rupture, liquefaction and lateral spreading. The design

approach for the Project requires mitigation against risks associated with geological hazards, such as earthquakes and liquefaction, which will be largely avoided or mitigated by being designed out.

Policy 11.3.4 provides for new critical infrastructure to be located outside high hazard areas unless there is no reasonable alternative. In addition, it requires critical infrastructure to be designed to maintain, as far as practicable, its integrity and function during natural hazard events. There is little anecdotal evidence of flooding in the vicinity of the proposed alignment. The design standard for the highway drainage system is the 100 year ARI rainfall event including an allowance for climate change. Stopping overland flows from entering the road drainage system is essential to preventing flooding of the road. In addition, bunds running outside of the swales along low points in the existing topography will protect the roadside swales and disposal points. The design disposal to land has the potential to reduce downstream flooding having a positive effect on reducing flooding in the environment. Therefore, the Project is consistent with the objectives and the associated policies of Chapter 11 of the PRPS.

28.9.6. Landscape

Chapter 12 of the PRPS recognises that protection of landscapes is important at a local, district or regional level and Objective 12.2.2 is to identify and manage the landscapes that are not identified as outstanding natural landscapes. Policy 12.3.3 under this objective recognises that landscape management is not limited to outstanding natural features or landscapes. Rather, other matters are also important including preservation of natural character, cultural historic heritage or other purposes.

The landscape and visual assessment (Technical Report 4) summarises the potential landscape and visual changes resulting from the Project as ranging from slight through to substantial. The introduction of new landforms along the new road alignment in the shape of raised interchanges into a predominantly flat landscape will form a significant and immediately recognisable new element into a landscape which is more open and rural in nature. Landscape mitigation measures are proposed where the adverse visual effects would be noticeable from dwellings. It is considered that the Project is not inconsistent with the objective and associated policy in Chapter 12 of the PRPS.

28.9.7. Historic heritage

The historic heritage provisions in Chapter 13 of the PRPS address the protection of significant historic heritage from inappropriate subdivision, use and development (Objective 13.2.1 and Policy 13.3.1) and recognition of cultural and heritage values of landscapes and the protection of these from inappropriate development (Objective 13.2.2 and Policy 13.3.2). There are no known archaeological or built heritage sites within or adjacent to the proposed road corridor. The relationship between tangata whenua (Ngāi Tahu) and South-West Christchurch is culturally and historically significant. Although there are two recorded midden sites within the wider vicinity of the proposed Project, these have been deemed as being unlikely to be affected by the proposal as

they are located outside the road alignment and outside the construction area. As there is a known Māori historical presence around the Project area, there is the potential for unidentified archaeological sites to be exposed during earthworks for the new alignment. Appropriate protocols will be undertaken in the event of the accidental discovery of potential archaeological material. As such, it is considered that the Project is entirely consistent with the objectives and associated policies in Chapter 13 of the PRPS.

28.9.8. Air quality

One of the key air quality issues addressed in Chapter 14 of the PRPS is that of health and nuisance effects of low ambient air quality. Objective 14.2.1 is to '*Maintain or improve ambient air quality so that it is not a danger to people's health and safety, and reduce the nuisance effects of low ambient air quality*'. Objective 14.2.2 addresses localised adverse effects of discharges on air quality.

Policy 14.3.2 is of particular relevance to the Project as it addresses emissions from the use of solid and liquid based fuels which includes emissions from motor vehicles. This Policy seeks to promote measures that reduce the adverse effect on ambient air quality from these activities. It is concluded in the air quality assessment (Technical Report 10) that given current background and the small additional emissions from vehicles using the Project, offset by lower vehicle numbers on SH1, the discharge of air pollutants caused by vehicles are unlikely to cause more than minor adverse effects on human health.

Policy 14.3.3 seeks to avoid, remedy or mitigate localised adverse effects on air quality. This is relevant to the Project during construction when dust discharges have a potential to affect air quality. A range of methods have been proposed to mitigate against dust effects and these will be included in the CEMP.

Overall, it is considered that the proposal will be consistent with the relevant objectives and policies of the PRPS that relate to air quality.

28.9.9. Soils

Objective 15.2.1 of Chapter 15 is the maintenance and improvement of the quality of Canterbury's soil to safeguard their mauri, life-supporting capacity, their health and their productive capacity, while the underlying policy 15.3.1 seeks to avoid, remedy or mitigate their degradation. The Project will take land for CSM2 which will limit opportunity to use the soil for primary productive purposes in the long-term (farming). The foundation for the long term supply of food for domestic and export markets requires the productive capacity of soils to be maintained. The objective and policy recognises that protection of soil quality is not absolute. There will be situations where soil will be degraded as a result of land-uses and where it is not necessarily appropriate to foreclose a development option purely for soil conservation or soil quality reasons. This Project will remove an area of productive soils in the long term, but the Project has identified

significant benefits, including to the local and regional economy. It is considered that the Project is not inconsistent with the objective and associated policy.

28.9.10. Contaminated land

Objective 17.2.1 of Chapter 17 of the PRPS provides for the 'Protection of people and the environment from both on-site and off-site adverse effects of contaminated land'. The relevant policies under this objective seek to:

- avoid, remedy or mitigate adverse effects associated with contaminated land, including discharges from contaminated land, and require site investigations in relation to actually or potentially contaminated land (Policy 17.3.2); and
- where effects will not result in significant risk to human health or the environment that contaminants be allowed to remain in the ground (Policy 17.3.3).

The Contaminated Land Assessment (Technical Report 16) identified several locations within the Project area as HAIL sites, with two of these sites contaminated beyond background guideline values. However, contamination at these sites did not exceed the applicable health standard in the NES for Assessing and Managing Contaminants in Soil to Protect Human Health. Consent is sought under the NES in relation to the management of soil at these sites. In addition, mitigation measures will be implemented on site through the CEMP to manage and dispose of accidentally discovered contaminated soil in a manner consistent with the objective and associated policies of Chapter 17 of the PRPS.

28.9.11. Hazardous substances

Objective 18.2.1 and Policy 18.3.2 of Chapter 18 of the PRPS seek to avoid, remedy or mitigate adverse effects on the environment from the storage, use, disposal and transportation of hazardous substances. In addition, Policy 18.3.1 focuses on the protection of sensitive areas, such as areas of unconfined or semi-confined aquifers where depth to groundwater is such that there could be a risk of contamination.

Hazardous substances will be stored temporarily during construction of the Project. These substances will be managed in such a way as to seek to prevent their unintended release and associated effects on the environment. There are no known faults in the area and they will not be stored within flood areas. Closing of potentially affected wells adjacent to the Project area is proposed to minimise any potential effects from a large oil/chemical spill entering the groundwater system via a disposal point. It is considered that the Project is consistent with the objective and associated policies of Chapter 18 of the PRPS.

28.10. Recovery Strategy for Greater Christchurch 2012

The Recovery Strategy for Greater Christchurch (the Recovery Strategy) came into effect on 1 June 2012. Under the Canterbury Earthquake Recovery Act, the Recovery Strategy is to be read

together with, and forms part of, the RMA documents. The statutory part of the Recovery Strategy (sections 3-8) are therefore part of the RPS, NRRP, PLWRP, the Selwyn District Plan and the Christchurch City Plan and must be given regard in considering the NoR and resource consent applications.

The Recovery Strategy is outlined in Technical Report 20 and provides a vision, goals and a road map for ensuring the success of Greater Christchurch for recovery and future leadership in earthquake resilience.

The most relevant goals in the Recovery Strategy are in the Built Environment Recovery components:

- coordinating and prioritising infrastructure investment that effectively contributes to the economy and community during recovery and into the future;
- supporting innovative urban design, buildings, technology and infrastructure to redefine Greater Christchurch as a safe place built for the future;
- rebuilding infrastructure and buildings in a resilient, cost-effective and energy-efficient manner;
- developing an integrated transport system that meets the changed needs of people and businesses and enables accessible, sustainable, affordable and safe travel choices;
- zoning sufficient land for recovery needs within settlement patterns consistent with an urban form that provides for the future development of Greater Christchurch;
- having a range of affordable housing options connected to community and strategic infrastructure that provides for residents participation in social, cultural and economic activities; and
- drawing on sound information about on-going seismic activity and environmental constraints including other natural hazards and climate change.

The Project will contribute to the economy and community during recovery and into the future. It is a transport system that will serve the heightened needs for greater accessibility to south-west Christchurch and Rolleston including greenfield areas identified for development in PC1. The Project will provide a strategic transport route connecting people to the city, and it has been designed drawing on sound information about seismicity and natural hazards. The Project is also considered to be consistent with the goals for Built Environment Recovery.

28.11. Canterbury Natural Resources Regional Plan (NRRP)

The NRRP consists of 8 chapters which address sustainable management of natural resources in the Canterbury Region. Chapter 1 and Chapter 3 were made partly-operative from 27 October 2009. Chapter 2 was operative from 27 October 2009. The balance of Chapters 1 and 3, and all of Chapters 4 to 8 were made operative on 11 June 2011.

28.11.1. Ngai Tahu and the management of natural resources

Chapter 2 of the NRRP provides for Ngāi Tahu and their relationship with resources by setting out the tools and processes that ECan will use to engage with Ngāi Tahu (as tangata whenua) in the management of natural and physical resources. Of particular relevance to the Project is the recognition that, on a case-by-case basis, ECan can seek a cultural impact assessment or cultural value assessment as part of an assessment of environmental effects under Schedule 4 of the RMA, where an application is likely to impact on a significant resource management issue for Ngāi Tahu. Iwi management plans can be used as a tool to guide consideration of a need for a cultural impact assessment or cultural value assessment as part of an assessment of environmental effects.

The relationship between tangata whenua and south-west Christchurch is culturally and historically significant. There are two recorded midden sites within the wider vicinity of the proposed Project area. These have been deemed as being unlikely to be affected by the proposal as they are located outside the road alignment.

A draft CIA has been produced as part of a consultation method, whereby the NZTA consultant has drafted the report, which MKT is currently peer reviewing on behalf of Te Ngāi Tuahuriri Runanga, as mana whenua. As a result of the initial draft CIA findings, recommendations have been made to seek to avoid, remedy or mitigate adverse effects on tangata whenua values. Chapter 23 provides the assessment sought in Chapter 2.

28.11.2. Air Quality

Chapter 3 of the NRRP provides for discharges to air in the Canterbury Region and sets out objectives and policies to manage these discharges.

Objective AQL1 is to maintain localised air quality and ensure discharges do not on their own or in combination with other discharges cause significant adverse effects. Policy AQL3 aims to promote measures to address motor vehicle exhaust emissions.

A small section of the Project area (between Springs Road and Halswell Junction Road) is within Clean Air Zone 2 and in this Zone Objective AQL3 contains objectives for ambient air quality in Christchurch and Policy AQL20 aims to promote measures to address discharges to air from motor vehicles.

An evaluation of the impact of the Project on air quality is included in Technical Report 10. Based on this assessment the Project is considered to be consistent with the relevant objectives and policies of Chapter 3 of the NRRP for the following reasons:

- existing air quality: overall, the existing ambient air quality close to the Project area reflects the typical characteristics of rural - urban fringe environments;
- sensitive receptors: there are no specific sensitive receptors (i.e. schools, pre-schools, residential healthcare or retirement accommodation) within 200 m of the proposed

motorway, although there are a number of residential dwellings within 100 m of some sections of the alignment;

- effects from construction: the construction of the motorway has the potential to generate dust from earthworks and road construction, odour and vehicle exhaust emissions which has the potential to have an adverse effect on air quality. This effect is mitigated to an acceptable level through dust management measures detailed in the CEMP (Policy AQL6);
- effects from operation: the results of the dispersion modelling indicate that once the motorway is in use, discharges of air pollutants caused by vehicles are unlikely to cause exceedances of any NES AQ or NZAAQG at any nearby receptor (Policies AQL3 and AQL20); and
- cumulative effects: regional scale impacts on the wider airshed will be insignificant, despite a slight increase in vehicle kilometres travelled overall. This is due to improvements in traffic flow through the Project area, combined with the continuing improvements in vehicle emissions generally, as a result of better fuel efficiency and improving emission standards for vehicles (policies AQL3 and AQL20).

28.11.3. Water quality

Chapter 4 of the NRRP provides a framework that enables appropriate use of the region's water resources while ensuring that taking of, or discharges to water (direct or indirect) do not significantly diminish the quality of those resources. The Chapter addresses the effects of activities on surface and groundwater quality such as industrial discharges, stormwater discharges, storage of hazardous substances, point and non-point source discharges to land and irrigation.

Objective WQL1.1 is to manage the quality of water for rivers to achieve water quality outcomes stated in the NRRP. There are no rivers or lakes directly impacted by the Project. Policy WQL4 refers to minor point source discharges that may enter surface water. Technical Report 3 refers to two main scenarios for discharges to surface water from the highway drainage system:

1. overflows from the Maize Maze Pond and the Ramp Pond during events greater than a 100 year ARI (or combinations of extreme groundwater and lesser rainfall events); and
2. drawing down of the pond during extreme groundwater events.

Both scenarios will discharge into Montgomery's Drain and/or Upper Knights Stream. The discharges will be treated prior to discharge as outlined in the bullet points below.

The Project is considered to be consistent with the Objective WQL1.1 and Policy WQL4 of Chapter 4 of the NRRP in respect of surface water quality for the following reasons:

- given that the discharges will be significantly diluted (by post-first flush runoff in the overflow scenario and potentially groundwater in the drawdown scenario) and from

the downstream end of a treatment system, the water quality standards can be met without difficulty;

- with the CEMP and discharge to land (except extreme events into Montgomery's Drain), it is not considered that there will be any adverse effects on water quality or ecosystems during construction. Over time it is anticipated that there will be a positive effect on water quality and hence instream habitat as a result;
- opportunities have also been identified along the alignment to enhance the riparian margins with plantings with the aim to improve water quality within the water race network and downstream receiving environment of some new and existing sections of water race. This will also reduce the risk of erosion of the banks of the races; and
- as part of the CEMP, the position of the refuelling, machinery storage and construction are not in close proximity to surface water bodies. As a precaution, the CEMP also requires contractors to have an agreed accidental spill management process in case an event should happen, to ensure that contractors will be able to minimise the impact of any event.

Objective WQL2.1 aims to maintain water quality outcomes for groundwater within certain parameter limits. In addition, Objective WQL4 is a specific objective to maintain or enhance the quality of Christchurch groundwater as far as practicable. A number of associated policies set out how the objectives will be achieved in respect of specific activities and potential effects on groundwater. Water quality of community drinking water sources is addressed by Objective WQL3. Technical Report 3 outlines a treatment train approach incorporating sheet flow across grass, water quality swales, first flush basins (where required) and controlled percolation rates (where required). The NRRP allows untreated road runoff to be disposed to land for much of the proposed alignment. Almost the entire Project will receive some treatment in the swale system prior to discharge to land (excluding some very limited kerb and channelled sections and the base of the Robinsons Road overpass).

The Project is considered to be consistent with Objective WQL2.1, WQL3, WQL4 and associated policies of Chapter 4 of the NRRP for the following reasons:

- the NRRP rules are prescriptive with regards to water quality effects. As such compliance with the rules infers adequate treatment and effects being less than minor. Soakage design on the Project is generally above the water table as per NRRP conditions ensuring that water quality objectives will easily be met for much of the alignment. Where water quality treatment is required first flush basins will be constructed with organic filter media included in the road drainage system prior to disposal. As such the discharges to land will have minor or negligible impacts on the waterway and effects on instream values and are considered to be minor (Policy WQL8);
- the existing bores and wells form an essential element in supplying water to adjacent properties. This Project has a potential to affect existing bores. To ensure that contamination of groundwater via bores is avoided it is recommended to move any shallow, close proximity wells (i.e. wells within 30 m plan distance) of disposal points and also move any wells beneath the footprint of the Project (Policy WQL8);

- hazardous substances such as diesel, petrol or oil stored in temporary construction management areas will be stored on site outside of the Christchurch Groundwater Protection Zones. It is expected that there will be less than 5000 litres on site at any one time during construction. Storage will not be within 20 m of a bore, not within a flood area or within 100 m of an active fault. Hazardous substance design, containment, management and certification are part of the CEMP. There will be no entry of hazardous contaminants to groundwater as a result of the Project (Policy WQL9);
- clean, safe drinking water is an essential requirement for human health and it is important to maintain the quality of this source. There are no community supply bores within the Project area and the protection zones identified around these bores are also outside the Project area and as such the potential for contamination of community drinking water sources will be avoided (Policy WQL13);
- the discharge of water associated with the operation of the motorway (for example general run off, washing, maintenance) will be carried out in a way that appropriately manages the quality of the discharge. The proposal design incorporates swales, soak pits and treatment ponds along the alignment to capture stormwater discharge and treat this water as it moves to ground. Policies WQL14, WQL15 and WQL19 encourage the treatment of stormwater discharge and the Project is consistent with this approach; and
- contaminant generation modelling has been undertaken for this Project, notwithstanding that general compliance with the NRRP provides evidence of acceptable effects. The distance between the level of disposal and the typical groundwater level provides treatment of any residual contaminants which may not be captured in the treatment system (Policies WQL15 and WQL19).

Overall, it is considered that the Project will be consistent with the Water Quality objectives and policies in Chapter 4 of the NRRP.

28.11.4. Water quantity

Chapter 5 of the NRRP deals with water quantity management topics. Of relevance to the Project are surface and ground water management and the allocation of water.

Objective WQN1 is for surface water management to enable future generations to access the region's surface water. The Project is consistent with this Objective as follows:

- flows in the stockwater race network will pass beneath the Project in siphon arrangements similar to the overland flow siphons (albeit continuously wet and of smaller diameter). Some modifications (temporary and permanent diversions, realignments and some race closures) to the network are proposed to rationalise the number of crossings but the function of the network will remain. There will be no reduction in the capacity of the race network to cope with run off in high rain events. Some of this run off is proposed to be directed to the stormwater swales, pits, ponds, and not into the races, thus retaining the capacity available in the races;

- in order to prevent sedimentation of the siphon a small diameter pipe with higher velocities is preferred. However, the proposed pipe diameters will not have sufficient capacity to pass flood flows. A second parallel pipe has been proposed to maintain the land drainage function of the races and to prevent flooding immediately upstream of the crossing points;
- water will still be available for stock drinking and sustaining the life-supporting capacity of the water, including the aquatic ecosystems. Any impact of the proposed works for the diversions and realignments will be low in the short term and neutral to positive following completion of the proposed mitigation works;
- culvert and pipe design will ensure that fish passage can be maintained through the new diverted sections or alternative routes will be available along other sections of the network. Proposed riparian planting (refer Technical Report 7 and 17) will enhance the available instream habitat over time. It will also maintain and enhance amenity values; and
- stormwater disposal to land has the potential to reduce downstream flooding due to the reduction in the area draining to the motorway drainage system. This will have a positive effect and diminish the flooding of the existing environment.

Groundwater quantity management is covered by this chapter of the NRRP. A design objective of the Project is to ensure the effective disposal of stormwater runoff whilst achieving the 1m clearance between the disposal system and the design groundwater level as specified in the NRRP (Objective WQN3, Policies WQN10 and WQN12).

Some site dewatering may be required, depending on seasonal groundwater levels, in order to construct the foundations for the road and operate the stormwater pond land drainage system. The discharges are likely to be to Montgomery's Drain, an artificial watercourse (Policy WQN12) and Upper Knights Stream. This would only be required in extreme weather events when groundwater levels were high.

At the southern end of the Project the chance of encountering high groundwater is low. Adverse effects on the groundwater disposal system due to changes in groundwater level resulting from the CPWES are avoided by the elevation of the disposal system, with the exception of the Robinsons Road overpass. Specific mitigation measures and groundwater monitoring measures are proposed at this site. Construction of the required below ground infrastructure is proposed permitting the installation of the electrical and mechanical equipment for pumping at a later date (Policy WQN12).

Piping sections of the race network could result in water savings by reducing leakage from the systems in the piped areas (Objective WQN5 Policy WQN16)

Overall, it is considered that the Project will be consistent with the Water Quantity objectives and policies.

28.11.5. Beds of Lakes and Rivers

Chapter 6 of the NRRP covers the land use aspects of works within the beds of lakes and rivers. The objectives and policies in this chapter do not apply to the artificial watercourses (stockwater races) however, they apply to the activities occurring within Upper Knights Stream.

Objective BLR1 allow activities to be undertaken provided that the works protect the flood carrying capacity of the river, protect the stability of lawfully established structures and the banks of rivers, minimizing spread of pest plant species, preserve natural character, protect outstanding natural features and landscapes, protect areas of significant indigenous vegetation and habitat of indigenous fauna, promote maintenance and enhancement of amenity values, provide for the relationship of Ngai Tahu, avoid, remedy or mitigate sediment reduction to the coast, protect significant habitat of trout and salmon and protect historic heritage.

The associated Policy BLR1 outlines controls for activities within the bed of a river. This Project requires the placement of an outlet pipe within the bed of the Upper Knights Stream and the reclamation of former stream bed during the realignment of John Paterson Drive. The controls require that the activities do not restrict the passage or dynamics of water flow, cause localised scouring or erosion to the bed or banks of the river, create undesirable pest plant infestation and include planting of crack willow.

The realignment activity will take place in a location which is marked as stream on the planning maps, but where there is no stream bed evident on site, as the water has been diverted into a nearby stockwater race and the land is flat farmland. As such, the activity will not result in the restriction of water flow or cause scouring. Furthermore, controls will be in place to ensure that there is no spread of weed species during construction works.

The outlet pipe will be to a formed (but dry) streambed and will require works within 7.5 metres of the bed of the stream. The proposed works will be undertaken during dry conditions and erosion and sediment control measures will be implemented in accordance with the ESCP. Scour protection will be installed in a way that does not restrict the passage of water flow. At this location the stream is typically a dry semi-vegetated channel and it will be reinstated to this upon completion of the stream bed works.

The bed reclamation and outlet pipe will have less than minor effects on amenity, flooding, and erosion and water quality, so it is considered to be consistent with the objective and the associated policy.

28.11.6. Wetlands

Chapter 7 of the NRRP covers the wetland issues for Canterbury and objective, policies and rules for their management. This chapter is not relevant as there are no wetlands within or in close proximity to the Project area.

28.11.7. Soil conservation

Chapter 8 of the NRRP focuses on the prevention of soil erosion that is induced or accelerated by the activities of people and/or the animals they have introduced. It also addresses soil quality, particularly with regard to accumulation of contaminants in soil.

As part of the CEMP, soil erosion and land rehabilitation practices are proposed. These include measures to minimise sediment deposition to water bodies, proposed plantings, measures to contain any sediment runoff from the Project area and other measures consistent with the NZTA and ECan sediment and erosion control guidance on these matters. It is also noted that the Project area is outside the priority areas identified for management (Policy SCN5). The Project involves discharges of stormwater containing contaminants to land. Measures are in place to manage soil contamination, including stormwater treatment and first flush basins to remove contaminants prior to disposal to land and soil monitoring will be undertaken at disposal points (Policy SCN9).

28.12. Proposed Land and Water Regional Plan

ECan has notified the Proposed Land and Water Regional Plan that will replace Chapters 4 to 8 of the NRRP along with embedding throughout the Plan the provisions currently found in Chapter 2. The Proposed Land and Water Regional Plan was publicly notified 11 August 2012 and submissions called.

The objectives in this Plan identify the resource management outcomes or goals for land and water resources in Canterbury region, to achieve the purpose of the RMA. The objectives form a comprehensive suite of outcomes to be attained.

The Project is considered to be consistent with these objectives firstly as the Project is assessed as infrastructure of national and regional significance, which will be to be resilient and will positively contribute to economic, cultural and social wellbeing. Furthermore, the design of the stormwater disposal system has taken into consideration the integration of land, groundwater and surface water. The stormwater disposal system has been designed so that stormwater runoff is treated prior to discharge to land via swales, soak pits and where required, first flush basins to ensure the quality of groundwater in the aquifer below is maintained. Stormwater discharge to water has been minimised through the Project design. Upon discharging into surface water the discharge will be significantly diluted as it will have been treated through stormwater detention ponds so that surface water quality and the life supporting capacity of surface water will be maintained. While dewatering will take water from an over-allocated area this is for non-consumptive purposes and will be discharged to a disposal field and returned to the aquifer. Furthermore, it has been assessed that activities within the beds or margins of rivers will have less than minor effects on the health of ecosystems, natural processes of the stream, and values of local iwi.

The PLWRP contains two forms of policies. The PLWRP first lists strategic policies, which apply to all activities. These key policies provide an overall direction for the integrated management of land and water. The strategic policies are followed by more specific policies which apply to activities. These policies are 'outcome-based' policies, identifying the outcomes sought from the management of land and water resources.

The Project is considered to be consistent with these strategic policies for the reasons outlined above. The Project is considered to be consistent with the policies associated with discharges to land and water and protection of sources of human drinking water for the following reasons:

- the discharges resulting from the Project will be the discharge of treated stormwater runoff (to land or water); the discharge of overland flow which has been diverted beneath the Project; and the discharge of site dewatering water. There will be no discharges of untreated sewage, wastewater or bio-solids; solid or hazardous waste or solid animal waste; animal effluent from an effluent storage facility or a stock holding area; organic waste or leachate from storage of organic material; and untreated industrial or trade waste (Policy 4.9);
- stormwater runoff from the Project will be treated as it flows through the grass verge and along the treatment swale, prior to soakage to land (soak pits), in addition where water quality treatment is required first flush basins will be constructed with organic filter media. Therefore, stormwater will be treated prior to discharge (Policy 4.10);
- design of the stormwater drainage systems is for the 100 year ARI event, the discharge of stormwater will not exceed the available water storage capacity of the soil and will not raise groundwater levels as soakage devices have been designed so that stormwater does not result in ponding for more than 48 hours (other than in the stormwater treatment ponds which will be specifically designed for this). In addition it will not cause inundation erosion or damage to property or infrastructure downstream (Policy 4.11 and 4.14);
- sources of human drinking water will be protected as there are no community supply bores or protection zones within the Project area. Furthermore, shallow bores within close proximity (i.e. wells within 30 m plan distance) of disposal points and wells beneath the Project footprint will be relocated (Policy 4.20); and
- where practicable, discharges will be to land (Policy 4.10).

The Project is considered to be consistent with the policies associated with the management of stormwater systems for the following reasons:

- the Project has been designed so that stormwater flows to discharge points and treatment areas which have been designed to capture a 100 year ARI. Furthermore, the design has taken into consideration overland flows. During the design of the Project discussions have been held with CCC and ECan where the stormwater will be to systems associated with the SWAP (Policy 4.13).

The Project is considered to be consistent with the policies associated with earthworks, land excavation and deposition of material into land over aquifers and soil stability for the following reasons:

- all stormwater run-off during construction will be managed through the CEMP and ESCP which will manage the capture and treatment of stormwater run-off prior to discharge (Policy 4.15, Policy 4.16); and
- construction works will be undertaken in a manner which minimises the exposure of soil to erosion through re-vegetation as soon as practicable (Policy 4.17).

The Project is considered to be consistent with the policies associated with hazardous substances for the following reasons:

- as part of the CEMP, the position of the refuelling, machinery storage, and construction are not in close proximity to sensitive receiving bodies (surface water bodies). As a precaution, the CEMP also requires contractors to have an agreed accidental spill management process in case an event should happen, to ensure that contractors will be able to minimise the impact of any event. It is expected that less than 5,000 L will be stored on site and storage will not be located within 20 m of a bore, not within a flood area or within 100 m of an active fault. As a precaution, the CEMP also requires contractors to have an agreed accidental spill management process in case an event should happen, to ensure that contractors will be able to minimise the impact of any event (Policy 4.22).

The Project is considered to be consistent with the policies associated with the damming and diversion of water bodies for the following reason:

- the Project will not involve the diversion of water within the beds of lakes, rivers or wetlands, however it will require the diversion of water within artificial watercourses used for the storage of water (stockwater races). There will be temporary or permanent small scale diversions for the purpose of establishing infrastructure (highway). The diversions will appropriately manage fish passage and floodwaters (Policy 4.45).

The Project is considered to be consistent with the policies associated with abstraction of water, in particular site de-watering for the following reasons:

- the Project may involve the intermittent pumping of groundwater at Robinsons Road, this will be pumped to an adjacent stockwater race. This is a water take for a non-consumptive use and the water will be returned to the same water catchment when groundwater levels are high and it will be protected from contamination (Policy 4.55);
- the use and construction of bores and water infiltration galleries associated with the Project will not result in the contamination of surface water or groundwater (Policy 4.56);

- the direct cumulative interference effect from the new groundwater takes on existing groundwater takes will be minimised by relocation of existing water takes (where necessary) and drawdown within 2 km radius will not be more than 20% (Policy 4.58); and
- it is not expected that significant de-watering will be required during the construction of the Project which has been designed at grade. There may be intermittent pumping at Robinsons Road however, it is not expected that this will cause localised subsidence or lowering of groundwater levels (Policy 4.65).

The Project is considered to be consistent with the policy associated with groundwater quality and quantity in the Christchurch Groundwater Protection Zone in the Christchurch-West Melton Sub-regional area (Policy 9.4.1) for the following reasons:

- a consumptive abstraction of groundwater is not proposed;
- the best practicable option will be used for the treatment and disposal of stormwater where it may enter groundwater, which will include first flush basins above the Christchurch Groundwater Protection zone.;
- hazardous substances will not be stored above the Christchurch Groundwater Protection zone; and
- where practicable, excavation will be undertaken in a way which maintains at least 1 m between the base of excavation and the aquifer, and where this is not possible (it is reduced) measures will be implemented to mitigate the risk of contaminants from land uses entering groundwater (such as lining ponds). In addition, a management plan will be in place as part of the CEMP to manage the effects of accidentally penetrating the confined layer.

The Project is considered to be consistent with the policies associated with the activities in the beds of lakes and rivers for the following reasons:

- The works will not take place in an area of recognised significant indigenous biodiversity or cultural significance and will not preclude any existing lawful access to the bed of the river (Policy 4.84);
- Controls will be in place to ensure that there is no spread of weed species during construction works (Policy 4.85);
- The earthworks and placement of the pipe outlet will not occur in flowing or standing water as the riverbed is notionally dry and the works will be undertaken in dry conditions with erosion and sediment control measures in place (Policy 4.86); and
- The activities will be undertaken in a manner which does not restrict flood flows and scour protection will be installed so that there is no exacerbation of the beds or banks of the stream (Policy 4.87).

28.13. Selwyn District Plan

The list of considerations for Notices of Requirement, as set out in Section 171 of the RMA, include, amongst other things, having particular regard to any relevant provisions of a district plan or proposed plan. All of the Main South Road four-laning and part of the new CSM2 alignment from Main South Road to Marshs Road is located within the Selwyn District. Therefore, the NoRs (NoR1 for the alteration of designation TR1 and NoR2 for the new designation) relate to land managed under the provisions of the Selwyn District Plan (SDP). Plan notations and existing designations were identified in Chapter 6.

28.13.1. Zoning

From Park Lane, Rolleston the SDP zoning of the land subject to the NoRs is Inner Plains (Rural) until the territorial authority boundary at Marshs Road. The properties fronting Park Lane have Living 1 zoning of the properties fronting Park Lane Rolleston, near the southern end of the Project alignment. Other relevant notations and designations were outlined in Chapter 6 of this AEE.

The proposed alignment is also located within the Christchurch International Airport noise contours noted on the Selwyn District Plan maps. Noise contours discourage noise sensitive development from occurring in these areas. The Project is not a noise sensitive development.

28.13.2. Assessment of objectives and policies

The "relevant provisions" of the SDP are matters to which particular regard is to be given when considering the NoR, and the land use consent application being sought under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011.

The SDP provides a framework to promote sustainable management of the Selwyn District's land resources with specific methods developed to address the significant resource management issues the community has identified.

There are a number of objectives and policies contained in the Rural section of the SDP which are relevant to the Project. These are identified in Technical Report 20 and are assessed below. In addition, where operative or proposed plan changes are of relevance to the Project they are also assessed below.

- *Land and soil*: Objectives and policies of the Rural volume of the SDP seek to ensure activities do not create unstable land or locate activities on unstable land (Rural Objective B1.1.2, Policy B1.1.5). They also seek to address adverse effects on people through exposure to contaminated land and encouraging management of these sites so that effects on people's health or the environment are avoided (Rural Objective B1.1.2 and Policies B1.1.1, B1.1.2 and B1.1.3). Furthermore, they seek to avoid, remedy or mitigate adverse effects on soil resources and to encourage residential

development around existing townships (Objective B1.1.1 and Policy B1.1.8). The Project has been designed to mitigate against the risk of seismicity and liquefaction as well as being designed to accommodate the 100 year ARI rainfall event (including an allowance for climate change). In addition, HAIL sites in the vicinity of the Project area have been tested for contamination, with no site exceeding background health standards. Management of any undiscovered contaminated land will occur through the implementation of the CEMP. This Project will remove an area of productive soils in the long term, but has minimised the amount of land required, and there is no practicable non-versatile land alternative available on which to site the Project. Further, the Project has identified significant benefits, including to the local and regional economy;

- *Water:* The rural volume contains relevant objectives and policies seeking to minimise any potential risk of adverse effects on water quality (surface water and ground water) from earthworks, structures and hazardous substances in close proximity to water bodies, or activities on land which may result in surface run-off of contaminants or leaching of contaminants into groundwater (Rural Objective B1.3.6 and Policy B1.3.4). As outlined above in respect of similar objectives and policies in the RPS and NRRP, the design and mitigation measures will seek to ensure any construction or operational effects on water quality (in stockwater races and groundwater) are mitigated;
- *Ecosystems:* The rural volume contains objectives and policies recognising and protecting areas of significant indigenous vegetation, significant habitats of indigenous fauna and indigenous biodiversity by avoiding, remedying or mitigating adverse effects (Rural Objective B1.2.4 and Policy B1.2.6). It has been assessed that effects on indigenous vegetation and habitats on indigenous fauna will be no more than minor with proposed mitigation measures in place;
- *Transport networks:* The rural volume of the SDP contains objectives and policies to manage adverse effects of land transport networks, including constructing and maintaining roads, effects on natural or physical resources and effects on amenity values (Rural Objective B2.1.2 and Policy B2.1.14). Policy B2.1.3 of this volume seeks to manage roads classified as Strategic Roads in Appendix 9. This includes the Main South Road. The adverse effects associated with the Project can be avoided or mitigated. Plan Change 12 to the SDP amends these objectives and policies to provide for a more sustainable land transport system, better urban form and to cater for future transport networks. The plan change aims to allow for a variety of living environments to be created and integrated design of transport and land development. The Project is consistent with PC12 as an integrated approach to transport planning has been undertaken to enable the safe and efficient transport of people and goods while managing adverse effects;
- *Natural hazards:* The relevant objectives and policies seek to ensure activities do not cause or exacerbate the effects of natural hazards with the associated policies requiring the mitigation of risks if activities are located in vulnerable areas (Rural Objective B3.1.1 and Policies B3.2.1, B3.1.5, and B3.1.8). As discussed above, the Project has been designed to minimise risks associated with seismicity, liquefaction and flooding. It has been assessed that due to design and stormwater mitigation

measures, the Project is unlikely to lead to or intensify the effects of these natural hazards;

- *Hazardous substances:* The objectives and policies associated with hazardous substances seek to ensure that adequate measures will be taken to avoid, remedy or mitigate any adverse effects to human health, to amenity of townships, the rural environment and to the natural environment arising from the manufacture, storage, transport and disposal of hazardous substances (Rural Objectives B3.2.1 and B3.2.2). Rural Policy B3.2.1(b) seeks to ensure hazardous substances are used and stored under conditions which reduce the risk of any leaks or spills contaminating land or water. Hazardous substances stored temporarily during the construction works will be managed in such a way as to prevent their unintended release and associated environmental effects and these measures will be addressed in the CEMP;
- *Culture and historic heritage:* Objectives in the rural volume seek to protect sites of wahi tapu, wahi taonga, mahinga kai and other sites importance to tangata whenua (Rural Objective B3.3.1). In addition, they seek to recognise and value protection of sites and buildings with heritage values (Rural Objective B3.3.2 and Policy B3.3.9). It has been assessed that there are no sites of heritage value which will be affected by the proposed works. In addition, no significant values have been raised regarding the cultural heritage values of the Project area; and
- *Quality of the environment:* The objectives and policies allow for a variety of activities in the rural environment while maintaining the character and amenity values of the zone, and seek to manage effects such as noise, glare, dust, vibration and traffic (Rural Objective B3.4.1 and Policies B3.4.9, B3.4.11, B3.4.13 and B3.4.14. The CEMP outlines methods in which nuisance effects such as noise, dust, vibration will be managed during construction of the Project. Once operational it has been assessed that the effects of noise, lighting and traffic will be minimal or can be mitigated. In the rural volume, Objective 3.4.2 is to recognise the rural zone as an area where a variety of activities occur but where environmental standards should be maintained. In this respect the policies seek to avoid, remedy or mitigate significant adverse effects of activities on the amenity values of the rural area and new development is sensitive to surrounding properties (Policy B3.4.1 and B3.4.3). With respect to rural amenity, the landscape and visual assessment concludes that although effects on amenity values may be moderate, the proposed mitigation measures will ensure effects are 'acceptable' within the overall scale of the Project.

Overall, it is considered that the Project will be consistent with the objectives and the policies of the SDP.

28.14. Christchurch City Plan

The part of the Project from Marshs Road through to CSM1 is within Christchurch City. The boundary between CCC and SDC lies along Marshs Road. Therefore, NoR3 relates to land managed under the provisions of the Christchurch City Plan ("CCP"). Plan notations and existing designations were identified in Chapter 6 of this AEE.

28.14.1. Zoning

The zoning in the CCP, from the south-eastern end of the proposed alignment towards the north-east, is Rural 2 (Templeton – Halswell), Business 5 (General Industrial), Rural 2 (Templeton – Halswell) and Business 7 (Wilmers Road – subject to special provisions)to the connection with CSM1.

28.14.2. Assessment of objectives and policies

The "relevant provisions" of the CCP are matters to which particular regard is to be given when considering the NoR, and the land use consent application being sought under the Soil NES.

The CCP provides a framework to promote sustainable management of Christchurch City's land resources, with specific methods developed to address the significant resource management issues the community has identified.

There are a number of objectives and policies contained in the CCP which are relevant to the Project. These are identified in Technical Report 20 and are assessed below. In addition, where operative or proposed plan changes are of relevance to the Project they are also assessed below.

- *Land and soil:* Objective 2.1 is to maintain and enhance land and soils and the ecosystems they contain with policies protecting versatile soils and avoiding degradation of their value including through the management of hazardous substances (Policies 2.1.1 and 2.1.3). The Project will foreclose some future land use options that may have benefited from being located on this land, as it will take land which might otherwise be used for farming purposes. However, the Project will contribute to the purpose of the RMA by managing development in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety. Furthermore, the area to be taken for roading within the rural zone is only a length of approximately 1.5 km from Marshs Road to Halswell Junction Road, with a proportion of this set to be rezoned through PC54. The CEMP will contain measures to avoid, and where required remedy effects from the storage of hazardous substances;
- *Water:* Objective 2.2 is the maintenance and enhancement of the quality and availability of water while the underlying policies (Policy 2.2.1, 2.2.3 and 2.2.4) manage effects of land use activities and stormwater disposal on groundwater quality, flooding, surface water quality and aquatic habitats. The assessment of adverse effects on water quality arising from the Project concluded that the effects would be appropriately avoided, remedied or mitigated so that they will be no more than minor;
- *Air:* Objective 2.3 is the improvement of air quality standards over the city where influenced by location and nature of land use activities, with Policy 2.3.1 managing transport emissions. The air quality assessment concludes that discharges of air pollutants caused by vehicles using the Project are unlikely to cause more than minor adverse impacts on human health or the environment in the surrounding area;

- *Natural features and habitats*: Objective 2.4 is the protection and enhancement of key areas of the City's natural environment with policies 2.4.4 and 2.4.6 seeking to conserve biological diversity and promoting environmental enhancement. The terrestrial and aquatic ecology assessment concludes that with minimal indigenous vegetation or habitat for commonly occurring indigenous fauna it is considered that any associated effects would be no more than minor with mitigation measures and with design landscaping in place would provide an enhancement. In addition, the Project integrates landscaping with ecological enhancement through plantings along the motorway margins;
- *Natural hazards*: Objective 2.5 is to avoid or mitigate the actual or potential adverse effects from natural hazards with policies 2.5.1 and 2.5.2 limiting scale and density of development in areas subject to risk. The design of the Project requires the management of risks associated with seismicity, liquefaction and flooding to ensure that where possible, the risk is designed out. With this design approach in mind and mitigation measures in place to manage flooding, the natural hazard risks, the Project will be consistent with the Objective and the associated policies;
- *Amenity:* This chapter contains Objective 4.2 to manage amenity values to achieve a pleasant and attractive city environment with policies relating to managing adverse effects associated with noise, hazardous substances, airborne contamination and glare (Policies 4.2.9, 4.2.12, 4.2.13 and 4.2.14). The CEMP will ensure that any adverse effects associated with noise, lighting, hazardous substances and dust will be appropriately managed during construction of the Project so that effects are no more than minor. In addition, the lighting assessment concluded that glare for residents would be minimal as road lighting will be carried out to the requirements of Standard AS/NZS 1158. Furthermore, sky glow effects were assessed as negligible. Operational noise levels were assessed and will be appropriately mitigated to ensure effects are no more than minor, and will generally be less than minor. Significant noise effects can be avoided, remedied or mitigated by utilising the best practicable option approach, through the use of low noise road surfacing and acoustic fences, and the achievement of compliance with the relevant criteria of NZS 6806:2010;
- *Heritage protection:* Objective 4.3 requires the conservation of heritage items and values with policies requiring identification of heritage items (Policy 4.3.1) and sites of significance to tangata whenua (policy 4.3.2) and avoiding, remedying or mitigating any adverse effects on their values. The heritage assessment concludes that there are no known archaeological sites or built heritage items in the Project area. As the area has been used in the past by Europeans and Maori accidental discovery protocols will be in place during the works;
- *Tangata Whenua:* Objective 5.1 is to recognise the importance of the relationship of Maori, their culture and traditions with ancestral lands, waters, sites and other taonga. The associated policy 5.1.4 addresses water and places of special significance and avoiding, remedying or mitigating adverse effects upon their values. Iwi consultation has been undertaken during investigation of the Project and a CIA is being undertaken. In addition, as it has been assessed that the area has been occupied by Maori in the past, accidental discovery protocols will be established to address circumstances pertaining to protection of sites discovered during the course of the construction works;

- *Sustainable transport system*: Objective 7.1 is to provide an efficient, safe and sustainable transport system with policies 7.1.2, 7.1.3, 7.1.7 and 7.1.8 seeking to remedy, mitigate or avoid adverse effects of its use and promoting integration of transport and land use planning while taking into consideration amenity values of the area. The Project will enable greater connectivity, increased road safety and a more reliable and resilient transport network improving land use integration in the Project area. Mitigation measures will be implemented to ensure adverse effects are avoided or mitigated including effects on amenity values;
- *Road network*: Objective 7.2 is an efficient and effective road network taking into account roading hierarchy, environmental impacts as well as economic benefits while encouraging public participation in planning for roading improvements (Policies 7.2.1, 7.2.4 and 7.2.6). The Project will form part of the roading hierarchy and its benefits include improving economic growth and productivity. In addition, consultation has taken place with the public regarding the alignment and design of the Project and adverse effects on the environment will be avoided or mitigated;
- *Transport safety*: Objective 7.7 is to maintain and improve transport safety throughout the City with policies focusing on traffic improvements. The Project will improve safety in areas where high crash rates have been recorded as well as improve access for emergency services;
- *Access to City*: Objective 7.8 is recognition of the need for regional, national, and international links with the City and provision for those links including the importance of high quality transport links between road, rail, port and airport facilities (Policy 7.8.5). The Project will provide an important link to the city CBD as well as improve access to the Christchurch International Airport, and Lyttelton Port; and
- *Rural amenity values*: Objective 13.4 is to maintain rural amenity values and control adverse effects with policies addressing activities in rural areas so they do not give rise to adverse effects without mitigation (Policies 13.4.2 and 13.4.3). The visual and landscape assessment concludes that although effects on amenity values may be moderate, the proposed mitigation measures will ensure effects are 'acceptable' within the overall scale of the Project.

Overall, it is considered that the Project will be consistent with the relevant objectives and the associated policies of the CCP.

28.15. Other relevant matters

Other relevant documents in terms of section 104(1)(c) and 171(1)(d) include both statutory documents (for example, those required to be prepared under other legislation such as the Land Transport Management Act 2003 or Conservation Act 1987) and those non-statutory documents that, whilst not having a regulatory function under the RMA, have been through a public process and/or are important policy documents that set national or regional direction on key resource or environmental matters. Those identified as having some relevance to the Project are as follows:

- Land Transport Management Act 2003;
- Canterbury Earthquake Recovery Act 2011;

- Connecting New Zealand;
- Government Policy Statement on Land Transport Funding;
- National Infrastructure Plan 2011;
- National State Highway Strategy 2007;
- Canterbury Regional Land Transport Strategy 2012-2042;
- Canterbury Regional Land Transport Programme;
- Draft Christchurch Transport Plan 2012-2042;
- NZTA Environmental Plan 2008;
- New Zealand Cycling and Walking Strategy – Getting there On Foot By Cycle 2005;
- Proposed NPS on Indigenous Biodiversity;
- Wildlife Act 1953;
- New Zealand Urban Design Protocol 2005;
- Greater Christchurch Urban Development Strategy 2007;
- South-West Christchurch Area Plan 2009;
- Selwyn District Council Water Race Bylaw 2008; and
- The Future of Prebbleton, Prebbleton Structure Plan 2010.

28.15.1. Land Transport Management Act 2003

The LTMA is the main statute for New Zealand's land transport planning and funding system. The purpose of the LTMA is to contribute to the aim of achieving an affordable, integrated, safe, responsive and sustainable land transport system. It also sets out five key transport objectives:

- assisting economic development (improving trip reliability and reducing journey times on critical routes);
- assisting safety and personal security (reducing deaths and serious injuries as a result of road crashes);
- improving access and mobility (increasing mode share of public transport, walking and cycling and other active modes);
- protecting and promoting public health (reducing the number of people exposed to health endangering levels of noise and air pollution); and
- ensuring environmental sustainability (reducing the use of non-renewable resources and carbon emissions).

The Project will be generally consistent with all these objectives for the following reasons:

- it will assist economic growth and productivity by improving access to Christchurch City, Christchurch International Airport and the Lyttelton Port;
- it is anticipated that there will be a reduction in road crashes and a significant improvement in overall traffic safety through reduction in through traffic on some local roads, designing a new route and improving access for emergency services;

- it is predicted to significantly improve journey times around the Region and improve journey time reliability;
- it will not preclude opportunities for improved development of public transport, and provides some new opportunities for recreational walking, cycling and riding; and
- noise effects will be appropriately avoided or mitigated. Properties potentially exposed to higher levels of noise than anticipated under the relevant standard will be protected by noise mitigation measures, including noise barriers.

However, the Project is likely to increase the use of non-renewable resources and carbon emissions.

28.15.2. Canterbury Earthquake Recovery Act 2011 (CER Act)

The purpose of the CER Act is outlined in Technical Report 20. The CER Act requires that the Minister prepare a Recovery Strategy (section 11(1) of the CER Act). While the Project is not specifically a recovery project in response to the Canterbury earthquakes, it is timely in its contribution to recovery, particularly in facilitating strategic transport connections for the changed settlement patterns.

28.15.3. Connecting New Zealand

Connecting New Zealand is the primary long-term government transport strategy. It was issued by the current Government in 2011 as a current summary of the Government's intentions for the entire transport sector.

Connecting New Zealand is a non-statutory document but establishes the context for developing the GPS on land transport funding. Connecting New Zealand sets out the direction for the transport sector for the 10 year period to 2021. It is based around the Government's three key themes of economic growth and productivity, value for money and road safety. It confirms as a key action, the completion of the current RoNS programme.

The Project will upgrade part of the Christchurch Motorways RoNS so is consistent with Connecting New Zealand as it will assist with the completion of the RoNS programme.

28.15.4. Government Policy Statement on Land Transport Funding

The Government Policy Statement on Land Transport Funding (GPS) was outlined in detail in Chapter 2. The NZTA must ensure that the National Land Transport Programme gives effect to the GPS and must take into account the GPS when deciding whether or not to approve activities for funding from the national land transport fund. Regional transport committees preparing a Regional Land Transport Strategy must take into account the GPS and Regional Land Transport Programmes must be consistent with the GPS.

The GPS identifies and recognises the RoNS as New Zealand's most essential routes, and that they require significant development in order to reduce congestion, improve safety and support economic growth. The purpose of listing roads as nationally significant in the GPS is to ensure that they are taken fully into account when the NZTA develops the National Land Transport Programme.

This Project will upgrade part of the Christchurch Motorways RoNS, which is considered an essential route, so it is consistent with the GPS.

28.15.5. National Infrastructure Plan 2011 (NIP)

The NIP was outlined in Chapter 2 and further detailed in Technical Report 20. A transport chapter is contained within the NIP. The chapter assesses the current situation, current work programme and key issues for transport infrastructure. The vision for transport is outlined as "a transport sector that supports economic growth by achieving efficient and safe movement of freight and people".

The relevant goals for transport are as follows:

- maximising the potential synergies between regional planning and central government strategies;
- a flexible and resilient transport system offering greater accessibility that can respond to changing patterns in demand;
- a network of priority roads to improve journey time and reliability, and ease severe congestion, boosting the growth potential of key economic areas and improving transport efficiency, road safety and access to markets; and
- a continued reduction in the number of accidents, deaths and serious injuries that occur on the network.

The Project is consistent with all of these goals, as highlighted by the benefits of the Project, as summarised in Chapter 2.

28.15.6. National State Highway Strategy 2007

The National State Highway Strategy (NSHS) sets out how the NZTA will develop and manage the State Highway as an integral part of a multimodal transport system over the next 30 years. It provides a link between the NZTS, the Land Transport Management Act 2003 (and other legislation) and the NZTA's plans and policies. The goals of the strategy are to:

- ensure State highway corridors make the optimum contribution to an integrated multimodal land transport system;
- provide safe State highway corridors for all users and affected communities;
- ensure State highways enable improved and more reliable access and mobility for people and freight;

- improve the contribution of State highways to economic development; and
- improve the contribution of State highways to the environmental and social wellbeing of New Zealand, including energy efficiency and public health.

The Project is consistent with these goals for the same reasons outlined in section 28.15.1.

28.15.7. Canterbury Regional Land Transport Strategy 2012-2042

The vision of the RLTS is that "Canterbury has an accessible, affordable, integrated, safe, resilient and sustainable transport system."

The vision is supported by objectives to:

- ensure a resilient, environmentally sustainable and integrated transport system;
- increase transport safety for all users;
- protect and promote public health;
- assist economic development; and
- improve levels of accessibility for all.

The Project will be consistent with all these objectives as per the stated benefits of the Project in section 28.8.6.

28.15.8. Canterbury Regional Land Transport Programme

The RLTP includes the design of the Project as one of the approved activities that will not be fully completed prior to 1 July 2012. It also lists the Project as one of the regionally significant activities that are expected to commence in the three years following the term of this RLTP i.e. 2015 to 2018.

28.15.9. Draft Christchurch Transport Plan 2012-2042

The Draft Christchurch Transport Plan (DCTP) was released by the CCC in July 2012 for public consultation. It details the transport actions for Christchurch City over the next 30 years. The DCTP seeks improvements to the strategic road and freight network and confirms that new infrastructure is essential, particularly the upgrading road infrastructure, including some long-awaited improvements to key strategic routes. The DCTP notes that these road improvements are reflected in the NZTA's RoNS programme.

The Project is consistent with the DCTP as it will contribute to improvements to the road and freight network, as outlined in the Project benefits in Chapter 2 (Section 2.2) and as discussed in Chapter 11. Furthermore, the Project is one of the roading improvements outlined in the RoNS programme.

28.15.10. NZTA Environmental Plan 2008

The NZTA Environmental Plan outlines the NZTA's environmental policies and provides guidance on a wide range of environmental considerations including:

- noise (operation and construction);
- air quality;
- water management (runoff, stormwater, use);
- erosion and sediment control;
- social responsibility;
- cultural and heritage;
- ecological;
- spill response and contamination;
- resource efficiency;
- climate change;
- visual quality; and
- vibration.

The Project is consistent with these policies. In particular, they have influenced and shaped the proposed alignment and Project design, and have also informed relevant technical assessments, such as the Assessments of Operational Noise and Construction Noise and Vibration (Technical Reports 8 and 9), the Assessment of Air Quality Effects (Technical Report 10), Aquatic and Terrestrial Ecological Assessments (Technical Reports 17 and 18), the Assessment of Landscape and Visual Effects (Technical Report 4), the Social Impact Assessment (Technical Report 13), the Assessment of Archaeological Effects (Technical Report 12), the Assessment of Stormwater Disposal and Water Quality Environmental Effects (Technical report 3) and the Cultural Impact Assessment (Technical Report 15).

28.15.11. New Zealand Cycling and Walking Strategy – Getting there On Foot By Cycle 2005

The New Zealand Cycling and Walking Strategy sets out a strategy to advance walking and cycling in New Zealand transport. It is a high level strategic document with a vision of "A New Zealand where people from all sectors of the community walk and cycle for transport and enjoyment". This vision is supported by the following goals:

- community environments and transport systems that support walking and cycling;
- more people choosing to walk and cycle, more often; and
- improved safety for pedestrians and cyclists.

The integration of cycling and walking opportunities into the Project was a consideration throughout the initial investigations, the alternative route assessment and also the Project design

process. However, if the Project becomes a motorway, cyclists and pedestrians will not be able to use the road.

Cycling and walking connectivity will be significantly enhanced by the Project. Provisions have been included in the proposal in the connections and bridges. All underpasses will provide access and connectivity for walkers and cyclists on the bridges. This is discussed further in Chapter 4 (Description of the Project).

A complementary shared use pedestrian/cycle route is proposed to follow part of the CSM2 alignment to link the Little River Rail Trail with the CSM1 cycle way at Marshs Road. Cyclists will have a choice of heading into Hornby or along CSM1 cycleway to southern Christchurch.

28.15.12. Proposed National Policy Statement on Indigenous Biodiversity

The proposed NPS on Indigenous Biodiversity is intended to provide clearer direction to local authorities on their responsibilities for managing and enhancing indigenous biodiversity under the RMA. The proposed NPS, which does not apply to public conservation land, contains a list of criteria to identify areas of indigenous vegetation and habitats of indigenous animals that are considered to be rare and/or threatened at a national level. Under the proposed NPS, local authorities would be required to identify significant areas of biodiversity within five years after it takes effect. It would also require a "no net loss" approach to be applied to resource consents.

Although the NPS is not yet gazetted it provides guidance on possible national direction. Regardless, the effects of the Project on indigenous biodiversity have been given regard to in the selection of the proposed Project alignment and design and in developing appropriate measures to avoid, remedy and mitigate adverse ecological effects arising from the Project. Chapter 20 and Technical Reports 17 and 18 conclude that there is no significant naturally occurring indigenous vegetation and no natural waterways within the Project area. With the exotic nature of the surrounding farmland, similarity of nearby habitats and the wide tolerance of and adaptability of affected indigenous freshwater bird, lizard and invertebrate species, the effect of vegetation removal on indigenous fauna arising from the loss of those habitats is considered to be no more than minor. In addition, the design includes measures to provide for fish passage and manage effects on lizards. It is considered the Project is consistent with the intent of the proposed NPS.

28.15.13. Wildlife Act 1953

The Wildlife Act deals with the protection and control of wild animals and birds and the management of game. Permits are necessary to deal with certain wildlife. Most species of wildlife (including mammals, birds, reptiles and amphibians), native or introduced, are absolutely protected under the Act. No-one may kill or have in their possession any such bird or animal, unless they have a permit.

All native lizard species are protected by the Wildlife Act 1953. Lizards cannot be disturbed, injured or killed without a Wildlife Permit from the Department of Conservation. A wildlife permit

will need to be obtained from the Department of Conservation to disturb (capture and relocate) lizards and for any unintentional killing or injury of lizards as a result of the earthworks associated with construction of the Project.

28.15.14. New Zealand Urban Design Protocol 2005

The New Zealand Urban Design Protocol (the Protocol) provides a platform to make New Zealand towns and cities more successful through quality urban design. The Protocol is a voluntary commitment by central and local government, property developers and investors, design professionals, educational institutes and other groups to promote better design and to undertake specific urban design initiatives. The NZTA is a signatory to the Protocol.

Consistent with the intent of the Protocol, an Urban and Landscape Design Framework (ULDF) has been developed for the Project. The ULDF has helped to inform the nature and extent of investigations into the urban and landscape design matters relating to the Project, and also sets out the underlying design principles to guide Project development and implementation.

28.15.15. Greater Christchurch Urban Development Strategy 2007 (UDS)

The UDS was outlined in Chapter 2. Transport is one of the key aspects underpinning the UDS, and it highlights the importance of integrating land use development with the transport system.

The 'Key Approaches' section of the UDS (Section 6.21) includes a number of goals to secure the Transport Vision. These include:

- the principles of sustainability, integration, safety, responsiveness and targeted investment underpin all activities in the transport system;
- protect and secure the future strategic transport corridors for the continued efficient operation of road and rail transport;
- develop and manage key inter and intra-regional corridors to manage the transport network;
- provide transport infrastructure and services to ensure a multi-modal transport system that enable a range of transport mode choices; and
- develop transport modes based on their ability to meet functional objectives – to meet levels of demand and travel patterns in an affordable and sustainable manner.

The city centre, Lyttelton Port and Christchurch International Airport are noted as key economic hubs for the region and it is outlined that there is a need to provide efficient transport access to these destinations. Lyttelton Port and Christchurch International Airport are also cited as key import and export hubs for the area, region and the South Island. There is a need to ensure that efficient transport access to, from and between these two facilities is maintained and enhanced through improved road and rail networks. The Project is essential transport infrastructure to facilitate this development. One means of implementing the UDS is through Proposed Change 1 (PC1) to the RPS. Also important is that CRETS was developed concurrently with the UDS showing

a strong integration between strategic land use planning and transport planning for South west Christchurch and towards Rolleston.

28.15.16. South-West Christchurch Area Plan 2009

The SWAP was outlined in Chapter 2. The SWAP establishes the following vision for the area:

> *"South-West Christchurch is a unique and prosperous environment, where nature and people interact and thrive".*

The SWAP sets out goals and objectives to meet this vision and in so doing, integrates land-use planning with key infrastructure projects, such as the major sewer upgrade, strategic roading projects and community facilities.

Goal 11 seeks to provide a transportation system that gives priority to active and energy-efficient ways of travel and minimises its effects on the environment. Objective 11.1 is to:

- establish direct connections between business centres, neighbourhoods and major public open spaces; and
- provide a legible and connected road hierarchy that supports the movement of people and goods within and across the area.

The Project will be consistent with the direction of this objective and supports the vision of the SWAP as assessed in Chapters 11, 14 and 26 of the AEE.

28.15.17. Selwyn District Council Water Race Bylaw 2008

The activities governed by the Selwyn District Council Water Race Bylaw (the Bylaw) include the taking, use, damming and diversion of water. This Bylaw applies throughout the Selwyn District and includes properties that are rated for stockwater outside of the Selwyn District boundary. This is relevant to the Project as it involves diversion of stockwater races. The Project will be undertaken in accordance with the requirements of the Bylaw.

28.15.18. Prebbleton Structure Plan

The purpose of the Prebbleton Structure Plan is to provide a framework for coordinating development and other changes in Prebbleton in order to achieve a high standard of planning and urban design. It guides the preparation of outline development plans, the processing of resource consents and review of the Selwyn District Plan. The Structure Plan acknowledges the proposed CSM2 in the vicinity of Prebbleton and identifies a potential issue being a reduction in the rural-urban 'gap' which provides the sense of leaving Christchurch City and arriving in Prebbleton.

The CSM2 alignment is located in the 'rural gap' on the Shands Road and Springs Road routes into Prebbleton. The two overbridges will be the most visible elements of CSM2 in the rural vicinity of Prebbleton. The landscape design includes extensive planting along the southern edge of CSM2

and the abutments to the Shands Road overbridge to maintain the parkway concept. This will also maintain the rural amenity. The assessment of effects on urban design has considered the issue identified in the Prebbleton Structure Plan.

28.16. Assessment of Section 105 RMA matters

As some of the resource consent applications relating to the Project are for permits to discharge contaminants onto land where it may enter water, section 105 of the RMA is therefore relevant. The assessment is provided in Table 42.

Table 42: Section 105 assessment

Section 105(1)	Comments
Nature of the discharge and sensitivity of the receiving environment to adverse effects	Construction of the Project involves a high volume of earthworks, with the resultant effect being that stormwater discharge will contain higher levels of sediment than normal during the construction period and will potentially increase the volume of sediment run-off. A detailed description of these receiving environments and the nature of the corresponding discharges proposed are included in Part G and relevant Technical Reports, in Volume 3 of the AEE.
The applicant's reasons for the proposed choice	The design process to date has, as far as practicable, avoided creating adverse effects on sensitive receiving environments.

Section 105(1)	Comments
Any possible alternative methods of discharge, including discharge into any other receiving environment	In circumstances where this has not been achievable the best practicable option is to be employed to remedy, mitigate or offset any actual and potential effects on these areas as no other feasible alternative method of discharge is available. The selection of a best practicable option will be informed by the following principles regarding the control of erosion and sediment: • control of stormwater and isolating runoff from the stockwater network; • separating clean from dirty water; • protecting adjacent landowners from surface flows; • minimise sediment leaving the site; and • disposal to land. The construction of the Project will involve all discharge being appropriately managed to ensure that any effects on surface water or groundwater receiving environments are negligible to minor. These effects and their associated mitigation measures are discussed in detail in the relevant Technical Reports in Volume 3, Part G of this AEE and the preceding sections of this chapter in relation to statutory provisions.

28.17. Conclusion

The Project is consistent or not inconsistent with the relevant statutory planning documents, particularly when the benefits of the proposal are considered alongside the proposed measures to avoid, remedy and mitigate any actual or potential adverse effects, which are set out in Chapter 27 of the AEE. Furthermore, the Project meets the tests outlined in Section 105 of the RMA.

29. RMA PART 2 ASSESSMENT

Overview

Section 104(1)(b) of the RMA sets out the matters that decision-makers are required to have regard to when considering an application for resource consent and any submissions received. Similarly, section 171(1)(a) of the RMA sets out the matters that decision-makers must have particular regard to when considering a NoR and any submissions received.

Any such consideration however is subject to Part 2 of the RMA which sets out the purpose and principles of the RMA. The purpose of the RMA as stated in section 5 is to promote the sustainable management of natural and physical resources.

Part 2 of the RMA provides further direction on the matters of national importance (section 6), other matters (section 7) and the principles of the Treaty of Waitangi (section 8) which need to be considered and responded to.

The promotion of sustainable management often requires balancing competing values placed on resources, and the benefits and adverse effects associated with a project. The overall assessment under Part 2 of the RMA is particularly important for a major public project where there is a need for careful consideration of the balance between the regional or national benefits that accrue from the project and the more localised adverse effects that the project might have on the environment, including effects on local people, communities, natural resources and values.

Overall, when the benefits of the Project are considered alongside measures to avoid, remedy and mitigate adverse effects, it is considered the project promotes the sustainable management of natural and physical resources and is consistent with the purpose and principles of the RMA. The purpose of the RMA will be achieved by confirming the NoRs and granting the resource consents sought, subject to the proposed designation and consent conditions set out in Chapters 30 and 31 of this AEE.

29.1. Section 5 Purpose

Section 5(2) of the Act defines 'sustainable management' as:

"means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while—

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment."

The construction of this section of the Christchurch Southern Motorway (a RoNS project) will enable people and communities to provide for their social, economic and cultural wellbeing and for their health and safety through:

Supporting the economic growth of the Canterbury Region by:

- improving accessibility and connectivity between Christchurch and the wider Canterbury Region, including between the Port of Lyttelton and its hinterland;
- facilitating residential development south of Christchurch and industrial and business development in Templeton and Wigram;
- completing a significant portion of the Southern Corridor project – a Project with recognised economic benefits.

Providing significant community, social and transport benefits including:

- improved resilience in the transport network;
- social and economic benefits through improved travel time reliability and more efficient movement;
- improved reliability for freight movements and resulting economic and social benefits; and
- improved health and safety for road users.

The Project is consistent with the Canterbury RLTS, and has been identified as an important component of the Region's strategic land transport solution and a key factor in delivering sustainable economic growth for the long term needs of the Canterbury Region. It has also been identified as a road of national significance.

The construction, operation and maintenance of the MSRFL and CSM2 Project is necessary for the NZTA to be able to meet its objectives for the Project, as outlined in section 2.4 of this AEE.

In balancing these considerations with the matters in section 5(2) of the RMA, the following conclusions are derived from the assessment in the preceding chapters of the AEE:

- the Project will help meet the future transportation needs of the Region and does not preclude future opportunities for other transport development, such as improvements to public transport and walking and cycling routes; and
- the Project will help safeguard the life supporting capacity of natural resources, specifically:
  - air - by reducing traffic congestion on SH1 and local road network;
  - water - as no natural watercourses will be directly affected and stormwater discharges will be treated and there will be overall long term benefits arising from re-vegetation and planting;

  - soils - by the management of construction works within a confined area (particularly controlling erosion and land disturbance) and landscaping will provide evidence of life supporting capacity; and
  - ecosystems - by avoiding, remedying and mitigating the adverse effects on ecological values, including habitats of aquatic, and terrestrial fauna and flora.
- the Project avoids, remedies and mitigates adverse effects on the environment both during construction and operation, through design and through identification of specific mitigation measures which will be recommended as conditions for the consent applications and designations (refer Chapter 27, 30 and 31).

29.2. Section 6 – Matters of National Importance

The Project recognises and provides for the matters of national significance within section 6 of the RMA as follows:

- the Project avoids any direct impacts on natural watercourses and wetlands; all watercourses within the Project area are stockwater races. Through proposed planting and the sensitive design of swales and piped water races, there will be an overall improvement in the freshwater habitat and ecological function of the water races (section 6(a));
- the Project avoids outstanding natural features and landscapes. There are no outstanding natural features or landscapes in the vicinity of the Project area (section 6(b));
- the Project will not affect any notable areas of indigenous vegetation. Biodiversity within the Project area will be enhanced through establishment of areas of new planting, and there will be no significant adverse effects on habitats of indigenous fauna (section 6(c));
- the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga was taken into account in the development of the Project and through the preparation of a Cultural Impact Assessment (section 6(e));
- the protection of archaeological and historic heritage has been recognised in the route selection process as the route alignment avoids recorded archaeological and heritage sites and there will be no effects on identified sites in the surrounding area (section 6(f)); and
- the Project does not impact on any protected customary activities as there are no known activities taking place within the Project area (section 6(g)).

29.3. Section 7 Other Matters

The Project has also had particular regard to and has appropriately responded to the matters set out in section 7 of the RMA. The following matters are considered relevant:

- the kaitiakitanga of tangata whenua has been recognised in preparation of a cultural impact assessment with local iwi (section 7(a));

- the ethic of stewardship has been recognised through participation of tangata whenua early in the development of the Project (section 7(aa));
- community groups who have a specific interest in and who have exercised stewardship over particular resources of relevance to the Project have been involved in the scheme assessment phase of the Project and considered in the design of the Project (section 7(aa));
- the Project will improve the efficient use of the Canterbury State highway network as a physical resource and improve the use and function of the wider road network (section 7(b));
- the selected alignment and design seeks to mitigate the effect of the Project on local amenity values. Urban areas and residential communities are largely avoided by the alignment with mitigation proposed for affected rural dwellings; An inter-disciplinary approach has been used to identify and mitigate potential adverse effects of the proposed design relating to noise, air quality, lighting, urban design, landscape and visual effect, and ecology (section 7(c));
- the alignment avoids any material adverse effects on intrinsic values of ecosystems (section 7(d));
- it is recognised that the Project represents a permanent change to the existing character of the area and the quality of the environment. In general terms, the development and use of a State highway that connects a large and growing urban area with the wider Region is in keeping with the existing and anticipated urban form of the Greater Christchurch area (section 7(g)); and
- the effects of climate change have been have been taken account of in the stormwater modelling and design has responded to relevant natural hazards (section 7(i)).

29.4. Section 8 Treaty of Waitangi

The NZTA as a Crown agency recognises its role in taking into account the principles of the Treaty of Waitangi through its partnership with local Iwi. This is endorsed through a Memorandum of Understanding (MoU) between the NZTA and Ngai Tahu. The Project reflects the MoU and Treaty of Waitangi principles through the retention by Māori of rangatiratanga over their resources and taonga in the surrounding area. A Cultural Impact Assessment is under preparation for this Project in consultation with Ngai Tahu (through MKT), which considers relevant Treaty principles at a Project-specific level.

29.5. Conclusion

Overall, when the benefits of the Project are considered alongside measures to avoid, remedy and mitigate adverse effects, it is considered the Project promotes the sustainable management of natural and physical resources and is consistent with the purpose and principles of the RMA. The purpose of the RMA will be achieved by confirming the NoRs and granting the resource consents sought, subject to the proposed designation and consent conditions set out in Chapters 30 and 31 of this AEE.

PART J: PROPOSED CONDITIONS

30. PROPOSED DESIGNATION CONDITIONS

30.1. Introduction

The NZTA has proposed a suite of conditions to be attached to the designations to manage the effects of the Project. These are outlined below.

30.2. Guide to reading the conditions

The proposed suite of conditions to manage effects of the Project has been numbered in order to eliminate confusion with resource consent conditions and specifically to avoid multiple 'Condition 1' and so forth. The numbering format is as follows:

Set of proposed conditions	Numbering format
Designation conditions	DC.1, DC.2 and so on.

The table below provides explanation to a number of the acronyms and terms used in the conditions:

Definitions	
AEE	Means the CSM2 and MSRFL ("Project") Assessment of Effects on the Environment (Volume 2) dated November 2012
BPO	Means the Best Practicable Option
CCC	Means the Christchurch City Council
CEMP	Means the Construction Environmental Management Plan
City	Means the Christchurch City
Commencement of Works	Means the time when the works that are authorised by the designations commence
Council	Means the relevant territorial authority (Selwyn District Council or Christchurch City Council)
District	Means the Selwyn District
District Plan	Means the relevant territorial authority district plan (Selwyn District Plan or Christchurch City Plan)

Definitions	
Highly sensitive air pollution land use	Means residential properties, premises used primarily as temporary accommodation (such as hotels, motels and camping grounds), hospitals, schools, early childhood education centres, childcare facilities, rest homes, public open space used for recreation, the conservation estate, marae and other similar cultural facilities
Manager	Means the Regulatory Manager of the relevant territorial authority (Selwyn District Council or Christchurch City Council)
Noise Criteria Categories	Means the groups of preference for time-averaged sound levels established in accordance with NZS 6806:2010 when determining the BPO mitigation option, i.e. Category A – primary noise criterion, Category B – secondary noise criterion and Category C – internal noise criterion
NZS 6806:2010	Means New Zealand Standard NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads
PPFs	Means only the premises and facilities identified in green, orange or red in the Assessment of Operational Noise Effects dated November 2012, submitted with the Notice of Requirement
Project	Means the widening and upgrading of SH1 Main South Road between Robinsons Road and Rolleston to provide a four-lane median separated expressway (Main South Road Four Laning known as MSRFL) and the construction, operation and maintenance of the Christchurch Southern Motorway Stage 2 (CSM2) and includes associated local road works, including new rear access roads
Requiring Authority	Means the New Zealand Transport Agency
Road Controlling Authority	Means the relevant Road Controlling Authority (Selwyn District Council or Christchurch City Council)
RMA	Means the Resource Management Act 1991
SDC	Means the Selwyn District Council
SEMP	Means Specialised Environmental Management Plan
Structural Mitigation	Has the same meaning as in NZS 6806:2010

Definitions	
Territorial authority	Means the relevant territorial authority (Selwyn District Council or Christchurch City Council)
Work	Means any activity or activities undertaken in relation to the construction and operation of the Project

30.3. Proposed designation conditions

Ref	Draft conditions
	General and Administration

Ref	Draft conditions
DC.1	Except as modified by the conditions below, and subject to final design, the Project shall be undertaken in general accordance with the information provided by the Requiring Authority in the Notices of Requirement dated November 2012 and supporting documents being: a) Assessment of Environmental Effects report, dated November 2012; b) Plan sets: i. Layout Plans: 62236-A-C020-C029 & 62236-B-C020-C038 ii. Plan and Longitudinal Sections: 62236-A-C100-C133 & 62236-B-C101-C163 iii. Typical Cross Sections: 62236-A-C171-C173 & 62236-B-C171-C173 iv. Pavement Surfaces: 62236-A-C250-C253 & 62236-B-C250-C255 v. Cycle Path Plans: 62236-B-C315-C316 vi. Drainage Layout Plans: 62236-A-C401-C412 & 62236-B-C401-C426 vii. Drainage Details: 62236-A-C451-C463 & 62236-B-C451-C466 viii. Signage Plans: 62236-A-C501-C508 & 62236-B-C501-C517 ix. Land Requirement Plans: 62236-A-C1101-C1110 & 62236-B-C1101-C1118 x. Structural Plans: 62236-B-S000-S083 xi. Landscape Planting Plans: 62236-A-L011-L018 & 62236-B-L011-L024 xii. Lighting Plans: 16.001630, sheets 1-20 ***Advice Notes:*** *For the avoidance of doubt, none of these conditions prevent or apply to works required for the ongoing operation or maintenance of the Project following construction, such as changes to street furniture or signage over time. Depending upon the nature of such works, Outline Plans or Outline Plan waivers may be required for any such works.* *The documentation provided in support of the Notices of Requirement for the designations contains all the information that would be required to be provided with an Outline Plan under Section 176A of the RMA, therefore no separate Outline Plans for construction will be submitted.* *An Outline Plan may be prepared and submitted for any works not included within Condition DC.1 in accordance with the requirements of Section 176A of the RMA.*

Ref	Draft conditions
DC.2	As soon as practicable following completion of construction of the Project, the Requiring Authority shall: a) Review the width of the area designated for the Project; b) Identify any areas of designated land that are no longer necessary for the ongoing operation, or maintenance of the Project or for ongoing mitigation measures; and c) Give notice to the Council in accordance with Section 182 of the RMA for the removal of those parts of the designation identified in Condition DC.2(b) above.
DC.3	The designation shall lapse if not given effect to within 15 years from the date on which it is included in the District Plan under Section 175 of the RMA.
	Communications and Public Liaison - Construction
DC.4	The Requiring Authority shall appoint a liaison person for the duration of the construction phase of the Project to be the main and readily accessible point of contact at all times for persons affected by the construction work. The Requiring Authority shall take appropriate steps to advise all affected parties of the liaison person's name and contact details. The Project contact person shall be reasonably available by telephone during the construction phase of the Project. If the liaison person will not be available for any reason, an alternative contact person shall be nominated.

Ref	Draft conditions
DC.5	Prior to the commencement of works, the Requiring Authority shall prepare and implement a Communications Plan that sets out procedures detailing how the public and stakeholders will be communicated with throughout the construction period. As a minimum, the Communications Plan shall include: i. details of a public liaison person available at all times during works. Contact details shall be prominently displayed at the site office so that they are clearly visible to the public at all times; ii. methods to consult on and to communicate details of the proposed construction activities to surrounding residential communities, and methods to deal with concerns raised; iii. methods to record feedback raised about construction activities; iv. any stakeholder specific communication plans; v. monitoring and review procedures for the Communication Plan; vi. details of communications activities proposed which may include: • Publication of a newsletter, or similar, and its proposed delivery area. • Newspaper advertising. • Website. • Notification of surrounding properties within 200 metres of construction activities and consultation with individual property owners and occupiers with dwellings within 20 metres of construction activities. The Communications Plan shall include linkages and cross-references to methods set out in other management plans where relevant. The Requiring Authority shall provide the Communications Plan to the Manager at least 15 working days prior to the commencement of works.

Ref	Draft conditions
DC.6	The Requiring Authority shall establish a Community Liaison Group(s) (CLG) at least 30 working days prior to the commencement of works. The purpose of the CLG shall be to provide a regular forum through which information about the Project can be provided to the community, and an opportunity for concerns and issues to be raised with the Requiring Authority. The CLG shall consist of a maximum of eight persons with a preference for representatives from the following groups: i. Selwyn District Council; ii. Christchurch City Council; iii. Educational facilities surrounding the Project area (schools, kindergartens, childcare facilities); iv. Community/ environmental groups; and v. The Project liaison person, appointed in accordance with Condition DC.4. The CLG will be offered the opportunity of meeting at least once every three months or as requested throughout the construction period, so that ongoing information can be disseminated and discussed, at the Requiring Authority's expense.
	Management Plans - General
DC.7	At least three months prior to the commencement of works, the Requiring Authority shall submit information to the Manager to demonstrate that the proposed certifier of the management plans (required by Condition DC.8) is independent, suitably qualified and experienced. If no response is provided by the Council within 10 working days of the Requiring Authority sending the information, the person shall be deemed to be approved by the Council. If the Manager does not approve the person(s) proposed by the Requiring Authority, reasons should be provided to indicate why the person(s) is not considered to be suitable. With the prior agreement of the Manager, the independent certifier may be changed at any stage in the Project.

Ref	Draft conditions
DC.8	a) All works shall be carried out in general accordance with the Construction Environmental Management Plan and relevant Specialised Environmental Management Plans ("SEMPs") required by these designation conditions. The draft management plans lodged with the Notices of Requirement that are listed below in this condition shall be updated and finalised by the Requiring Authority: i. Construction Environmental Management Plan ("CEMP") ii. SEMP 001 Air Quality Management Plan iii. SEMP 003 Construction Noise and Vibration Management Plan iv. SEMP 004 Construction Traffic Management Plan v. SEMP 005 Landscape Management Plan b) The management plans shall be certified by an independent, suitably qualified and experienced person(s) (approved by the Manager as being competent and suitable to provide such certification as per Condition DC.7), at least 40 working days prior to the commencement of construction of the relevant stage or stages of work. Unless advised to the contrary to the Requiring Authority within 20 working days after receipt of the relevant management plan(s), the management plan(s) shall be deemed to be certified. c) This certification shall be provided to the Manager at least 10 working days prior to the commencement of construction of the relevant stage or stages of work. d) Where a management plan(s) is to be submitted in a staged manner as a result of the staging of construction works, information about the proposed staging shall be submitted as part of the CEMP.
DC.9	Works shall not proceed until the relevant management plans and certification described in Condition DC.8 have been received and acknowledged in writing by the Manager. If written acknowledgement is not provided by the Council within 10 working days of the Requiring Authority sending the certification, the certification shall be deemed to be confirmed.
DC.10	The Requiring Authority may make reasonable amendments to the management plans at any time. Any changes to the management plans shall remain consistent with the overall intent of the relevant management plan and shall be certified by the agreed independent certifier, as per the requirements outlined in Condition DC.8. The Requiring Authority shall provide a copy of any such amendment to the management plans and the certification to Council for information, prior to giving effect to the amendment.
DC.11	All operational personnel involved with the construction of the Project shall be made aware of, and have access to, all conditions and management plans applicable to the construction, maintenance and operation of the Project. A copy shall be kept on site at all times.

Ref	Draft conditions
	Construction Environmental Management Plan
DC.12	The Requiring Authority shall finalise the CEMP submitted with the application and this shall be certified in accordance with Condition DC.8. The certification shall confirm that the CEMP: a) is generally consistent with the draft CEMP submitted with the application; and b) addresses the matters set out in Condition DC.13 below.
DC.13	The CEMP shall include, but need not be limited to, the following: a) General: • CEMP purpose; • Project details including anticipated construction activities; • CEMP Objectives and Policies; b) Environmental Management: • Existing environment characteristics; • Environmental issues anticipated during construction; • Environmental management approach and methods and measures to avoid and mitigate adverse environmental effects arising from construction work; • Mitigation/contingency measures; c) CEMP Requirements: • Roles and responsibilities; • Training and education; • Monitoring, maintenance, audit and reporting; • Corrective action and emergency contacts and response; • Feedback management; • CEMP revision and compliance issue resolution processes; d) Activity Specific Requirements: *i) Hazardous Substances* The CEMP shall describe measures to avoid, remedy or mitigate the effects of the use and storage of hazardous substances during construction of the Project and the transportation, disposal and tracking of materials taken away. This shall include: a) the types and volumes of hazardous substances stored during the construction phase; b) the equipment, systems and procedures to be used to minimise the risk of spills or leaks of hazardous substances; c) the spill management and containment equipment to be maintained at all times on site, and its location;

Ref	Draft conditions
	d) procedures for containing, managing, cleaning and disposing of any spill or leak of contaminated material from the site (spill kits); e) procedures to notify and report to Council within 24 hours of a spill or leak involving 10 litres or more occurring, including a maintained schedule of emergency contact names and numbers; and f) procedures to be followed to identify causes of spills or leaks and to prevent their recurrence. *ii) Network Utilities* The CEMP shall outline methods to address the safety, integrity, protection or where necessary the relocation of existing network utilities. This shall include: a) measures to be used to accurately identify the location of existing network utilities; b) measures for the protection, relocation and/or reinstatement of existing network utilities; c) measures to ensure the continued operation and supply of existing infrastructure services which may include, but not be limited to, electricity lines, telecommunications cables, sewer pipes and water supply; d) measures to provide for the safe operation of plant and equipment, and the safety of workers and other persons, in proximity to existing live network utilities; e) measures to provide for access to network utilities at reasonable times; f) measures to manage potential induction hazards to existing network utilities; g) earthworks management (including depth and extent of earthworks) and management of dust, for earthworks in close proximity to existing network utilities (in particular compliance with New Zealand Electrical Code of Practice for Electrical Safe Distances – NZECP 34:2001); h) Vibration management for works in close proximity to existing network utilities; and *i)* Emergency management procedures in the event of any emergency involving existing network utilities. *iii) Construction Lighting* The CEMP shall identify measures to avoid, remedy or mitigate the effects of construction lighting. This shall include: a) in areas adjacent to residences, all security and construction lighting shall be installed so that it can be shielded, or directed to the required work area to minimise light spill, glare and upward waste beyond the site so far as it is reasonably practical and to achieve compliance with relevant District Plan standards; and

Ref	Draft conditions
	b) careful consideration to the location of site offices to ensure there is no obtrusive lighting effects to nearby residences; *iv) Cultural/ Archaeology and Heritage Management* The CEMP shall incorporate the Accidental Discovery Protocol covering NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast) and the Ngai Tahu Koiwi Tangata Policy 1993. ***Advice Note:*** *The use and storage of hazardous substances will be compliant with the relevant provisions of the Hazardous Substances and New Organisms Act 1996.*
	Air Quality Management Plan - Construction
DC.14	The Requiring Authority shall finalise the Air Quality Management Plan (SEMP 001) submitted with the application. The Air Quality Management Plan shall be certified (as a requirement of Condition DC.8) to confirm that the Air Quality Management Plan: a) is generally consistent with the draft Air Quality Management Plan submitted with the application; and **b)** addresses all the matters listed in Condition DC.15 below.

Ref	Draft conditions
DC.15	The Air Quality Management Plan (SEMP 001) shall describe the measures to be adopted that, so far as practicable, reduce the dust or fumes arising as a result of the construction of the Project at any point beyond the designation boundary that borders a highly sensitive air pollution land use. The Air Quality Management Plan shall include, but need not be limited to, the following: i. Description of the works, and sources of dust and fumes; ii. Identification of periods of time when emissions of dust or fumes might arise from construction activities; iii. Identification of highly sensitive air pollution land uses likely to be adversely affected by emissions of dust or fumes from construction activities; iv. Methods for managing dust emitted from construction yards, haul roads, stock-piles and construction site exits used by trucks; v. Methods for maintaining and operating construction equipment and vehicles in order to minimise vehicle emissions from exhaust tailpipes; vi. Methods for monitoring dust and fumes during construction, including visual inspections of dust sources and dust generating activities, visual inspections of management measures, checking weather forecasts and observing weather conditions; vii. Methods for undertaking and reporting on the results of daily inspections of construction activities that might give rise to dust or fumes; and viii. Procedures for maintaining contact with stakeholders, notifying of proposed construction activities and handling feedback about dust or fumes.
	Noise and Vibration – Construction
DC.16	The Requiring Authority shall finalise the Construction Noise and Vibration Management Plan (SEMP 003) submitted with the application. The Construction Noise and Vibration Management Plan shall be certified (as a requirement of Condition DC.8), to confirm that the Construction Noise and Vibration Management Plan: a) is generally consistent with the draft Construction Noise and Vibration Management Plan submitted with the application; and b) addresses all the matters listed in Condition DC.17 below.

Ref	Draft conditions
DC.17	The Construction Noise and Vibration Management Plan (SEMP 003) shall describe the measures adopted to, as far as practicable, meet: a) The noise criteria set out in Condition DC.19. Where it is not practicable to achieve those criteria, alternative strategies should be described to address the effects of noise on neighbours. b) The Category A vibration criteria set out in Condition DC.20. Where it is not practicable to achieve those criteria, a suitably qualified acoustic expert shall be engaged to assess and manage construction vibration during the activities that exceed the Category A criteria. If predicted construction vibration levels exceed Category B criteria, then construction activity should only proceed if approved by the independent, suitably qualified certifier and if there is appropriate monitoring of vibration levels and effects on buildings at risk of exceeding the Category B criteria, by suitably qualified experts. The Construction Noise and Vibration Management Plan shall include, but need not be limited to, the following: i. Description of the works, anticipated equipment/ processes and their scheduled durations; ii. Hours of operation, including times and days when construction activities causing noise and/or vibration would occur; iii. The construction noise and vibration criteria for the Project; iv. Identification of affected dwellings and other sensitive locations where noise and vibration criteria apply; v. Mitigation options, including alternative strategies where full compliance with the relevant noise and/or vibration criteria cannot be achieved; vi. Details of which road traffic noise mitigation options as required by Condition DC.18 will be implemented early enough to also mitigate construction noise; vii. Requirement for management schedules containing site specific information; viii. Methods and frequency for monitoring and reporting on construction noise and vibration; ix. Procedures and methods for maintaining contact with stakeholders, notifying of proposed construction activities and handling noise and vibration complaints; x. Construction equipment operator training procedures and expected construction site behaviours; and xi. Contact numbers for key construction staff, staff responsible for noise and vibration assessment and Council officers.

Ref	Draft conditions
DC.18	The Requiring Authority should, where practicable, implement the Structural Mitigation measures for operational traffic noise, detailed in Condition DC.21, which are identified in the Construction Noise and Vibration Management Plan (SEMP 003) as traffic noise mitigation measures which will also mitigate construction noise, prior to commencing construction works that would be attenuated by these mitigation measures.

<table>
<tr><th>Ref</th><th>Draft conditions</th></tr>
<tr><td>DC.19</td><td>Construction noise shall be measured and assessed in accordance with NZS 6803:1999 ‘Acoustics – Construction Noise’. The construction noise criteria for the purposes of the Construction Noise and Vibration Management Plan (SEMP 003) are:
<table>
<tr><th>Time of week</th><th>Time period</th><th colspan="2">“Long-term” duration construction (dBA)</th></tr>
<tr><td></td><td></td><td>L_{Aeq}</td><td>L_{AFmax}</td></tr>
<tr><td colspan="4">Noise criteria at residential buildings</td></tr>
<tr><td rowspan="4">Weekdays</td><td>0630-0730</td><td>55</td><td>75</td></tr>
<tr><td>0730-1800</td><td>70</td><td>85</td></tr>
<tr><td>1800-2000</td><td>65</td><td>80</td></tr>
<tr><td>2000-0630</td><td>45</td><td>75</td></tr>
<tr><td rowspan="4">Saturdays</td><td>0630-0730</td><td>45</td><td>75</td></tr>
<tr><td>0730-1800</td><td>70</td><td>85</td></tr>
<tr><td>1800-2000</td><td>45</td><td>75</td></tr>
<tr><td>2000-0630</td><td>45</td><td>75</td></tr>
<tr><td rowspan="4">Sundays and public holidays</td><td>0630-0730</td><td>45</td><td>75</td></tr>
<tr><td>0730-1800</td><td>55</td><td>85</td></tr>
<tr><td>1800-2000</td><td>45</td><td>75</td></tr>
<tr><td>2000-0630</td><td>45</td><td>75</td></tr>
<tr><td colspan="4">Noise criteria at commercial/ industrial buildings</td></tr>
<tr><td rowspan="2">Any day</td><td>0730-1800</td><td>70</td><td>-</td></tr>
<tr><td>1800-0730</td><td>75</td><td>-</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Ref</th><th>Draft conditions</th></tr>
<tr><td>DC.20</td><td>Construction vibration shall be measured in accordance with ISO 4866:2012 “Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures”. The construction vibration criteria for the purposes of the Construction Noise and Vibration Management Plan (SEMP 003) are:
<table>
<tr><th>Receiver</th><th>Details</th><th>Category A</th><th>Category B</th></tr>
<tr><td>Occupied dwellings</td><td>Night-time 2000h - 0630h</td><td>0.3 mm/s PPV</td><td>1 mm/s PPV</td></tr>
<tr><td></td><td>Daytime 0630h - 2000h</td><td>1 mm/s PPV</td><td>5 mm/s PPV</td></tr>
<tr><td>Other occupied buildings*</td><td>Daytime 0630h - 2000h</td><td>2 mm/s PPV</td><td>5 mm/s PPV</td></tr>
<tr><td rowspan="2">All other buildings</td><td>Vibration - transient</td><td rowspan="2">5 mm/s PPV</td><td>BS 5228-2:2009, Table B.2</td></tr>
<tr><td>Vibration – continuous</td><td>BS 5228-2:2009, 50% of Table B.2</td></tr>
</table>
* ‘Other occupied buildings’ is intended to include daytime workplaces such as offices, community centres etc., and not industrial buildings. Schools, hospitals, rest homes etc. would fall under the occupied dwellings category.</td></tr>
<tr><td></td><td>Noise and Vibration Management - Operation</td></tr>
</table>

Ref	Draft conditions
DC.21	Design of all Structural Mitigation measures (the "Preferred Mitigation Options") listed in this condition shall be undertaken by a suitably qualified acoustic specialist prior to commencement of construction of the measures, and shall include, as a minimum, the following traffic noise mitigation measures: a) Noise barriers with a mass rating of at least 10kg/m^2 at: i. Two 1.8 m high acoustic fences at 1528 Main South Road; ii. One 1.8 m high acoustic fence at 95 Berketts Road; iii. One 1.8 m high acoustic fence at 1213 Main South Road; iv. One 1.8 m high acoustic fence at 312 Springs Road; and b) Open Graded Porous Asphalt ("OGPA") or equivalent low-noise generating road surface be used in the locations illustrated on Drawings 62236-A-C251 to C254 and 62236-B-C250 to C255.
DC.22	Where the design of the Preferred Mitigation Options identifies that it is not practicable to implement a particular Structural Mitigation measure in the location or of the length or height included in Condition DC.21 either: a) If the design of the Structural Mitigation measure could be changed and would still achieve the same Noise Criteria Category or Category B at all relevant PPFs, and a suitably qualified planner approved by the Council certifies to the Council that the changed Structural Mitigation would be consistent with adopting the Best Practicable Option in accordance with NZS 6806:2010, the Preferred Mitigation Options may include the changed mitigation measure; or b) If changed design of the Structural Mitigation measure would change the Noise Criteria Category at any relevant PPF from Category A or Category B to Category C, but the Council confirms that the changed Structural Mitigation would be consistent with adopting the Best Practicable Option in accordance with NZS 6806:2010, the Preferred Mitigation Options may include the changed mitigation measure.
DC.23	The Preferred Mitigation Options outlined in Condition DC.21 shall be implemented prior to completion of construction of the Project, with the exception of any low-noise generating road surfaces, which shall be implemented within 12 months of completion of construction.
DC.24	The Requiring Authority shall manage and maintain the Preferred Mitigation Options to ensure that, to the extent practicable, those mitigation measures retain their noise reduction performance.
	Traffic Management - Construction

Ref	Draft conditions
DC.25	The Requiring Authority shall finalise the Construction Traffic Management Plan (SEMP 004) submitted with the application. The Construction Traffic Management Plan shall be updated in consultation with the Road Controlling Authority (or its nominees). This consultation shall commence at least 20 working days prior to certification of the Construction Traffic Management Plan (as a requirement of Condition DC.8). The certification shall confirm that the Construction Traffic Management Plan: a) is generally consistent with the draft Construction Traffic Management Plan submitted with the application; and b) addresses all the matters listed in Condition DC.26 below.
DC.26	The Construction Traffic Management Plan (SEMP 004) shall include, but need not be limited to, the following: (a) the staging of the works, including details of any proposals to work on multiple sections of the Project route concurrently; (b) details of traffic management activities proposed within each section of the Project; (c) the potential effects of traffic management activities and how these will be managed to ensure safety for all road users; (d) a process for the development and submission of site specific traffic management plans; (e) monitoring, auditing and reporting requirements; and (f) training requirements for staff.
DC.27	Site specific traffic management plans shall be prepared in consultation with the Road Controlling Authority in accordance the Construction Traffic Management Plan (SEMP 004). Site specific traffic management plans shall be certified by an independent Approving Engineer and provided to the Road Controlling Authority Traffic Management Coordinator for approval at least 5 working days prior to the commencement of work in that area, and shall describe the measures that will be taken to manage the traffic effects associated with the construction of specific parts of the Project prior to commencement of work in the relevant part(s) of the Project.
DC.28	The Construction Traffic Management Plan (SEMP 004) and the site specific traffic management plans shall generally be consistent with the version of the NZ Transport Agency Code of Practice for Temporary Traffic Management ("COPTTM") which applies at the time the CTMP or the relevant Site Specific Traffic Management Plans are prepared. Where it is not practicable to adhere to this Code, the COPTTM's prescribed Engineering Exception Decision ("EED") process will be followed, which will include appropriate management measures agreed with the Road Controlling Authority.
	Landscape and Urban Design

Ref	Draft conditions
DC.29	The Requiring Authority shall finalise the Landscape Management Plan (SEMP 005) submitted with the application. The Landscape Management Plan shall be certified (as a requirement of Condition DC.8), to confirm that the Landscape Management Plan: a) is generally consistent with the draft Landscape Management Plan submitted with the application; and **b)** addresses all the matters listed in Condition DC.30 below.

Ref	Draft conditions
DC.30	The Landscape Management Plan (SEMP 005) shall include, but need not be limited to, the following: a) The Project Landscape Plans; b) Demonstration of how the Landscape Key Design Principles (in Chapter 5.0 of the Urban and Landscape Design Framework) have been taken into account throughout the Project alignment; c) Outline of the landscape treatment proposed as mitigation throughout the Project alignment; d) Landscape implementation details including: i. Training of staff; ii. Meetings with the Project Landscape Architect; iii. The identification of vegetation to be retained or relocated (including the definition of the extent of vegetation clearance boundaries); iv. Sourcing native plants from the Canterbury Ecological District; v. A planting programme (the staging of planting in relation to the construction programme); vi. A planting restoration schedule (to so far as practicable replicate existing planting patterns); vii. Landscape treatment for noise barriers; viii. Landscape integration of pedestrian and cycleway facilities; ix. Stormwater detention basin design; x. Pre-preparing boulderfields (if required); xi. Riparian planting adjacent to stockwater races that takes into account the SDC Planting Guide for Water Race Margins; xii. Planting in accordance with the New Zealand Electricity (Hazard from Trees) Regulations 2003, including the provisions of the Schedule (Growth Limit Zones) to those regulations; e) Maintenance and monitoring including: i. Monitoring and reporting of baseline conditions and monthly throughout construction; ii. Maintenance regime which should apply for the two years following planting being undertaken (including weed control and clearance and pest control and replacement of unhealthy plants).
DC.31	The design principles set out in Chapter 5.0 of the CSM2 and MSRFL Urban and Landscape Design Framework shall be taken into account in the development of the design concepts for the Project's permanent works, including (but not limited to) principles for acoustic fences, boundary walls and structures (including bridges, underpasses and associated retaining walls).
	Cultural, Archaeology and Heritage Management - Construction

Ref	Draft conditions
	Advice Note: *An Archaeological Authority shall be sought from the New Zealand Historic Places Trust where required under the Historic Places Act 1993.*
DC.32	The Requiring Authority shall implement the Accidental Discovery Protocol covering NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast) in the event of accidental discovery of cultural or archaeological artefacts or features during the construction of the Project.
DC.33	The Requiring Authority shall implement the Ngai Tahu Koiwi Tangata Policy 1993 "The Policy of Ngai Tahu Concerning the Human Remains of our Ancestors" in the event that Koiwi are discovered.
	Electricity Transmission Management
DC.34	All works or activities associated with the Project shall be designed and undertaken to comply with the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34:2001) where the alignment passes beneath the Islington - Springston A (ISL-SPN A) and Bromley-Islington A (BRY-ISL A) transmission lines.
	Operational Lighting
DC.35	Lighting shall be designed to comply with AS/NZS1158 "Lighting for Roads and Public Spaces". This shall include limiting the amount of light spill, glare and upward waste light into the neighbouring environment via the selection of appropriate luminaires. These effects shall not exceed the technical parameters indicated within the Standard.
	Ecology
	Advice Note: *A Wildlife Permit shall be sought from the Department of Conservation where required under the Wildlife Act 1953.*
DC.36	The Requiring Authority shall engage a suitably qualified ecologist to carry out the following: (a) At least one season of lizard monitoring prior to commencing works in the riparian vegetation and rank exotic grassland habitats. (b) If lizards are present in numbers and locations that put them at risk during road construction, the Requiring Authority shall develop a Lizard Management Plan which determines the actions required to minimise adverse effects. Actions may include creating sufficient habitat and a lizard relocation programme.
DC.37	All machinery shall be water blasted at a suitable facility prior to entry on site to avoid spread of weed species.
	Feedback and Incidents - Construction

Ref	Draft conditions
DC.38	(a) At all times during construction work, the Requiring Authority shall maintain a permanent register(s) of any public or stakeholder feedback received and any incidents or non-compliance noted by the Requiring Authority's contractor, in relation to the construction of the Project. The register(s) shall include: i. the name and contact details (as far as practicable) of the person providing feedback or contractor observing the incident/ non-compliance; ii. identification of the nature and details of the feedback/ incident; and iii. location, date and time of the feedback/ incident. (b) The Requiring Authority shall promptly investigate any adverse feedback, incident or non-compliance. This shall include, but need not be limited to: i. recording weather conditions at the time of the event (as far as practicable), and including wind direction and approximate wind speed if the adverse feedback or incident relates to dust; ii. recording any other activities in the area, unrelated to the Project that may have contributed to the adverse feedback/ incident/ non-compliance, such as non-Project construction, fires, traffic accidents or unusually dusty conditions generally (if applicable); iii. investigating other circumstances surrounding the incident. (c) In relation to Condition DC.37(b), the Requiring Authority shall: i. record the outcome of the investigation on the register(s); ii. record any remedial actions or measures undertaken to address or respond to the matter on the register(s); iii. respond to the initiator, in closing the feedback loop, if practicable; and iv. where the adverse feedback or incident was in relation to a non-compliance, the Manager shall be notified in writing of the matter within 5 working days of the non-compliance, and inform of the remedial actions undertaken. (d) The register(s) shall be maintained on site and shall be made available to the Manager upon request.

31. PROPOSED RESOURCE CONSENT CONDITIONS

31.1. Introduction

The NZTA has proposed a suite of conditions to be attached to the resource consents to manage effects of the Project. These are outlined below.

31.2. Guide to reading the conditions

The proposed suite of conditions to manage effects of the Project has been numbered in order to eliminate confusion, specifically to avoid multiple 'Condition 1' and so forth. The numbering format is as follows:

The NZTA regional resource consent conditions	
G	General conditions applying to all resource consents.
E	Conditions applying to consents for the excavation and deposition of fill over unconfined or semi-confined aquifers and the Coastal Confined Gravel Aquifer System.
BC	Conditions applying to consents for the construction of boreholes/ infiltration galleries and wells.
GT	Conditions applying to the consent for the taking of groundwater.
D	Conditions applying to the consent for the temporary and permanent diversion and take of water in stockwater races.
DP	Conditions applying to the consents for the discharges to water and land associated with construction and operation of the Project.
DA	Conditions applying to the consent for the discharge of dust to air associated with construction of the Project.
HS	Conditions applying to the consent for the storage and use of hazardous substances during construction
BR	Conditions applying to the consent for activities within the bed of a river associated with the construction of the Project.

The NZTA district resource consent conditions	
CL	Conditions applying to the consents in relation to potentially contaminated land under the National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health.

The table below provides explanation to a number of the acronyms and terms used in the conditions:

Definitions	
AEE	Means the CSM2 and MSRFL ("Project") Assessment of Effects on the Environment (Volume 2) dated November 2012
AEP	Means the Annual Exceedence Probability
BPO	Means the Best Practicable Option
CCC	Means the Christchurch City Council
CEMP	Means the Construction Environmental Management Plan
Consent Holder	Means the New Zealand Transport Agency
CRC	Means the Canterbury Regional Council
Commencement of Works	Means the time when the works that are authorised by the resource consents commence
Manager	Means the Regulatory Manager of Canterbury Regional Council
Project	Means the construction, operation and maintenance of the Christchurch Southern Motorway Stage 2 (CSM2), and the widening and upgrading of SH1 Main South Road between Robinsons Road and Rolleston to provide a four-lane median separated expressway (Main South Road Four Laning known as MSRFL), and includes associated local road works, including new rear access roads
Road Controlling Authority	Means the relevant Road Controlling Authority (Selwyn District Council or Christchurch City Council)
RMA	Means the Resource Management Act 1991
SDC	Means the Selwyn District Council
SEMP	Means Specialised Environmental Management Plan
Work	Means any activity or activities undertaken in relation to the construction and operation of the Project

31.3. Proposed regional resource consent conditions

31.3.1. General conditions

Except as specified otherwise, the general conditions shall apply to the regional resource consents as specified in the table below. In addition, a number of resource consents have specific conditions that will apply as outlined in the sections below the general conditions.

Ref	Draft regional consent conditions	Applicable resource consent
	General and Administration	
G.1	Except as modified by the conditions below, and subject to final design, the Project shall be undertaken in general accordance with the information provided by the Consent Holder in the resource consent applications dated November 2012 and supporting documents being: (a) Assessment of Environmental Effects report, dated November 2012 (b) Plan sets: i. Layout Plans: 62236-A-C020-C029 & 62236-B-C020-C038 ii. Plan and Longitudinal Sections: 62236-A-C100-C133 & 62236-B-C101-C163 iii. Typical Cross Sections: 62236-A-C171-C173 & 62236-B-C171-C173 iv. Pavement Surfaces: 62236-A-C250-C253 & 62236-B-C250-C255 v. Cycle Path Plans: 62236-B-C315-C316 vi. Drainage Layout Plans: 62236-A-C401-C412 & 62236-B-C401-C426 vii. Drainage Details: 62236-A-C451-C463 & 62236-B-C451-C466 viii. Signage Plans: 62236-A-C501-C508 & 62236-B-C501-C517 ix. Land Requirement Plans: 62236-A-C1101-C1110 & 62236-B-C1101-C1118 x. Structural Plans: 62236-B-S000-S083 xi. Landscape Planting Plans: 62236-A-L011-L018 & 62236-B-L011-L024 xii. Lighting Plans: 16.001630, sheets 1-20 Where there is conflict between the documents lodged and the conditions, the conditions shall prevail.	All
G.2	The Canterbury Regional Council shall be notified in writing of the intention to commence construction work at least three months prior to the start of construction activities.	All

Ref	Draft regional consent conditions	Applicable resource consent
G.3	All operational personnel involved with the construction of the Project shall be made aware of, and have access to, all consent documents, conditions and management plans applicable to the construction, maintenance and operation of the Project. A copy shall be kept on site at all times.	All
G.4	Pursuant to section 125(1) of the RMA, this consent shall lapse 15 years from the date of its commencement (pursuant to Section 116(5) of the RMA) unless it has been given effect, surrendered or been cancelled at an earlier date.	All
G.5	Pursuant to section 123(d) of the RMA, this consent shall expire 35 years from the date of its commencement (pursuant to Section 116(5) of the RMA).	All
	Management Plans - General	
G.6	At least three months prior to the commencement of works, the Consent Holder shall submit information to the Manager to demonstrate that the proposed certifier (required by Condition G.7) is independent, suitably qualified and experienced. If no response is provided by the Canterbury Regional Council within 10 working days of the Consent Holder sending the information, the person shall be deemed to be approved by the Canterbury Regional Council. If the Manager does not approve the person(s) proposed by the Consent Holder, reasons should be provided to indicate why the person(s) is not considered to be suitable. With the prior agreement of the Manager, the independent certifier may be changed at any stage in the Project.	All

Ref	Draft regional consent conditions	Applicable resource consent
G.7	(a) All works shall be carried out in general accordance with Construction Environmental Management Plan and relevant Specialised Environmental Management Plans ("SEMPs") required by these conditions. The draft management plans lodged with the Consent Applications that are listed below in this condition shall be updated and finalised by the Consent Holder: i. Construction Environmental Management Plan ("CEMP") ii. SEMP 001 Air Quality Management Plan iii. SEMP 002 Erosion and Sediment Control Plan iv. SEMP 006 Accidental Aquifer Interception Management Plan (b) The management plans shall be certified by an independent, suitably qualified and experienced person(s) (approved by the Manager as being competent and suitable to provide such certification as per Condition G.6), at least 40 working days prior to the commencement of construction of the relevant stage or stages. Unless advised to the contrary to the Consent Holder within 20 working days after receipt of the management plans the management plans shall be deemed to be certified. (c) This certification shall be provided to the Manager at least 10 working days prior to the commencement of construction of the relevant stage or stages. (d) Where a management plan(s) is to be submitted in a staged manner as a result of the staging of construction works, information about the proposed staging shall be submitted as part of the CEMP.	All
G.8	Works shall not proceed until the relevant management plans and certification described in Condition G.7 have been received and acknowledged in writing by the Manager. If written acknowledgement is not provided by the Canterbury Regional Council within 10 working days of the Consent Holder sending the certification, the certification shall be deemed to be confirmed.	All

Ref	Draft regional consent conditions	Applicable resource consent
G.9	The Consent Holder may make reasonable amendments to the management plans at any time. Any changes to the management plans shall remain consistent with the overall intent of the relevant management plan and shall be certified by the agreed independent certifier, as per the requirements outlined in Condition G.6. The Consent Holder shall provide a copy of any such amendment to the management plans and certification to Canterbury Regional Council for information, prior to giving effect to the amendment, or within 15 working days.	All
	Construction Environmental Management Plan	
G.10	The Consent Holder shall finalise the CEMP submitted with the application and this shall be certified in accordance with Condition G.7. The certification shall confirm that the CEMP: (a) is generally consistent with the draft CEMP submitted with the application; and (b) addresses the matters set out in Condition G.11 below.	All
G.11	The CEMP shall include, but need not be limited to, the following: (a) General: i. CEMP purpose; ii. Project details including anticipated construction activities; iii. CEMP Objectives and Policies; (b) Environmental Management: i. Existing environment characteristics; ii. Environmental issues anticipated during construction; iii. Environmental management approach and methods; iv. Mitigation/contingency measures; (c) CEMP Requirements: i. Roles and responsibilities; ii. Training and education; iii. Monitoring, maintenance, audit and reporting; iv. Corrective action and emergency contacts and response; v. Feedback management; vi. CEMP revision and compliance issue resolution processes; (d) Activity Specific Requirements: *i. Hazardous Substances* The CEMP shall describe measures to avoid, remedy or mitigate the effects of the use and storage of hazardous substances	All

Ref	Draft regional consent conditions	Applicable resource consent
	during construction of the Project and the transport, disposal and tracking of materials taken away. This shall include: a) the types and volumes of hazardous substances stored during the construction phase; b) the equipment, systems and procedures to be used to minimise the risk of spills or leaks of hazardous substances; c) the spill management and containment equipment to be maintained at all times on site, and its location; d) procedures for containing, managing, cleaning and disposing of any spill or leak of contaminated material from the site (spill kits); e) procedures to notify and report to the Canterbury Regional Council within 24 hours of a spill or leak involving 10 litres or more occurring, including a maintained schedule of emergency contact names and numbers; and f) procedures to be followed to identify causes of spills or leaks and to avoid their recurrence. *ii. Cultural/ Archaeology and Heritage Management* a) The CEMP shall incorporate the Accidental Discovery Protocol covering NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast) and the Ngai Tahu Koiwi Tangata Policy 1993.	
	Air Quality Management Plan - Construction	
G.12	The Consent Holder shall finalise the Air Quality Management Plan (SEMP 001) submitted with the application. The Air Quality Management Plan shall be certified (as a requirement of Condition G.7) to confirm that the Air Quality Management Plan: (a) is generally consistent with the draft Air Quality Management Plan submitted with the application; and (b) addresses all the matters listed in Condition G.13 below.	E, BC, D, DA & BR

Ref	Draft regional consent conditions	Applicable resource consent
G.13	The Air Quality Management Plan (SEMP 001) shall describe the measures to be adopted that, so far as practicable, reduce the dust or fumes arising as a result of the construction of the Project at any point beyond the designation boundary that borders a highly sensitive air pollution land use. The Air Quality Management Plan shall include, but need not be limited to, the following: i. Description of the works, and sources of dust and fumes; ii. Periods of time when emissions of dust or fumes might arise from construction activities; iii. Identification of highly sensitive air pollution land uses likely to be adversely affected by emissions of dust or fumes from construction activities; iv. Methods for managing dust emitted from construction yards, haul roads, stock-piles and construction site exits used by trucks; v. Methods for maintaining and operating construction equipment and vehicles in order to minimise vehicle emissions from exhaust tailpipes; vi. Methods for monitoring dust and fumes during construction, including visual inspections of dust sources and dust generating activities, visual inspections of management measures, checking weather forecasts and observing weather conditions; vii. Methods for undertaking and reporting on the results of daily inspections of construction activities that might give rise to dust or fumes; and viii. Procedures for maintaining contact with stakeholders, notifying of proposed construction activities and handling feedback about dust or fumes.	E, BC, D, DA & BR
	Erosion and Sediment Control Plan	
G.14	The Consent Holder shall finalise the Erosion and Sediment Control Plan (SEMP 002) submitted with the application. The Erosion and Sediment Control Plan shall be certified (in accordance with Condition G.7), to confirm that the Erosion and Sediment Control Plan: a) is generally consistent with the draft Erosion and Sediment Control Plan submitted with the application; and b) addresses all the matters listed in Condition G.15 below.	All
G.15	The Erosion and Sediment Control Plan (SEMP 002) shall be prepared in accordance with Environment Canterbury's Erosion and Sediment	All

Ref	Draft regional consent conditions	Applicable resource consent
	Control Guideline 2007. The purpose of the Erosion and Sediment Control Plan is to describe the methods and practices to be implemented during construction to minimise the effects of soil erosion and sediment generation and yield on the aquatic receiving environments associated with the Project. The Erosion and Sediment Control Plan shall include, but need not be limited to, the following: a) outline of the principles of the Erosion and Sediment Control Plan whereby the plan shall be consistent with the NZTA's Erosion and Sediment Control Standard for State Highway Infrastructure and the objectives outlined in the NZTA's Environmental Plan; b) a site description, including land type, climate, topography, vegetation, soils, and water bodies; c) locality map(s) detailing as a minimum the location of roads, property boundaries, surface waterways/ water races and crossings, stormwater reticulation surfaces (existing and proposed), the direction of stormwater flows, and the erosion and sediment control devices. Contour information shall be identified at suitable intervals to show the contour of the land within and around the Project alignment; d) a detailed programme of works identifying: i. each stage of construction; ii. an estimate of the maximum area of bare ground (cumulative total) exposed at each stage of construction, including progressive stabilisation and minimising areas of exposed soil considerations; iii. an estimate of the total length of exposed roads, trenches and tracks; iv. the volume of earthworks proposed. e) a description of the sediment control measures proposed. Measures considered may include, but need not be limited to, the following: i. clean water diversions; ii. diversion drains and infiltration ditches for sediment-laden runoff; iii. collection and treatment of sediment laden runoff water, treatment thereof and discharge to ground (sediment retention ponds); iv. use of permanent swales and the ability to rehabilitate the swales to their final purpose during the construction process, including use of decanting earth bunds; v. use of silt fences to protect surface waterways and adjacent	

Ref	Draft regional consent conditions	Applicable resource consent
	land; vi. specific disposal to land soak pits which are not to form part of the final soak pit system; vii. covering exposed areas of earth and stockpiles with appropriate erosion resistant material; viii. diversion of stormwater runoff away from any contaminated land from the Project area; and ix. stabilised site exit(s) and measures to ensure tracking of sediment onto the existing road network is reduced; f) a description of the erosion control measures proposed. Measures considered shall include, but need not be limited to, the following: i. vegetating the stormwater system, including swales, detention basins and infiltration basins and embankments as soon as is practicable, ii. surface roughening on embankment slopes prior to re-vegetating; and iii. mulching, seeding or sealing areas of exposed soil as soon as is practicable; g) prior to each stage of works, detailed drawings and design specifications of erosion and sediment control measures shall be provided to the Manager; h) a schedule of the frequency and methods of inspection, monitoring and maintenance of all erosion and sediment control measures, including any checks proposed to be undertaken after more than 15mm of rain falls in a 24 hour period; and i) emergency procedures that set out measures that will be implemented if there is an accidental untreated sediment discharge to surface water.	
	Accidental Aquifer Interception Management Plan	
G.16	The Consent Holder shall finalise the Accidental Aquifer Interception Management Plan (SEMP 006) submitted with the application. The Accidental Aquifer Interception Management Plan shall be certified (in accordance with Condition G.7), to confirm that the Accidental Aquifer Interception Management Plan: (a) is generally consistent with the draft Accidental Aquifer Interception Management Plan submitted with the application; and (b) addresses all the matters listed in Condition G.17 below.	E & BC

Ref	Draft regional consent conditions	Applicable resource consent
G.17	The Accidental Aquifer Interception Management Plan (SEMP 006) shall include, but need not be limited to, the following: i. Techniques to avoid interception of aquifers during construction works; ii. Monitoring of groundwater levels prior to commencement of construction; iii. Procedures for immediate action should an aquifer accidentally be breached; iv. Measures to ensure sufficient quantities of impervious material encountered during excavation are stockpiled within the Project area so it is ready for immediate deployment if a spring is encountered; v. Measures to remove excess water to the sediment control treatment devices and the removal of all water affected and weak soil material without exacerbating the spring; vi. Replacement of the material in the breached area with compacted impervious material; vii. Measures to ensure that no contamination of the aquifer occurs and that hydraulic pressure is restored; viii. Procedures for the notification of the Canterbury Regional Council; ix. Monitoring of the material to ensure no leakage and that the aquifer is fully sealed; and x. Monitoring of groundwater levels following the breach to confirm that groundwater conditions have stabilised.	E & BC
	Stormwater Operation and Maintenance Plan	

Ref	Draft regional consent conditions	Applicable resource consent
G.18	At least 20 working days prior to the commencement of works relevant to systems identified in (a) to (f) listed below in this condition, the Consent Holder shall submit an Stormwater Operation and Maintenance Plan to the Manager for certification. The certification shall confirm the Stormwater Operation and Maintenance Plan addresses each of the following aspects of the Project: a) Maintenance and operation of the stormwater treatment ponds, inflows, soakage systems (including swales, soak pits and first flush basins) and emergency spillway, including the removal of debris; b) Pumping and disposal system at Robinsons Road overpass; c) Drainage system at Maize Maze and Ramp ponds; d) Operation and maintenance of the inverted siphons which pass flows from upstream of the Project, including prevention of blockage of the siphons; e) Operation and maintenance of the stockwater race siphons, including prevention of blockage of the siphons; and f) Maintenance of the integrity of the CCC ponds (Owaka Basin/ Wilmers Quarry) to the extent they are impacted. The Consent Holder shall progressively implement the Stormwater Operation and Maintenance Plan as construction is completed and on an on-going basis as part of routine maintenance. Upon completion of construction of the Project, the Stormwater Operation and Maintenance Plan shall be updated to reflect any changes made during the construction process.	GT, D, & DP
	Cultural and Archaeological Disturbance	
G.19	The Consent Holder shall implement the Accidental Discovery Protocol covering NZTA New Zealand Regions 11 (Canterbury) and 12 (West Coast) in the event of accidental discovery of cultural or archaeological artefacts or features during the construction of the Project.	E, BC, D & BR
G.20	The Consent Holder shall implement the Ngai Tahu Koiwi Tangata Policy 1993 “The Policy of Ngai Tahu Concerning the Human Remains of our Ancestors” in the event that Koiwi are discovered.	E, BC, D & BR
	Feedback and Incidents	

Ref	Draft regional consent conditions	Applicable resource consent
G.21	(a) At all times during construction work, the Consent Holder shall maintain permanent register(s) of any public or stakeholder feedback received and any incidents or non-compliance noted by the Consent Holder's contractor, in relation to the construction of the Project. The register(s) shall include: i. the name and contact details (as far as practicable) of the person providing feedback or contractor observing the incident/ non-compliance; ii. identification of the nature and details of the feedback/ incident; and iii. location, date and time of the feedback/ incident. (b) The Consent Holder shall promptly investigate any adverse feedback, incident or non-compliance. This shall include, but need not be limited to: i. recording weather conditions at the time of the event (as far as practicable), and including wind direction and approximate wind speed if the adverse feedback or incident relates to dust; ii. recording any other activities in the area, unrelated to the Project that may have contributed to the adverse feedback/ incident/ non-compliance, such as non-Project construction, fires, traffic accidents or unusually dusty conditions generally (if applicable); iii. investigating the circumstances surrounding the incident. (c) In relation to Condition G.21(b), the Consent Holder shall: i. record the outcome of the investigation on the register(s); ii. record any remedial actions or measures undertaken to address or respond to the matter on the register(s); iii. respond to the initiator, in closing the feedback loop, if practicable; and iv. where the adverse feedback or incident was in relation to a non-compliance, the Manager shall be notified in writing of the matter within 5 working days of the non-compliance, and inform of the remedial actions undertaken. (d) The register(s) shall be maintained on site and shall be made available to the Manager upon request.	All

31.3.2. Proposed consent conditions for the excavation of land and deposition of fill over an unconfined or semi-confined aquifer

- **Land use consent** for the excavation of greater than 100 cubic metres of land where the depth of excavation will be deeper than the highest groundwater level which is reasonably expected to occur in isolated places. This may occur during construction of the Robinsons Road underpass and stormwater detention ponds at Halswell Junction Road, but it will be applicable to areas where any excavation intercepts an aquifer, or there is less than one metre between the base of the excavation and the shallowest aquifer.
- **Land use consent** for the deposition of more than 50 m^3 of fill where the land has been excavated to a depth of 5 m or deeper than the highest groundwater level which is reasonably expected to occur (in the isolated places identified above).

Ref	Draft regional consent conditions
E.1	In the event any excavation intercepts an aquifer the Consent Holder shall: a) Notify the Canterbury Regional Council within 24 hours of the interception occurring; and b) Follow the procedures in the certified Accidental Aquifer Interception Management Plan (SEMP 006) submitted in compliance with General Condition G.16.
E.2	Following the completion of the excavation no seepage of groundwater from the aquifer beneath the excavated and backfilled areas shall occur. If seepage does occur, the Consent Holder shall notify the Canterbury Regional Council and undertake reasonable remedial action to ensure that there is no further seepage of groundwater from the aquifer.
E.3	The Consent Holder shall: a) Adopt the best practicable options to prevent the discharge of sediment and contaminants into the excavated land. Measures shall include, but shall not be limited to, the installation of erosion and sediment control measures in accordance with the certified Erosion and Sediment Control Plan (SEMP 002) as required by General Condition G.14. b) Ensure that all disturbed areas shall be stabilised and regrassed or sealed as soon as practicable following completion of the works. c) Remove from site all spoil and other waste material from the works on completion of the works. d) Avoid placing cut or cleared vegetation, debris, or excavated material in a position such that it may enter excavated land.
E.4	All practicable measures shall be undertaken to prevent oil and fuel leaks from vehicles and machinery. Measures shall include, but not be limited to: a) No storage of fuel or refuelling of vehicles and machinery within 50 metres of excavation(s). b) Secure storage of fuel or overnight removal from the site.

Ref	Draft regional consent conditions
E.5	Spill kits capable of absorbing the quantity of oil and petroleum products that may be spilled on site at any one time, shall be kept on-site in an accessible location and: (a) The Consent Holder shall take all practicable measures to avoid spills of fuel or any other hazardous substances within the site, including but not limited to storing fuel and carrying out refuelling at least 50 metres from any waterway and the excavated area. (b) In the event of a spill of fuel or any other hazardous substance, the Consent Holder shall clean up the spill as soon as practicable and take practicable measures to prevent recurrence. (c) The Consent Holder shall inform the Canterbury Regional Council within 24 hours of a spill event and shall provide the following information: i. The date, time, location and estimated volume of the spill; ii. The cause of the spill; iii. The type of hazardous substance(s) spilled; iv. Clean up procedures undertaken; v. Details of the steps taken to control and remediate the effects of the spill on the receiving environment; vi. An assessment of any potential effects of the spill; and vii. Measures to be undertaken to prevent recurrence.
E.6	Open excavations that expose groundwater shall be infilled with cleanfill material within 24 hours following the completion of the construction requiring the open excavation. Cleanfill material is defined as material that when buried will have no adverse effect on people or the environment; and includes virgin natural materials such as clay, soil and rock, and other inert materials such as concrete or brick that are free of: • combustible, putrescible, degradable or leachable components, • hazardous substances, • products or materials derived from hazardous waste treatment, hazardous waste stabilisation or hazardous waste disposal practices, • materials that may present a risk to human health, or • liquid waste.

31.3.3. Proposed consent conditions for the construction of bores

- **Land use consent** for the construction of investigation and monitoring bores across the Project;
- **Land use consent** for the construction of a bore/ infiltration facility (groundwater collection field) associated with the Robinsons Road Underpass area and extraction wells at Maize Maze and Ramp ponds; and

- **Land use consent** for the construction of bores for domestic and stockwater as a result of bore relocation across the Project.

Explanatory Note: The use of the new bores and decommissioning of the existing bores have been assessed as permitted activities.

Ref	Draft regional consent conditions
BC.1	The bore(s) shall be constructed in accordance with the New Zealand Environmental Standard for Drilling of Soil and Rock (NZS 4411:2011).
BC.2	The exterior of each bore shall be sealed with bentonite or concrete grout or similar material to above the screen pack or one metre below ground level, whichever is the lesser, to prevent fluid movement down the sides of the casings into the screened collection layers.
BC.3	When not in use, the top of each bore or the above ground portion of the gallery pipe shall be covered or capped to prevent contaminants entering the bores and underlying groundwater.
BC.4	A concrete pad of at least 0.3 metres radius and 0.1 metres thickness shall be constructed around the bore head at ground or pumphouse floor level to prevent leakage of groundwater, any movement of the casing, and any material or surface water entering the bore or annulus. The concrete pad shall slope away from the bore(s).
BC.5	The bore(s) shall be located at least 50 metres from any bore that a neighbouring property owner is authorised to use via a water permit or as a permitted activity.
BC.6	The information requirements of the CRC BORE COMPLIANCE REPORT and CRC COMPLIANCE PLANS shall be completed and returned to Canterbury Regional Council within 20 working days of the completion of the construction of the bore(s).
BC.7	The information requirements of the CRC BORE INSTALLATION REPORT, including the installer's or drillers GPS eight digit map reference, shall be completed and returned to Canterbury Regional Council within 20 working days of the completion of construction of the bore(s).

31.3.4. Proposed consent conditions for the groundwater takes

- **Water permit** for the groundwater takes from the groundwater collection field from the Robinsons Road underpass area (pumping) and the extraction wells at Maize Maze and Ramp ponds (on an intermittent basis during operation).

Ref	Draft regional consent conditions

Ref	Draft regional consent conditions
GT.1	The location, design, implementation and operation of the groundwater takes shall be in general accordance with the consent application and its associated plans and documents, as outlined in General Condition G.1.
GT.2	Groundwater levels shall be monitored at the Robinsons Road overpass to determine the appropriate timing for temporary closure of the local road or installation of the equipment for groundwater lowering and the predicted frequency, level and duration of groundwater lowering at this location. This shall occur in consultation with the Road Controlling Authority.
GT.3	Groundwater levels shall be monitored at Halswell Junction Road to determine the appropriate timing for installation of the groundwater lowering intervention proposed at this location.
GT.4	An annual Groundwater Monitoring Report shall be submitted to the Manager outlining the recorded groundwater levels at Robinsons Road and Halswell Junction Road over the previous year. This report shall include an updated prediction for the timing of installation of the groundwater lowering intervention at the Robinsons and Halswell Junction Road areas (if required). The report shall recommend any necessary changes to the trigger level set out in condition GT.5 below and include the information required by Condition GT.6 and GT.7 (if applicable). The requirement for an annual Groundwater Monitoring Report may cease with the agreement of the Manager.
GT.5	The interim trigger level for the groundwater lowering intervention at Halswell Junction Road shall be 1.0m below base of Maize Maze pond. The trigger level shall be updated annually in accordance with condition GT.4 above.
GT.6	The groundwater lowering measures at Robinsons Road will be installed in consultation with the Road Controlling Authority, if flooding effects on the local road are adverse and persistent. At this time, a recording device shall be installed to record the rate of groundwater take, the volume of take and the period of groundwater diversion. The annual Groundwater Monitoring Report, prepared in accordance with Condition GT.4, shall include a summary of the recorded groundwater diversion data once operational.
GT.7	(a) Once the groundwater has exceeded the trigger level at Halswell Junction Road (Condition GT.5), then the intervention measures for lowering groundwater below the Maize Maze and Ramp ponds shall be installed. The infrastructure to complete the groundwater drainage regime to Upper Knights Stream shall be completed and commissioned. (b) A data logger shall be installed to record the flow rate, volume of diverted groundwater and period of groundwater diversion. (c) An annual Groundwater Monitoring Report, prepared in accordance with Condition GT.4, shall include a summary of the recorded groundwater diversion data once operational.

Ref	Draft regional consent conditions
GT.8	The pumping and disposal systems shall be operated and maintained in accordance with the certified Stormwater Operation and Maintenance Plan submitted in compliance with General Condition G.18.

31.3.5. Proposed consent conditions for the temporary and permanent diversion of stockwater races

- **Water permit** for the temporary and permanent diversion of stockwater races.

Ref	Draft regional consent conditions
	Advice Note: *Approval to modify stockwater races will be sought where required under the Selwyn District Council Water Race Bylaw 2008.*
D.1	The location, design and construction of the temporary and permanent diversions shall be in general accordance with the consent application and its associated plans and documents, as outlined in General Condition G.1.
D.2	The Consent Holder shall design and construct all temporary and permanent diversions in a manner that will maintain the function of the stockwater race, in particular where this is culverted or piped beneath or adjacent to the Project, which shall include: a) maintaining water velocity in a similar state (no more than 10% change) to its natural state at the time of Commencement of Works; b) controlling the rate of leakage to a similar rate (no more than 10% change) to the existing water race system; c) providing for the land drainage function of the race network for the passage of flood flows; d) providing for fish passage whereby the races shall not include any steep drops or perched sections. This may also include the use of light wells and resting areas for fish along the long, flat, piped sections (approximately every 40 - 60 m where possible) and the use of baffles; e) avoiding unnecessary modification of the water race bed and channel (such as the avoidance of large areas of concrete channelling).
D.3	All works necessary to carry out the temporary diversions shall be completed prior to flows being progressively diverted to the new temporary channel location. Flows shall be returned to the original channel as soon as practicable following the completion of temporary works, to ensure that water quality and race stability are not adversely affected.
D.4	Diversion works shall not permanently decrease the flood carrying capacity of the stockwater races or exacerbate flood potential on surrounding land.

Ref	Draft regional consent conditions
D.5	Diversion works shall be undertaken in a manner which avoids the stranding of fish in pools or channels.
D.6	Instream works will be carried out off line from the active race flow. Once the water race network is shut off, works can be undertaken to complete the cross over in the dry bed.
D.7	Within two months of the completion of the diversions, a certificate signed by a suitably experienced chartered professional engineer (CPEng) confirming that the diversions have been constructed in accordance with the requirements of Condition D.2, shall be submitted to the Manager.
D.8	All areas disturbed by diverting the stockwater races and disturbed areas adjacent to water races shall be stabilised and planted with suitable riparian vegetation as soon as practicable following completion of the diversion works. Stabilisation, in this condition, means providing appropriate measures, vegetative or structural, to protect exposed soil from erosion.

31.3.6. Proposed consent conditions for the discharge of stormwater and water during construction and operation of the Project

- **Discharge permit** for the discharge of stormwater to land during construction and operation of the Project.
- **Discharge permit** for the discharge of overflow water from the stormwater detention basin to an artificial watercourse (Montgomery's Drain / Upper Knights Stream) in an extreme rainfall event or extreme groundwater events during construction of the Project.
- **Discharge permit** for the discharge of water to water (artificial watercourse) from site dewatering activities during construction and operation of the Project.
- **Discharge permit** for the discharge of de-watering water to land at Robinsons Road during operation of the Project.

Ref	Draft regional consent conditions
	Erosion and Sediment Control - Construction
DP.1	All erosion and sediment control measures shall be designed, constructed, implemented and maintained in accordance with the certified Erosion and Sediment Control Plan, submitted in compliance with General Condition G.14.
DP.2	The Consent Holder shall ensure that earthworks are staged, as outlined in the certified Erosion and Sediment Control Plan, and that disturbance is kept to the minimum practicable.

Ref	Draft regional consent conditions
DP.3	All erosion and sediment control measures, and any necessary perimeter controls, shall be installed prior to the commencement of earthworks, for each stage of the Project.
DP.4	The Consent Holder shall carry out monitoring of erosion and sediment control measures in accordance with the certified Erosion and Sediment Control Plan, submitted in compliance with General Condition G.14, and shall satisfy the following: a) The erosion and sediment control measures shall be inspected at least once every week, and after each rainfall event where greater than 15 mm of rain falls within a 24 hour period. b) Any repair and maintenance of the erosion and sediment control measures shall be undertaken in accordance with the certified Erosion and Sediment Control Plan and any amendments to the certified Erosion and Sediment Control Plan. c) Accumulated sediment shall be removed from any sediment retention device when it occupies more than 20 percent of that device. d) Records of each inspection, and all repairs and maintenance shall be kept and provided to the Canterbury Regional Council upon request.
DP.5	If any storm event, up to and including the 2% AEP, occurs during the construction phase and results in sediment laden water discharging from any erosion and sediment control measure into surface water, the Consent Holder shall, within 24 hours of the discharge: a) Visually inspect the discharge from the erosion and sediment control measure and the watercourse upstream and downstream of the discharge point; and b) Take photographs of the discharge point and of the watercourse downstream of the discharge point. The photographs shall be retained and made available to Canterbury Regional Council upon request.
DP.6	All exposed earthworks shall be stabilised once earthworks are completed or if the exposed area is not to be earthworked for a period of 14 days. For those areas that are to be vegetated, an exposed area is considered to be fully stabilised once: c) 80 percent vegetation cover has been established via conventional grassing or hydro-seeding; or d) 100 percent cover established via mulching.
	Operational Stormwater Treatment and Disposal

Ref	Draft regional consent conditions
DP.7	At least 20 working days prior to commencing construction of the relevant stormwater system(s), the Consent Holder shall submit design plans and details of the stormwater management system(s) to be used to treat and dispose of stormwater from the site (in accordance with Conditions DP.9 - DP.13 below) to the Manager. The plans shall be accompanied by a certificate signed by a chartered professional engineer (CPEng) certifying that the stormwater treatment systems comply with, or enable compliance with, Conditions DP.9 - DP.13 and that the design, construction and installation specifications are in accordance with all relevant New Zealand Standards. The certificate shall be accompanied with sufficient technical information to demonstrate the basis for the certification.
DP.8	a) For the section of the Project west of Shands Road, the stormwater runoff from the carriageway shall be discharged either, directly to land via sheet flow over the grassed verge and treatment swales, or to land or water via stormwater treatment and infiltration systems that shall be designed to collect and dispose of stormwater from all storm events up to and including the 1% AEP. b) For the balance of the Project east of Shands Road including ramps and at overpasses and underpasses, the BPO approach shall be used to treat stormwater runoff, including pre-treatment of stormwater via first flush basins prior to discharge into or onto land. (Note this may include kerb and channel which directs the discharge to stormwater treatments systems). These systems shall be designed to collect and dispose of stormwater from all storm events up to and including the 1% AEP.
DP.9	Where practicable, the design of swales shall be in general accordance with the NZTA Stormwater Treatment Standard for State Highway Infrastructure (May 2010). The exceptions may include: i. longitudinal slope may be flatter than the Standard. ii. minimum length may be less than the Standard. iii. rear slopes may be steeper than the Standard on Main South Road. All swales shall: a) Be vegetated uniformly with grass or similar vegetation; and b) Be lined with a layer of sandy loam topsoil at least 120 millimetres thick. c) Be designed to ensure stormwater will not pond for longer than 48 hours after the cessation of any storm event. d) Be designed to have a total infiltration rate not exceeding 12 mm/hr.
DP.10	The following specific requirements for the design and construction of the soak pits shall apply: (a) Soak pits and soakage trenches shall be installed at the ends of swales where the mapped depth to groundwater level is greater than 6 m. (b) A field testing programme shall be developed to confirm soakage rates of the receiving ground, in particular at critical locations including sag points.

Ref	Draft regional consent conditions
DP.11	The following specific requirements for the design and construction of the first flush basins shall apply: i. First flush treatment depth of 25 mm of rainfall (or similar if other than rational method is to be used). ii. First flush treatment shall be installed at the ends of storage or infiltration devices where the mapped depth to groundwater level is less than 6 m. iii. First flush infiltration basins shall be vegetated uniformly with grass or similar vegetation. iv. First flush infiltration basins shall be lined with a layer of infiltration media of at least 350 millimetres in thickness. v. All first flush infiltration basins shall be lined with a layer of infiltration media consisting of well graded sand, with sufficient organic material added to support grass growth. The infiltration material shall meet the following requirements: i. D100 < 10mm ii. 0.065mm < D10 < 0.160mm iii. <3% w/w clay and silt (<0.06mm) iv. With a 5 to 10% organic material (e.g. compost, mulch) added to the top 100 mm.

Ref	Draft regional consent conditions
DP.12	The following specific requirements for the design and construction of stormwater treatment ponds shall apply: i. Maintenance of flows in and out of Mushroom Pond and Owaka Basin during construction and operation of the Project. ii. An ability to receive and store the entire 24 hour 100 year storm runoff from the Project. iii. Provision for stormwater treatment within the ponds through an organic filter medium. iv. A primary outlet from ponds that discharges to ground via an infiltration basin. v. An ability to draw down the level of the pond following a large rain or groundwater event. vi. A process for the controlled release of water from the Maize Maze and Ramp ponds. vii. A liner system that prevents the direct connection of surface water to land in the forebay/first flush basin section and prior to the organic biofiltration media. viii. Separate areas to be divided by pervious bunds to ensure water cannot short circuit the pond. ix. Infiltration basins shall be designed to minimise ponding for longer than 72 hours after the cessation of any storm event and shall be grassed and/or vegetated to take account of the extended detention times. Pond bases shall provide for varied depth zones. x. Provision for increased groundwater levels as a result of the Central Plains Water Enhancement Scheme.
DP.13	The following specific requirement for the design and construction of overland flows shall apply: The extent of afflux as a result of the Project (i.e. increase in flood level) upstream of the Project post construction shall not exceed 250 mm upstream of the Project for a 1% AEP event, including the effects of climate change to 2080, and where no existing habitable floor levels are affected. Where existing habitable floor levels are potentially affected the increase in afflux shall be 0 mm.
DP.14	An assessment process shall be undertaken to identify where an existing well has the potential to be adversely affected by the stormwater discharges (i.e. those wells within 30 m plan distance of the Project disposal points). Prior to any discharges occurring in the vicinity of a well which is identified as being potentially adversely affected, the Consent Holder shall either adjust the discharge location to avoid potential contamination, or, arrange for the well to be decommissioned and (if required) a new well shall be located, drilled, tested and developed in accordance with the Bore Construction Conditions BC.1 to BC.7.

Ref	Draft regional consent conditions
DP.15	Stormwater that exceeds the design capacity of the stormwater systems shall discharge into an artificial watercourse via an emergency spillway designed to carry flood events.
DP.16	Within two months of completion of construction of the stormwater systems, a certificate signed by a suitably experienced chartered professional engineer (CPEng) certifying that the stormwater systems have been constructed in full accordance with the design, location and installation specifications submitted in Conditions DP.9-DP.13 of this consent, shall be submitted to the Manager.
	Inspections, Maintenance and Monitoring
DP.17	The Consent Holder shall maintain and operate the stormwater treatment devices in accordance with the certified Stormwater Operation and Maintenance Plan submitted in compliance with General Condition G.18.
DP.18	The Consent Holder shall inspect the stormwater treatment systems, including swales, infiltration basins, and soakage pits: a) At least once every six months; and b) After each rainfall event resulting in more than 25 millimetres of rainfall within the previous 24 hours.
DP.19	Following the inspection carried out in Condition DP.18, the Consent Holder shall maintain the stormwater treatment systems, including swales, infiltration basins, and soakage pits as follows: a) Any visible hydrocarbons, litter or debris in the stormwater system shall be removed within five working days of the inspection. b) Any accumulated sediment in the stormwater system shall be removed within three months of the inspection, unless it is or is likely to decrease the performance of the stormwater treatment and or disposal system in which case it shall be removed within five working days of the inspection. c) Any damage that has the potential to lead to a decrease in the stormwater treatment, or increase in erosion or scour shall be repaired within five working days of the inspection. d) Any minor damage or moderate damage that is unlikely to cause a decrease in performance of the stormwater system shall be scheduled for routine maintenance within the following three months of the inspection.
DP.20	The Consent Holder shall ensure that the swales and infiltration basins are: a) Maintained so that grass/ vegetation is in a healthy and uniform state; b) Replanted where erosion or die-off has resulted in bare or patchy soil cover; and c) Mowed so grass/ vegetation is maintained to a height between 50 mm and 200 mm.

Ref	Draft regional consent conditions
DP.21	The Consent Holder shall keep records of all inspections, maintenance and monitoring. These records shall include, but not be limited to: (a) Date and details of inspections of the stormwater system; (b) Date and details of any monitoring undertaken in relation to this consent; and (c) Date and details of any maintenance work, repairs and upgrades to the stormwater system, including removal of material and its disposal. These records shall be made available to the Canterbury Regional Council on request.
	Stormwater Treatment Performance Monitoring
DP.22	Following 25 mm of rain in the preceding 24 hours and at least once per year, inspections shall be made to observe the extent of ponding of water at soakage locations. Where ponding longer than 48 hours is occurring in the soil media in first flush basins and ponds, and in the swale invert of the balance of the Project area, the Consent Holder shall initiate a programme to reinvigorate the soak rate through the media and though the swale invert.

Ref	Draft regional consent conditions
DP.23	(a) At least once every five years, a representative composite sample of soil shall be taken from a depth of 50 millimetres at the lowest point of elevation, from the following locations: • Two representative samples of swales on the MSRFL section • Two representative samples of swales from the CSM2 section • One sample each from the Maize Maze Pond and Ramp Ponds forebay • One sample each from the Maize Maze Pond and Ramp Ponds infiltration basin (b) The soil samples shall be analysed using the United States Environmental Protection Agency method 1312, Synthetic Precipitation Leaching Procedure (SPLP), using reagent water, by a laboratory accredited by Telarc for this method. (c) The soil samples shall be analysed, using the method outlined above, for the following contaminants and compared against the Leachate Trigger Concentrations as listed in Condition DP.24: • Total copper • Total zinc • Total lead • Benzo(a)pyrene • Total petroleum hydrocarbons C_7-C_9 • Total petroleum hydrocarbons C_{10}-C_{14} (d) The soil samples shall be measured in milligrams per litre (mg/L). (e) The analyses undertaken shall be carried out with detection limits of a maximum of 10 percent of the trigger levels for total copper, zinc, lead and benzo(a)pyrene and 0.2 percent for total petroleum hydrocarbons. (f) The results of the analyses shall be provided to the Manager, within two months of sampling.

Ref	Draft regional consent conditions
DP.24	(a) The Consent Holder shall compare the results of analyses undertaken in accordance with Condition DP.23 with the following trigger concentrations: **Contaminant (mg/L)** — **Leachate Trigger Values** Total copper — 40 Total zinc — 0.30 Total lead — 0.2 Benzo(a)pyrene — 0.014 Total petroleum hydrocarbons C_7-C_9 — 360 Total petroleum hydrocarbons C_{10}-C_{14} — 7 (b) Should the concentration of any of the contaminants in the soil samples exceed the trigger concentrations, an investigation of the extent of the soil contamination, with reference to the above trigger values, shall be undertaken under the supervision of a suitably qualified and experienced person and a report on the contamination prepared within three months of the first soil sampling. A copy of that report shall be provided to the Manager within 10 working days of its receipt by the Consent Holder. (c) The volume of soil identified as contaminated in the above report shall be removed and replaced with uncontaminated soil within six months of provision of the above report.
DP.25	Any material removed during maintenance of the stormwater systems or in accordance with Condition DP.23 shall be disposed of at a facility authorised to receive such material.
	Liaison with River Engineers
DP.26	Prior to operating the discharge valve at the Maize Maze Pond and Ramp Ponds, the Consent Holder shall liaise with the Canterbury Regional Council 'Regional Engineer' and with the CCC 'Surface Water Operations Manager' to ensure the discharge rate (up to 60 l/s) from the Maize Maze and Ramp ponds emptying will not exacerbate flooding of the Halswell River drainage system.

31.3.7. Proposed consent conditions for the discharge of dust to air during construction of the Project

- **Discharge permit** to discharge dust to air beyond the boundary of the Project area.

The conditions proposed for this consent are those general conditions set out in section 31.3.1.

31.3.8. Proposed consent conditions for the storage and use of hazardous substances

- **Land use consent** to store and use hazardous substances during construction.

The conditions proposed for this consent are those general conditions set out in section 31.3.1.

31.3.9. Proposed consent conditions for earthworks within riparian margins and activities in the bed of a stream

- **Land** use consent for earthworks within the riparian margin adjacent to Upper Knights Stream.
- **Land** use consent for reclamation/ disturbance of former stream bed.

The conditions proposed for this consent are those general conditions set out in section 31.3.1.

31.4. Proposed district resource consent conditions

The table below provides explanation to a number of the acronyms and terms used in the conditions:

Definitions	
AEE	Means the CSM2 and MSRFL ("Project") Assessment of Effects on the Environment (Volume 2) dated November 2012
CEMP	Means the Construction Environmental Management Plan
Council	Means the relevant territorial authority (Selwyn District Council or Christchurch City Council)
Consent Holder	Means the New Zealand Transport Agency
Commencement of Works	Means the time when the works that are authorised by the resource consents commence
Manager	Means the Regulatory Manager of the relevant territorial authority (Selwyn District Council or Christchurch City Council)
Project	Means the construction, operation and maintenance of the Christchurch Southern Motorway Stage 2 (CSM2), and the widening and upgrading of SH1 Main South Road between Robinsons Road and Rolleston to provide a four-lane median separated expressway (Main South Road Four Laning known as MSRFL), and includes associated local road works, including new rear access roads
RMA	Means the Resource Management Act 1991
Work	Means any activity or activities undertaken in relation to the construction and operation of the Project

31.4.1. Proposed resource consent conditions for the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health land use consents

- **Land use consent** for the sampling and disturbance of soil and change in land use within land identified as Hazardous Activities Industries List (HAIL) sites in the Selwyn District and Christchurch City

Ref	Draft district consent conditions
CL.1	Except as modified by the conditions below, and subject to final design, the Project shall be undertaken in general accordance with the information provided by the Consent Holder in the Resource Consent Application dated November 2012 and supporting documents being: (a) Assessment of Environmental Effects report, dated November 2012 (b) Plan sets: i. Layout Plans: 62236-A-C020-C029 & 62236-B-C020-C038 ii. Plan and Longitudinal Sections: 62236-A-C100-C133 & 62236-B-C101-C163 iii. Typical Cross Sections: 62236-A-C171-C173 & 62236-B-C171-C173 iv. Pavement Surfaces: 62236-A-C250-C253 & 62236-B-C250-C255 v. Cycle Path Plans: 62236-B-C315-C316 vi. Drainage Layout Plans: 62236-A-C401-C412 & 62236-B-C401-C426 vii. Drainage Details: 62236-A-C451-C463 & 62236-B-C451-C466 viii. Signage Plans: 62236-A-C501-C508 & 62236-B-C501-C517 ix. Land Requirement Plans: 62236-A-C1101-C1110 & 62236-B-C1101-C1118 x. Structural Plans: 62236-B-S000-S083 xi. Landscape Planting Plans: 62236-A-L011-L018 & 62236-B-L011-L024 xii. Lighting Plans: 16.001630, sheets 1-20 Where there is conflict between the documents lodged and the conditions, the conditions shall prevail.
CL.2	Pursuant to section 125(1) of the RMA, this consent shall lapse 15 years from the date of its commencement (pursuant to Section 116(5) of the RMA) unless it has been given effect, surrendered or been cancelled at an earlier date.

Ref	Draft district consent conditions
CL.3	At least three months prior to the commencement of the relevant stage or stages of work, the Consent Holder shall submit information to the Manager to demonstrate that the proposed certifier (required by Condition CL.4) is independent, suitably qualified and experienced. If no response is provided by the Council within 10 working days of the Consent Holder sending the information, the person shall be deemed to be approved by the Council. If the Manager does not approve the person(s) proposed by the Consent Holder, reasons should be provided to indicate why the person(s) is not considered to be suitable. With the prior agreement of the Manager, the independent certifier may be changed at any stage in the Project.
CL.4	(a) All works shall be carried out in general accordance with CEMP lodged with the Consent Applications which shall be updated and finalised by the Consent Holder. (b) The CEMP shall be certified by an independent, suitably qualified and experienced person(s) (approved by the Manager as being competent and suitable to provide such certification as per Condition CL.3), at least 40 working days prior to the commencement of construction of the relevant stage or stages. Unless advised to the contrary to the Consent Holder within 20 working days after receipt of the CEMP, the CEMP shall be deemed to be certified. (c) The certification shall confirm that the CEMP: i. is generally consistent with the draft CEMP submitted with the application; and ii. addresses the matters set out in Condition CL.7. (d) This certification shall be provided to the Manager at least 10 working days prior to the commencement of construction of the relevant stage or stages. (e) Where the CEMP is to be submitted in a staged manner as a result of the staging of construction works, information about the proposed staging shall be submitted as part of the CEMP.
CL.5	Works shall not proceed until the CEMP and certification described in Condition CL.4 have been received and acknowledged in writing by the Manager. If written acknowledgement is not provided by the Council within 10 working days of the Consent Holder sending the certification, the certification shall be deemed to be confirmed.

Ref	Draft district consent conditions
CL.6	The Consent Holder may make amendments to the CEMP at any time. Any changes to the CEMP shall remain consistent with the overall intent of the CEMP and shall be certified by the agreed independent certifier, as per the requirements outlined in Condition CL.4. The Consent Holder shall provide a copy of any such amendment to the CEMP and certification to Council for information, prior to giving effect to the amendment, or within 15 working days.
CL.7	The CEMP shall outline measures to identify actions required for any contamination discovered which shall include: a) Methods for managing excavation and storage of soil (including erosion and sediment controls and dust controls); b) Methods for managing transport, disposal (at an appropriate facility) and tracking of soil and other material taken away from site; c) Safety measures during the work (appropriate PPE); d) How spills and emissions from any such areas shall be managed; and e) Procedures for consultation with the relevant territorial authority.

Appendix A

Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994

Departmental Notices

Agriculture and Fisheries

Animals Protection Act 1960

Approval of Code of Ethical Conduct Notice No. 5330 (100-A1-07)

Pursuant to section 19A of the Animals Protection Act 1960 and on the advice of the National Animal Ethics Advisory Committee, I hereby approve the code of ethical conduct submitted to me by Elanco Animal Health, which is the same as the approved code of ethical conduct of Massey University.

Dated at Wellington this 22nd day of February 1994.

JOHN FALLOON, Minister of Agriculture.
go1646

Revocation of Approval of Code of Ethical Conduct Notice No. 5329 (100-A1-07)

Pursuant to section 19A of the Animals Protection Act 1960 and on the advice of the National Animal Ethics Advisory Committee, I hereby revoke the approval of Tauhara Furs Partnership to use the code of ethical conduct of the Ministry of Agriculture and Fisheries.

Notice No. 4421 appearing in the *New Zealand Gazette* on the 30th day of June 1988, at page 2628 is hereby revoked.

Dated at Wellington this 22nd day of February 1994.

JOHN FALLOON, Minister of Agriculture.
go1647

Approval of Code of Ethical Conduct Notice No. 5328 (100-A1-07)

Pursuant to section 19A of the Animals Protection Act 1960 and on the advice of the National Animal Ethics Advisory Committee, I hereby approve the code of ethical conduct submitted to me by Lowe Walker Hawera Limited, which is the same as the approved code of ethical conduct of NZ Pastoral Agriculture Research Institute Limited.

Dated at Wellington this 22nd day of February 1994.

JOHN FALLOON, Minister of Agriculture.
go1648

Conservation

Resource Management Act 1991

Notice of Approval of Bylaws Amendment

The Minister of Transport and the Minister of Conservation, pursuant to section 424(6) of the Resource Management Act 1991, hereby give approval to The Northland Regional Council Maritime Bylaw Amendment No. 5 (Bylaw Charges 1992/93) resolved by way of Special Order and confirmed by a meeting of the said Council on 19 May 1993.

Dated at Wellington this 14th day of February 1994.

DENIS MARSHALL, Minister of Conservation (in relation to section 232(37) of the Harbours Act).

B. A. MARTIN, for Russell Kilvington, Director of Maritime Safety in exercise of powers delegated by the Minister of Transport.
go1499

Crown Law Office

Judicature Act 1908

Appointment of Temporary Judge Made Permanent

Pursuant to section 4 of the Judicature Act 1908, Her Excellency the Governor-General, in the name and on behalf of Her Majesty the Queen, has been pleased to appoint

The Honourable Dame Silvia Rose Cartwright

to be a Judge of the High Court.

Dated at Wellington this 17th day of February 1994.

PAUL EAST, Attorney-General.
go1498

Environment

Resource Management Act 1991

The Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994

Pursuant to sections 167 and 420(6) of the Resource Management Act 1991, the Minister for the Environment, hereby gives the following notice:

Notice

1. Title and commencement—(1) This notice may be cited as the Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994.

(2) This notice shall come into force on the 7th day after the date of its publication in the *New Zealand Gazette*.

2. Interpretation—In this notice "State highway" and "motorway" have the same meaning as in section 2(1) of the Transit New Zealand Act 1989.

3. Application of notice—This notice shall apply in addition to and not in substitution for the Resource Management (Approval of Transit New Zealand as Requiring Authority) Order 1992.

4. Approval as requiring authority—Transit New Zealand is hereby approved as a requiring authority under section 167 of the Resource Management Act 1991, for its particular network utility operation being the construction and operation (including the maintenance, improvement, enhancement, expansion, realignment and alteration) of any State highway or motorway pursuant to the Transit New Zealand Act 1989.

5. Approval in respect of existing designation—Transit New Zealand is hereby approved as a requiring authority under section 167 of the Resource Management Act 1991 for the Christchurch Northern Arterial (State Highway 74) in the district of Christchurch City Council.

Dated at Wellington this 17th day of February 1994.

SIMON UPTON, Minister for the Environment.
go1500

29 New Agency replaces Transit New Zealand as requiring authority

(1) This clause applies to any Order in Council, notice, or other instrument that approves of Transit New Zealand as a requiring authority and that was in effect immediately before 1 August 2008, including (without limitation)—

(a) the Resource Management (Approval of Transit New Zealand as Requiring Authority) Order 1992; and

(b) the Resource Management (Approval of Transit as Requiring Authority) Notice 1994.

(2) Without limiting clauses 26 and 28, on 1 August 2008,—

(a) the new Agency replaces Transit New Zealand as a requiring authority under any Order in Council, notice, or other instrument to which this clause applies; and

(b) every reference to Transit New Zealand in any Order in Council, notice, or other instrument to which this clause applies, is, unless the context otherwise requires, to be read as a reference to the new Agency; and

(c) anything done, or omitted to be done, or that is to be or may be done (under or in relation to an Order in Council, notice, or other instrument to which this clause applies) by Transit New Zealand is to be treated as having been done, or having been omitted to be done, or to be or may be done, by the new Agency; and

(d) every notice of requirement and designation of Transit New Zealand is transferred to and held by the new Agency, with the same status and priority as if Transit New Zealand and the new Agency were the same entity.

30 First members of new Agency

In appointing the first members of the new Agency, the Minister may, but need not, consult in accordance with section 98(2) of the Land Transport Management Act 2003.

Compare: 2004 No 97 Schedule 2 cl 4

31 Transferred employees

(1) The terms and conditions of employment of a transferred employee immediately before 1 August 2008 continue to apply in relation to that employee until—

Appendix B

Land Requirement Schedule

Land Requirement Schedule

MAIN SOUTH ROAD FOUR LANING – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Ownership	Legal Description		Title Ref	Area of Land (m²)		
					Existing Area	Required Land[1]	Area Left
105	Cropmark Seeds Limited	Lot 2	DP 69734	27422	27,422	5,561	21,861
106	Lester Clarence Warren	Lot 1	DP 83245	40460	40,460	8,707	31,753
107	Christopher Selwyn Warren	Lot 2	DP 83245	131227	131,227	21,394	109,833
108	Ronald John Thomson Marie Michele Thomson	Lot 4	DP 20292	20244	20,244	20,231	-
109	Kevin William Barron Cynthia Maryan Barron	Lot 3	DP 20292	20801	20,801	2,435	18,366
110	Brinks South Island Limited	Lot 2	DP 20292	20234	20,234	2,292	17,942
111	Brinks South Island Limited	Lot 1	DP 20292	20234	20,234	2,220	18,014
112	Brinks South Island Limited	Lot 4	DP 22430	40469	40,469	4,015	36,454
113	William Gordon Cameron Gavin William Eastwick Andrew Morrell McIntosh	Lot 3	DP 22430	57440	57,440	5,440	52,000
114	Phyllis Merrilynne Sitarz Worcester Trustee Services Limited	Lot 2	DP 22430	40469	40,469	3,684	36,785
115	Philip Barry Brien Vivienne Ann Brien	Lot 1	DP 22430	40469	40,469	3,899	36,570
116	Southern Horticultural Products Limited	Lot 1	DP 25904	41227	41,227	4,161	37,066
117	Lois Kathleen Odering Colin Anthony Odering	Lot 2	DP 25904	42062	42,062	4,283	37,779

[1] Note the areas shown in this table are indicative only and are based on cadastral data predating the 4th of September 2010 earthquake.

MAIN SOUTH ROAD FOUR LANING – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Ownership	Legal Description		Title Ref	Area of Land (m^2)		
					Existing Area	Required Land[1]	Area Left
118	MacLee Holdings Limited	Pt Lot 3	DP 25904	39520	39,520	4,318	35,202
119	Giltrap Holdings Limited	Pt Lot 1	DP 47768	27131	27,131	3,291	23,840
119a	Orion NZ Ltd	Lot 4	DP 387453	3000	3,000	173	2,827
119b	Lawrence John Manion Carol Mary Manion	Lot 1	DP 387453	64427	64,427	39,739	24,688
120	Lawrence John Manion Carol Mary Manion	Lot 2	DP 387453	40442	40,442	6,255	34,187
120a	Lawrence John Manion Carol Mary Manion	Lot 3	DP 387453	40050	40,050	1,951	38,099
138	David Lewis Mitchell Sara Louise Mitchell Timpany Walton Trustess Limited	Lot 1	DP 418409	17526	140,005	89	139,916
142	Selwyn District Council		RES 955	40649	40,649	2,523	38,126
148	William Frederick Fletcher Fay Patricia Fletcher	Lot 3	DP 343777	309114	309,114	61,352	247,762
148x	William Frederick Fletcher Fay Patricia Fletcher	Lot 2	DP 343777	40000	40,000	9,755	30,245
149	Noel Francis Welbeloved Colleen Lola Welbeloved	Lot 1	DP 13617	8094	8,094	621	7,473
150	Bruce Cedric Coles Michelle Anne Coles	Lot 4	DP 74253	205900	205,900	2,796	203,104
154	Timargo Holdings Limited	Lot 2	DP 25718	49389	49,389	2,197	47,192
155	Carol Mary Manion Denis Alfeld Lee Michael Christopher Robinson	Lot 1	DP 489	543695	543,695	5,173	538,522
156	Christopher Warren		RS 7881	202343	202,343	4,107	198,236

MAIN SOUTH ROAD FOUR LANING – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Ownership	Legal Description		Title Ref	Area of Land (m^2)		
					Existing Area	Required Land[1]	Area Left
157	Geoffrey Christopher Blokland Amanda Marie Blokland	Lot 3	DP 35168	83745	83,745	2,558	81,187
158	Stanway Sharemilking Limited	Lot 5	DP 305890	126150	126,150	4,111	122,039
161	Thomas Colin Behrns	Lot 6	DP 411377	40005	40,005	2,006	37,999
162	Kevin William Barron Cynthia Maryan Barron	Lot 5	DP 411377	40008	40,008	2,173	37,835
163	Paul Young Associates Ltd	Lot 2	DP 411377	45783	45,783	8,286	37,497
181	Kiwi Rail		Pt Railway Reserve SO 9896			38,031	

CHRISTCHURCH SOUTHERN MOTORWAY STAGE 2 – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Owner	Legal Description		Title Ref	Area of Land (m²)		
					Existing Area	Required Land[2]	Area Left
1	Murray John Mannall Susanne Madeline Mannall Jennifer Joy Flett	Lot 1	DP 55499	CB33A/569	47,557	9,619	37,938
2	NZTA (Ex Clark)	Lot 1-2	DP 81942	CB47B/504	46,741	8,939	37,802
3	Jonathan Stewart Armstrong Erin Mary Armstrong	Lot 2	DP 55499	CB33A/570	50,654	280	50,374
4	Peters Stables Limited	Lot 2	DP 55499	CB33A/570	48,089	237	47,852
5	NZTA (Ex Clark)	Lot 3	DP 81942	CB47B/504 CB47B/505 CB47B/506 CB47B/507 CB47B/508	4,575	872	3,703
6	NZTA (Ex Clark)	Lot 1	DP 81942	CB47B/504	23,062	23,063	-
7	NZTA (Ex Kim)	Lot 10	DP 50079	CB47B/508	35,672	2,049	33,623
8	John Stewart Wilson Susan Margaret Merrett	Lot 1	DP 20502 & Part RS 38039	CB38C/482	32,468	26,804	5,664
9	NZTA (Ex Clark)	Lot 9	DP 50079	CB47B/507	35,665	20,300	15,365
10	NZTA (Ex Clark)	Lot 8	DP 50079	CB47B/506	35,755	970	34,785
11	Paterson Poultry Limited	Lot 3	DP 306932	27047	39,800	7,309	32,491
12	NZTA (Ex Kim)	Lot 2	DP 26707	CB8F/32	80,937	22,391	58,546
13	NZTA (Ex Heald)	Lot 1	DP 26707	CB8F/31	72,434	72,460	-
15	John Ronald Tate Gaylene Elizabeth Tate	Lot 2	DP 341197	169382	43,000	43,003	-

[2] Note the areas shown in this table are indicative only and are based on cadastral data predating the 4th of September 2010 earthquake.

CHRISTCHURCH SOUTHERN MOTORWAY STAGE 2 – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Owner	Legal Description		Title Ref	Area of Land (m²)		
					Existing Area	Required Land[2]	Area Left
16	NZTA (Ex Wadsworth)	Lot 1	DP 408618	431405	40,000	40,000	-
17	John Ronald Tate Gaylene Elizabeth Tate	Lot 1	DP 341197	169381	40,290	993	39,297
18	Emma Joy Steel Michael Joseph Sweeney	Lot 2	DP 408618	431404	40,000	2,696	37,304
19	NZTA (Ex RLM)	Lot 3	DP 408618	431406	123,621	123,614	-
20	NZTA (Ex Nyhan)	Lot 1	DP 19955	CB760/91	207,528	207,570	-
21	John Alexander Shanks Susan Annette Shanks Lindsay John Dick Michael Christopher Robinson	Lot 2	DP 19955	CB759/81	203,481	2,476	201,005
22	NZTA (Ex Williams)	Lot 1	DP 322541	89932	47,554	47,510	-
23	NZTA (Ex O Connor)	Lot 2	DP 340332	165870	40,005	40,006	-
24	NZTA (Ex Williams)	Lot 1	DP 340332	165869	40,000	39,998	-
25	Toolshed Investments Limited	Lot 2	DP 307041	27367	46,000	46,000	-
27	Warren Allen Hastings Julie Hastings Grant Rae Trustee Limited	Lot 2	DP 58229	CB34B/437	40,000	4,184	35,816
29	Kevin Lawrence Williams Bonnie Ann Williams		RS 2705	CB9A/792	204,168	37,837	166,331
31	Chelandry Farms Limited	Lot 1	DP	43002	87,180	181	86,999

CHRISTCHURCH SOUTHERN MOTORWAY STAGE 2 – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Owner	Legal Description		Title Ref	Area of Land (m²)		
					Existing Area	Required Land[2]	Area Left
			310929				
32	Chelandry Farms Limited	Lot 2	DP 310929	43003	120,900	26,144	94,756
33	Kevin Lawrence Williams Bonnie Ann Williams	Lot 1	DP 54254	CB31K/1089	333,194	133,407	199,787
34	Tegel Foods Limited	Lot 1	DP 53738	CB31F/593	28,378	28,375	-
38	Foddercube Products Nth Canty Limited	Lot 2	DP 24365	CB8K/984	99,697	24,149	75,548
39	Benjamin William McAlpine Tothill Sally Jean Tothill	Lot 1	DP 24365	CB12B/1269	105,339	84,741	20,598
40	Barrie Leonard Houghton Janice Ann Houghton	Lot 1	DP 57203	CB33K/1059	45,875	3,414	42,461
41	Tegel Foods Limited	Lot 1	DP 53739	CB31F/595	38,977	11,462	27,515
42	Calder Stewart Industries Limited	Lot 2	DP 49203	387248	351,595	86,780	264,815
44	Calder Stewart Industries Limited	Lot 1	DP 397092	387248	4,584	2,094	2,490
45	Preshes Investments Limited	Lot 2	DP 397092	387249	4,853	3,935	918
47	Shands Road Industrial Park	Lot 2	DP 61408	263701	3,925	3,924	-
48	Kovan Limited	Lot 2	DP 82095	CB47B/926	41,631	41,660	-
49	NZTA (Ex Carter)	Pt	RS 1480	CB493/44	73,176	73,219	-
50	NZTA Historic Purchase.	Pt	RS 1480		67,383	67,355	-
51	NZTA Historic Purchase.	Pt Lot 1	DP 8509		41,792	41,793	-
52	NZTA Historic Purchase.	Pt	RS 2426		18,333	3,140	15,193
53	NZTA Historic Purchase.	Lot 1	DP	14540	82,538	66,917	15,621

CHRISTCHURCH SOUTHERN MOTORWAY STAGE 2 – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Owner	Legal Description		Title Ref	Area of Land (m²)		
					Existing Area	Required Land[2]	Area Left
			303635				
54	Richard John Sissons Carolyn Beverley Sissons	Lot 1	DP 318764	73541	40,215	16,650	23,565
55	Christchurch City Council	PT Lot 1	DP 45957	CB24F/296	137,450	2,513	134,937
58	Kevin Lawrence Williams Bonnie Ann Williams		RS 2836	CB9A/792	150,083	1,286	148,797
59	NZTA (Ex Morrison)	Lot 3	DP 307041	27368	40,030	2,864	37,166
60	Phillip George Clarke Margarete Frances Clarke	Lot 1	DP 23731	CB5A/641	1,611	1,620	-
65	Noel Lindsay Moore	Lot 2	DP 64487	CB35D/1273	7,625	402	7,223
66	NZTA	Lot 1	DP 19825	CB756/94	895	259	636
67	Grant Phillip England Halie Sharleen Kellaway	Lot 8	DP 318764	73548	40,120	1,987	38,133
71	John Gregory Keith Olive	Lot 1	DP 60678	CB36A/670	19,904	8,873	11,031
72	Mee Lai Lee Bak Cheong Lee	Pt Lot 1	DP 42549	CB20B/292	53,793	33,600	20,193
76	Fodder Cube Products North Canterbury Limited	Lot 1	DP 53489	CB31K/460	52,608	306	52,302
101	Gulf Central Properties Limited		RS 7416	CB22A/1199	79,748	4,226	75,522
102	Curraghs Holdings Limited		RS 40376	CB13K/1475	26,400	6,610	19,790
103	Templeton Investments Limited	Lot 2	DP 18353	CB667/57	28,328	8,701	19,627
104	Lamond Poultry Limited	Lot 1	DP 69734	CB40C/533	26,196	5,033	21,163
122	Wendy Shao Ping Gan	Lot 1	DP 20355	CB790/93	20,234	4,172	16,062

CHRISTCHURCH SOUTHERN MOTORWAY STAGE 2 – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Owner	Legal Description		Title Ref	Area of Land (m²)		
					Existing Area	Required Land[2]	Area Left
128	Geoffrey James Hall White Kathriene Dora Roth Phillip Roth	Lot 1	DP 307449	22826	59,580	28,233	31,347
129	Godfried Maria Louise van Tulder Sandra Kay van Tulder Philip Robert Haunui Royal	Pt Lot 2	DP 82599	CB47D/144	39,969	22,147	17,822
170	Suzette Meroiti Andrew Meroiti Antonia Lamont	Lot 1	DP 334582	432527	17,480	3,940	13,540
171	Gary John Cross Gerard Joseph Twaites	Lot 1	DP 406023	421093	38,320	2,312	36,008
172	The Selwyn District Council	Section 2	SO 435267	544078	82,081	1,466	80,615
173	John David Boyland Robin Annette Boylan	Pt RS 38039		CB744/40	20,224	1,723	18,501
177	Ying ho Chen Kwei Fen Hsueh	Pt Lot 1	DP 34236	CB33K/472	11,941	314	11,627
178	Martin Richard Harcourt Aiko Harcourt Peter Ian Cullen	Lot 4	DP 318764	73544	44,635	1,408	43,227
179	Fulton Hogan Land Development	Lots 1 and 2	DP 3256	CB759/44	186,236	14,177	172,059
181	Kiwi Rail		Pt Railway Reserve SO 9896			5,191	
183	Michael Stuart Peters Anne Felicia Peters	Lot 2	DP 402608	480476	1,613	313	1,300
184	Kiwi Rail	Pt RS 2637	Pt Railway Reserve SO 9896		3,522	3,254	2,770

CHRISTCHURCH SOUTHERN MOTORWAY STAGE 2 – LAND REQUIREMENT SCHEDULE

Property Acquisition Reference	Owner	Legal Description		Title Ref	Area of Land (m²)		
					Existing Area	Required Land[2]	Area Left
185	Neil Morton Sword Philipa Sword William Leslie Brown	Lot 5	DP 318764	73545	65,229	1,280	63,949

Appendix C

List of Potentially Affected Wells

List of Potentially Affected Wells

Bore Number *	Status *	NZTM X *	NZTM Y *	Legal Description #	Land owner #	Address #	Within or outside designation *
M36/0124	Not Used	1551507	5174189	RS 40945	Elizabeth Ann Veix, John Maurin Veix	1528 Main South Road	Outside
M36/0288	Not Used	1552496	5173439	Lot 1 DP 75990	Denis John Bussell, Helen Isabel Bussell, John Francis Butchard	693 Weedons Road	Outside
M36/0314	Not used	1554534	5175849	Lot 2 DP 83245	Christopher Warren	Main South Road	Outside
M36/0319	Active	1553057	5174833	Lot 2 DP 22430	PM Sitarz, Worchester Trustees Services Ltd. Steve and Margaret Arbuckle	1366 Main South Road	Outside
M36/0326	Not Used	1560143	5176719	Pt Lot 2 DP 49203	Calder Stewart Industries Limited	201 Marshs Road	Outside
M36/0327	Active	1559933	5176378	Lot 1 DP 24365	Benjamin William McAlpine Tothill, Sally Jean Tothill	493 Shands Road & 246 Marshs Road	Within
M36/0911	Active	1560503	5176239	Lot 1 DP 53739	Her Majesty the Queen	262 Marshs Road	Outside
M36/1857	Active	1559682	5176272	Lot 1 DP 53738	Tegel Foods Limited	516/518 Shands Road	Outside
M36/20238	Proposed			Lot 6 DP 411377	Thomas Colin Behrns	3 Jacobsons Place, Lincoln	Not known until drilled
M36/20242	Active	1562480	5176277	Pt Lot 1 DP 42549	Bak Cheong Lee, Mee Lai Lee	402 Halswell Junction Road	Within
M36/20347	Active	1555205	5176188	Pt RS 40376	Curraghs Holdings Limited	10 Curraghs Road	Outside
M36/20485	Capped	1552381	5174445	Road reserve	Her Majesty the Queen	Main South Road	Within
M36/20492	Capped	1555370	5176195	Road reserve	Her Majesty the Queen	Main South Road	Within
M36/20493	Active	1556646	5175980	Road reserve	Selwyn District Council	Hamptons Road	Within

Bore Number *	Status *	NZTM X *	NZTM Y *	Legal Description #	Land owner #	Address #	Within or outside designation *
M36/20495	Active	1558043	5176428	Road reserve	Selwyn District Council	Trents Road	Within
M36/20498	Active	1559969	5176594	Road reserve	Selwyn District Council	Shands Road / Marshs Road intersection	Within
M36/20501	Active	1560636	5176216	Road reserve	Selwyn District Council	Marshs Road	Within
M36/20504	Active	1561831	5176536	Road reserve	Christchurch City Council	Springs Road	Within
M36/2231	Active	1554770	5175775	RS 7881	Christopher Selwyn Warren	1181 Main South Road	Outside
M36/2695	Active	1556751	5175952	Lot 1 DP 408618	Her Majesty the Queen	544 Hamptons Road	Outside
M36/3570	Not used	1553610	5175191	Lot 2 DP 20292	Brinks South Island Ltd	1310 Main South Road	Outside
M36/3737	Active	1552422	5174030	Lot 3 DP 343777	Fay Patricia Fletcher, William Frederick Fletcher	755 Weedons Road	Outside
M36/3875	Active	1555250	5176046	Lot 1 DP 55499	Jennifer Joy Flett, Murray John Mannall, Susanne Madeline Mannall	1/1133 Main South Road	Outside
M36/3953	Active	1553526	5175139	Lot 1 DP 20292	Brinks South Island Limited	1312 Main South Road	Outside
M36/3954	Not used	1553486	5175089	Lot 4 DP 22430	Brinks South Island Limited	Main South Road	Outside
M36/4025	Active	1552826	5174709	Lot 1 DP 25904	Southern Horticultural Products Limited	1394 Main South Road	Outside
M36/4083	Active	1552350	5174569	Pt Lot 1 DP 47768	Giltrap Holdings Limited	16 Weedons Ross Road	Outside
M36/4100	Active	1554532	5175862	Lot 2 DP 83245	Christopher Warren	Main South Road	Outside
M36/4229	Active	1559983	5176639	Lot 1 DP 16381	Deirdre Elena Groube, Kevin Charles Groube	191 Marshs Road	Outside
M36/4306	Active	1555115	5175899	Pt Lot 2 DP 82599	Godfried Maria Louise Van Tulder, Philip Robert Haunui Royal, Sandra Kay Van Tulder	Corner, Main South Road and Robinsons Road	Outside
M36/4353	Active	1554520	5175870	Lot 2 DP 83245	Christopher Selwyn Warren	Main South Road	Within
M36/4410	Active	1560558	5176321	Pt Lot 2 DP 49203	Calder Stewart Industries Limited	201 Marshs Road	Within

Bore Number *	Status *	NZTM X *	NZTM Y *	Legal Description #	Land owner #	Address #	Within or outside designation *
M36/4675	Not Used	1552456	5174399	Lot 1 DP 22179	Elizabeth Jean Doyle, Gary Edward Doyle	768 Weedons Road	Outside
M36/4709	Not Used	1552018	5173229	Lot 4 DP 354337	Fay Lynette Taylor, Grant Murray Taylor, LS Trustees (No.7) Limited	58 Levi Road	Outside
M36/4734	Active	1552896	5174759	Lot 1 DP 22430	Philip B & Vivienne A Brien	1386 Main South Road	Outside
M36/5002	Not used	1554805	5175869	Lot 2 DP 69734	Cropmark Seeds Limited	1192 Main South Road	Outside
M36/5122	Active	1556746	5175999	Lot 1 DP 408618	Her Majesty the Queen	544 Hamptons Road	Within
M36/5640	Active	1561933	5176669	Lot 1 DP 303635	Her Majesty the Queen	277-299 Springs Road	Within
M36/7213	Not Used	1562063	5176509	Lot 1 DP 303635	Her Majesty the Queen	277-299 Springs Road	Within
M36/7374	Active	1560561	5176211	Lot 1 DP 53739	Her Majesty the Queen	262 Marshs Road	Outside
M36/7500	Active	1552326	5174549	Pt Lot 1 DP 47768	Giltrap Holdings Limited	16 Weedons Ross Road	Within
M36/7502	Active	1562292	5175989	Lot 4 DP 318764	Aiko Harcourt, Martin Richard Harcourt, Peter Ian Cullen	19 John Paterson Drive	Outside
M36/7545	Active	1558314	5176529	Lot 3 DP 307041	Her Majesty the Queen	304 Blakes Road	Outside
M36/7917	Active	1555155	5175959	Pt Lot 1 DP 307449	Geoffrey James Hall White, Kathriene Dora White, Phillip Roth	1002 Robinsons Road	Within
M36/7996	Active	1556199	5176782	Pt Railway Reserve SO 9896	KiwiRail	South Island Main Trunk	Outside
M36/8298	Active	1555745	5176328	Lot 1 DP 20502	Stuart John Wilson, Susan Margaret Merrett	1067 Main South Road	Within
M36/8570	Active	1562406	5176321	Lot 3 DP 447519	Christchurch City Council	434-502 Halswell Junction Road	Within

*This information is sourced from (or calculated based on) Environment Canterbury records and has not been verified by the NZTA.

This information has been sourced from the Land Information New Zealand database and the NZTA Land Requirement Plans, based on the information supplied above.