The Case for Change

Christchurch City Council's Transport System

10 June 2016

FINAL VERSION

Strategic Case and Funding Application

Christchurch City Council

NZ TRANSPORT AGENCY WAKA KOTAHI

New Zealand Government

Contents

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GLOSSARY

Active Modes - walking and cycling.

Better Business Case - Transport Agency approach to guide planning, investment and project development processes. It is a principles-based approach that links strategy to outcomes.

CCC - Christchurch City Council.

CDHB - Canterbury District Health Board.

CTSP - Christchurch Transport Strategic Plan (2012).

ECan - Environment Canterbury.

Horizontal Infrastructure - Roads, footpaths, underground pipes and bridges

ILM - Investment Logic Mapping: structured workshops that bring together key stakeholders to ensure that there is early agreement on problems, outcomes and benefits before a solution is identified.

KPI's - Key Performance Indicators.

LGNZ - Local Government New Zealand

LTP - Long Term Plan: a statutory Council document outlining the long term vision (10 years).

NZTA - New Zealand Transport Agency.

One Network Approach - the concept of planning the entire transport network for all modes in a connected, multi-agency manner.

Overarching Strategic Assessment - high level review of the transport challenges facing the **CCC** transport system to reconfirm the issues identified in the **CTSP** (completed November 2015).

Problem Statement - a description of the issue(s) that need(s) to be addressed (cause and effects).

RLTP - Regional Land Transport Plan: a statutory document which sets the strategic direction for land transport within the region over a 30 year period.

SMART Objectives - specific, measurable, attributable, relevant and timed investment objectives.

State Highway - a strategically important road managed by the **NZTA**.

Strategic Case - a more detailed review of the key challenges and drivers for change (this document).

Strategic Response - High level interventions that might be taken to address the problem and deliver the benefits.

1. PART A: STRATEGIC CASE

Introduction

This Strategic Case has been prepared in accordance with the principles outlined in the NZ Transport Agency (NZTA) Business Case guidelines. These guidelines allow alternative approaches to be used, provided the information required to make an investment decision is demonstrated.

The aim of this Strategic Case is to identify the key problems facing the Christchurch City Council (CCC) transport system and to determine the significance of these challenges to inform future investment decisions. This Strategic Case is broader than a traditional Strategic Case as it has multiple audiences (CCC - NZTA), different purposes (CCC 2018-2028 Long Term Plan - securing NZTA co-funding) and it takes a whole of network approach, at a city wide level. The likely value and level of investment required long-term by NZTA is anticipated to exceed $100 million[1].

This Strategic Case has been developed collaboratively, with input from Environment Canterbury (ECan), Local Government New Zealand (LGNZ), NZ Transport Agency (NZTA) and Canterbury District Health Board (CDHB). It forms part of a wider suite of documents which together outline Christchurch City Council's case for investment. The process used to develop this Strategic Case is outlined in full at **Appendix A.**

An overarching Strategic Assessment (November 2015) was endorsed by CCC on 7th December 2015 and by the National Land Transport Programme Advisory Group on 21st January 2016. The Overarching Strategic Assessment identified two distinctive challenges facing the Christchurch transport system (Figure 1). The aim of this document is to reconfirm and further refine these problem statements and to identify potential strategic responses.

Figure 1: Overarching Strategic Assessment Investment Logic Map (problems)

Problem A 60%	Problem B 40%
The current transport system and the way we operate it as a network does not offer viable modal choice, resulting in a high number of journeys by private vehicle, which is becoming increasingly inefficient, detrimental to the environment and peoples social well-being and health.	Population and business changes (post-earthquake shift and growth) has resulted in different travel distribution patterns that put the transport network under pressure, causing road congestion and network delays.

Further work has been undertaken to better understand the context and case for investment within four outcome areas that were identified in the overarching Strategic Assessment. The four areas were identified as the main outcome classes (linked to the identified benefits) in the overarching Strategic Assessment benefits map, these were:

- Transport Safety
- Network Performance and Capability
- Transport and the Environment
- Transport and Health

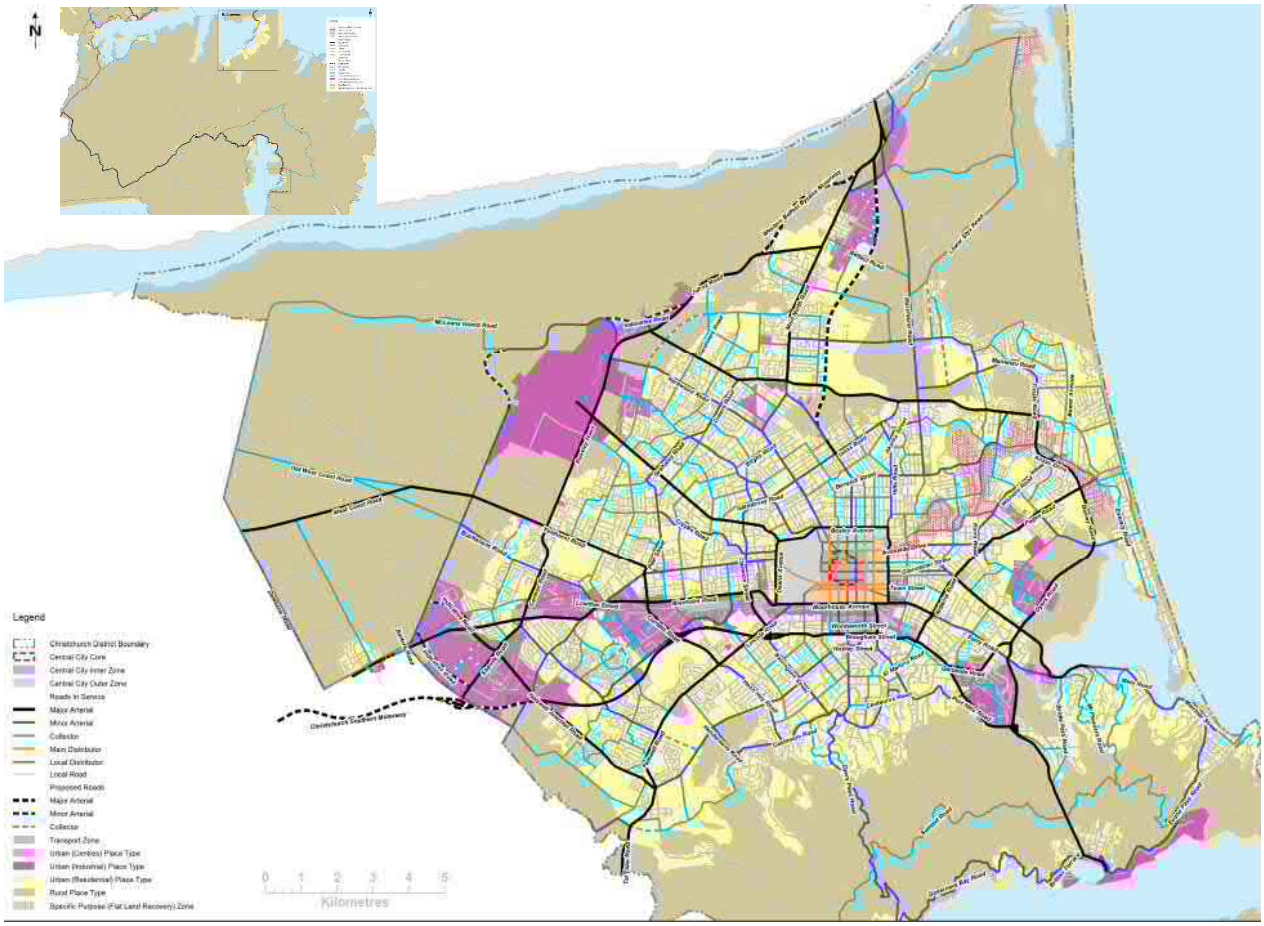
[1] Included to help inform NZTA delegation levels

Scope

The CCC transport system is identified in Figure 2. This defines the geographical scope of the Strategic Case in terms of future programme development. In developing the future programme CCC recognises that addressing the problems identified in this Strategic Case will require an integrated 'one network' approach in order to optimise key outcomes relevant to wider Urban Development partners (NZTA, ECan, KiwiRail, Lyttleton Port Company, Christchurch International Airport Limited, CDHB and neighbouring Selwyn and Waimakariri District Council's) as well as Ngai Tahu and community partners.

As such, strategic and community partners will continue to play an important role in the ongoing development of the CCC transport business case project and will be asked to participate at relevant stages along the way. CCC also recognises the differences between the various business cases that are being drafted by different transport agencies in Greater Christchurch and the need to coordinate interventions and the need for alignment to achieve 'one network' outcomes.

Figure 2: Map of Christchurch City Boundary, transport network, Inc. State Highways (inset of Banks Peninsula)



Over the past 12-18 months CCC has developed several existing modal or area based business cases. These have been recognised, however, they have not been used to predetermine the outcome of this Strategic Case. Existing business cases with interventions that are scheduled to be delivered prior to the 2018-2028 CCC Long Term Plan will continue to be progressed.

Any proposed interventions contained within existing business cases that will not be funded prior to the 2018-2028 CCC Long Term Plan will be reviewed at the proposed Programme Business Case stage to ensure they remain current and valid.

2. THE CURRENT STATE

Background

Christchurch is located on the east coast of New Zealand's South Island and is home to around 377,000 people (about 8.5% of New Zealand's population). It is the largest city in the South Island and is crucial to the economic output of the Canterbury region. Christchurch is crucial to Canterbury and New Zealand for many reasons:

- Nearly 70% of the region's economic output coming from activities that occur within the city.
- It is the major service centre for the South Island and tourism gateway and is home to the South Island's only tertiary hospital, two universities and seven Crown Research Institutes.
- It is a major strategic transport hub, with a 24 hour international airport, and a port that handles over $5 billion of exports per year.

Transport in the city has evolved in a similar fashion to that of other westernised settlements. After World War two the emergence and growth of the car, bus and goods vehicles changed the transport planning focus from rail to the motor vehicle. This change in focus has shaped the city's land use form to the present day.

The central city, bounded by the Four Avenues, has a key transformational role in the management and operation of the transport network. The "An Accessible City" plan advocates for significant investment in new cycle routes and public transport infrastructure, including the now completed world class passenger facility - the new central city bus interchange. The central city network also plays a key influencer role for the wider transport network. The "An Accessible City Programme Business Case" (CERA, January 2016) identified substantial transport benefits associated with the AAC projects:

- Change in Mode Share (between 36% to 38% or $450 million to $480 million)
- Walking and cycling benefits (62% to 67% or $780 million to $850 million)
- Public transport user benefits (approximately 0.1% or $1.2 million to $1.5 million)
- Accident reduction benefits (approximately 2% or $25 million to $27 million)

The city's road network (Figure 2) is characterised by arterial routes which form predominantly radial spokes from the central city. The spokes are supported by informal inner (four avenues) and outer ring roads. The city's road network is supported by the State Highway network which is managed by NZTA and links Christchurch with neighbouring regions and the rest of the South Island. NZTA is currently undertaking an $800 million highway construction programme to increase capacity in order to handle increasing freight traffic and improve safety for all users.

The railway network (managed by KiwiRail) traverses the city to the north, east and west and crosses many arterial roads. Freight rail services operate between Picton and Christchurch and the west coast to the port of Lyttleton. Christchurch does not currently have a commuter passenger rail service.

Public transport facilities and infrastructure is provided by CCC, however, the local bus service, known as Metro, is managed by Environment Canterbury. Christchurch has an extensive bus network with bus routes serving most areas of the city and satellite towns. Following the earthquakes the bus network has been reshaped to a 'hubs and spokes' model, consisting of five core high frequency routes and several connecting routes, which requires some passengers to transfer and connect to their destinations via five core routes.

Nationally Christchurch has been known as New Zealand's cycling city with seven percent of commuters cycling. The central city has flat terrain and CCC is currently developing 13 Major Cycleway Routes across the city to increase cycling mode share further. Post-quake public consultation on rebuilding the city expressed a strong desire for a more sustainable transport system, particularly greater use of cycling, and this has been reflected in the Council's strategic transport plan.

The effects of the 2010/11 earthquakes continue to be observed across the city and it is anticipated that the shape of urban Christchurch will continue to change during the ongoing recovery period, particularly over the next 10-15 years. The condition of the transport network and corresponding levels of service have been severely impacted by the earthquakes, with the majority of damage in Lyttleton and the eastern suburbs of the urban area of Christchurch.

Approximately 1,000 kilometres (45%) of Christchurch's street network sustained significant damage in the earthquakes, requiring some 50,000 repairs. The council is budgeting to spend $250 million a year on the city's horizontal infrastructure. In addition, earthquake-damaged infrastructure that has a remaining life of at least 15 years is being patch-repaired rather than replaced. This means that there may be another renewals peak starting in 15 years' time (see page 45).

Stronger Christchurch Infrastructure Rebuild Team (SCIRT) has been responsible for repairing earthquake damaged infrastructure, and has repaired urgent issues. However, SCIRT will cease to exist in six months and there are many assets still requiring remediation over the next 30 years to bring the network back to a state comparable to pre-earthquake. When comparing the Christchurch network to the rest of the country the evidence shows that the network is in a much poorer state than the national average and will require specific, targeted intervention to improve it. For example, a review of key national outcomes shows that Christchurch roads are significantly rougher than national targets.

The earthquakes did highlight that the transport network is reasonably resilient, and the sections that needed to be closed to mitigate hazards were primarily due to geological reasons rather than hard engineering (such as slips on the Port Hills). The closure of the Central Business District and retreat from the residential red zone has led to the temporary and permanent relocation of residents and businesses, which has contributed to associated changes in short and long term travel patterns. Demand on the road network is highest in the west of Christchurch. If current trends continue, by 2041 there is forecast to be 40% more traffic congestion compared to 2010 levels.[i]

A significant amount of urban development is proposed for Christchurch. This includes accelerated Greenfield development (previously undeveloped and phased for release) and intensification around existing commercial centres in the short term. In many cases, transport infrastructure needs to be upgraded or expanded to support this growth (see page 43).

Partners and Key Stakeholders

Please see **Appendix B** for a full stakeholder list. Key project partners include:

- **Christchurch City Council:** is the asset owner and is responsible for undertaking the Strategic Case. All of the CCC transport system was considered through the development of this Strategic Case. CCC is also the majority funder of the local transport network.

- **NZ Transport Agency:** is a project partner and potential funder. The NZTA manages the State Highway network in the CCC boundary, this includes SH1, 73, 74, 74(A), 75, 76 which provide inter-regional connections to the city. NZTA is also responsible for allocating funds from the National Land Transport Fund.

- **Environment Canterbury:** is a project partner. ECan is the regional council for the Canterbury region. ECan provides an important role as the lead agency for regional transport planning, provision of public transport services, and is an advocating and influencing agency for the provision of public transport infrastructure in the city.

- **Canterbury District Health Board:** is an important stakeholder and provider of regional healthcare. CDHB have technical expertise in the area of transport and health and are an advocate for walking, cycling and public transport to encourage healthy lifestyles.

In developing the future programme CCC recognises that addressing the problems identified in this Strategic Case will require an integrated a 'one network' approach in order to optimise key outcomes relevant to wider Urban Development partners (NZTA, ECan, KiwiRail, Lyttleton Port Company, Christchurch International Airport Limited, CDHB and neighbouring Selwyn and Waimakariri District Council's) as well as Ngai Tahu, industry and community partners. As such, strategic and community partners will continue to play an important role in the ongoing development of the CCC transport business case project and will be asked to participate at relevant stages along the way.

3. CONFIRMING THE CASE FOR INVESTMENT

Facilitated ILM workshops were held on 17th and 18th February 2016 with project partners and key stakeholders to gain a better understanding of the key transport problems and challenges related to safety, network performance and capability, transport and the environment and transport and health. Please refer to **Appendix C** for the full ILM workshop outcomes (maps).

ILM participants identified and agreed 13 problem statements, which have reinforced the issues identified in the overarching Strategic Assessment (November, 2015). The following section provides a summary of each problem statement. Further supporting evidence can be found in **Appendix D**.

Transport Safety Problem Identification

Weighting	Problem Statement
Problem A (40%)	Christchurch's road network and design engenders a perception of a safe urban driving environment that can lead to driver complacency and behaviour that contributes to a high number of crashes associated with distraction.

Problem A relates to the correlation between the design of the road network and subsequent human behaviour. A key problem with the Christchurch road network is that there is very little distinction between the "look and feel" of local, collector and arterial roads, which contributes to safety issues including speeding, driver complacency and short-cutting through local areas.

- For the period 2010 to 2015, distraction and inattention in Christchurch contributed to 16% of all fatal and serious injury crashes, poor observation to 32% of all crashes and failing to give way/stop to 37% of all crashes.[ii]

- Vehicle conflicts were recorded as factors in 60% of all fatal and serious injury crashes, causing 18 deaths and 148 serious injuries in 2015. The estimated social cost of these crashes is $103 million per year.[ii]

- A total of 212 kilometres (less than 10% of the network) of the Christchurch transport network (by length and including State Highways) is on a corridor that has a Collective Risk level of High or Medium-High. However, this part of the network contains around 75.1% of all injury crashes.[iii]

Weighting	Problem Statement
Problem B (30%)	Management of and user behaviour in respect to Christchurch's grid network and the associated intersections, result in turn conflicts that are contributing factors in a large number of crashes.

Similar to the first problem, Problem B identifies that the design of parts of the network and subsequent human interaction are a potential contributing factor in a large number of crashes. Christchurch's road network is predominantly laid out in a grid pattern, which means that there are a large number of controlled and uncontrolled intersections which regulate the flow of vehicles and people.

- Between 2010 and 2014, 53% of crashes in Christchurch City occurred at intersections.[ii] Data indicates that between 2010 and 2014, 51% of fatal and serious crashes (497 people) in Christchurch occurred at intersections.[ii]

- Urban intersections have been identified as the highest risk factor in Christchurch urban crashes by the Canterbury District Road Risk Profile.[iv]

- In Christchurch, 92% of the crashes that occurred at intersections were at urban intersections; 40% at traffic signal controlled intersections, 34% at give way controlled intersections and 26% at other (stop or uncontrolled) intersections (see page 33).[ii]

- A total of 5,379 intersections in Christchurch have been analysed as part of the KiwiRAP risk mapping process. Data shows that 108 intersections in Christchurch meet the High-Risk Intersections Guide definition. These intersections represent 2% of all intersections in the city yet account for 30.7% of all injury crashes and 30.4% of all fatal and serious crashes at intersections.[iii]

Weighting	Problem Statement
Problem C (30%)	The perception that our roads are unsafe for pedestrians and cyclists is a deterrent to the City achieving a greater shift from the private car to walking and cycling.

Problem C relates to the perception that Christchurch roads are unsafe for certain modes, which could be limiting the efficiency of the network.

- For the period 2010 to 2014, 13% of injured road users in Christchurch City were cyclists, compared to the national average of 7% injured cyclists.

- Of the people killed or seriously injured in road crashes in Christchurch City between 2010 and 2014, 16% were pedestrians, a higher proportion than the mode share (6%).[ii]

- Cyclists and pedestrians are assessed as being a high risk factor in Christchurch City crashes by Police National COMMS Intel and the NZTA Communities at Risk Register 2014.[iv]

- In Christchurch, 96% of cycle crashes were recorded on urban roads, 63% of these were at intersections and 37% mid-block locations. Poor observation and failure to give way or stop were the main crash factors (predominantly vehicles deemed at fault rather than cyclists).[ii]

- In Christchurch, 98% of pedestrian injuries occurred on urban roads, 40% were at intersections and 60% at mid-block locations. Pedestrian factors were reported for 65% of the crashes, with poor observation and failure to give way or stop the next two highest crash factors.[ii]

Transport Safety Summary

A review of available evidence suggests that driver distraction and inattention are key factors to a large proportion of vehicle crashes. Urban intersections have been identified through the evidence as the highest crash factor in Christchurch urban crashes. Finally, a review of available evidence suggests that the perception that roads are unsafe for pedestrians and cyclists is a real rather than perceived issue. A review of available evidence shows that a higher proportion of pedestrians and cyclists are being killed or seriously injured compared to the mode share of both walking and cycling.

To summarise, transport safety (in particular urban intersections, driver distraction and the safety of pedestrians and cyclists) are considered a problem facing the operation and management of the CCC transport system and therefore warrant further investigation.

Network Performance and Capability Problem Identification

Weighting	Problem Statement
Problem A (45%)	The convenience of the private motor vehicle and the lack of continuity of bus and cycle lanes means that it is difficult to get more people to use public transport, walk or cycle in the City, which exacerbates localised congestion and associated adverse social and economic outcomes.

Levels of congestion on the road network continue to increase, with 40% more traffic congestion expected in Christchurch by 2041.[v] Congestion and poor journey time reliability affects wider economic outcomes including the ability to efficiently move people and goods around the network. As improvements to travel times during the school holidays show, a relatively small reduction in trips or mode share can have a significant impact on the efficiency of the network for all users.

- Currently only 68% of households are within 500m of a bus route, which may restrict the use of public transport as a viable travel option for many households.[vi] Data on the origin of people who took a bus to work on Census day highlights highest usage to the east and west of the central city with areas of low usage notably to the north and further south of the City (see page 34, the darker shades of green indicate a higher percentage of public transport use for trips to work on census day 2013).[vii]

- Public transport patronage in the Greater Christchurch area is declining. In 2011, 10.1 million trips were made on the Christchurch bus network, down over 40% from pre-earthquake levels.[viii] On census day in 2013, 2.5% of people travelled to work by bus in greater Christchurch (5,526 people), down from 3.5% (7,443 people) in 2006.[ix] Meanwhile on census day, 84% of commuters in Greater Christchurch used a car to get to work up from 82.3% in 2006.

- A survey undertaken by ECan in March 2016 indicated the main factors influencing decisions to stop using Metro urban scheduled bus services. A total of 41% of respondents indicated that changes to the network impacted their decision to stop using the bus service; other reasons cited included the decreased costs associated with driving and the unreliability of the bus service.[x]

- Current bus priority infrastructure is disjointed and examples include Papanui Road and Colombo Street where sections of the routes have bus lanes and other sections require buses to merge with general traffic, which reduces the effectiveness of the bus priority sections.

- The Network Management Plan (see page 35) analyses the existing network to identify the most significant service level gaps and prioritise the order in which gaps should be addressed based on agreed mode priorities. The size of the circles relates to the magnitude of the gap in service levels, and the different colours present in each circle represent the different travel modes. The intersections with the greatest gaps in service levels for public transport are situated along several key corridors including Riccarton Road and Blenheim/Main South Road to the southwest of the central city and Main North Road to the north of the central city. These routes form part of the core metro bus network. There are also less severe level of service gaps for public transport services on other parts of the network.[xi]

- Parking is widely available to private motor vehicle users (see pages 36 and 37, which show the cost and location of Council managed on street all day parking and the location of all off street parking facilities in the central city. The maps illustrate how all day parking is relatively inexpensive when compared to public transport – ranging from as little as $2 a day to $7. The map on page 37 illustrates the geographical spread of off street parking facilities, with a high number of facilities located in the southern and central parts of the city)[xii]. The graph on page 38 shows the gap between the supply and demand of parking in the Central City. This suggests current levels of parking exceed demand, making driving a more attractive option.[xiii]

- The private vehicle is the dominant mode of transport in Christchurch, as highlighted by the City's high private vehicle mode share for journeys to work (83% in the Christchurch metropolitan urban area), compared to public transport 3%, walking 6% and cycling 8%.[xiv]

- Current cycle infrastructure is disjointed as illustrated on page 38, which shows gaps in existing cycle facility provision, particularly to the north of the central city, where provision is sparse and notable gaps which has led to disjointed and incomplete routes to the south, east and west of the central city.[xv] Existing cycle routes are also not necessarily designed to attract potential cyclists (e.g. not physically separated routes).

Weighting	Problem Statement
Problem B (40%)	Land use associated with population and business change is no longer aligned with transport infrastructure, which is putting the network under pressure causing local 'pinch points' that experience peak time delays and poor journey time reliability.

Problem B is primarily concerned with post-earthquake land-use and the risk of sub-optimal transportation network performance due to a lack of flexibility in terms of programmed investment not being sufficiently aligned to address new travel demands and traffic patterns. In particular, the misalignment in terms of the timing of investment to support land use development.

- The most significant cause of local pinch points is considered to be the use of private vehicles from areas of high growth, most notably from Selwyn and Waimakariri districts. On Census day 2013, there was a 32.2% increase in the number of people commuting into Christchurch City to work from Hurunui District, Waimakariri District, Selwyn District, and Ashburton District compared to 2006.[ix] In 2013, 13.4% of the Christchurch City workforce (23,166 people) commuted to work from surrounding districts. This was a 10.7% increase (17,526 people) since 2006.[ix]

- The Network Management Plan (see page 35) analyses the existing network to identify the most significant service level gaps and prioritise the order in which gaps should be addressed based on agreed mode priorities. The size of the circles relates to the magnitude of the gap in service levels, and the different colours present in each circle represent the different travel modes. The intersections with the greatest gaps in service levels are situated along several key corridors including Riccarton Road and Blenheim/Main South Road to the southwest of the central city, Main North Road to the north, Brougham Street to the south and Carmen Road, Russley Road and Johns Road to the west. Differences between the AM and PM peaks are most pronounced along Blenheim and Riccarton Roads.

  Further, Level of Service maps (see page 39) are provided to indicate localised congestion hotspots. The maps are outputs from the CCC Cast transport model and visually illustrate the saturation capacity of each link (represents the volume of traffic over the capacity of the corridor as a ratio). The base year for the model is 2013 and this was used to determine the current state of the network.

  The maps highlight the corridors which are operating in the peak hours close to the theoretical capacity. The colour of the lines indicate the degree of saturation:

  - Green lines showing routes with a volume to capacity ratio of up to 80% (Level of service A – C, meaning a minor reduction when compared against the optimum speed is likely).

  - Orange lines showing routes with a volume to capacity ration of between 80%-90% (Level of service D, meaning a noticeable reduction in travel speed, congestion will be building up).

  - Red lines indicate a volume to capacity ratio of 90%-100% (Level of service E, meaning considerable speed reduction, longer queues at intersections, traffic delays and can result in significant re-routing of traffic).

  - Black lines indicate a volume to capacity ratio of above 100% (Level of service F, meaning high levels of congestion, delays and significant network operating issues are experienced).

  The corridors with the highest saturation capacity are predominantly situated to the north and west of the central city around the urban fringe, suggestion large numbers of trips from outside of the CCC boundary. Overall, the results clearly show corridors where the operating gaps and poor levels of service are most pronounced are areas which align with the location of recent growth areas.

  In addition, the Christchurch Transport Operations Centre produce monthly peak period heat maps which illustrate route performance (average speed observed as a percentage of the speed limit). The maps on pages 40 and 41 highlight the routes where average speeds are significantly below the posted speed limit (during peak hours, data from May 2016).

- Waimakariri District and Selwyn District have experienced significant population growth recently. Data obtained from Statistics New Zealand projects growth in these areas will likely continue (see page 42, which shows actual and projected population growth and highlights moderate growth in Christchurch City when compared with Waimakariri and Selwyn Districts), which is likely to have significant consequences for the CCC transport network.[xvi]

- Since the Canterbury earthquakes there has been a significant increase in household building consents issued as well as the development of Greenfield sites. Residential development in the 15 years since 2000 has been dominated by growth in Greenfield areas with it accounting for just over half the new residential development in the City (see graphs on page 42).[xvii]

- The release of Greenfield land for development was sequenced in Proposed Change 1 to the Regional Policy Statement over a period of 30 years.[xviii] However, post-earthquake, the Land Use Recovery Plan was developed by the Urban Development Strategy partners and the government to provide direction for residential and business land use development to support recovery and rebuilding across metropolitan greater Christchurch over the next 10-15 years.

  The Regional Policy Statement was subsequently amended to allow for Greenfield development without the requirement for sequencing. This has resulted in the release of large areas of Greenfield land for development and impacted the timing of planned transport infrastructure to support Greenfield growth sites. The maps on page 43 show the transport projects that are required to accommodate this growth, with the overlay of Greenfield and Plan Change sites.[xix] The maps illustrate that the Greenfield growth locations are predominantly located to the north and west of the central city.

- Poor journey time reliability has economic impacts. Data on per kilometre economic impact of delays on the CCC road network is provided on page 44. The data indicates the impact poor journey time reliability is having on the economy. It is noted some of these delays may be caused by ongoing repairs of the road network.[xx] The largest economic impacts are observed on the Four Avenues and the major routes to the west and south of the central city.

- Census data illustrates how the number of workers by greater Christchurch area unit is largest to the south and west of the city (see page 44, the darker shades of green indicate a higher number of workers by area unit on census day 2013)[ix], which corresponds with the growth of employment land in these areas post-earthquake and during the rebuild of the Central City.

Weighting	Problem Statement
Problem C (15%)	The condition of some of Christchurch's roads has deteriorated to the point where the performance of the roading network is causing inconvenience to road users and adjacent communities that contributes to economic loss.

Problem C specifically relates to the unique post-earthquake environment in Christchurch and the impact this has had on the condition of the transport network and corresponding levels of service.

- Approximately 1,000 kilometres (45%) of Christchurch's street network sustained significant damage in the earthquakes, requiring some 50,000 repairs. It is estimated that it will take around 30 years before the whole network is returned to a reasonable level of service.[xxi]

- The repairs generally focus on structural repair, waterproofing and positive drainage. However these do not address roughness, smooth travel exposure or the reduction in remaining asset life to pre-earthquake levels, see graphs on page 45, which indicates the time it will take for the roads to return to a reasonable level of service.[xxii]

- Currently 53% of or 1,224.3 km of the network pavement surfacing has passed the end of its expected life. This has been inspected and the quantity that requires resurfacing due to condition is in the order of 400km.[xxii] This has been verified by an independent consultant appointed by NZTA.

- Council has 3,245km of kerb and channel. Nominally 5% of this has defects. Further to this approximately 300km is old deep dish channel. [xxii]

- Council has 2,545km of footpath, and approximately 100km of this is in poor to very poor condition. Repairs are prioritised for paths near schools, community centres hospitals malls etc. Current budgets allow for footpath renewals of approximately 25km per year. [xxii]

- Council current has 17 weight restricted bridges, the majority of these a small timer bridges in the Banks Peninsula. However, several are large structures in the city and one of these is Pages Road Bridge, which serves a busy arterial road and will take considerable funding to remediate. It sustained damage in the earthquakes and has not yet been repaired. [xxii]

- Further to this Fitzgerald Avenue Twin bridges were also damaged in the earthquakes, while they are capable of carrying class 1 loads, they serve a regional road, and will require replacement in the near future. [xxii] Post SCIRT Council also has 80 earthquake damaged walls to remediate. [xxii]

Network Performance and Capability Summary

To summarise, the evidence suggests that network performance and capability is a significant driver for investment. Localised congestion and pinch points on parts of the network have been identified as key issues on the CCC transport network associated with several factors including post-earthquake growth (population and land use), the lack of sequencing of growth with transport infrastructure and the high reliance on the private vehicle. It is proposed that further refinement of the location of these issues and their significance will be provided in the Programme Business Case.

Issues such as growth (population and land use), the cost of public transport versus private vehicle travel, social attitudes to private vehicle use and the lack of dedicated bus or cycle infrastructure in Christchurch are all contributing factors to localised congestion. The condition of the road network post-earthquake is a key driver for investment. Current estimates suggest that it will take 30 years before the whole network is returned to a reasonable level of service. This is considered to be a significant period of time and a potential driver for increased investment.

This issue will be explored further in the Asset Management Plan Programme Business Case. The Asset Management Plan will outline options to close the level of service gap, their relative merits and costs. These options will then be presented to CCC, NZTA and the community for consideration as part of the 2018-2028 Long Term Plan Process.

Overall, the evidence provides a compelling case for further investigation into the network performance and capability issues and the benefits of any future investment to address the key challenges identified.

Transport and the Environment Problem Identification

Weighting	Problem Statement
Problem A (45%)	Lack of understanding of the way the network is planned and operated at a local level has at times resulted in tension with the goal of Christchurch becoming a liveable and sustainable city.

Problem A relates to projects that gain public approval and support at a city wide level, but can be delayed or compromised at a local level through site specific matters that are raised by local communities through the consultation stage. Understanding the underlying cause of this problem statement (lack of understanding) requires in-depth study, which has not been undertaken for this Strategic Case.

There is no readily available evidence to support or reject this aspect of the problem statement at this time. However, the consequences are well understood and key partners at the ILM workshop highlighted examples of local communities challenging proposals, making decision making difficult and delaying the implementation of schemes. It is considered that this problem statement is not unique to Christchurch.

Weighting	Problem Statement
Problem B (20%)	The way Christchurch's network is planned and managed fails to adequately recognise its interface with adjacent uses in order to provide equitable land use, physical and ecological quality of the environment and multi-modal connectivity.

Problem B highlights the important link between transport, land use and wider community aspirations. The use of existing, and development of new, transport infrastructure play a significant role in place-shaping and stimulating demand for new development. The land uses adjacent to roads are important as they influence road user behaviour.

- There are numerous examples across the city of streets which lack the balance between the provision of carriageway widths, car parking, footpaths and opportunities for amenity such as tree planting, taking into account the nature and land use of the adjacent environments. As an example Colenso Street in Sumner is a local street with low traffic volumes, which has a 15.3 metre wide carriageway and no grass berms. Local streets are typically 9 metres or less in width.

- Where there are groups of shops it is usual to finding loading and delivery activity and there is often demand for short term parking. High levels of activity by vulnerable users including pedestrians, cyclists and public transport users also tend to be common at these locations. As an example, Sumner is a key neighbourhood centre that is struggling to balance the desire for a walkable centre with the function of the road network (forms part of the Over-Dimension vehicle network).

  A further example is Blenheim Road, a route which provides a strategic function for freight transport, but also traverses several residential areas and causes severance and safety issues for pedestrians and cyclists. This route's function has changed from a single lane road to a multi-lane highway.

- The type of access properties have onto a traffic route also influences behaviour and capacity as a result of traffic entering and exiting the flow of traffic on the main carriageway, notwithstanding the conflicts created between vehicles, cyclists and pedestrians. The majority of Christchurch properties gain access directly via the local road network, including on the majority of arterial roads.

Weighting	Problem Statement
Problem C (20%)	Post-earthquake, Christchurch is more prone to localised flooding, which results in disruption to the network, access to property and subsequent economic loss.

Problem C conveys the issues associated with the city's geography and terrain. Christchurch is a low-lying city and there have always been areas that are prone to flooding during heavy rainfall or high tides. The Canterbury earthquakes have worsened the flooding risk in certain areas of the city through damage to waterways and land settlement and deformation. However, a review of available evidence suggests that flooding is not a significant issue that requires immediate investment in relation to the transport network.

- 9,000 properties have been identified as having increased flooding vulnerability post-earthquake (as shown in the flood risk map on page 46).

- The earthquakes have shown the transport network in Christchurch is resilient and alternative routes are likely to be available in the event of flooding episodes, which limits economic loss.

- This issue requires a multi-disciplinary response that is not limited to transport. Therefore, this problem statement is not considered a significant driver for transport investment (likely to be addressed for alternative reasons than transport) at the current time.

Weighting	Problem Statement
Problem D (15%)	The quality of infrastructure, amount of construction and increased use of roads is resulting in more heavy metal and sediment contaminants entering the stormwater system and subsequently polluting waterways.

Problem D captures the environmental impacts associated with the operation of the network and the damaged state of parts of the roading network following the earthquakes. Christchurch City Council manage an open water system of 158 kilometres of natural waterways as well as 61 kilometres of boxed drains and 72 kilometres of unlined drainage channels.[xxiii]

- Post-earthquake damaged roads meant the storm water systems could no longer divert storm water into the storm water drains. Liquefaction left deposits in some storm water systems after it dried up, causing blockages and road side drainage channels were damaged.[xxiii]

- The 2015 Christchurch City Council Residents' Survey indicates that 38% of respondents were either dissatisfied or very dissatisfied with the condition of waterways such as the Avon, Heathcote and Styx rivers and tributary waterways such as St Albans, and Cashmere Streams.[xxiv]

- High concentrations of transport-related heavy metals (which are toxic at low levels) have been found in the Heathcote, Avon and Styx rivers. Stormwater runoff from roads can also increase sedimentation in the rivers and Lyttleton Harbour.[xxv]

- The use of coal tar in roading materials has been identified as a major source of Polycyclic Aromatic Hydrocarbons (PAH's), in older areas of Christchurch. It is estimated that up to 50% of Christchurch's urban roads still have coal tar in subsurface layers.[xxvi] According to the SCIRT Best Practice Paper, an estimated 100 kilometres of road have been identified within the Christchurch rebuild area which contain, or potentially contain coal tar.

Transport and the Environment Summary

Although several issues have been identified in relation to the way the transport system interacts with the natural and built environment, a review of available evidence does not suggest these problems are a significant driver for investment at the current time.

It might be more appropriate for these issues to be addressed from a wider environmental portfolio perspective alongside wider environmental issues (not just transport). This would help to quantify the significance of the issues identified against wider environmental challenges.

To summarise, although transport and the environment is a key outcome that CCC is seeking to improve, it is not currently considered a direct key driver for investment in the transport system (likely to be secondary environmental benefits by addressing the network performance and capability issues).

Transport and Health Problem Identification

Weighting	Problem Statement
Problem A (60%)	Historic underinvestment in public transport, walking and cycling, can isolate users and limits modal shift.

Underinvestment in public transport, walking and cycling has resulted in disjointed networks, which contributes to a high reliance on private vehicle travel and low levels of public transport use, walking and cycling.

- Private vehicles account for 83% of journeys in Christchurch[xiv], this suggests that there are wider factors other than investment which influence modal choice. Further work is required to understand the cause of limited modal shift.

- A significant proportion of the public transport and active mode networks are incomplete, which limits the viability of these modes and contributes to a reliance on the private motor vehicle. See map of current cycle infrastructure on page 38, which illustrates the disjointed cycle network.

- Data on household income and expenditure shows that in Canterbury people spend on average $14 more per week on transport than the national average, which is likely to lead to place a burden on low income groups who have limited discretionary funds for transport costs.[xxvii]

Weighting	Problem Statement
Problem B (20%)	There is a perception that active modes of travel are dangerous, which leads to poor take up of active modes, which contributes to long term poor health outcomes.

Problem B is linked to Problem C in Transport Safety. It relates to the perception that active modes are unsafe, however the effect is linked directly to poor health outcomes.

- Data from the 2013 Census indicates that approximately 9,000 people in Christchurch reported cycling to work. This is approximately 7% of the population and is the second highest mode share in the country behind Nelson.[ix]

- Data collected through the Christchurch City Council Annual Satisfaction Survey indicated that only 37% of respondents agreed that Christchurch was cycle friendly, with 46% disagreeing.

- 50% of all car journeys in Christchurch are under five kilometres, these short trips could be made on foot or by bike.[xxviii]

- In Christchurch only 39% of residents are active every day.[xxix] The health benefits of active modes are well documented and include reduced risk of obesity, osteoporosis, diabetes, cardiovascular disease, depression and some cancers.

- Accident data included in Transport Safety (Problem C) suggest that cycle and pedestrian safety reflects an actual issue rather than just a perception that walking and cycling is unsafe.

Weighting	Problem Statement
Problem C (20%)	The volume of vehicles on key routes at peak times results in increased levels of polluting and consequent poor health outcomes.

Problem C captures the impact the transport system has on the environment, specifically air quality. New Zealand is one of the country's that emits the largest volume per capita of greenhouse gases, only just behind the United States and Australia.

- In 2008, 3.6 million tonnes of greenhouse gas were emitted from Christchurch. This is about 10 tonnes per person, per year. Transport fuels make up around 67% of emissions (see page 46).[xxx]

- It is widely recognised that high levels of pollution associated with a car dominated transport system leads to increased levels of asthma (Bell and Cohen, 2009). Approximately 15-20% of adults and children in New Zealand (600,000 people) live with asthma. Asthma is the most common cause of hospital admissions in children, costing the New Zealand economy over $825 million per year.[xxxi]

- Mortality resulting from vehicle emissions is an 'invisible' road toll. Although difficult to quantify with any certainty, both international and New Zealand studies have estimated that mortality in people aged over 30 is likely to be equal to the number of fatalities caused by road crashes.[xxxii]

Transport and Health Summary

The problem statements captured in the transport and health ILM workshop provide an alternative lens to the network performance and capability problem statements. Many of the challenges identified are similar, however the consequences within this section are linked to health outcomes. A review of available evidence highlights the benefits of addressing many of the network performance and capability challenges.

To summarise, although transport and health is a key outcome that CCC is seeking to improve, it is not currently considered a direct key driver for investment in the transport system (likely to be secondary health benefits by addressing the network performance and capability issues).

Problem Identification Summary

The four ILM workshops reaffirmed many of the challenges identified in the overarching Strategic Assessment (November, 2015). A review of available evidence suggests that there are specific safety, travel time reliability, congestion, network continuity and road condition problems affecting the operation of the CCC transport system. Future growth forecast for the Greater Christchurch area will likely increase these problems if there is no intervention.

The causes of the problems were suggested as being post-earthquake and predicted future population changes, the way people choose to travel (predominantly by single occupant private vehicle), the location and type of current infrastructure and post-earthquake damage to the local road network.

The potential benefits of successfully addressing the problems outlined in the previous section were also identified during the ILM workshops with key stakeholders. A full description of these benefits is provided within the Benefit Maps at **Appendix E**. Further information is required to quantify the scale and location of the issues on the CCC network. This information, along with further detail on bus delays, the renewals programme, crash statistics, travel time delays and network deficiencies should be developed through a Programme Business Case.

4. PART B: PLANNING THE PROGRAMME CASE

Purpose

The purpose of a Programme Business Case (PBC) is to investigate and develop a preferred programme of activities for implementation that will best address the key investment drivers (problem areas) and outcomes defined in the Strategic Case. Based on the conclusions of the Strategic Business Case the following scope or work is proposed for the development of a single PBC:

- Re-confirm the scale of the problems, confirm the benefits and SMART objectives and measures to assess success of potential alternatives and options.
- Undertake a city wide analysis to identify key parts of the network (by using evidence) where there are problems (such as current and predicted network delays, high crash risk, gaps in the network, poor condition roads etc.) that require intervention.
- Develop a long list (toolbox) of potential strategic responses that could address the problems identified in the overall city wide analysis.
- Develop an options assessment framework for each 'hotspot' identified through the network analysis that identifies a short list of strategic responses for each location. Where there are multiple issues in close proximity, the strategic response will aim to address all problems collectively.
- Use a multi-criteria analysis tool to prioritise the proposed projects by the extent to which they are demonstrably effective at addressing the problems identified in the Strategic Case. The output will be a prioritised list of projects to take forward to the draft 2018-2028 Long Term Plan.

5. FUNDING APPLICATION

Resourcing

The project will be managed in-house by CCC staff, with technical consultancy support and NZTA regional office over-sight and input. A management project control group has been established between key CCC and NZTA staff to ensure good visibility of the business case development. A separate technical working group has also been developed and includes key CCC staff working on the PBC. The technical group will meet fortnightly and include a member of NZTA's Christchurch Planning and Investment team to ensure strong visibility of the development of the PBC.

Table 1: Estimated costs

Resource	Anticipated Cost
Staff costs	$200,000
Consultant costs	$100,000

The estimated cost of developing the next phase of the business case is **$300,000**.

As this work will be used to inform the development of CCC's next Long Term Plan (2018-2028) the anticipated final cost of the final response is estimated to be over $300 million, over ten years (excluding renewals, maintenance and operating costs).

Interfaces

Over the past 12-18 months CCC has developed several existing modal or area based business cases. These have been recognised, however, they have not been used to predetermine the outcome of the Strategic Case. Existing business cases with interventions that are scheduled to be delivered prior to the 2018-2028 CCC Long Term Plan will continue to be progressed.

Any proposed interventions contained within existing business cases that will not be funded prior to the 2018-2028 CCC Long Term Plan will be reviewed at the proposed Programme Business Case stage to ensure they remain current and valid. NZTA and Selwyn District Councils are also developing business cases for their areas of control and these need to be considered to align the best possible "one network" outcomes.

Challenges and Risks

Key challenges, risks and mitigations to undertaking the PBC include:

- CCC is proposing a new approach to investment and programme planning, which may not be fit for purpose. However, CCC is confident that it has taken the intent of the Better Business Case principles and with the support of NZTA applied them in a logical way, whilst taking account of CCC requirements.

- Funding processes and tools may not align with the development of an integrated package of responses that cover multiple outcomes or activity classes, which could delay the processing of funding applications. However, CCC is confident these challenges can be resolved through continued dialogue with funding partners.

- CCC has involved Councillors in the ILM workshops to achieve buy-in and ownership of the problem identification. Councillors where possible will continue to be involved in the development of the Programme Business Case and options assessment to ensure alignment with the Long Term Plan process and their roles as key decision makers for future investment.

- The next Christchurch City Council elections will be held in October 2016, which may introduce some political risks as councillors engage in election campaigns, which could impact the availability of councillors to participate in the next stages of the business case. A change in representation may also pose a risk. CCC will engage with councillors as soon as possible after the elections.

- Recognition and understanding of inter-regional and cross-boundary priorities to ensure an appropriate "one network" approach. CCC will engage with partners such as Selwyn District, Waimakariri District and NZTA around the ongoing development of business cases.

- Meeting the tight timeline deadlines detailed in the key deliverables and schedule. CCC has statutory obligations to meet both Regional Land Transport Plan and Long Term Plan timeframes. CCC is confident that it has allocated sufficient resource and time to enable a robust programme of work to be completed in time to feed into both of these important regional documents.

Stakeholder Engagement

Key regional stakeholders have been involved to date to ensure that a one network approach is taken to addressing CCC transport system problems. Political input has also been sought from Christchurch City Councillors. Wider consultation will be required to develop the PBC and integrate the capital works planning through the upcoming Regional Land Transport Plan.

The project team will engage directly with stakeholder officers during the development of the PBC. Other communication updates will be provided through the UDS Transportation Group, and the existing UDS governance group structures.

6. STRATEGIC CONTEXT

Organisational Overview

Appendix F illustrates how investment in the CCC transport system aligns with existing partner and stakeholder strategies and organisational goals. In summary, this Strategic Case aligns with relevant national, regional and local strategic priorities and objectives (as demonstrated at **Appendix G**).

Anticipated Strategic Fit and Effectiveness

An assessment of the Strategic Fit has been undertaken in accordance with the NZTA Investment Assessment Framework for the Transport Planning Activity Class and is provided at **Appendix H**. It has been determined that this Strategic Case has a **HIGH** level of strategic fit. An assessment of effectiveness is also provided at **Appendix H**.

Recommendations

This Strategic Case has undertaken a review of the key transport problems and challenges related to the CCC transport system. A review of available evidence has confirmed that the problems are significant and require addressing.

It is recommended that this Strategic Case is refined through the development of a single Programme Business Case to begin the process of investigating potential strategic responses.

It is recommended that:

i. This Strategic Case be endorsed by CCC and NZTA; and that

ii. Approval is sought to develop a Programme Business Case to consider at the appropriate level the various strategic options, programmes and alternatives for solving the problems or realising the benefits, outcomes and opportunities.

APPENDIX A - STRATEGIC CASE PROCESS

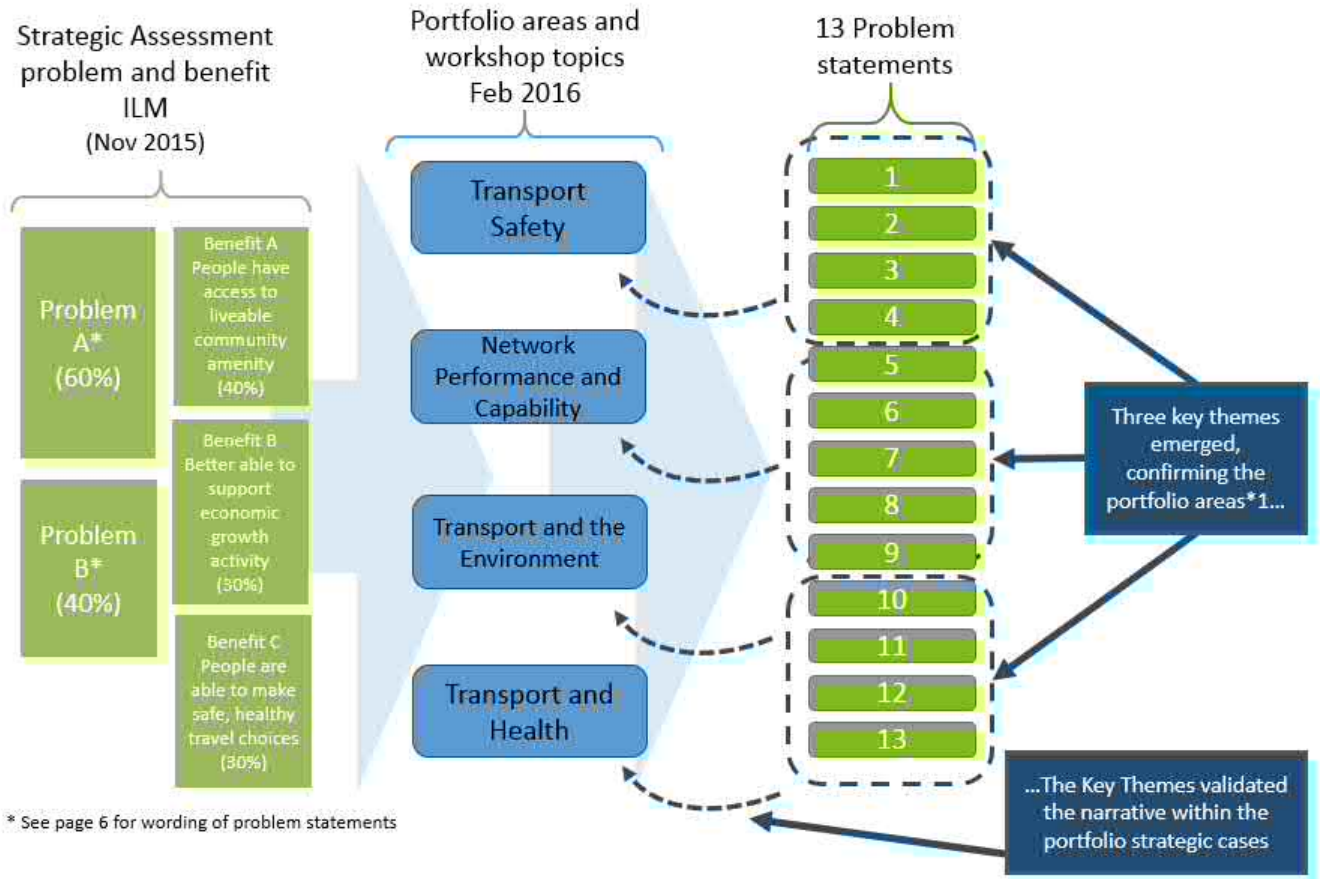
Overview of Process

The approach adopted to draft this Strategic Case has been developed in consultation with NZTA and LGNZ to allow CCC to right size the effort to the risks and uncertainties. CCC has built up an investment story through the overarching Strategic Assessment and this subsequent Strategic Case. This information alongside the proposed next steps (Programme Business Case) will be used to inform the development of the 2018-2028 CCC Long Term Plan and the Regional Land Transport Plan.

The overarching Strategic Assessment identified four portfolios of activity grouped around the outcomes of transport safety, network performance and capability, transport and the environment and transport and health. In February 2016, senior CCC staff, external stakeholders and industry experts contributed to four Investment Logic Mapping (ILM) workshops (one for each portfolio) to examine the key transport issues and challenges.

The ILM workshops identified 13 problem statements, with a number of synergies across the four portfolios; the aim being to add granularity to the high level problems identified in the overarching Strategic Assessment (a detailed description of the problem statements is provided within Section 4). This led to the identification of three main themes or drivers for change.

Figure 3: Link between Strategic Assessment, Strategic Case, Problem Statements and Themes



High Level Themes *1

Throughout the ILM workshops three consistent themes emerged. These themes represent the core challenges faced in the operation of the CCC transport system and are consistent with the high level problem statements identified in the overarching Strategic Assessment (November 2015). They are:

- Human behaviour, awareness and perception play an important role in the way the transport system is designed and operated and also impacts the way the network operates.

- The Christchurch transport system still faces major challenges as a result of the earthquakes, which affect the way the network is used and managed, which can result in negative impacts on the natural environment.

- Historic investment and network design decisions have resulted in a car dominant city which makes it challenging for public transport, walking and cycling to compete as viable modes of transport and contributes to specific safety issues on parts of the network.

A review of available evidence suggests that there are specific safety, travel time reliability, congestion, network continuity and road condition problems affecting the operation of the CCC transport system. Future growth forecast for the Greater Christchurch area will likely increase these problems if there is no intervention.

The causes of the problems were suggested as being post-earthquake and predicted future population changes, the way people choose to travel (predominantly by single occupant private vehicle), the location and type of current infrastructure and post-earthquake damage to the local road network.

Further information is required to quantify the scale and location of the issues on the CCC network. This information, along with further detail on bus delays, the renewals programme, crash statistics, travel time delays and network deficiencies should be developed through a Programme Business Case.

APPENDIX B - STAKEHOLDER LIST

Table 2: Safety ILM Workshop - 17th February 2016

Name	Organisation and Position	Input to Strategic Case
Stephen Davies-Howard	Davies Howard Group	Accredited ILM Facilitator
Tim Scandrett	City Councillor	ILM Participant
Steve McNeill	CCC Senior Capital Programme Advisor	ILM Participant
Eynon Phillips	CCC Transport Planner	ILM Participant
Paul Burden	CCC Senior Traffic Engineer	ILM Participant
Tim Cheesebrough	CCC Senior Transport Planner	ILM Participant
Angela McDonnell	CCC Community Travel Advisor - Safety	ILM Participant
Ryan Rolston	CCC Senior Traffic Engineer	ILM Participant
Steffan Thomas	CCC Operations Manager (Transport)	ILM Participant
Michael Blyleven	NZTA Transport Planning Manager	ILM Participant
David Scarlet	NZTA Senior Investment Advisor	ILM Participant
Caroline Hutchison	NZTA Senior Planning Advisor	ILM Observer
Rae-Anne Kurucz	CCC Team Leader Transport Strategy	ILM Participant/Problem Owner
David Falconer	CCC Senior Policy Planner - Transport	ILM Participant
Karyn Teather	CCC Policy Planner - Transport	ILM Observer/Author
Andrew Smith	CCC Policy Planner - Transport	ILM Observer/Author

Table 3: Network Performance and Capability ILM Workshop - 17th February 2016

Name	Organisation and Position	Input to Strategic Case
Stephen Davies-Howard	Davies Howard Group	Accredited ILM Facilitator
Phil Clearwater	City Councillor	ILM Participant
Steve McNeill	CCC Senior Capital Programme Advisor	ILM Participant
Ryan Cooney	CCC Manager Christchurch Transport	ILM Participant
Nilesh Redekar	CCC Transport Planner (network)	ILM Participant
Mark Pinner	CCC Manager City Streets (maintenance)	ILM Participant
Paul Burden	CCC Senior Traffic Engineer	ILM Participant
Michael Jacobson	CCC Asset Engineer (roading)	ILM Participant
Shannon Boorer	ECan Senior Strategy Advisor	ILM Participant
Ryan Rolston	CCC Senior Traffic Engineer	ILM Participant
Michael Blyleven	NZTA Transport Planning Manager	ILM Participant
Caroline Hutchison	NZTA Senior Planning Advisor	ILM Observer
Rae-Anne Kurucz	CCC Team Leader Transport Strategy	ILM Participant/Problem Owner
Karyn Teather	CCC Policy Planner - Transport	ILM Observer/Author
Andrew Smith	CCC Policy Planner - Transport	ILM Observer/Author

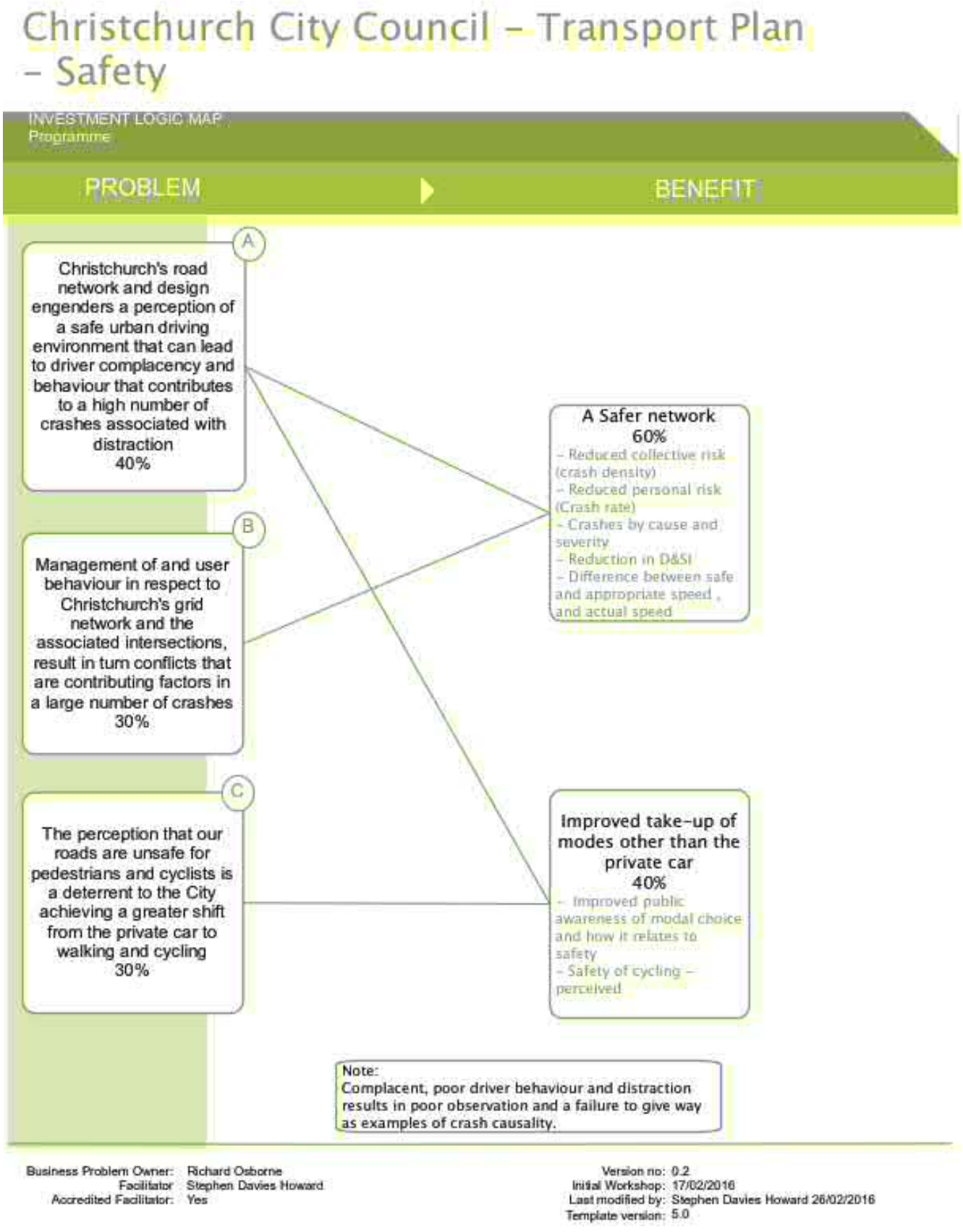
Table 4: Transport and the Environment ILM Workshop - 18th February 2016

3Name	Organisation and Position	Input to Strategic Case
Stephen Davies-Howard	Davies Howard Group	Accredited ILM Facilitator
Phil Clearwater	City Councillor	ILM Participant
Vicki Buck	City Councillor	ILM Participant
Pauline Cotter	City Councillor	ILM Participant
Steve McNeill	CCC Senior Capital Programme Advisor	ILM Participant
Tim Cheesebrough	CCC Senior Transport Planner	ILM Participant
Eynon Phillips	CCC Transport Planner	ILM Participant
Josie Schroder	CCC Principal Advisor (urban design)	ILM Participant
Clive Appleton	CCC Team Leader Natural Environment	ILM Participant
Len Fleete	ECan Strategy Advisor	ILM Participant
James Young	CDHB Sustainability Advisor	ILM Participant
Caroline Hutchison	NZTA Senior Planning Advisor	ILM Observer
Rae-Anne Kurucz	CCC Team Leader Transport Strategy	ILM Participant/Problem Owner
Andrew Smith	CCC Policy Planner - Transport	ILM Observer/Author

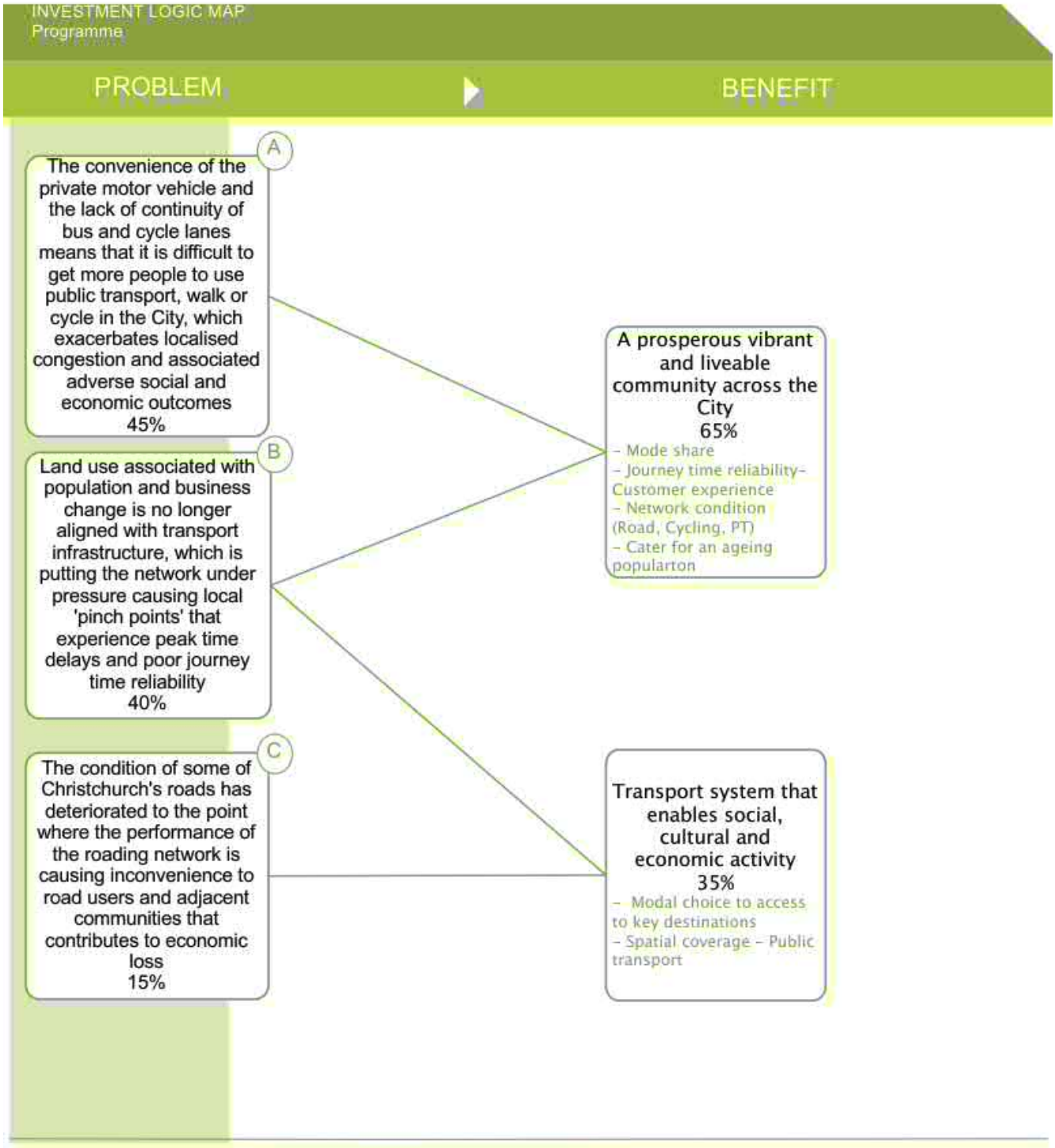
Table 5: Transport and Health ILM Workshop - 18th February 2016

Name	Organisation and Position	Input to Strategic Case
Stephen Davies-Howard	Davies Howard Group	Accredited ILM Facilitator
Tim Scandrett	City Councillor	ILM Participant
Steve McNeill	CCC Senior Capital Programme Advisor	ILM Participant
Trudy Jones	CCC Transport Planner	ILM Participant
Dhanesh Amerasingam	CCC Urban Designer	ILM Participant
Sarah-Jane Cooper	CCC Community Education Coordinator	ILM Participant
Nick Lovett	CCC Policy Planner - Transport	ILM Participant
James Young	CDHB Sustainability Advisor	ILM Participant
Jane Murray	CDHB Health Policy Advisor	ILM Participant
Angela Cassidy	CCC Principal Advisor Policy	ILM Observer
Rae-Anne Kurucz	CCC Team Leader Transport Strategy	ILM Participant/Problem Owner
Andrew Smith	CCC Policy Planner - Transport	ILM Observer/Author

APPENDIX C - INVESTMENT LOGIC MAPS



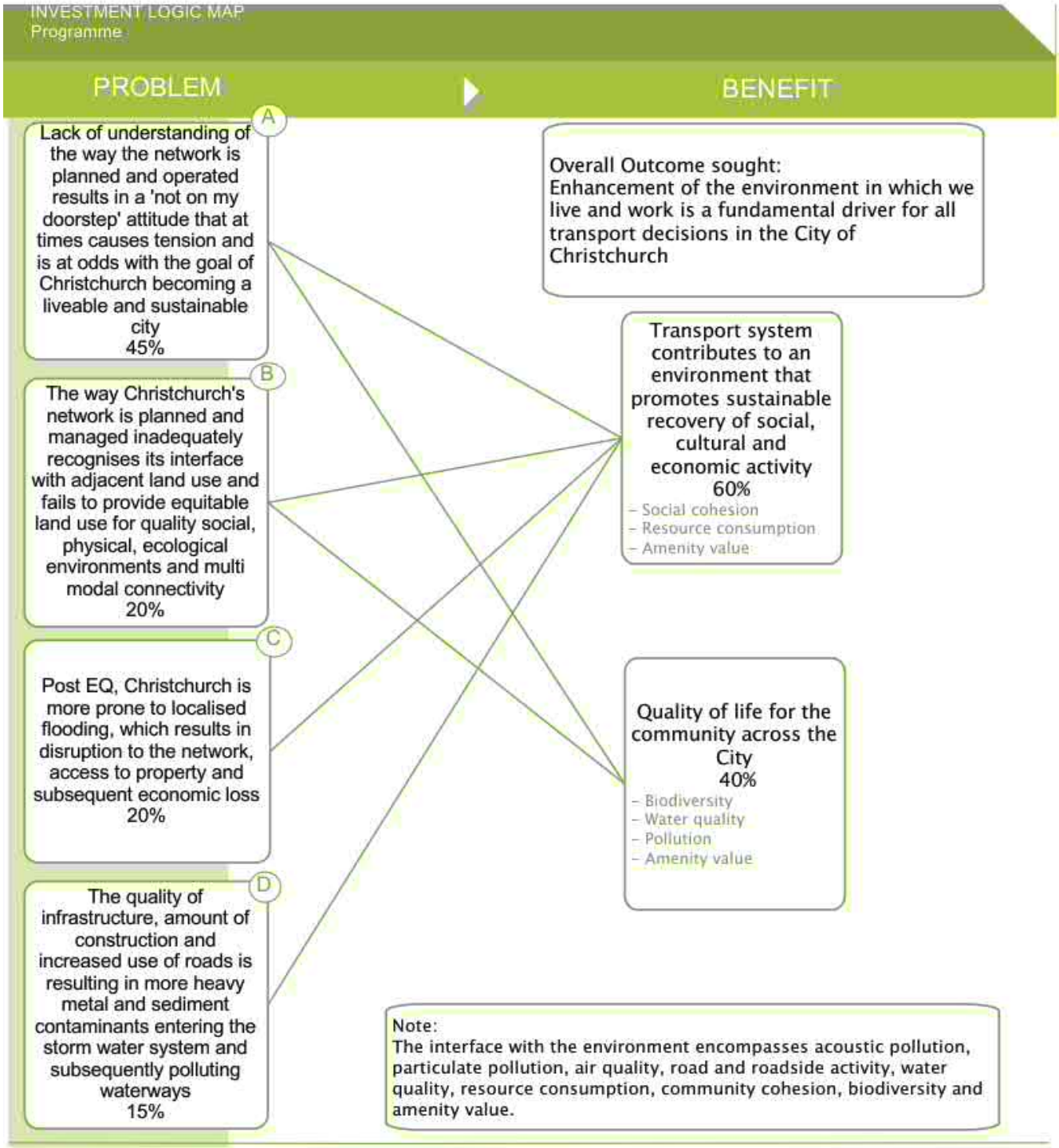
Christchurch City Council – Transport Plan – Network Performance and Capability



Business Problem Owner: Richard Osborne
Facilitator Stephen Davies Howard
Accredited Facilitator: Yes

Version no: 0.3
Initial Workshop: 17/02/2016
Last modified by: Stephen Davies Howard 2/03/2016
Template version: 5.0

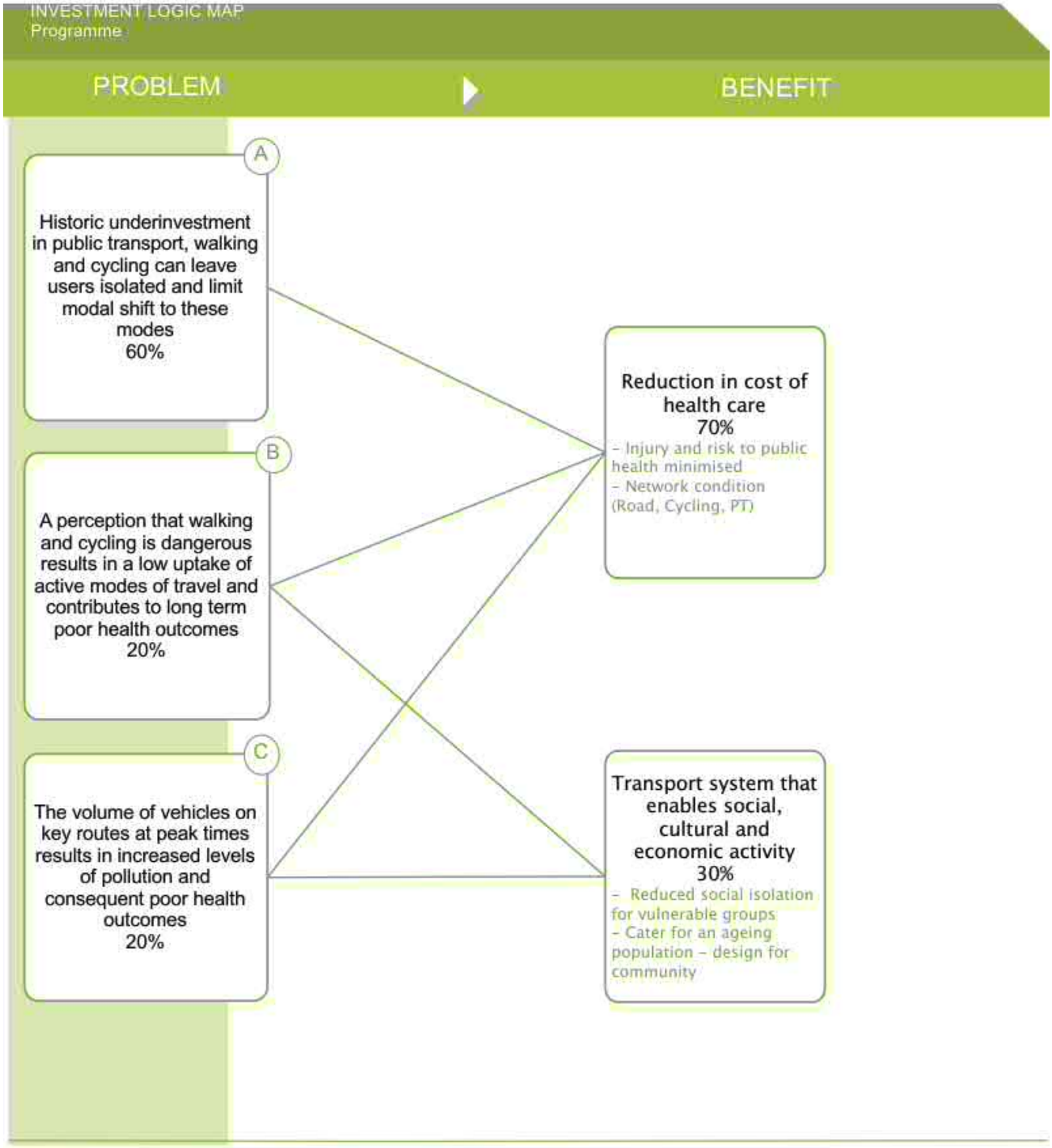
Christchurch City Council – Transport Plan – Environment



Business Problem Owner: Richard Osborne
Facilitator Stephen Davies Howard
Accredited Facilitator: Yes

Version no: 0.3
Initial Workshop: 18/02/2016
Last modified by: Stephen Davies Howard 2/03/2016
Template version: 5.0

Christchurch City Council – Transport Plan – Health



Business Problem Owner: Richard Osborne
Facilitator: Stephen Davies Howard
Accredited Facilitator: Yes

Version no: 0.3
Initial Workshop: 17/02/2016
Last modified by: Stephen Davies Howard 2/03/2016
Template version: 5.0

APPENDIX D - SUPPORTING EVIDENCE

Figure 4: Crashes at intersections in Christchurch (NZTA, Crash Analysis System)

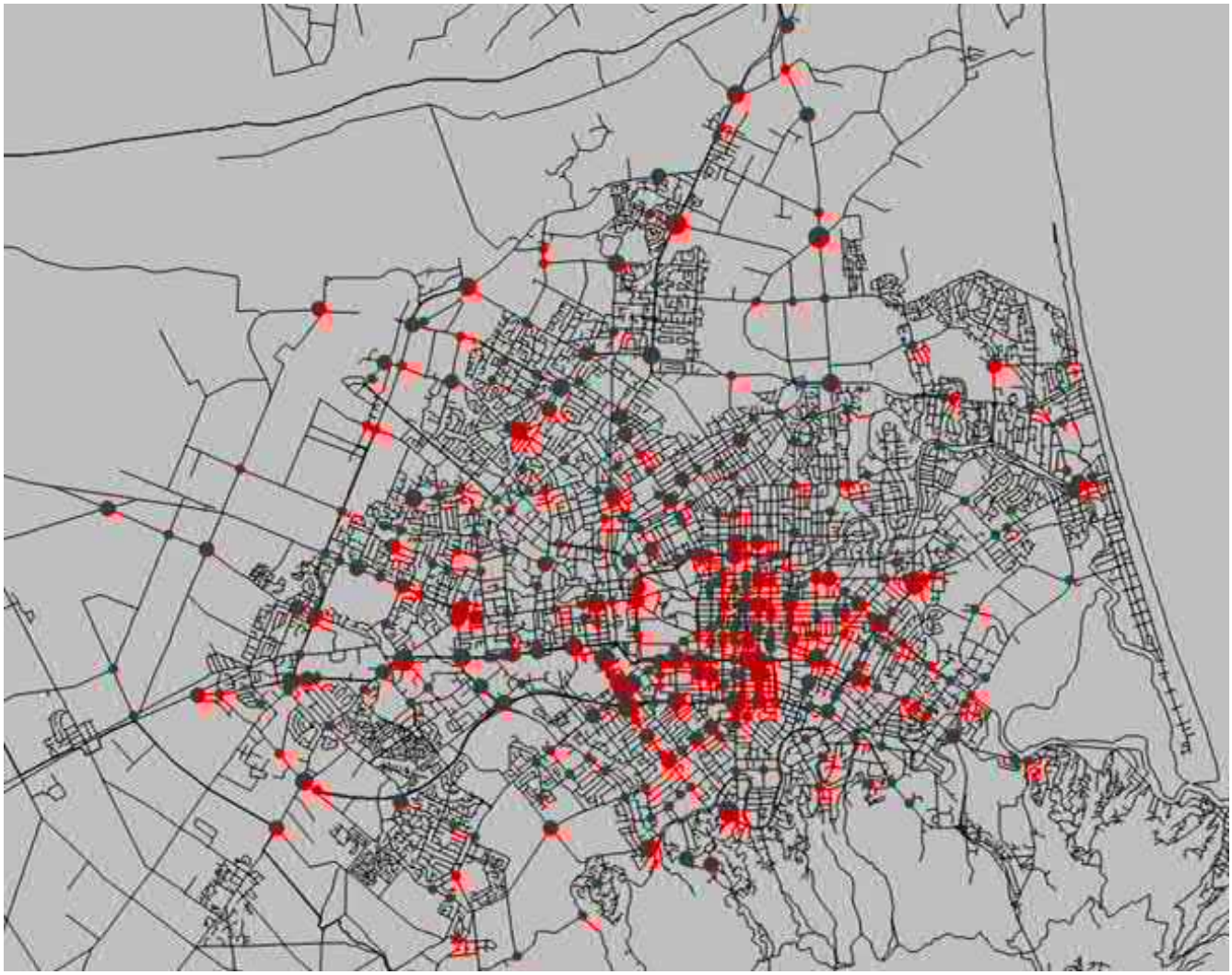


Figure 5: Percentage of people who took a public bus to work (2013 census)

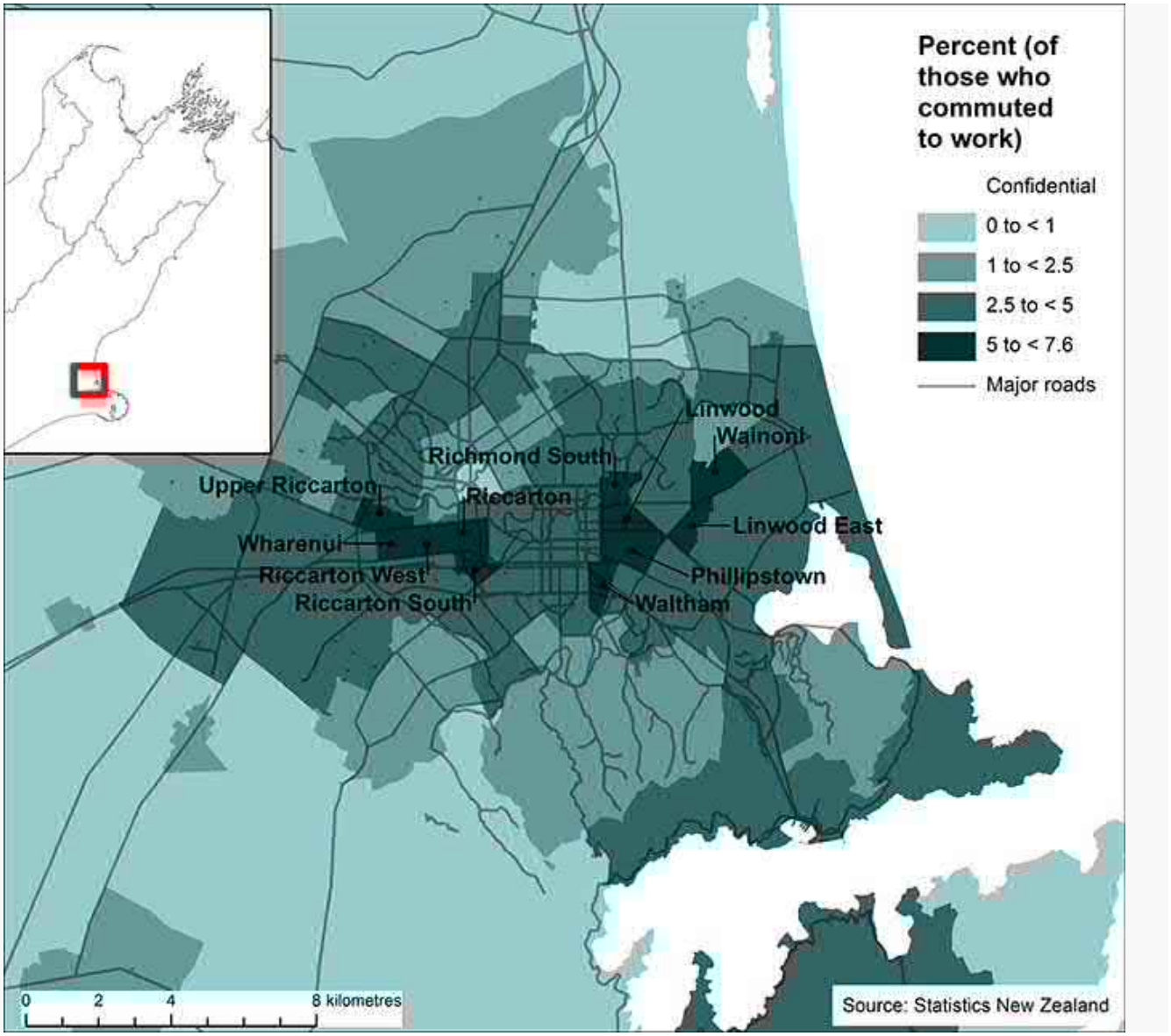


Table 6: Travel Time and Cost of Travel on Main Routes in Christchurch for Car, Bus and Bike (PM Peak)

	Route	Car	Bus	Bike
North	CBD to Belfast via Cranford St	12 min $5.55	37 min $2.50	32 min
South	CBD to Cashmere via Colombo St	9 min $4.42	26 min $2.50	26 min
East	CBD to New Brighton via Pages Rd	11 min $3.71	34 min $2.50	21 min
West	CBD to Chch Airport via Memorial Ave	13 min $5.39	35 min $2.50	31 min

Figure 6: Gap Analysis AM Peak

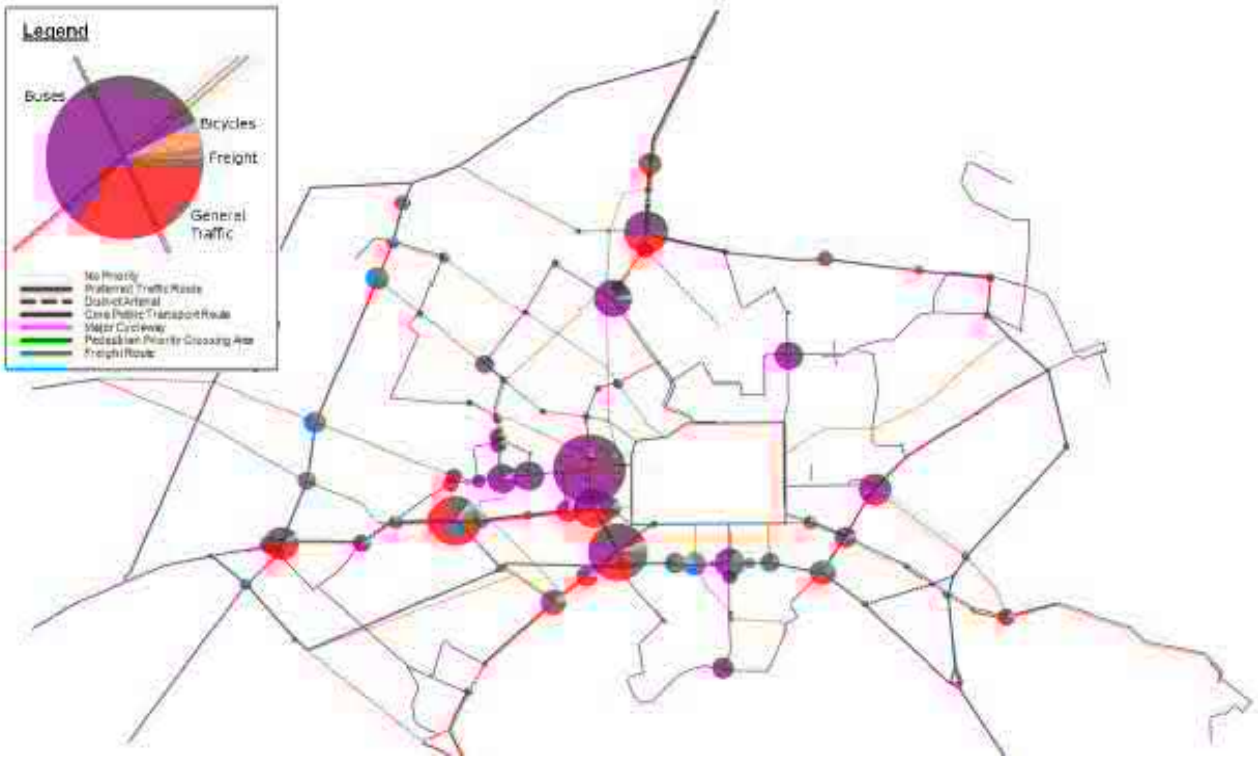


Figure 7: Gap Analysis PM Peak

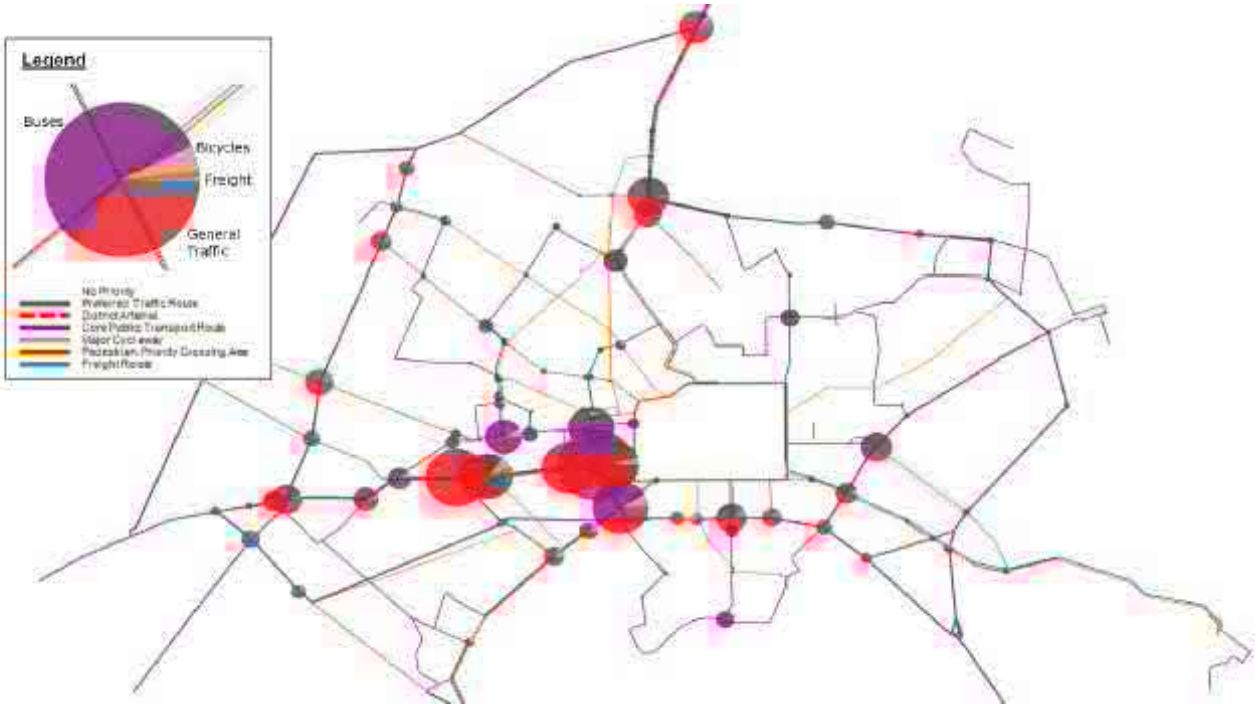


Figure 8: On-street all-day parking spaces in the Central City

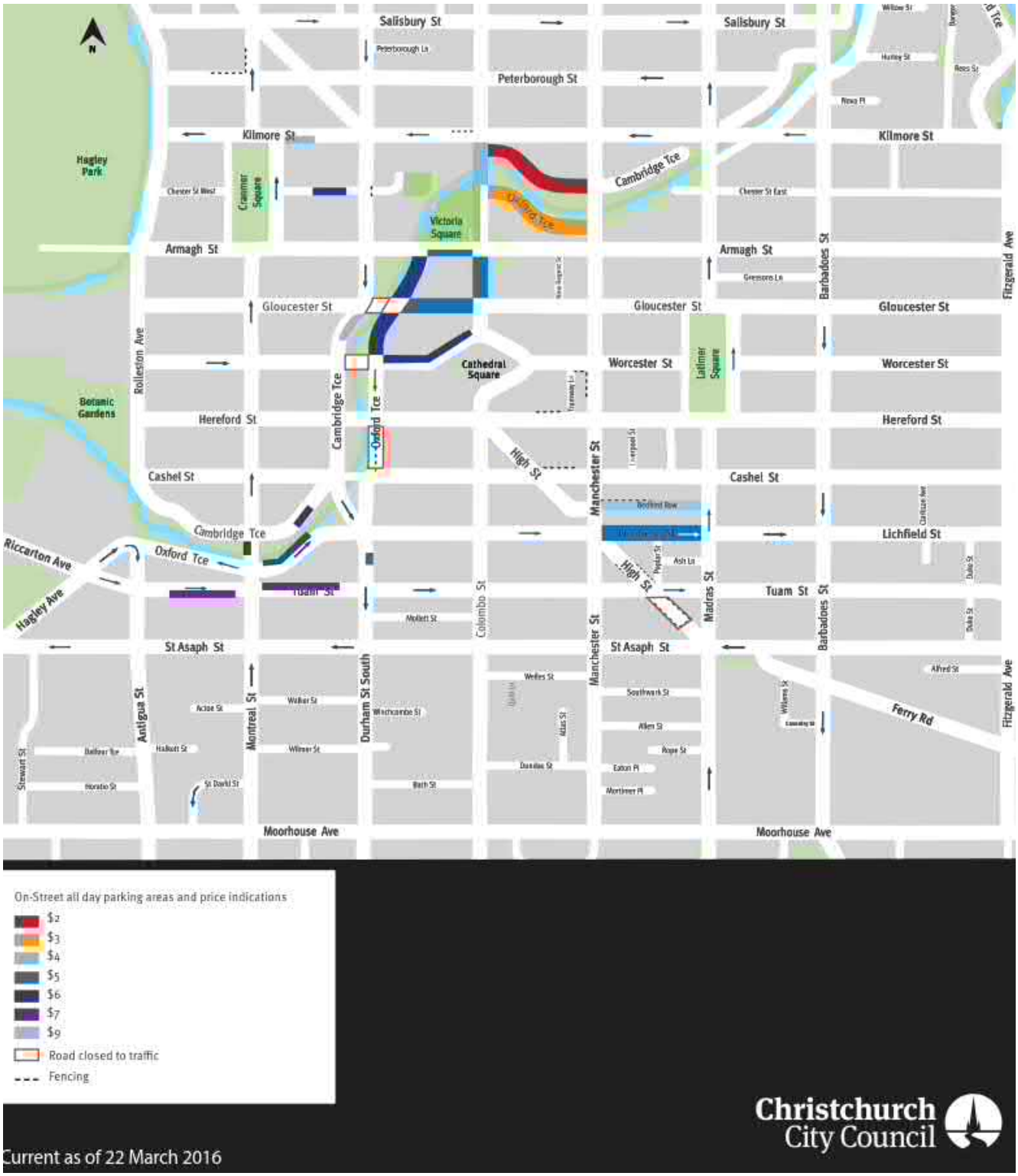


Figure 9: Off-Street parking facilities in the Central City

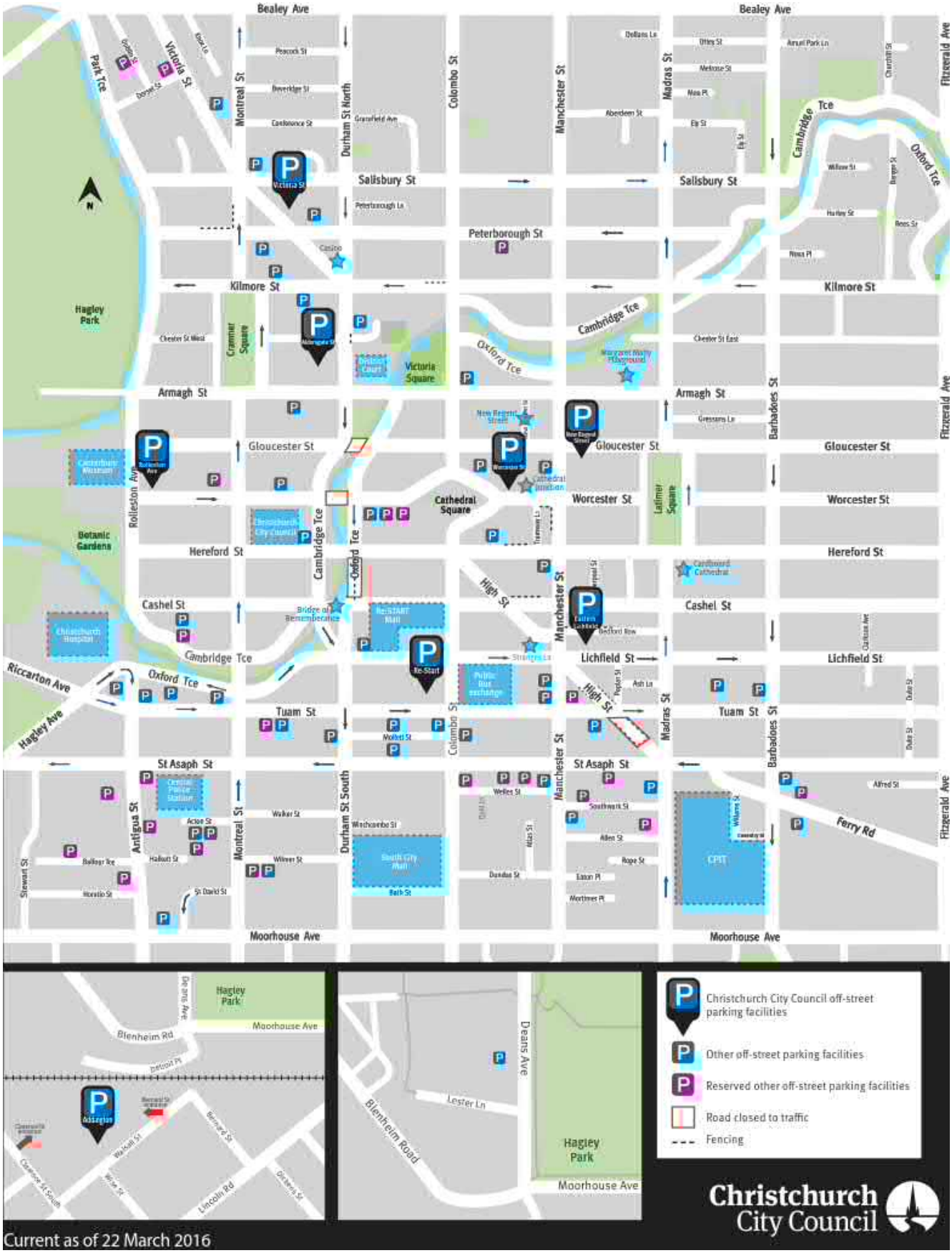


Figure 10: Supply and demand of parking (CCC quarterly surveys)

Figure 11: Existing Cycle Lanes (on road)

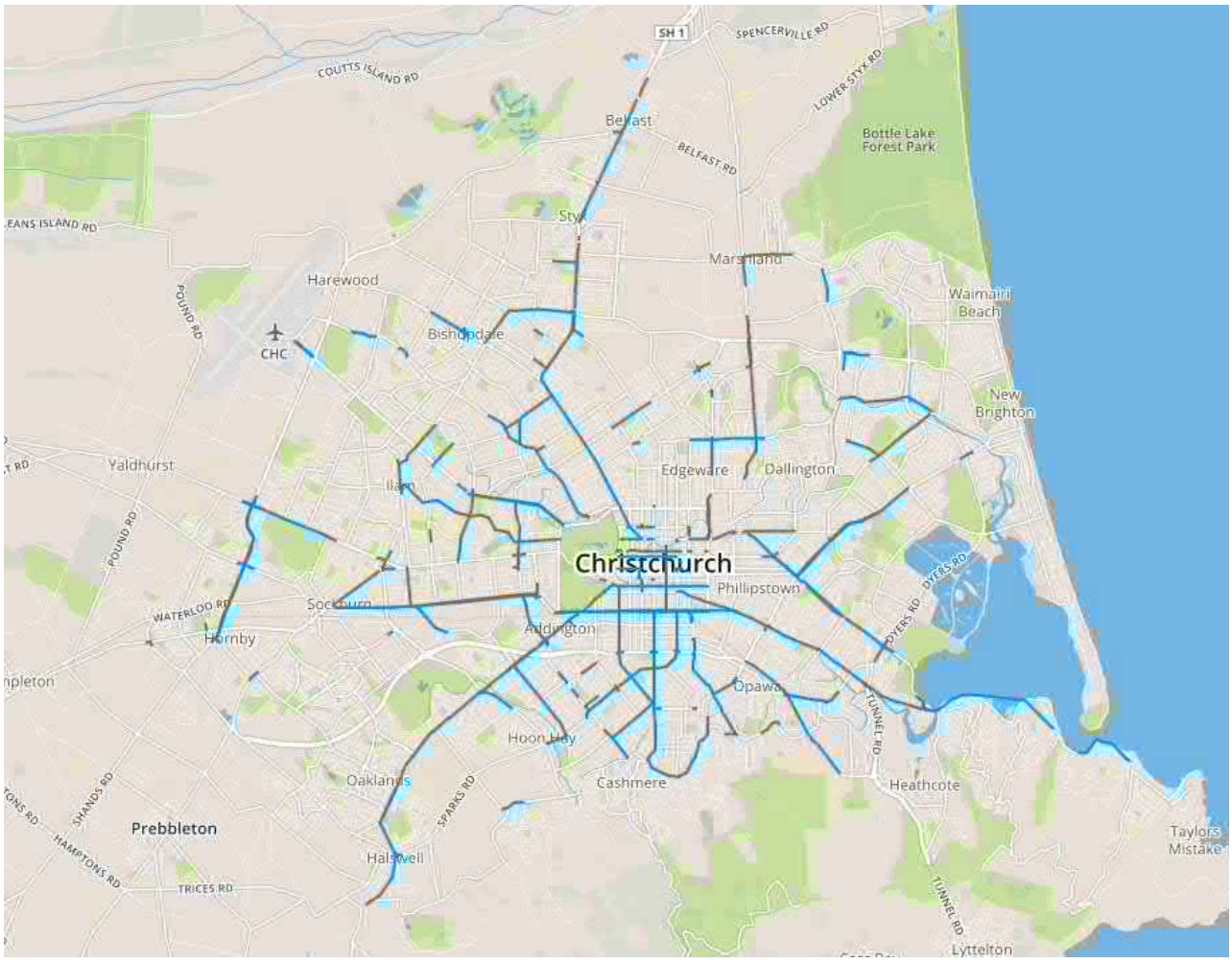


Figure 12: 2013 AM Peak Degree of Saturation (Volume over Capacity Percentage)

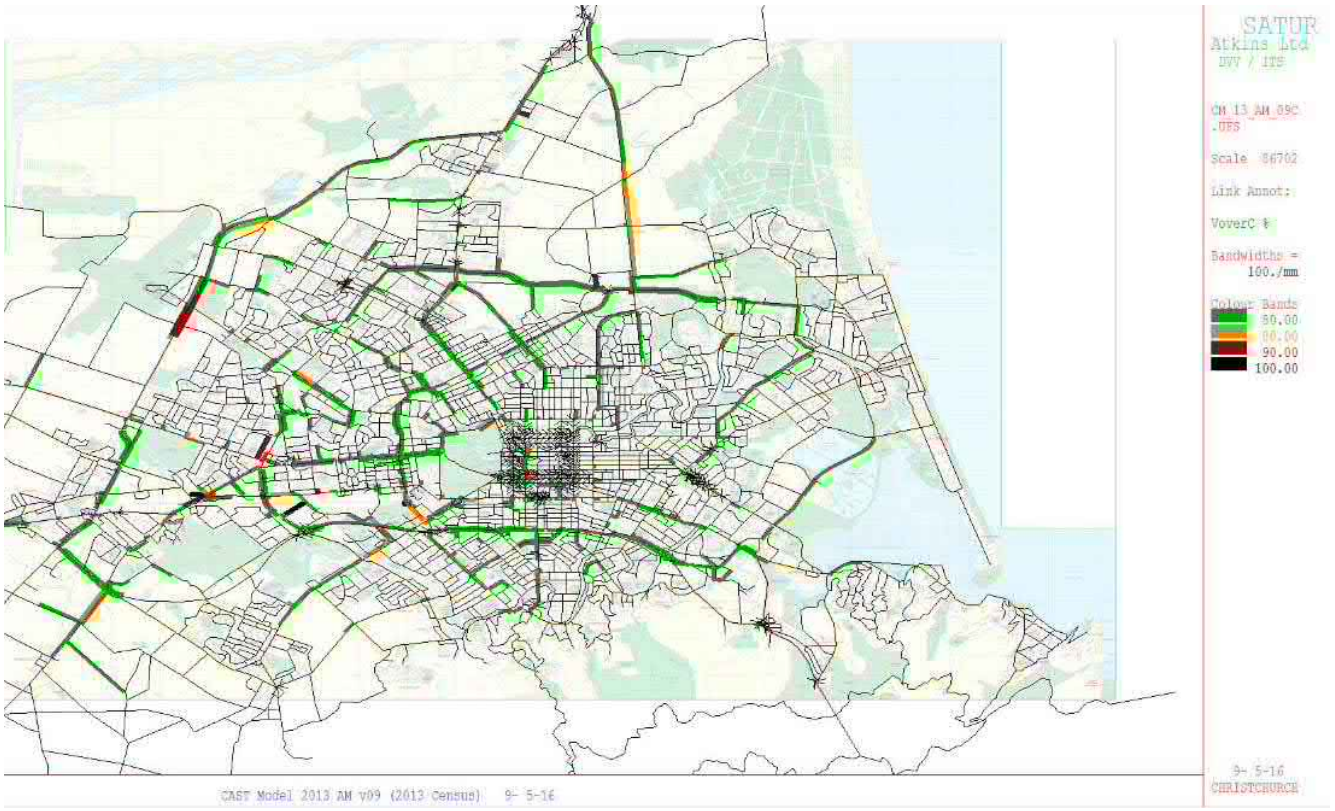


Figure 13: 2013 PM Peak Degree of Saturation (Volume over Capacity Percentage)

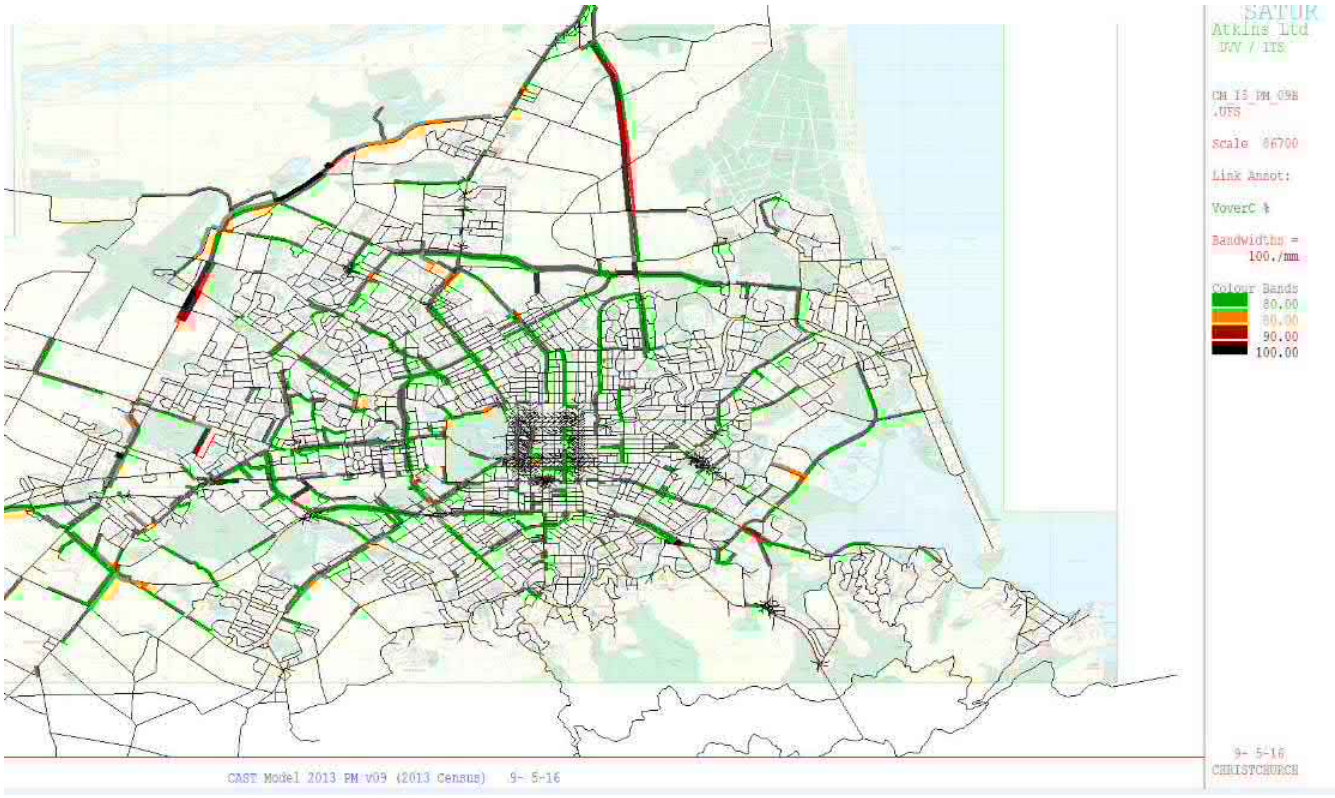
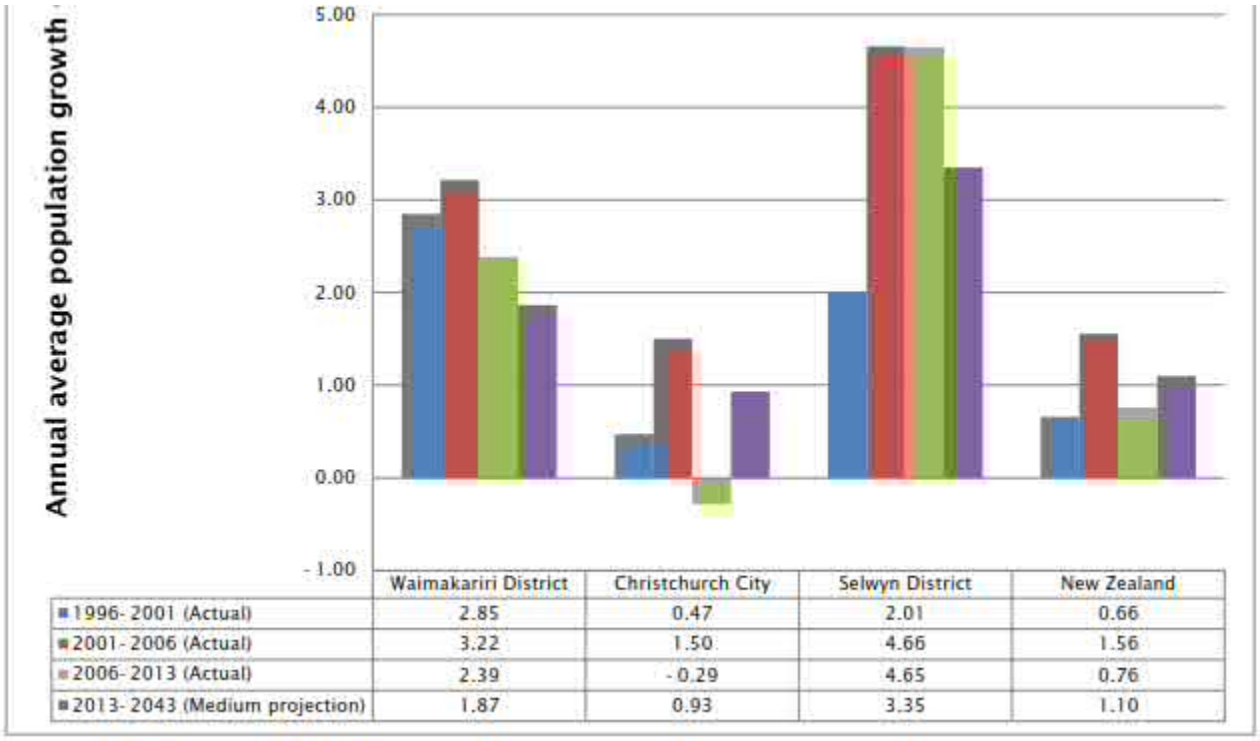


Figure 14: AM Peak Hour Heat Map (April 2016) note road works may impact reduced speeds on some routes

Figure 15: PM Peak Hour Heat Map (April 2016) note road works may impact reduced speeds on some routes

Figure 16: Annual average population growth for selected time periods (Statistics New Zealand)



	Waimakariri District	Christchurch City	Selwyn District	New Zealand
1996- 2001 (Actual)	2.85	0.47	2.01	0.66
2001- 2006 (Actual)	3.22	1.50	4.66	1.56
2006- 2013 (Actual)	2.39	- 0.29	4.65	0.76
2013- 2043 (Medium projection)	1.87	0.93	3.35	1.10

Figure 17: Cumulative new housing by UDS sector

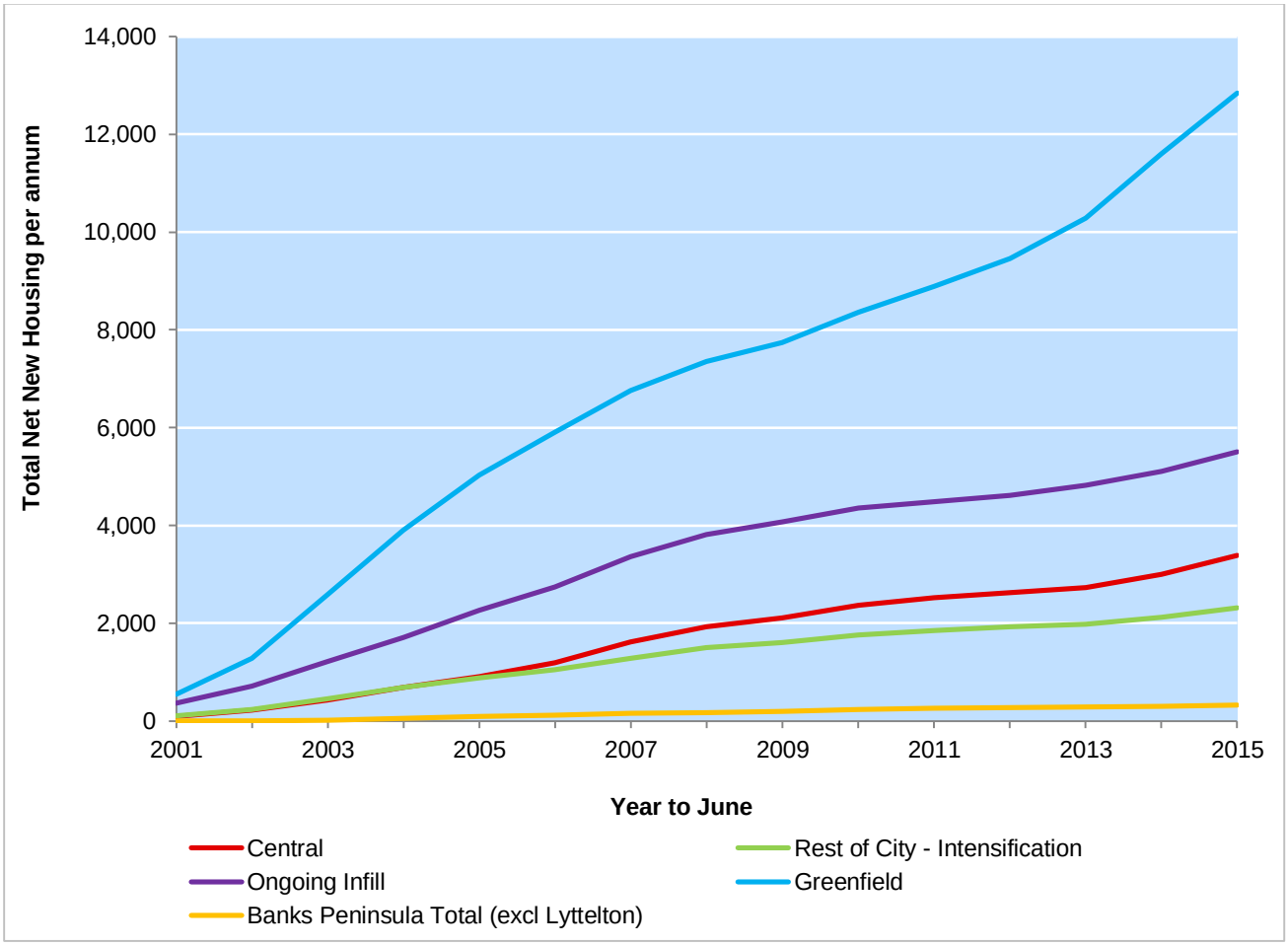


Figure 18: Land use growth and proposed transport improvement projects (Plan Changes and Greenfield Sites)

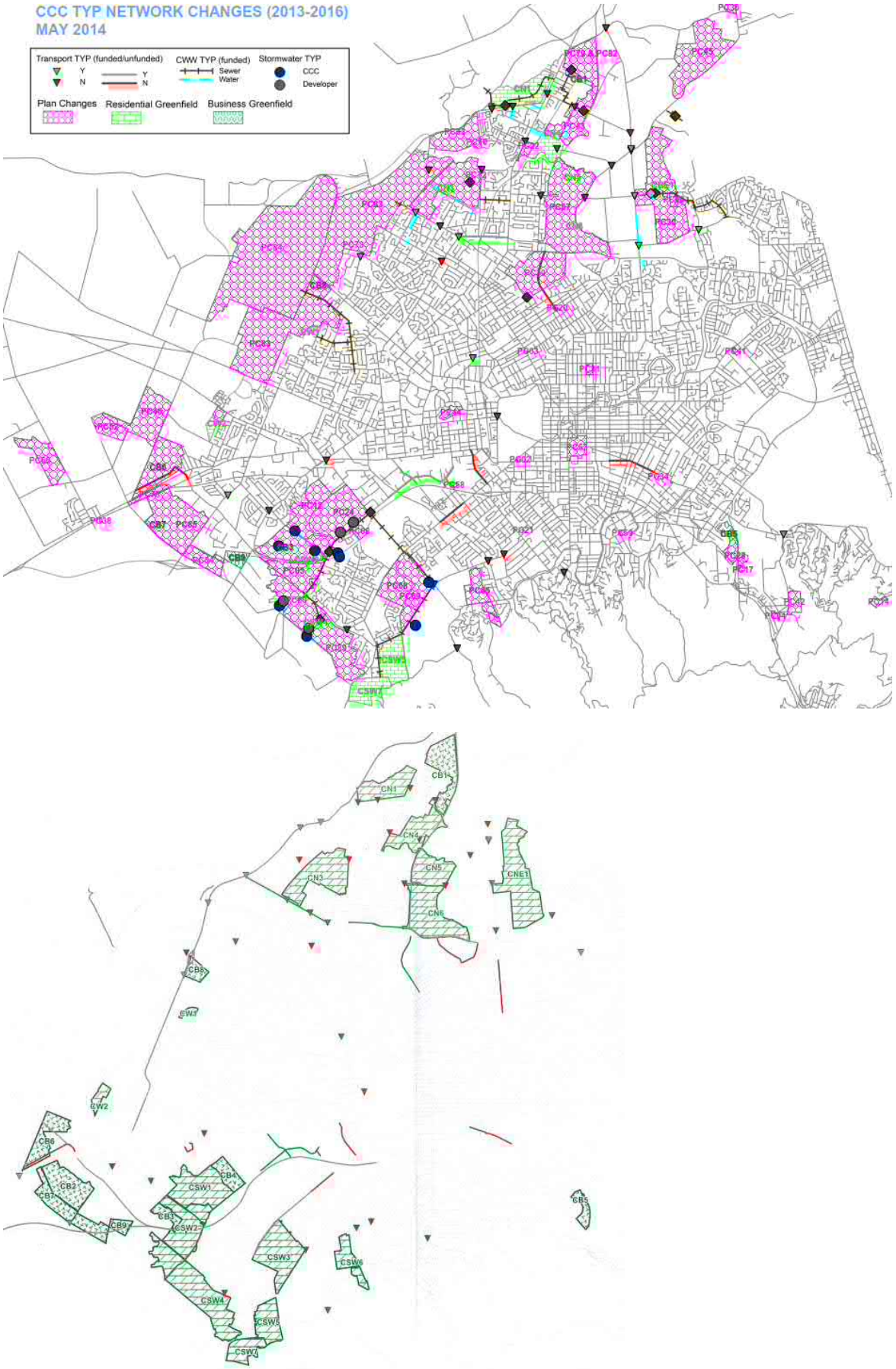


Figure 19: Total economic impact on monitored routes

Total economic impact on monitored routes

Total (exc. new routes)	$859,740	$921,114	$826,321	$771,724	$872,315
Total (inc. new routes)	$924,586	$990,593	$908,049	$843,374	$953,180

No.	Dir.	Route	Oct-15	Nov-15	Feb-16	Mar-16	AVERAGE
9	AtoB	Templeton to Ferrymead	$60,707	$63,125	$51,054	$51,533	$56,605
9	BtoA	Ferrymead to Templeton	$55,423	$60,414	$44,909	$42,301	$50,762
2	BtoA	CBD to Hornby	$49,341	$53,262	$40,407	$33,198	$44,052
2	AtoB	Hornby to CBD	$41,592	$45,759	$33,709	$29,306	$37,592
15	BtoA	CBD to Yaldhurst	$36,662	$38,948	$38,015	$36,731	$37,589
15	AtoB	Yaldhurst to CBD	$35,524	$36,400	$39,611	$36,730	$37,066
3	AtoB	Belfast to CBD	$40,908	$41,059	$33,033	$31,402	$36,601
3	BtoA	CBD to Belfast	$37,975	$40,324	$32,824	$32,058	$35,795
4	AtoB	South Kaiapoi to CBD	$30,167	$31,099	$38,005	$27,168	$31,610
12	AtoB	New Brighton to Northcote	$31,559	$32,655	$32,251	$31,228	$31,924
12	BtoA	Northcote to New Brighton	$27,345	$30,787	$36,311	$32,646	$31,772
18	AtoB	Moorhouse Ave Eastbound	$29,251	$30,799	$20,924	$19,032	$25,001
4	BtoA	CBD to South Kaiapoi	$22,543	$24,788	$28,265	$28,236	$25,958
21	BtoA	CBD to Tai Tapu	$0	$0	$26,392	$23,552	$24,972
10	AtoB	Hornby to Belfast	$29,024	$32,174	$24,941	$23,935	$27,519
21	AtoB	Tai Tapu to CBD	$0	$0	$24,232	$23,170	$23,701
11	AtoB	New Brighton to Opawa	$27,324	$36,144	$18,705	$24,388	$26,640
18	BtoA	Moorhouse Ave Westbound	$23,172	$25,223	$20,505	$17,809	$21,677
11	BtoA	Opawa to New Brighton	$29,508	$33,150	$17,641	$17,396	$24,424
20	AtoB	Bealey Ave Westbound	$20,119	$21,012	$15,667	$15,900	$18,175
10	BtoA	Belfast to Hornby	$23,872	$25,563	$19,722	$22,999	$23,039
14	BtoA	CSM to Burnside	$26,684	$30,035	$19,528	$17,857	$23,526
1	AtoB	Airport to CBD	$20,029	$23,303	$23,927	$17,181	$21,110
16	AtoB	CSM to Fendalton	$22,700	$22,781	$18,560	$16,525	$20,142
1	BtoA	CBD to Airport	$18,592	$21,781	$19,332	$19,901	$19,901
16	BtoA	Fendalton to CSM	$19,632	$20,499	$16,933	$14,694	$17,939
14	AtoB	Burnside to CSM	$22,191	$24,481	$16,427	$15,403	$19,625
7	AtoB	CNM (Woodend to Belfast)	$14,664	$14,221	$20,231	$15,221	$16,084
20	BtoA	Bealey Ave Eastbound	$11,752	$12,029	$11,306	$9,257	$11,086
5	AtoB	Ferrymead to CBD	$12,828	$12,884	$15,570	$14,500	$13,945
5	BtoA	CBD to Ferrymead	$11,999	$12,664	$14,809	$14,871	$13,586
8	AtoB	Lyttleton to Bexley	$14,692	$16,572	$10,179	$8,996	$12,610
17	BtoA	QEII Drive to Fendalton	$11,684	$11,495	$8,743	$9,418	$10,335
17	AtoB	Fendalton to QEII Drive	$10,323	$10,634	$9,455	$9,877	$10,072
8	BtoA	Bexley to Lyttleton	$12,989	$12,124	$7,630	$6,872	$9,904
7	BtoA	CNM (Belfast to Woodend)	$8,367	$8,205	$6,962	$5,440	$7,243
13	BtoA	Burnside to Northcote	$10,719	$10,705	$7,409	$6,942	$8,944
19	AtoB	Fitzgerald Ave Northbound	$6,265	$7,111	$7,341	$8,886	$7,401
22	AtoB	Cashmere to CBD	$0	$0	$6,856	$6,158	$6,507
13	AtoB	Northcote to Burnside	$8,208	$8,492	$5,236	$4,684	$6,655
19	BtoA	Fitzgerald Ave Southbound	$8,250	$7,894	$5,117	$3,591	$6,213
6	AtoB	Sumner to CBD	$0	$0	$7,225	$5,845	$6,535
6	BtoA	CBD to Sumner	$0	$0	$7,106	$5,811	$6,459
22	BtoA	CBD to Cashmere	$0	$0	$5,045	$4,725	$4,885

Figure 20: Number of workers by Greater Christchurch area unit (2013 Census)

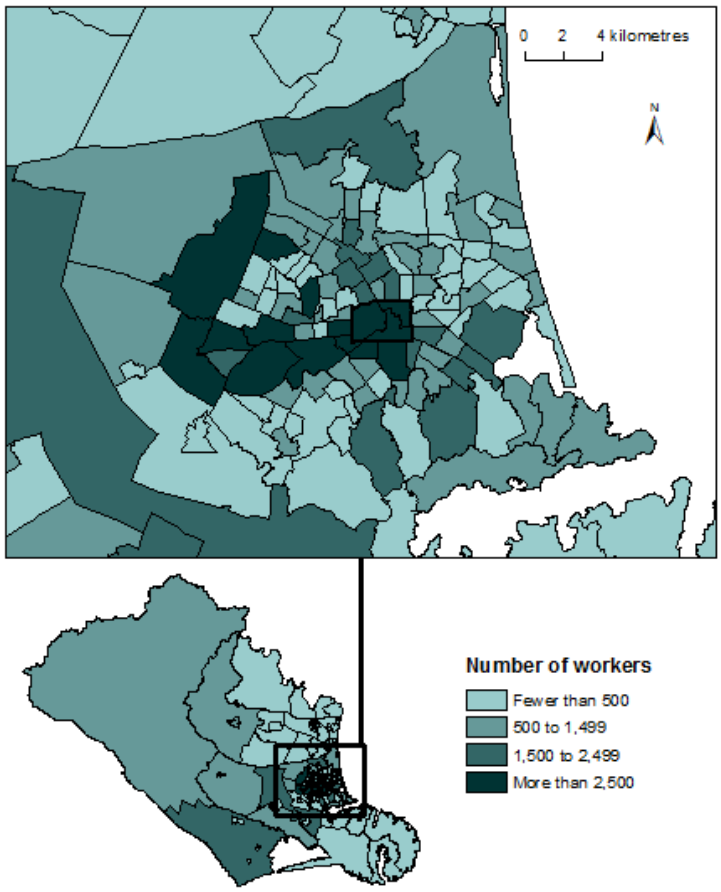


Figure 21: Average Network Roughness (Christchurch)

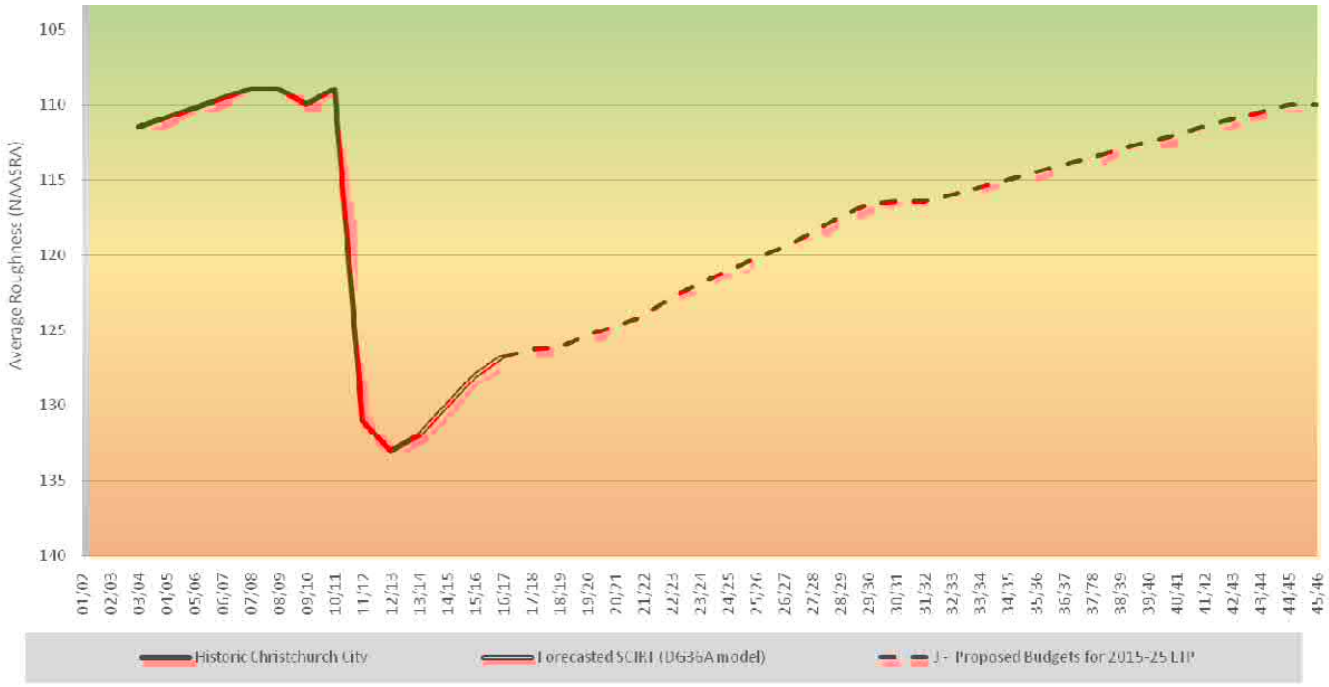


Figure 22: Snapshot of Network Roughness (Christchurch)

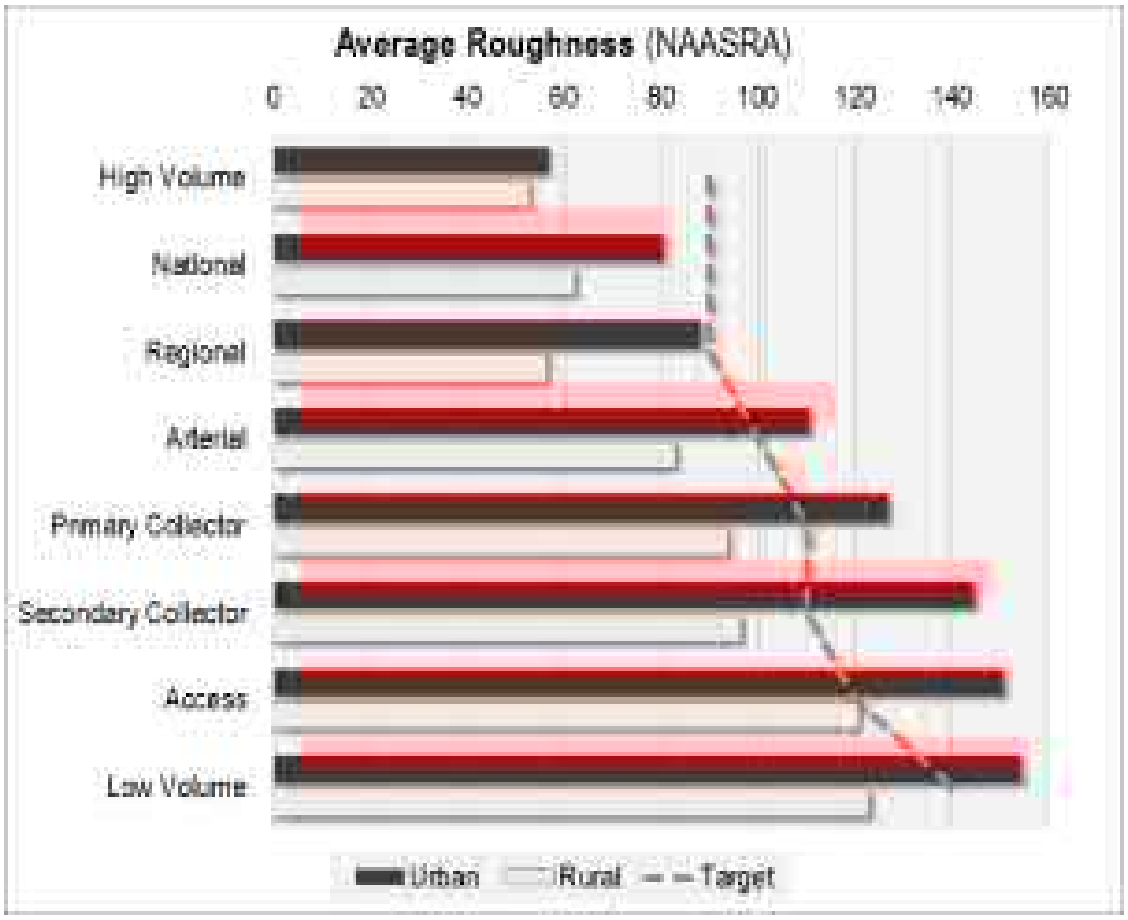


Figure 23: Flood Management Area Rainfall (Colours represent different District Plan rules)

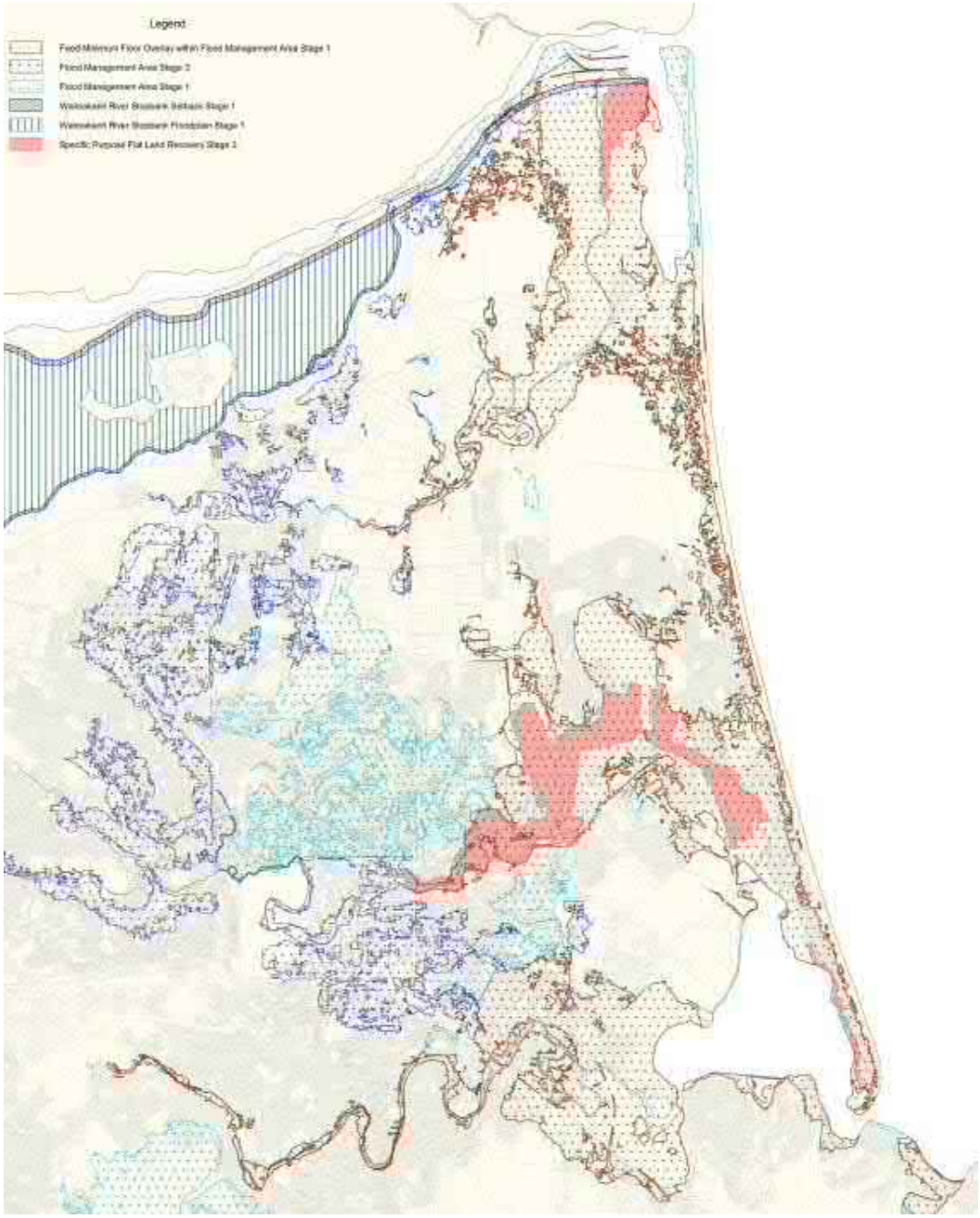
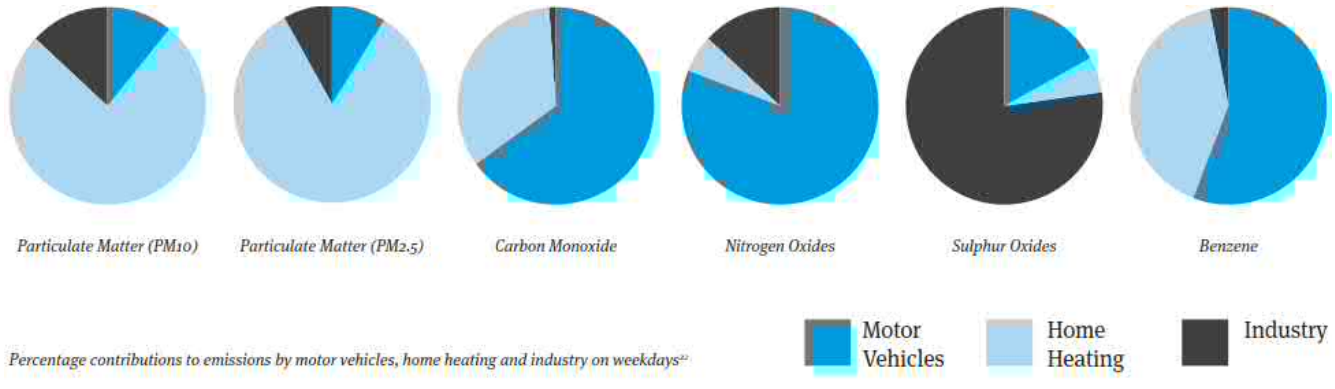


Figure 24: Percentage contributions to emissions by motor vehicles, home heating and industry (Christchurch)



Percentage contributions to emissions by motor vehicles, home heating and industry on weekdays[2]

APPENDIX E - BENEFITS OF INVESTMENT AND KEY PERFORMANCE INDICATORS

The workshop participants identified and agreed the benefits and Key Performance Indicators.

Table 7: Benefits of Investment and KPI's

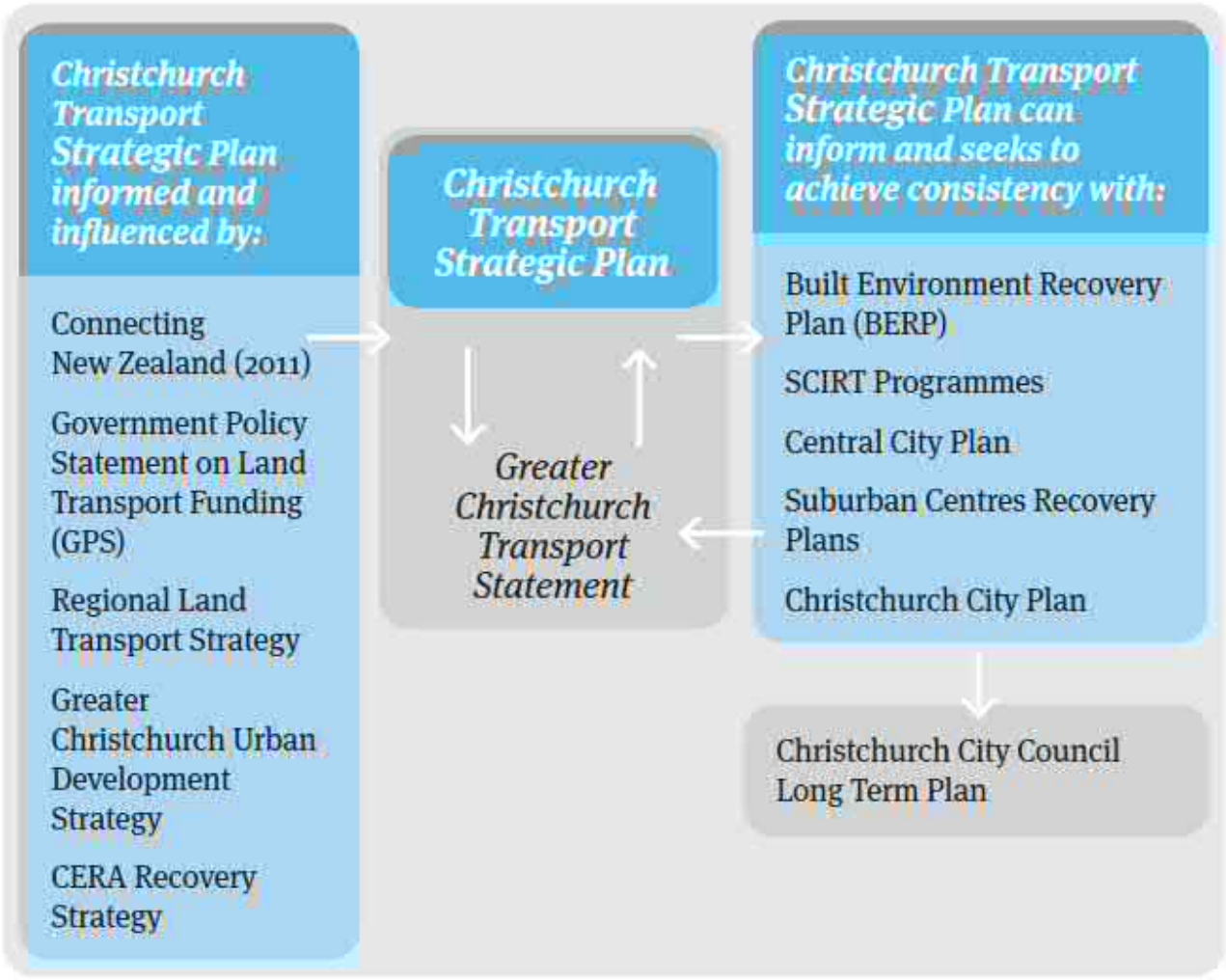
Portfolios	Benefits	Key Performance Indicators
Safety	Benefit one: A safer network (60%) Benefit two: Improved take-up of modes other than the private car (40%)	• Reduced collective risk (crash density) • Reduced personal risk (crash rate) • Crashes by cause and severity • Reduction in deaths and serious injuries • Difference between safe speed and actual speed • Improved public awareness of travel choice • Safety of cycling - perceived and actuals
Network Performance and Capability	Benefit one: A prosperous, vibrant and liveable community across the city (65%) Benefit two: Transport system that enables social, cultural and economic activity (35%)	• Mode share • Journey time reliability • Customer experience • Network condition (road, cycling, public transport, walking) • Cater for an ageing population • Modal choice to access key destinations • Spatial coverage (public transport, cycling networks)
Environment	Benefit one: Transport system contributes to an environment that promotes sustainable recovery of social, cultural and economic activity (60%) Benefit two: Quality of life for the community across the city (40%)	• Social cohesion • Resource consumption • Amenity value • Biodiversity • Water quality • Pollution
Health	Benefit one: Reduction in the cost of health care (70%) Benefit two: Transport system that enables social, cultural and economic activity (30%)	• Injury and risk to public health minimised • Reduced social isolation for vulnerable groups

APPENDIX F - CTSP TECHNICAL APPENDIX AND STRATEGIC LINKS

A web link is provided below to the Technical Appendices of the CTSP.

http://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Strategies/ChchTransportPlan2012Appendices.pdf

Strategic Context (Page 11 of CTSP)



CTSP Challenges	ILM Problem Statement
Travel patterns/congestion	Environment problem A, B and C Health all problems Network all problems Safety problem C
Earthquake damage, recovery, resilience	Environment problem C and D Network problem B and C
Household/business relocation & growth	Environment problem B Network problem B
Managing growth - long term land use	Network problem B
Safety for all road users	Environment problem A and B Health problem A and B Network problem A Safety problem A, B and C
Growth in freight demand	Environment problem B and D Health problem C Network all problems Safety problem A and B
Health and wellbeing	Environment problem B and C Health all problems Network all problems Safety all problems
Environment	Environment all problems Health problem C Network all problems Safety problem C
Climate change	Environment problem C

CTSP Goals	ILM Benefits
Improve access and choice	Transport system contributes to an environment that promotes sustainable recovery of social, cultural and economic activity. Quality of life for the community across the city. Reduction in cost of health care. A safer network. A prosperous, vibrant, liveable city. Improved take-up of modes other than private car.
Create safe, healthy and liveable communities	
Support economic vitality	
Create opportunities for environmental enhancements	

APPENDIX G - ALIGNMENT TO STAKEHOLDERS

Strategic Document	Organisation	Targets/directives/impacts and priorities
Land Transport Management Act 2003 (LTMA) updated 2013	NZ Government, Minister of Transport	The LTMA provides the legal framework for managing and funding land transport activities. The framework channels around $3 billion of central government funding annually into roading, public transport and traffic safety. The aim of the LTMA is to: "Achieve an affordable, integrated, safe, responsive and sustainable land transport system". The act: - Provides an integrated approach to land transport funding and management that take into account the views of affected communities. - Improves social and environmental responsibility in land transport funding, planning and management. - Ensures options and alternatives are given full consideration at an early stage in the development of programmes. - Improves long term planning and investment in land transport. - Ensures that land transport funding is allocated in an efficient and effective manner. - Improves the flexibility of land transport funding by providing for alternative funding mechanisms. The act also defines the function and roles of regional councils, CCC's Infrastructure. Transport and Environment (ITE) committee.
Government Policy Statement on Land Transport Funding 2015/16 - 2024/25	NZ Government, Minister of Transport	The national strategic direction for land transport is as follows: - To drive improved performance from the land transport system by focussing on: o Economic growth and productivity o Road safety o Value for money This strategic direction has been informed by the Government's national policy priorities. These are: - Building a more competitive and productive economy - Rebuilding Christchurch

		- Delivering better public services within tight financial constraints - Responsibly managing the Government's finances. To support economic growth and productivity the government is continuing investment in Roads of National Significance (the RoNS) programme, providing additional capacity through more transport choice (for example public transport) and improvements in Christchurch. This investment is significant and managing the local road network is an important component of maximising the return on investment on RoNS. Effective and efficient freight movement is also highlighted as critical to the economic health of New Zealand. Christchurch airport and seaport are the busiest in the South Island and play a major role in getting goods to market and as a gateway to the South Island. The GPS recognises that great access underpins all successful cities. Addressing current constraints and forecast demand will require the use of all available transport tools. The GPS notes that Canterbury traffic patterns have been significantly affected by land use changes following the earthquakes, with a substantial shift of traffic to the periphery of Christchurch. This has produced pressures on the network, some of which will be mitigated by a combination of the Christchurch RoNS investment and the re-opening of the Central Business District. However, there is substantial uncertainty around the speed and scale of further changes to the distribution of Christchurch traffic. The long term impacts of changed land use patterns will become clearer over the next 3 years. Additional measures to address network capacity may well prove necessary over time.
Canterbury Regional Land Transport Strategy 2012 - 2042	Canterbury Regional Transport Committee (ECan)	The regional vision for transport is included in the RLTS: "Canterbury has an accessible, affordable, integrated, safe, resilient and sustainable transport system". The vision is supported by five high level 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 - Improve levels of accessibility for all

		The strategy recognises the use of private vehicles is the dominant mode of transport for many people in Canterbury. However, the strategic direction over the medium to long term. Particularly in urban areas, is for the region to move to a more multi-modal transport system where the appropriate roles of each mode are used to their best advantage. The RLTS notes that to achieve the regional outcomes over the next 30 years, a shift in the balance of transport investment is required. A more multi-modal approach will shift investment away from providing additional road capacity towards active management of the road network to optimise its use. In Greater Christchurch the focus of the strategy is on improving transport options and promoting a multi-modal approach to meeting transport needs. Walking, cycling and public transport all require greater funding and planning support over the period of the strategy if this is to be achieved. In the short-term, planned road capacity improvements on the State Highway network will be completed, catering for much of the proposed growth in traffic congestion over the period of the strategy. In the medium to long term a more balanced approach is promoted to ensure freight can be efficiently transported into and around the city on the expanded road network. More efficient use of transport corridors through the city needs to be achieved to maintain community access.
Greater Christchurch Transport Statement 2012	UDS Partners (CCC, ECan, Selwyn, Waimakariri, NZTA, CERA, MoT, LPC, KiwiRail, Christchurch Int. Airport)	The GCTS provides an overarching framework to enable a consistent, integrated approach to planning, prioritising, implementing and managing the transport network and services in the Greater Christchurch area. The aim is: "The transport system will support economic and social well-being by connecting people, goods and services with places, while minimising the environmental impacts and creating liveable communities". The GCTS outlines eight overarching objectives: - Integrate land-use activities with transport solutions, enabling ease of movement between places. - Optimise the use of existing transport assets through managing travel demand and networks - Provide safe, efficient and resilient links to connect people and places

		- Ensure efficient and predictable travel time between key places - Provide more options for people to walk, cycle and use public transport - Minimise the severity and social cost of crashes - Improve personal security - Support place-making and 'active travel' and public transport, reducing emissions and improving public and environmental health. The strategy highlights a number of top priorities which have been grouped as follows: - Port Access: port repair and development, potential freight corridor and access to rail yards. - Public transport: develop public transport interchanges, priority measures and protect future options. - Western Corridor/Airport: airport access, inter-modal road/rail facilities and future freight opportunities. - North/South Access and Growth: future growth areas access. - Central City: integration with wider strategic networks and develop transport system to support the Christchurch Central Recovery Plan.
Christchurch Transport Strategic Plan (2012)	Christchurch City Council	The CTSP is a non-statutory plan that provides strategic direction for local transport policy in relation to relevant statutory plans. The vision is: "To keep Christchurch moving forward by providing transport choices to connect people and places". The plan recognises that there are many challenges facing the transport system in Christchurch ranging from congestion, changing travel patterns to changing demographics and environmental issues. To achieve the vision and address these challenges the CTSP focuses on four goals: - Improve access and choice Delivering resilient transport networks with an emphasis on efficient road use, public transport walking and making Christchurch a cycle city. - Create safe, healthy and liveable communities

		Adopting a safer systems approach. Transport actions which support the recovery of the Central City, suburban centres and new growth areas. Strengthening the integration of land use and transport planning through District Plan changes. - Support economic vitality Developing local freight routes to improve access to Christchurch airport, Lyttleton Port and freight hubs. Parking and congestion management to support the growth of commercial centres. - Create opportunities for environmental enhancements Building green infrastructure and adapting to climate change and peak oil by encouraging new technology and infrastructure enhancements. To successfully deliver each of the four goals, the plan identifies a range of actions to be delivered during the next 30 years, moving from recovery through transition to achieving the vision. The plan was developed through a process of stakeholder involvement and collaboration with the Urban Development Strategy partners, central government, technical experts and others as well as public consultation.
Christchurch Central Recovery Plan - An Accessible City	CERA, Ecan, CCDU, CCC, Ngai Tahu, NZTA	The Christchurch Central Recovery Plan was approved on 30 July 2012, and subsequently more detailed work was undertaken to support the recovery of the central city. An Accessible City replaces the Accessible City chapter of the Recovery Plan. An Accessible City is about making the Central City accessible – it's about upgrading the travel network to provide a compact, people-friendly core and about supporting the economic, social and environmental recovery of the Central City. The aim is to provide a travel network that will meet the current and future needs of all inner city travellers across a range of different modes of travel. The first phase of transport projects have been prioritised to align with the delivery of the key anchor projects: Te Papa Ōtākaro/Avon River Precinct, Health Precinct, East Frame, South Frame and the Bus Interchange. From March 2016 the speed limit for the heart of Christchurch's CBD changed to 30km/h to provide safer, more user friendly and enjoyable ways for people to travel. The speed limit applies to the area bounded by, but does not include, Kilmore, Madras and St Asaph streets. Victoria Street and sections of Colombo Street are also included.

APPENDIX H - STRATEGIC FIT & EFFECTIVENESS

Strategic Fit	Investment Assessment Framework	CCC Strategic Case/Investment
HIGH	**Transport Planning Activity Class** Meets all of the medium rating requirements for transport planning. Also meets majority of requirements for high rating as follows: Makes improvements to whole-of-network, long-term local, regional and national planning in response to significant changes in actual or predicted transport demand or performance, and their drivers such as changes in industry, population, technology, energy and climate. • Easing of severe **congestion** • **Optimised** levels of service, operation and management of networks • Journey time **reliability**	The Strategic Case is focused on significant change based on current and predicted transport demand and the ongoing impacts of the earthquakes. This demand is driven by population and land use growth and redistribution. Christchurch is the South Island's largest city (second largest nationally) and significantly contributes to the national economy. Increasing delays on the transport network, the lack of viable mode choice and the impact of infrastructure and land use planning form key parts of the problems identified in the Strategic Case. The Strategic Case highlights the importance of adopting a One Network approach and safety, environmental and health outcomes form a key part of the benefits story. The Christchurch Transport Strategic Plan and this Strategic Case both seek to ensure that transport investment in Christchurch is appropriately prioritised to deliver timely enhancements and changes to the whole transport network; providing more attractive and safe transport choices for people of all ages and abilities. Increasing modal choice and integration between modes will make the transport system more resilient and enable CCC to maintain good journey time reliability and target congestion hot spots. The causes of the problems were suggested as being post-earthquake and predicted future population changes, the way people choose to travel (predominantly by single occupant motor vehicle), the location and type of current infrastructure and post-earthquake damage to the local road network. These problems will be further quantified and defined (network specific locations) during the Programme Business Case.

Component	Explanation
Outcomes Focused	**HIGH** The evidence suggests the problem is significant and warrants further development. Parts of the network experience specific safety, travel time reliability, congestion, network continuity and road condition problems which if not addressed are likely to worsen with forecast growth and are already affecting the operation of the CCC transport system. Parts of the network do not meet the levels of service requirements of the One Network Road Classification and several intersections are classified as high risk in KiwiRAP.
Integrated	**HIGH** This Strategic Case is consistent with the current network and future national, regional and local transport plans as summarised in Appendix G. Current activities and future land use planning is discussed in the Strategic Case and forms part of the problem story. The Strategic Case highlights the importance of adopting a One Network approach to accommodate different needs across modes. Stakeholders were actively engaged during independently facilitated investment logic mapping workshops (undertaken by an accredited facilitator).
Correctly Scoped	**MEDIUM** Part B of the Strategic Case confirms the problems and benefits and is tailored to the relative size and complexity of the project. The potential spatial impact (CCC transport network wide), along with any adverse impacts were highlighted during the Investment Logic Mapping workshop process and will become clearer during development of the Programme Business Case This Strategic Case only addresses issues impacting the CCC transport system. CCC will continue to work with wider agencies to ensure consistency across transport delivery partners and to investigate and manage any upstream and downstream, network impacts.
Affordable	**MEDIUM** This work will be used to inform CCC's next Long Term Plan (2018), the benefits and costs will be explored during the next phases of the project.
Timely	**MEDIUM** The timeframe for delivery of benefits will be explored during the next phases of the project. The issues facing the CCC transport system are congestion, travel time reliability, safety, road condition, mode choice etc. The projected population and traffic growth will exacerbate these problems. Given the unique post-earthquake environment and population growth and redistribution (land use), as well as the timeframe for the drafting of the next Council

	Long Term Plan (2018) this Strategic Case is considered important and timely to guide future transport investment decisions.
Confidence	**HIGH** Problems and opportunities have been agreed by stakeholders through ILM workshops and high level evidence has supported the majority of the problem statements. Data gaps in the Strategic Case have been recognised and these will be explored further within the next phases. Inaction or failure to proceed to Programme Business Case stage carries a significant risk to CCC and wider stakeholders.
Overall	**MEDIUM** - Assessment based on lowest rating of all components.

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[xii] Christchurch City Council all day parking spaces map:
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[xiii] Christchurch City Council Quarterly Parking Surveys

[xiv] New Zealand Household Travel survey, data available at:
www.nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7432

[xv] Christchurch City Council, Christchurch Cycle Network, Programme and Indicative Case, August 2015, see page 34

[xvi] Data taken from SH73/76 Darfield to Lyttleton Tunnel and SH1 Ashley River to Selwyn River - Strategic Business Case, December 2015, page 10

[xvii] Data collected by Christchurch City Council, 'Cumulative new housing by UDS sector'

[xviii] Proposed Change No.1 (Development of Greater Christchurch) to the Canterbury Regional Policy Statement, 19 May 2010, see page 16

[xix] Christchurch City Council Network Changes (2013-2016) May 2014 (internal document)

[xx] Christchurch City Council, per km economic impact on monitored routes, October 15- March 16 - from Christchurch Key Route Economics and Ranking Values.xlsx.

[xxi] Christchurch City Council, Infrastructure Strategy, July 2015, page 34

[xxii] CCC 2015 Asset Management Plan

[xxiii] Christchurch Economic Infrastructure Situation Report, January 2015, available at: http://www.cdc.org.nz/wp-content/uploads/2015/02/CDC-Infrastructure-Situation-Report-January-2015.pdf see page 46

[xxiv] http://www.ccc.govt.nz/the-council/reporting-and-monitoring/residents-survey/

[xxv] CCC Surface Water Strategy (2009) page 16 and page 89

[xxvi] NIWA - Avon River Sediment Survey Feb 2014 - page 67.

[xxvii] Household income and expenditure - Statistics New Zealand 2013.

[xxviii] Ministry of Transport (2010) Christchurch Household Travel Survey 2009/10 (also CTSP page 31)

[xxix] Christchurch City Council (2006) Quality of Life Survey (also CTSP page 19)

[xxx] Christchurch Transport Strategic Plan 2013 page 19

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